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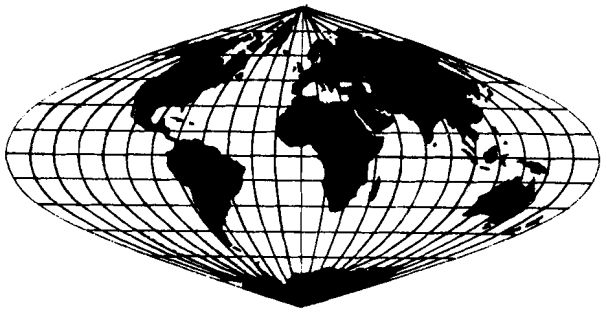
CORNELL/INTERNATIONAL AGRICULTURAL ECONOMICS STUDY

RESOLVING THE AGRICULTURE-PETROLEUM CONFLICT: THE EXPERIENCE OF CACAO SMALLHOLDERS IN MEXICO

Sara J. Scherr



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Until a decade or so ago, there was a consensus among most observers of the developing world that countries with substantial oil and gas reserves were privileged, and constrained in their social and economic transformation only by a shortage of skilled manpower. More recently the optimism has been tempered. The evidence from such places as Nigeria, Venezuela, and Gabon has not been happy and suggests that exploitation of petroleum brings in its train a host of problems, especially with respect to agriculture.

The common manifestations of the petroleum-agriculture conflict are stagnating food production, rising prices, increased food imports, and migration of farmers and farm workers into the petroleum centers in search of high-paying jobs. A booming petroleum enclave develops and those lucky enough to find employment within it thrive. For the many left out, however, the result can be a serious deterioration in levels of living and the demise of much that traditionally was held to be of value.

If this seems the usual scenario, there are exceptions; and one such is the Mexican state of Tabasco, the site of what is probably the largest petroleum find of the last quarter century. Despite the manifold changes brought on by exploitation of this discovery, the agricultural economy of Tabasco has flourished. How this came about--and the lessons other petroleum-rich countries can draw from it--are the subjects of Sara Scherr's paper.

The paper is an abbreviation of Dr. Scherr's PhD dissertation, a monumental work whose preparation took almost four years. Fully two years of field work in Tabasco were involved, made possible in part by a generous grant to Cornell University from the Tinker Foundation. We are indebted to Governor Leandro Rovirosa Wade for the cordial reception extended Dr. Scherr by the state government; and to Ing. Pedro Rodriguez Sierra, Lic. Aquiles Martinez del Pozo, Rosario Perez Sastre, of the Secretaria de Programacion y Prespuesto, for their kindness and help. Ing. German Velazquez (Grijalva Commission), Ing. Contreras (Promotora Chontalpa), and Ing. Jose Rodriguez Vallejo also offered cooperation and encouragement, as did many cacao farmers and their families. For reasons that will be apparent, they cannot be thanked by name.

At Cornell, Professors Davydd Greenwood, Tom Davis, and Daniel Sisler shared with me the pleasure of guiding Dr. Scherr's work. The maps and charts were drawn by Joseph Baldwin. Mrs. Lillian Thomas prepared many of the tables and saw the manuscript through the press. Thank you all.

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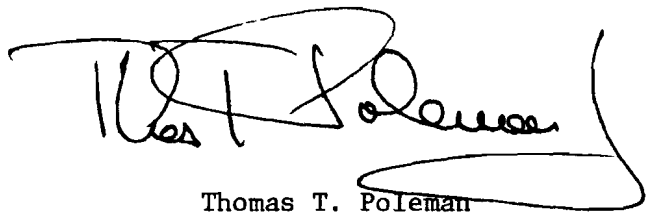

Thomas T. Poleman

TABLE OF CONTENTS

INTRODUCTION

"WITH PETROLEUM WEALTH, TO SOW JUSTICE"

Through most of its history, the small state of Tabasco on the Gulf coast of Mexico has been remote from the major events of world history and economics. A vast floodplain for the southern Sierra, its life has ebbed and flowed with its surface waters. During the rainy season, half the state is under water.

The higher lands are fertile and have for centuries supported an agricultural population settled along the dikes of the many rivers. Outsiders - Mayans, Spaniards, Aztecs - sought tribute from the Tabascans, or trade, but wrought only minor changes in their way of life. The land - and their lives - were held fast by the roots of jungle and plantation trees, which alone could tolerate the swollen water resources. In Tabasco, basic sustenance came traditionally not from the tortilla, but from pozol, a liquid mixture of crushed maize and cacao beans.

But while ribbons and sheets of water still dominate the land above, below Mexico's national oil company has discovered one of the largest deposits of oil and natural gas in the world. Since 1972, the entire region has undergone an extremely disruptive "petroleum boom."

Tabasco today is a place of astonishing contrasts and rapid change. New bridges connect what were previously islands of isolated settlement. Throngs of men from northern Mexico, from Mexico City, from the Sierra have travelled south drawn by the magnet of petroleum development, to mingle conspicuously with the perplexed and unsettled native Chontal/Maya/mestizo population. The eminently agrarian nature of the Tabascan landscape and settlement pattern has been radically altered by urban development, the erection of hundreds of oil wells, petrochemical processing plants, highways.

What has been the impact on rural life and on agriculture, the livelihood of most of the Tabascan people? The Zapata family represent thousands of other Tabascan farm families in their varied experience with the oil boom.

The Zapata's live in a small rancheria halfway between Teapa, Tabasco's southernmost town, and Villahermosa, the capital. Those few miles between city and farm, a quick trip on newly resurfaced roads, bring a new world. Could this tranquil land amidst the vestiges of rain forest really lie so close to boom-town Villahermosa and one of the world's great petroleum centers?

The family rises at 4:00 a.m.; the rains have not yet begun in earnest and most work has to be done before the mid-day heat. The Zapata's home is a typical one, partly of wood, partly of the traditional palm, with thatched roof. It is large and airy, and has two rooms, and a separate kitchen - signs of relative prosperity by campesino standards.

The homestead actually includes two other houses, occupied by families of Antonio and Rosa Zapata's married children. These are much smaller and simpler; the daughters-in-law do much of their household work, including cooking, with Dona Rosa.

The Zapata's is a prime example of the traditional Tabascan family farm, with its extended family, diversified production, subsistence security and cash export crop. Elsewhere in Tabasco, many such farms have evolved to become either more fully commercial, or have been sub-divided.

There are signs of new wealth everywhere - from Sra. Zapata's gas stove (which she used chiefly for boiling water, preferring the flavor of food cooked over wood) and sewing machine, to new household furniture.

All the grandchildren who are of age attend primary school. The range in education among the sons is extraordinary. The older two finished only the fourth grade, back when their village of Quintana Roo was far more isolated than it is today. The third finished primary school; the fourth finished high school; his younger brother was still in high school, but talked of seeking further schooling.

After a light meal of coffee and pozol, the family is off to work. Daniel accompanies his father to the cacao fields; Agustin leaves for his job as a health worker in Teapa; Jorge takes the bus to temporary construction sites outside of Villahermosa, where he works in petroleum company projects. In fact, a large number of young men from the rancheria are off to the buses, rather than the fields.

As Don Antonio and Daniel walk toward their cacao plantation, the morning is alive with vividly colored birds, including a flock of wild parrots. Already fishermen are out at the nearby lake. Fishing used to be a flourishing business here, but the water quality has gone down due to pollution from all the construction. Men can make a better living doing other things now, anyway.

They pass a large house obviously belonging to a wealthier rancher, and then some cacao plantations which are infested with weeds. Don Antonio shakes his head to see the "cacaoito" in such bad shape. Their owner cannot get men to work on his plantation; he won't pay them enough. They'd rather work for the petroleum company.

How different his own plantations! Huge trees - the "mothers of cacao" - shade the cacao with their broad canopies. The ground below is nearly clear of weeds or debris, and the air feels clean and much cooler than the land beyond the plantation. Banana trees shade the edges of the plantation. This is a welcome place to work or rest. Even the rainbow-colored butterflies and moths fly here day and night.

The cacao trees themselves are perfectly shaped and full of shiny striped purple pods about a foot long. Daniel grins at his dad, takes out his machete to crack open a pod and passes over a handful of cacao seeds so the two can suck off the sweet mucilage which covers them.

The men take out their new motor sprayer, a prized possession, and begin to apply insecticide. They are extremely careless with the chemicals, playfully spraying one another from time to time.

Taking a break for breakfast of pozol and fruit, Don Antonio and Daniel discuss digging a new drainage ditch on one side of the plantation. For this hard, hot work they plan to hire some experts, and calculate the cost, which will run almost fifty per cent above the minimum wage. Why don't the brothers do this work?

They are too busy right now in their other jobs. But when harvest time comes and when they are in between other jobs, they put in a significant amount of work on the plantations. Don Antonio is rather proud of the fact that his sons help him without even expecting a wage. Many of his neighbors pay their sons for such work (unheard of in the "old days") and in many cases, in order to get the sons to stay on the farm, some of his friends have gone ahead and legally passed on their land while still alive.

On their walk back home, the two men laugh at a curious sight, which underlines the innate contradictions of this agrarian society undergoing rapid change: about fifty head of cattle are being herded up the road by a group of cowboys (complete with cowboy hats) waving out the windows of a VW "Bug!"

In addition to cacao, the Zapatas also grow some maize, have a number of small livestock and a few head of cattle, a variety of fruit trees, some beans and chiles. The family is no longer self-sufficient in maize, and has to purchase quite a lot to feed their cattle. They do use their own maize for tortillas and pozol, however, for its taste is far superior to that which can be purchased.

The house is full of babies and wonderful cooking smells when the men return around 1:30. While they bathe, Dona Rosa and her daughters-in-law complete a special barbequed chicken (slaughtered in honor of a guest to the community), seasoned with spices found in the woods nearby. These women do not have a very extensive kitchen garden, but instead go on occasional hikes to find the items they want for cooking. They also mind the livestock, process all the food produced on the farm, and help with the cacao harvest. That day they had spent cooking lunch, and cleaning the house immaculately: the next day they would host the traveling rural clinic in their home.

At lunch, Dona Rosa, a hearty woman with "chutzpah," tells stories about life in Quintana Roo when her children were young. Then, there were no doctors - she treated her boys herself, including doing minor surgery like separating a tied tongue with a butcher knife! She likes the new roads, which are being maintained well for the first time since she can remember. She herself rarely goes to town, but a number of her neighbors earn extra money by making purchases in town to sell to village friends. Some even travel to Veracruz or Mexico City, if they have relatives there, and bring back goods. Prices are so much higher in Tabasco, that they can make handsome profits on these trips.

Talk turns to the petroleum boom - cause of the high prices. Don Antonio has had no bad experiences so far, but he has heard other farmers complain that their fences are rotting away, and many are also blaming lower than usual cacao yields this year on the fumes from petroleum processing.

The Zapatas are doing well because cacao prices have been so high. Don Antonio is enthusiastic about the local Cacao Producer's Association, which he feels is responsible for the high prices. He has used nursery stock from the Cacao Plan program, and has begun to ferment some of his cacao beans at the local fermenter, which improves bean quality. Daniel, however, is suspicious that the Union is building fancy new office buildings in Mexico City and other such things, and figures that in fact they should be making even more on the cacao.

Afternoon chores include work on the new roof, tool repair, and harvest of some fruit growing near the house. But the family all relax in hammocks as evening arrives and the breeze grows cooler and much more comfortable. The family stays up later now than they did last year, before the government extended electricity services to Quintana Roo.

But it's not very dark outside anyway. All along the northern and western horizons is the glare of natural gas flaring. One drilling rig is outlined by the glow - it looks like nothing so much as a rocket ship. They're used to seeing it now. Rumor has it that the company will soon be drilling in their own rancheria. Don Antonio is a little concerned that the drilling will "poison" his land.

Will Don Antonio's sons be running the farm twenty years from now?, asks their guest. "Oh, I think so. You can't go wrong with cacao. The young men may go away, sow their oats, make some money, but they'll be back." One of the older sons, back early from his construction job, nods in agreement. But Agustin, who harbors strong ambitions to move permanently to town as soon as he can afford to do so, merely frowns as his mother throws him a knowing look.

Slapping at an odd mosquito, the family gets into their hammocks, ready to sleep. Through the open window, they can see the drilling rig outlined by the flare.

One wonders. Will the Zapata sons be there twenty years hence? Their lives have been changed by the petroleum boom in Tabaso, but not profoundly, and - most surprisingly - not for the worse. Could such campesinos survive in the modern industrial economy which Tabasco is likely to become?

It has rarely happened. Elsewhere in petroleum zones such families are breaking apart, their incomes eroding, their farms abandoned - to become integrated at the margins of the new urban-industrial society. But such had not been the case for most farm families in Tabasco. The Zapatas felt content, secure and optimistic about a

future still solidly based on agriculture, regardless of significant participation in the petroleum economy.

What was responsible for this unexpected and unprecedented flourishing of a peasant economy within a petroleum boom zone? Is it likely to endure? Is it relevant to other zones undergoing such rapid industrial transition?

When I first went to Tabasco, it was with the expectation that petroleum development would clash violently with the traditional agrarian society of that state. Such is the accepted wisdom from all parts of the world which have experienced a petroleum boom.

But in Tabasco, the Mexican government simultaneously pushed for agricultural development in a big way - a response to the crisis in basic foods production and consumption in the 1970's. The Southeast - the "last agricultural frontier" - was to play an important role in the country's rural reorientation.

Furthermore, a strong and activist state government funded by tax monies from PEMEX, coordinated a broad series of investments not only in agriculture, but in social infrastructure, tourism, fishing and other sectors, throughout the state. Those responsible insisted that it was indeed possible to "sow justice" with petroleum wealth, as the governor proclaimed in 1980.

Government policies to contain the negative effects of petroleum development, and to spread the benefits of the massive capital transfers more widely through the state were only part of the explanation. A second was the state's exceeding good luck in having the petroleum boom coincide with a period of rapidly rising international prices for its major agricultural products. The negative impact of this situation on local inflation was far outweighed by its positive effect on internal distribution of income and political power.

Most important, the state's agricultural structure, based on small-scale family farms, proved highly favorable. The dominant "campesinado" showed more economic flexibility than "capitalist" type farmers and greater stability in the face of falling relative farm prices. Family employment strategies permitted them to combine farm operation with employment in petroleum activities.

The marked mobility, levels of investment, response to price incentives, resolution of labor and wage constraints, interaction with the non-agricultural economy of the cacao farmers was impresssive. The apparent multiplier effects of their prosperity - on rural employment, demand for consumer and investment goods, local and regional services - testify to the viability of rural-based development strategies. This evidence justifies a serious second look at the role of the peasantry in modern development.

Devising a methodology for analyzing the impact of major economic changes on the farm sector was challenging. It was tempting to attribute to petroleum development changes which in fact were the result of

internal dynamics, long-term state economic trends, and the dynamic agricultural growth of the 1970's.

Leading theories of development provided little guidance for a research method in this case. Many methodological tools were unavailable or inapplicable; most were too limited in scope. Research had to emphasize heterogeneity in choice of study areas, individuals interviewed, institutions to be studied. The study presents an attempt to utilize detailed research to understand the local situation, but in such a way as to be relevant to broader theoretical and policy issues.

The first half of the study consists of an introduction to the problems of petroleum development, Tabascan economic history, Tabascan cacao farming, and the research methodology followed. The second half examines the production and employment characteristics of the four principal types of cacao producers and landless workers, and their experiences in Tabasco's petroleum economy.

We look not only at the differences in farmer response to the boom, but try to explain why these differences exist. The study concludes with a summary of principles for resolving agriculture-petroleum conflicts and a challenge to rethink the role of the peasantry in areas of rapid economic development.

Reference to many local terms and organizational names will be made throughout the study. A comprehensive glossary follows, for convenience to readers. It is suggested that the reader review it before beginning Chapter 1.

This paper is an abbreviation of my doctoral dissertation. All of the appendices and much of the supporting data presented in the thesis have had to be omitted from this version. Some of this material is referred to by the citation "Source: see thesis." Copies of the full dissertation may be obtained from:

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GLOSSARY

afectacion	The process by which PEMEX, or a similar government agency, establishes the right of eminent domain over private property.
anticipo	The payment made to a producer upon delivery of cacao to the Association on the basis of the price estimated at the beginning of the season. If the final average price is higher, the difference is distributed later as a "remanente."
BANRURAL	Banco de Credito Rural, S.A. The Mexican national bank for rural credit.
cacaotero	A farmer who produces cacao.
cacao variety	There are three major types of cacao: "criollo," a high-quality variety native to Tabasco; "forastero," a higher-yield but lower-quality variety; and "Ceylan," a hybrid of the other two.
campesino	Spanish term for "peasant;" literally, man of the countryside.
campesinado	From campesino, referring to the entire peasant population.
CEPAL	Comision Economica para America Latina. Economic Commission for Latin America (ECLA).
CIES	Centro de Investigacion Ecologico del Sureste. The Center for Ecological Research in the Southeast.
CCT	Censo de Cacao de Tabasco. Census of Tabascan cacao producers, 1978, undertaken by SARH.
coa	A hand-produced wooden implement used in cacao production.
collective farm household	A family which belongs to a collective ejido, and farms on both the collective and a family plot.
compadrazgo	The institution of inter-family ties based on a relation of "compadres" (or the relationship between a child's parents and godparents).
comunidad	A type of village-based Mexican landholding based on historic indigenous communities. Members are "comuneros."

CONADECA — Comision Nacional del Cacao. National Cacao Commission, formed in 1974, principally to deal with international marketing. In Chiapas State, CONADECA is chief local marketing agent and in charge of technical programs as well.

CONAPO — Consejo Nacional de Poblacion. National Population Council, located in Mexico City.

CONASUPO — Comision Nacional de Subsistencias Populares. National Commission for Basic Commodities, the national marketing board for basic foods.

constructora — A private construction company, usually large-scale. Many government projects are contracted out to these enterprises.

contratista — Individual who contracts with an employer to complete a particular job, for which he independently hires the necessary workers and supervises their work; a private contractor.

convite — Traditional institution of communal sowing in the rancherias of Tabasco.

COPLADE — Comite de Planeacion para el Desarrollo. Tabasco State Development Planning Commission (formerly COPRODET).

COPLAMAR — Comision de Planeacion para las Areas Marginadas. Planning Commission for Marginal Areas.

COPRODET — Comite Promotora de Desarrollo del Estado de Tabasco. Committee to Promote Tabasco State Development.

CROC — Confederacion Regional de Obreros de la Construccion. Regional Federation of Construction Workers.

CTM — Confederacion de Trabajadores Mexicanos. Mexican Workers' Union, the umbrella organization for Mexican labor unions.

demographic cycle — The life-cycle of an individual or family, which changes according to changing demographic characteristics such as marriage and raising children, with consequent changes in work and life-style patterns.

demographic stage — A stage within the demographic cycle; e.g., the period of early marriage before children, when the new couple may remain with in-laws.

dependency ratio — Ratio within the family between the number of "dependents" (non-working spouses, invalids, students, small children, retired workers) and the number of active workers.

de planta — Type of worker who is employed full-time on a contract.

ejido — The principal unit of the Mexican agrarian reform; a grant of land usufruct rights to a group of "ejidatarios," either for individual or group farming.

encomienda — A charter to collect tribute from a given Indian community, granted by the King of Spain to individuals in the New World. Many encomenderos acquired rights to labor from the resident indigenous population. Some of the larger encomiendas covered hundreds of thousands of hectares and held thousands of workers.

enganchador — An individual who charges a company needing workers a payment for each qualified worker he finds.

expropriacion — Expropriation; referring to the takeover of private lands by PEMEX or some other government agency. In return, farmers receive indemnification for the worth of their land (in the case of private property owners) and standing crops and improvements.

family economy — A branch of economic analysis which focuses on family economic decision-making strategies as both producers and consumers.

family farm household — Type of farm household with sufficient land base to support a family without substantial off-farm income, whose farm can be operated primarily with family labor.

fermentation — Process by which chemical composition of cacao is changed to release chocolate color and flavor; generally done by piling beans in boxes over a period of days, thus subjecting them to heat, triggering natural fermentation.

FIRA — Fideicomiso Instituido en Relacion a la Agricultura. An organization of the central Banco de Mexico which funnels capital from various international banks into long-term investments in the agricultural sector.

hired-labor-based farm households — Farm households with more land than can be cared for solely with family labor, which thus depend on hired help.

INCATABSA — Industria de Cacao de Tabasco, S.A. Tabascan Cacao Industry. A group of cacao processing facilities owned by the cacao producer organization.

jornalero — A wage worker who finds employment by the day, or "jornal," principally in agriculture. "Jornalear" is to participate in such work.

League of Agrarian Communities	Long-established organization which became active in Tabasco in the 1970s to protect political and economic rights of campesinos. In 1980 it had 3000 members.
libres	Type of worker in industry or agriculture who works without a fixed contract.
man-day	A unit by which work is measured: a man-day usually corresponds to about 5 to 7 hours of farm work. The "family man-day" refers to a man-day worked by a farm family member.
man-month	A month of 25 man-day equivalents.
manga	Hand-made implement used in Tabasco for cacao farming.
milpa	A subsistence maize plot in Mexico; generally a shifting cultivation system.
minifundia farm household	Type of farm household whose land base is insufficient to support a family, and thus is dependent on income from off-farm employment. A "minifundia" refers to such a smallholding; "minifundista" to such a farmer.
municipio	Political unit in Mexico roughly equivalent to a county.
Pacto Ribereno	Organization of campesinos (with 7500 members in 1980) providing legal help in defending rights and payment of indemnification by PEMEX in Tabasco.
PEMEX	Petroleos Mexicanos, S.A. Mexican Petroleum Company, the nationalized oil monopoly of Mexico.
peso	Monetary unit of Mexico. Between 1952 and 1976, it was valued at US$.08. With subsequent devaluations, its worth fell to US$.045 in 1976, to US$.021 in 1982 and to US$.007 in 1983.
PIDER	Programa Integrado de Desarrollo Rural. Integrated Rural Development Program.
PRODERITH	Programa de Desarrollo de los Recursos del Tropico Humedo. Commission responsible to SARH, working since the early 1970s to investigate resources of the humid tropics and develop ecologically, socially and economically sound programs to exploit those resources.
propiedad	Mexican tenure designation for private property ownership; maximum size is limited by law. "Propietario" refers to the owner of such private property.

pruning	Important activity in cacao production to shape trees properly. The principal types of pruning in Tabasco cacao farming are: "desmadre" (removal of main stems), "desmamone" (removal of young shoots), "deschupone" (removal of suckers), and "poda" (early pruning of formation).
rancheria	A small, unincorporated rural community.
remanente	A payment made to cacaoteros for their cacao after marketing has been completed, usually based on profits from international sales. (See "anticipo.")
SAG	Secretaria de Agricultura y Ganaderia. Ministry of Agriculture and Ranching (until 1976).
SAM	Sistema Alimentario Mexicano. Mexican Food System, established at the end of the Lopez Portillo administration, to coordinate efforts to increase agricultural production by low-income farmers, and food consumption by low-income consumers.
SARH	Secretaria de Agricultura y Recursos Hidraulicos. Ministry of Agriculture and Hydraulic Resources (after 1976).
sexenio	A period of six years; in Mexico, a reference to the length of one term in office for politicians.
shade trees	Principal varieties of shade trees for cacao plantations in Tabasco are mote (Erythrina sp.), cocoite (Gliricidia sp.), saman and chipilin.
SPP	Secretaria de Programacion y Presupuesto. Ministry of Planning and Budget (after 1981).
SRH	Secretaria de Recursos Hidraulicos. Ministry of Hydraulic Resources (until 1976).
SST	Sociodemographic Survey of Tabasco. "Encuesta Sociodemografica del Estado de Tabasco." Survey in January 1980, sponsored by CONAPO and COPRODET.
tecnico	An individual who has been trained in some technical field.
tequio	Traditional system for communal work projects, such as school- and road-building.
transitorios	Type of industrial worker hired through a temporary contract.
UNPC	Union Nacional de Productores de Cacao. National Cacao Producers' Association.

CHAPTER 1. THE AGRICULTURE – PETROLEUM CONFLICT

"Estan sacando el petroleo y el gas; estan debilitando a las tierras para que no produzcan ya lo que producian antes de que vino Petroleos!"

"They are taking out the oil and the gas; they're weakening our lands so they no longer produce what they did before the petroleum company came!"

– Mexican farmer, 1980

Petroleum in Mexico

Mexico had a long and eventful history of oil production well before the extraordinary discoveries of the past decade. Map 1 shows the major historical zones of production.

At the turn of the 20th century, an American began exploration for oil on the east coast of Mexico near Tampico. His finds were the first in what would prove to be an oil-rich area known as the "Golden Lane." The major oil companies soon moved there and by 1921, Mexico was the second largest oil producer in the world after the United States. These fields were soon ruined by over-production, however, and later disputes between the companies and the Mexican government over labor policy in the mid-1930's led to Mexico's nationalization of production and the formation of Petroleos Mexicanos (PEMEX) (9, 10, 119, 141).

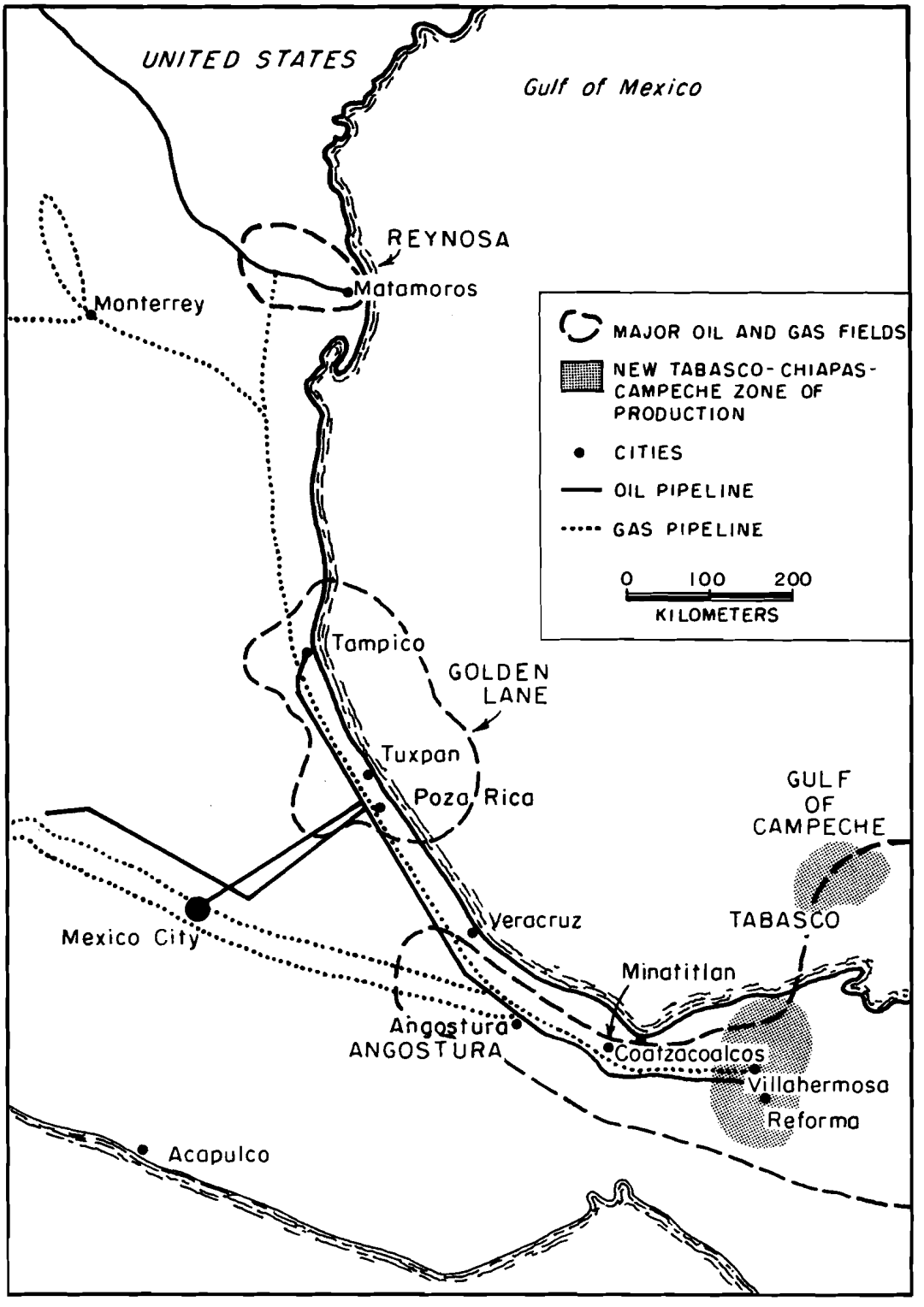
PEMEX in the next few decades discovered new fields around Poza Rica, Veracruz (the "New Golden Lane") and farther south by Angostura, Veracruz. The twin cities of Minatitlan and Coatzacoalcos in southern Veracruz became an important Mexican petrochemical and distributing center. In the 1960's, petroleum and natural gas were found in Tabasco, in the municipios of Comalcalco, Cardenas and Macuspana.

Mexico in 1972 had by far the most expert and experienced petroleum industry personnel in the developing world. But attention to new reserves had slackened due to inadequate investment in exploration, and the industry was in something of a crisis (9, p.16; 10, p.62).

The 1972 discovery of a huge, rich field in the Tabasco/Chiapas area took almost the whole country by surprise. A new technique of deep drilling revealed a giant Jurassic-Cretaceous "reef." Total production of crude rose from only .442 million (m.) barrels per day to 2.2 m. barrels per day in 1980 (88). Estimated reserves of oil, gas equivalent and gas liquids reached well over 200 billion (b.) barrels by 1982, a great deal more than Alaska's North Slope or the U.K.-Norwegian North Sea.

The dramatic recent production gains came almost entirely from three fields in the "Reforma" area in southern Tabasco and northern Chiapas states. Due to mountain barriers south of the Reforma field,

MAP 1. LOCATION OF MEXICAN HYDROCARBON PRODUCTION*



*Adapted from H. O'Shaughnessy, Oil in Latin America (The Financial Times Ltd.: London, 1976); and Mexico, Secretaria de Programacion y Presupueste, La Industria Petrolera en Mexico, pp. 353-355.

most of the generated local economic activity in new drilling, exploration and pipelines has been centered in Villahermosa, the state capital of Tabasco, and Cardenas, thirty miles to the west.

Unfortunately, this is the heartland of a densely settled agricultural region dominated by campesino farmers. In fact, the last remaining agricultural frontier in Mexico - the Southeast, comprising the states of Tabaso, Veracruz, Chiapas, Campeche and the Yucatan peninsula - sits over a vast pool of exploitable oil and natural gas.

Can an eminently agricultural community participate effectively - or even defend itself - in an oil economy? What role can or should agriculture play in economic development? Is the much-lamented conflict between agriculture and petroleum insuperable?

The Importance for Mexico of Agriculture-Petroleum Coexistence

The possibility of "peaceful coexistence" between campesinos and the petroleum industry is critical to Mexico today. Stagnation of campesino agriculture over the past fifteen years has led not only to severe food supply problems. Neglect and exploitation of the campesino sector has limited national investment and employment opportunities and development of a mass economic base.

During the 1950's and 1960's, the "Mexican growth miracle" took place, with five per cent annual GNP growth. Mexican agricultural production rose as a result of the development of new irrigation districts in the north, application of the "Green Revolution" to wheat production, and the resurgence of ejidal production after the Revolution. In addition, a very prosperous sector for export of fruits and vegetables to the United States developed (152). A combination of major infrastructure construction, industrial investment, development of extensive irrigation districts, and the more modest growth of rainfed agriculture provided sufficient employment to keep up with the rapid growth of the Mexican work force.

Since the late 1960's, however, agricultural production in general grew much more slowly than demand, and foodgrain production actually declined in many years. Between 1969 and 1981, maize production hovered between eight and ten million tons per year, though demand rose from eight to twelve million tons over that period (37). The role of the agricultural sector in the GNP declined from two thirds in 1950 to less than 40 per cent in 1970. Agricultural employment declined from nearly three quarters to only about fifteen per cent, although total numbers of workers increased until very recently (140).

Although long-cycle fruits, vegetables and forrages production showed continued growth and oil crops and industrial crops made modest gains, basic food crops and fibres showed a downward trend. There were major imports of maize, wheat, soy in the 1970's, and a number of other crops which Mexico exported in the 1960's had to be imported in

the 1970's. Despite impressive production gains during the 1970's, Mexico experienced shortages of sugar and beef as well. Mexican agricultural exports became restricted mainly to the tomato and other high value garden-type crops.

Actually, the stability of maize production is a remarkable sign of the persistence of campesino production. The real price of maize over that time period plummeted, as did prices for many other basic foods. This was the result of policies to keep urban wages down by keeping food prices low. Larger commercial producers, and most of those on irrigated lands, switched to more remunerative products: the fruits, vegetables and livestock products demanded by the increasingly prosperous middle classes (143).

But the vast majority of Mexican agriculturalists are "campesinos" - 87 per cent, according to analyses of the 1970 Census. They are characterized by small plot size, high employment and value of production per hectare, low value of production per person employed and the importance of subsistence production. Most are in rainfed areas; most did not in 1970 use fertilizer; some were even without draft animals (183, Charts 2, 3, 34, 35, 36).

Slower economic growth, massive mechanization of the irrigation disticts and a stagnating agriculture converged to sharply reduce the rate of new employment opportunities for these campesinos. At the same time, the largest generation ever of young people in Mexico began to enter the work force. A highly capital-intensive industry could employ few of them; most were engaged in the services sector, which is now swollen with poor-paying, low-productivity activities. Migration from rural areas accelerated and unlike the migrants who went to more prosperous agricultural areas in the 1950's, they went to the cities. The resultant over-crowding in major urban centers, particularly Mexico City, has become critical (138, 144).

The new migrants, generally untrained in needed urban skills, along with the campesinado producing poorly remunerated crops, comprise the "impoverished forty per cent" of the Mexican population. Their economic condition contrasts starkly with the middle-class prosperity in more dynamic sectors of the economy.

When the oil boom emerged in the late 1970's, the economy as a whole grew extremely rapidly, and millions of new jobs were created. But after the financial difficulties of 1982, the pace of growth slowed dramatically, again creating chronic conditions of unemployment.

Throughout the 1970's there was considerable experimentation with rural development for campesinos - integrated development (PIDER), stabilization of marginal areas (COPLAMAR), collectivization projects and many others. The tie between the equity problem and rural structure and employment was overtly acknowledged in the Sistema Alimentario Mexicano (SAM) program inaugurated in 1980. With a broad system of subsidies and production incentives, SAM sought to increase the production of low-income rainfed grain farmers as well as food

consumption by low-income urbanites (48, 112, 115, 116, 117). The production response was considerable, but its total cost is unknown.

The program disappeared in 1982 with government budget upheavals, although the multiple devaluations worked in favor of maize producers by raising the real product price and reducing competitive imports. But some policy must replace SAM, to deal with the persisting inequity, unemployment and agricultural problems, and it must directly address the issue of campesino development. Some of the experiences from Tabasco suggest guidelines for such a policy.

A second major thrust of policy in the 1970's was development - both experimental and large-scale - of new lands in the humid tropics, particularly the Southeast. Map 2 illustrates the southeast region, its major cities and agricultural areas.

According to a recent PRODERITH report,

> "In the coastal plains of the Gulf and Southeast zones, more than 3.6 million hectares of high or average agricultural productivity have been detected, presently underutilized with precarious agriculture or extensive ranching; the Mexican humid tropics are the most important agricultural frontier of the country" (106, p.3).1/

The chief advantage of the region is its abundant water resources. During the past decade, a major program was undertaken to transfer crops with very high water requirements out of the northern irrigation districts to substitute more valuable crops which could better justify expensive irrigation. New cane and rice processors were constructed in the Southeast; sources of oil such as coconut and African oil palm could potentially substitute for many oilseed crops now grown under irrigation. As new water sources for irrigation grow scarcer and increased non-agricultural demand on water supplies from urbanization and industry become heavier, the need for alternative, cheaper means of production and sources of water will accelerate (2, 106).

Sugar cane, oranges, mangos, other fruit trees, cacao, coconut, cattle, rubber and spices now dominate tropical agriculture. The area in maize, rice, beans, bananas and cassava is greater, but maize yields are relatively low and the crop is grown largely for subsistence. Small increases in productivity could lead to greatly expanded supplies, even though basic grains are more efficiently produced in more moderate climates. Great gains could be made in livestock production, even if restricted to land unsuitable for crop production.

The Southeast is relatively close to the major domestic market area of the Guadalajara-Mexico City-Veracruz axis, and is well

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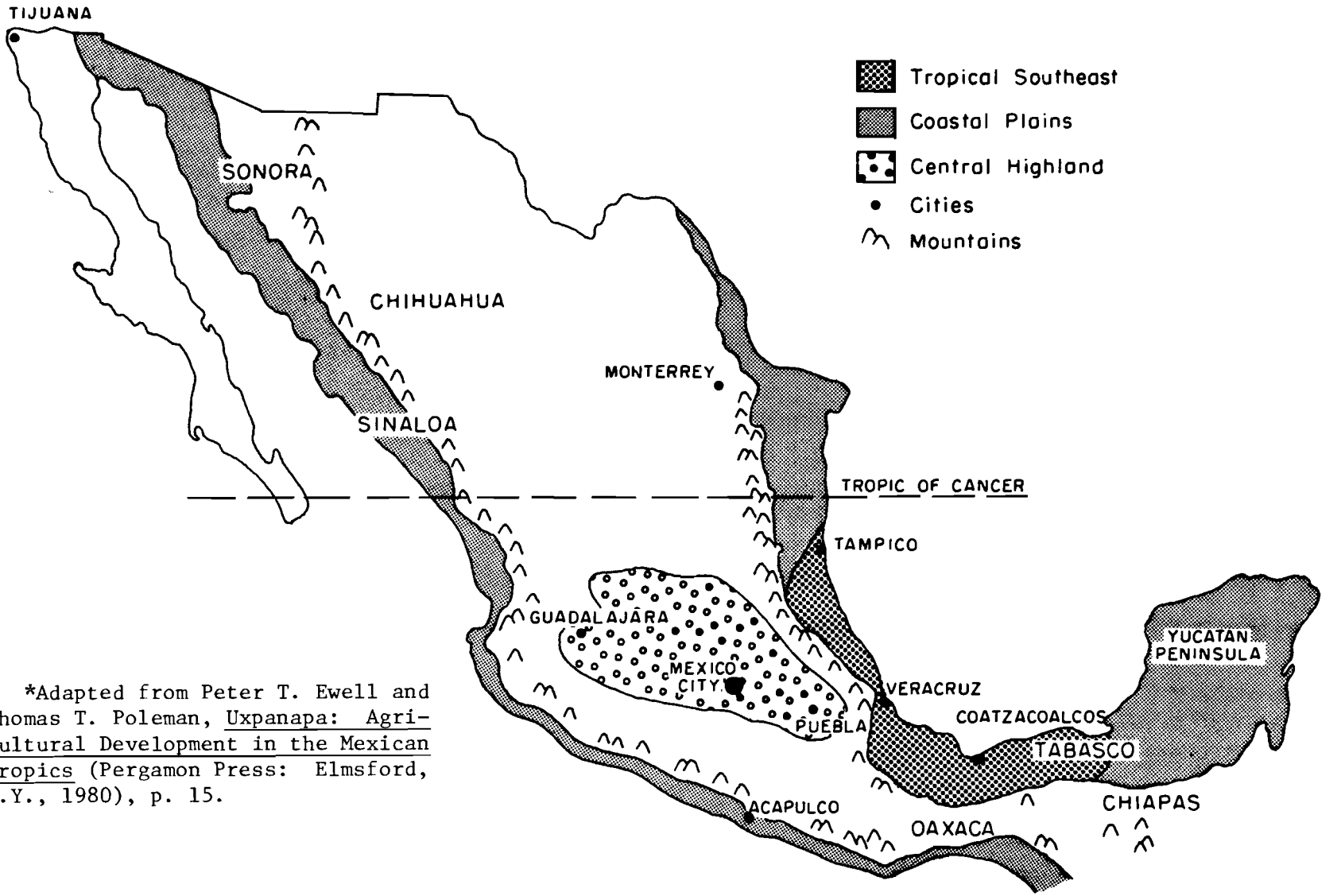
1/ This compares to approximately two million hectares in the northern and central zones of the country which it is feasible to put under irrigation. Tabasco has one million hectares of this area, plus 600,000 hectares of average or low agricultural potential which could be used for livestock production.

MAP 2. MEXICO AND THE TROPICAL SOUTHEAST*



*Adapted from Peter T. Ewell and Thomas T. Poleman, Uxpanapa: Agricultural Development in the Mexican Tropics (Pergamon Press: Elmsford, N.Y., 1980), p. 15.

placed for foreign trade on the Atlantic (through the ports of Coatzacoalcos and Dos Bocas) and Pacific (across the Isthmus land bridge and through Pacific ports).

Its agricultural potential is thus very important - and the prospect of achieving significant long-term agricultural development despite petroleum expansion should generate the support and confidence necessary to push for balanced programs of tropical development there.

International Experience with the Agriculture-Petroleum Conflict

But would such confidence be justified? The international experience of agriculture-petroleum interaction is not promising.

Until the 1970's, there was a general sense among academics, developing country administrations and others that nations with large oil reserves were privileged and faced no more serious problems for their social and economic development than a shortage of skilled labor (45, p.347). But evidence gathered from around the world in the past decade indicates a multitude of serious socioeconomic problems, particularly petroleum's almost uniformly negative effect on agriculture (38, 125, 130, 147, 160).

The common manifestations of the petroleum-agriculture conflict are stagnating food production, increasing food imports and the emigration of farmers and farm workers to petroleum centers seeking non-agricultural employment. A prosperous enclave within the production zone of petroleum workers and those providing service to them commonly develops, while the agricultural community outside the enclave experiences economic stagnation and declining living standards.

Mexico

Mexico's own experience is unpromising (119, 172).

A major study undertaken by the state of Veracruz indicated that despite average per capita income in Poza Rica far above the state average (due to extractive industry), aggregate value in agriculture was very low, lower than the state average - although sixty per cent of the population worked in that sector (82, pp.223-225; 91).

An observer of Poza Rica's boom commented:

> "Though it has long been one of Mexico's most important oil centers, Poza Rica, as town and region, is pockmarked with oil wells and most of its people continue to be poor. The oil company rests upon a privileged enclave, a comfortable segregated middle-class PEMEX residential area, but the system did not generate jobs and prosperity for the rest of the population" (146, p.3).

In Minatitlan, the 1970's showed sharp reductions in maize production: from 25,000 hectares in 1971 to 10,000 in 1973, 4000 in 1975, 500 in 1976, almost none in 1977 (105). "Lost cities" of rural migrants grew up all around the petroleum centers.

Venezuela

The Venezuela example provides a stern warning, one to which the Mexicans are particularly sensitive (122, 137). Except for a short period between 1957 and 1965, the agricultural sector stagnated from the 1940's to the 1970's. Venezuelan imports of goods in 1978 were eleven times greater than those in 1963; outstanding among these was food. A third of all internally consumed foodstuffs were imported in 1978, mostly cereals, legumes, oilseeds and milk (44, p.101).

> "Despite her beneficial foreign exchange position and relative abundance of capital, Venezuela has not been able to use retained earnings from oil to build a solid agricultural and industrial base for economic progress independent of petroleum" (165, p.168).

Income improvements in the rural sector lagged far behind the urban sector, despite increasing flows of migrants to the cities. Belated government attempts in the 1970's to promote livestock production and crop intensification near petroleum regions (intended mainly to substitute for imports) have demonstrated little success.

Nigeria

Nigeria's more recent oil wealth stimulated rapid economic change in the country, but its benefits were highly concentrated (132, 148). The chief beneficiary is the government, whose revenues have skyrocketed. The wide spectrum of oil-funded development projects that were begun show few results, largely due to management problems and a shortage of skilled personnel. When oil prices declined in 1981, the overextended government suffered severe cash shortages even in its daily operations.

Despite the country's relatively successful political comeback after the devastating Civil War of 1967-70, its economic organization has been poor. There is generally a greater emphasis on trade than investment or production, and an orientation to the short-term profits so easily come by in a boom economy. The currency is highly overvalued - as in most oil-producing countries - to provide relatively cheap imports for construction and the oil sector, but this has had a very depressing effect on domestic producers. Jobs in oil and "development" projects have prompted rapid urban migration and a corresponding boom in crime, congestion and general security problems.

Domestic farmers in particular have suffered from import competition and low official farm prices. Smallholder export farming was the mainstay of colonial Nigeria, based on palm oil, cocoa and groundnuts;

in early 1982, all but cocoa (of which little was exported) had to be imported.

> "Nigerian export agriculture put money straight into the countryside, and was the mainstay of thriving indigenous communities. Now it is dead, and the communities it supported are dying. Optimists reckon that Nigerian food production is growing by about half of one per cent a year, while the population is growing much faster. Food now takes about 15 per cent of total spending on imports, and will be taking more each year" (173, p.28).

Experts estimate that Nigerian agriculture has the potential to double the area under cultivation and treble yields on already cultivated land, but relative prices offer no incentive for the farmer to do so. Several attempts at large-scale government-corporate projects, e.g. in sugar, were spectacular failures, so agricultural policy refocused on the smallholders, with international agencies playing an important role. But Nigeria can find few trained people interested in helping make the modest improvements likely to work, so long as income and career possibilities in the oil economy are so tempting. Urban pressures make the prospect of higher relative farm prices unlikely (173).

Iran

In Iran, agriculture's importance dropped precipitously with the oil boom after 1959, as did the sector's productivity. The agricultural share in GNP dropped from 32 per cent in 1959 to 9.4 per cent in 1976. During the decade 1963-1973, oil revenues rose 15 per cent annually, while industrial production rose nine per cent and services eight per cent. By contrast, agricultural income increased less than three per cent, at about the rate of population growth. Despite a land reform, increased national real income, increasing agricultural prices and increased use of technical inputs, the sector stagnated, in part due to extreme concentration of those agricultural resources available.

Rural-urban migration in Iran in 1977 was officially 1.7 per cent per year; employment for the migrants came almost entirely from periodic construction booms, resulting in considerable unemployment problems between booms. As in Venezuela, high internal migration, high urban unemployment and high import bills in the mid-1970's led to renewed official interest and investment in agriculture. But new programs to encourage Iran as a net exporter of agricultural products in the early 1980's have fallen far short of this goal (45).

Reasons for the Agriculture-Petroleum Conflict

Inflation, labor scarcity in agriculture and pollution are the chief culprits in weakening the position of farmers in the oil zones.

The prices of agricultural inputs, labor, consumer goods and housing increase, while the level of agricultural prices of locally grown commodities remains relatively stable. The local economy is rarely organized to provision the large population increases that accompany the boom. The import markets that open in response rarely close later on, even after local farmer supply increases, and inflation makes it difficult for locals to compete with imports.

The difficulty of making a living in agriculture under these conditions - and the attraction of high incomes in the petroleum sector - induce workers and farmers to seek off-farm employment. General farmwork and maintenance activities decline; farmers may even be unable to find - or afford - workers to harvest their crop.

Finally, environmental damage from oil wells, pipeline projects and construction; air pollution from flaring and chemical plants; and destruction of property either through expropriation or temporary eminent domain threaten farms. In addition to the direct destruction, fear of potential disruption argues against long-term farm investment. Farmers may even disinvest - sell assets to send children for training in urban occupations or make speculative or productive investments in town.

There are few backward or forward linkages between agriculture and petroleum activity. Because the ultimate labor force for petroleum is relatively small, its presence does not significantly affect long-term demand for food, and a smaller part of their income increases are in fact devoted to food than among the general - poorer - population.

In Nigeria, for example, between 1950 and 1964 only an average of 35 per cent of total petroleum expenditures were made within the country; 40 per cent of local expenditures were made to contractors (of whom two thirds were foreign); 20 per cent of local expenditures went to wages and salaries; only ten per cent of local expenditures went to agriculture and forest products, small and large-scale industry combined. There were few technological linkages other than the use of petroleum roads for farm-to-market transport (148, pp. 181-182).

Political Weakness of Agriculture

The seeming paralysis of inspiration and action to assist the agricultural communities suffering from the above problems stems from a basic political weakness of rural populations. Petroleum development weakens their voice further (49).

Urban pressure to reduce food costs - which rise in petroleum regions due both to rising demand and to inflation - encourages the use of lower-cost imports (from other regions or countries) or price ceilings, further eroding rural income and status. The surpluses promised by petroleum revenue make dependence on imports seem an attractive alternative to agricultural development. The overvaluation

of currency that commonly occurs exacerbates international competition.

Few resources are available for the agricultural sector, and those which are tend to be spent without serious consideration of the policies necessary to deal with structural changes caused by petroleum development.

In the petroleum regions, new political formations weaken farm support. Even where political realignments do not occur, regional officials may be so paralyzed or occupied by trying to deal with the immediate visible problems of overcrowding, lack of services, etc. in the petroleum boom towns that no time, money or energy is left to support rural needs.

Most decisions about petroleum development take place in national urban centers far away. There is little interest in or regard for rural issues there - although new transport infrastructure, location of petroleum processing plants, housing services, market systems for petroleum workers all have important effects on local rural economies.

There is little to prevent petroleum companies from becoming dictatorial. At one point, PEMEX tried to build a petrochemical plant in the midst of the most productive cacao land in the country. Local protest and support from Mexico City did lead the company to rescind its decision (164, p.31), but in a fit of pique:

> "PEMEX announced that it would move all its new installations or a large part of them to Chiapas, in view of the fact that in Tabasco they were not well-received. This was fundamentally an attempt to pressure Tabasco to accept PEMEX unconditionally. And to make that pressure harder, PEMEX halted the construction of housing in Villahermosa" (164, p.103).

Contrary to popular belief, the discovery of oil and natural gas does not lead to an immediate availability of substantial capital surpluses. Antonio Bermudez, former director of PEMEX in Mexico, warned against using oil profits for general development. He believes that for many years to come, all revenue from oil and gas sales will have to be ploughed back into exploration, drilling, petroleum infrastructure and payment of petroleum debt (9, p.25).

Mexico's official pledge to "sow the petroleum" during the past sexenio - including major new programs for the agricultural sector - has in reality meant dramatically increasing the debt load of the country, using future petroleum production as collateral - a risky financial and political path that has been followed in most developing petroleum economies. When a temporary world oil glut occurred in 1981-82, pushing prices down, the foreign exchange used to pay interest on that debt was not forthcoming, and Mexico was forced to devalue its currency several times. The future of the agricultural development programs, and of economic conditions in general, are uncertain.

The Unique Case of Tabasco

As was expected, Tabasco - even more than the rest of Mexico - suffered extreme disruptions from the oil boom. But despite them, agricultural production in the state for major products rose throughout the decade of the 1970's. Maize production declined, but cacao, bananas, coconut and beef production reached unprecedented levels. Although there was extremely high participation by rural workers and farmers in petroleum-related employment, rural emigration rates were relatively low.

These extraordinary contradictions are the subject of this study; their explanation has far-reaching implications for agricultural development policy. State agriculture is dominated by smallholders whose production strategies reflect a campesino (peasant) economic orientation. "Capitalist"-oriented crop producers did indeed reduce production, but the campesinado did not. Their farm cost and resource structure enabled them to use family labor flexibly both on and off-farm, and to withstand many of the economic pressures of the petroleum economy. Their continued and increasing production buoyed the rural economy and was a major stabilizing force in Tabasco during the petroleum boom.

The evidence from Tabasco is that the campesinos have a major role to play in promoting desirable agriculture, employment and income distribution patterns in rural economies under stress. In the course of the study we will attempt to address the broader theoretical issues of the campesinado in Mexico: the survivability of the campesino mode of production under the stress of petroleum development; the possibility of reversing the traditional exploitative relationships between the campesino and non-campesino economies; and effective approaches to capitalizing campesino farms.

How Tabascan petroleum-agriculture interactions will evolve in the future is not certain, but initial success in the resolution of basic conflicts shows that coexistence is indeed possible. Tabasco's experience is widely relevant for other regions and countries attempting to promote petroleum or other large-scale industry in agricultural communities.

CHAPTER 2. AN INTRODUCTION TO TABASCO: HISTORY AND THE "BOOM" EXPERIENCE

"In the Chontalpa region, there is too much oil. Unavoidably a very serious conflict between agricultural development and the petroleum industry will take root. Who will vanquish whom? Undoubtedly it is petroleum that is winning the battle up to now."

-Manlio Tirado, 1977

"Basically, major conflict between petroleum and agriculture is unnecessary, if enough support is given the agricultural sector. We are doing that. Look at the results: the highest cacao and coconut production in history."

- Governor Leandro Rovirosa Wade, Tabasco, 1979

This chapter summarizes the history of Tabascan development, highlighting the interactions between the agricultural economy and the petroleum industry during the decade of the 1970's. This history establishes the depth of change and disruption which petroleum brought to the state. It also documents the unexpected agricultural boom, and the principal factors responsible for the boom.

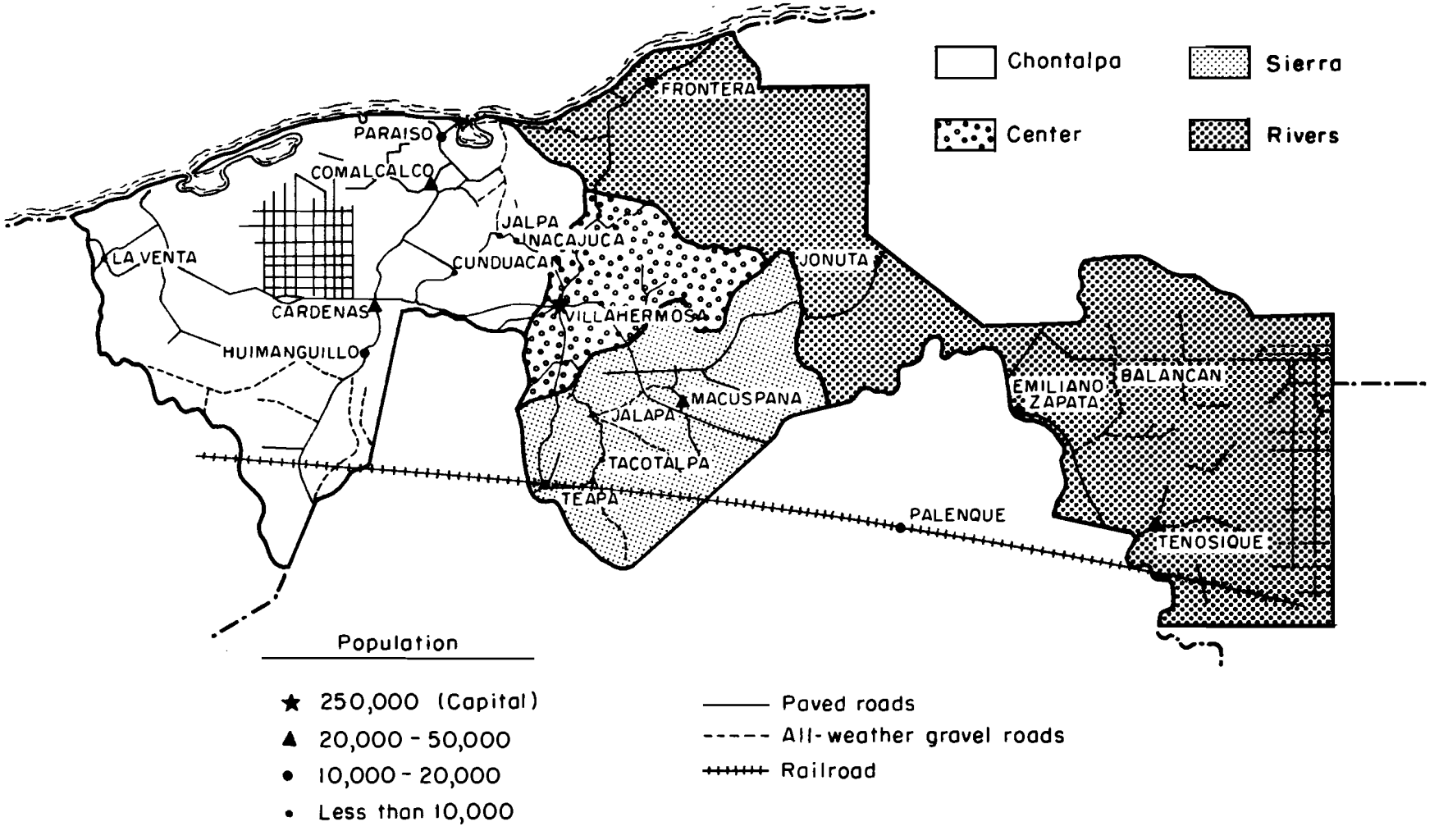
Tabasco: An Archipelago

Tabasco lies on the alluvial plain below the Isthmus of Tehuantepec, stretching along the Atlantic side of the Sierra Madre. The fundamental feature of its geography is an abundance of water. Only slightly exaggerating, one observer noted: "It is the only case in the world of an archipelago situated on solid ground" (13, p.3). The Tabasco plain receives the flow of Mexico's mightiest rivers - the Usumacinta and Grijalva - which, together with their also impressive tributaries, pour into this state about one third of all the water resources of the country.

Map 3 shows the principal features of the state and its major sociogeographic regions: the Chontalpa, Rivers, Sierra and Center. Maps 4 and 5 contrast the natural vegetation of Tabasco with contemporary land use patterns.

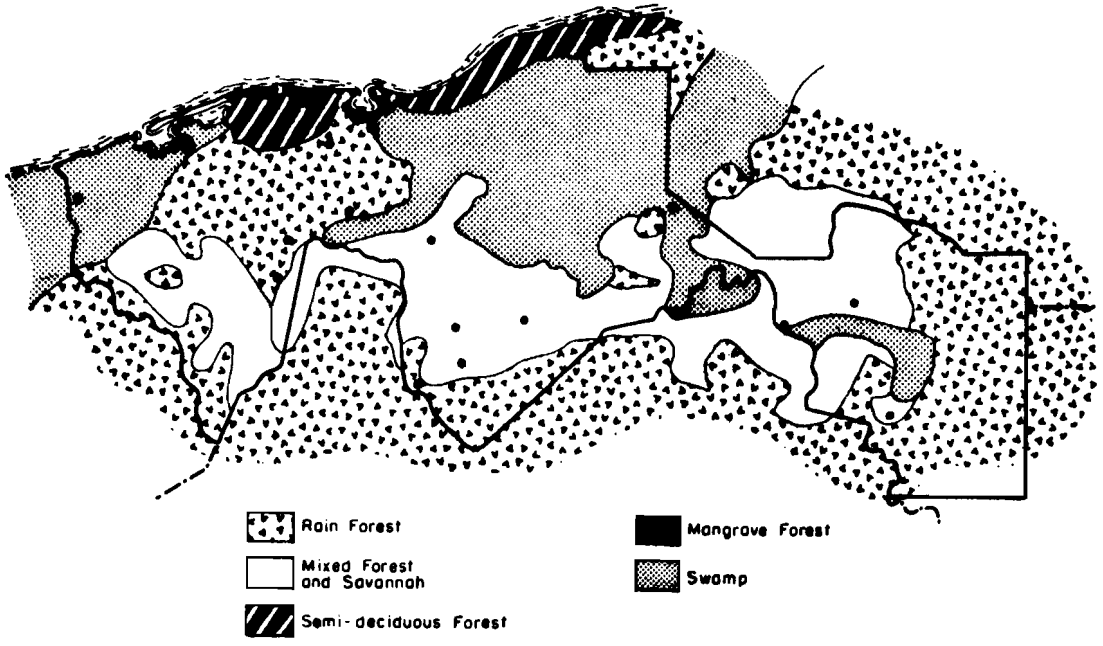
The mountains south of Tabasco form a barrier to moisture-laden Atlantic winds, resulting in a rainfall pattern which ranges from an average of only 1500 mm per year along the coast to nearly 5000 mm in the peaks above Teapa: the second rainiest spot in the world. The rainy season lasts from seven to nine months, lengthening nearer the Sierra. For at least eight months of the year, 52 per cent of Tabasco's land area (mostly in the Rivers region) is covered with water; thus the description "archipelago." Fifteen per cent is permanent swamp.

MAP 3. PRINCIPAL TOWNS AND ROAD COMMUNICATIONS IN TABASCO STATE, 1980*



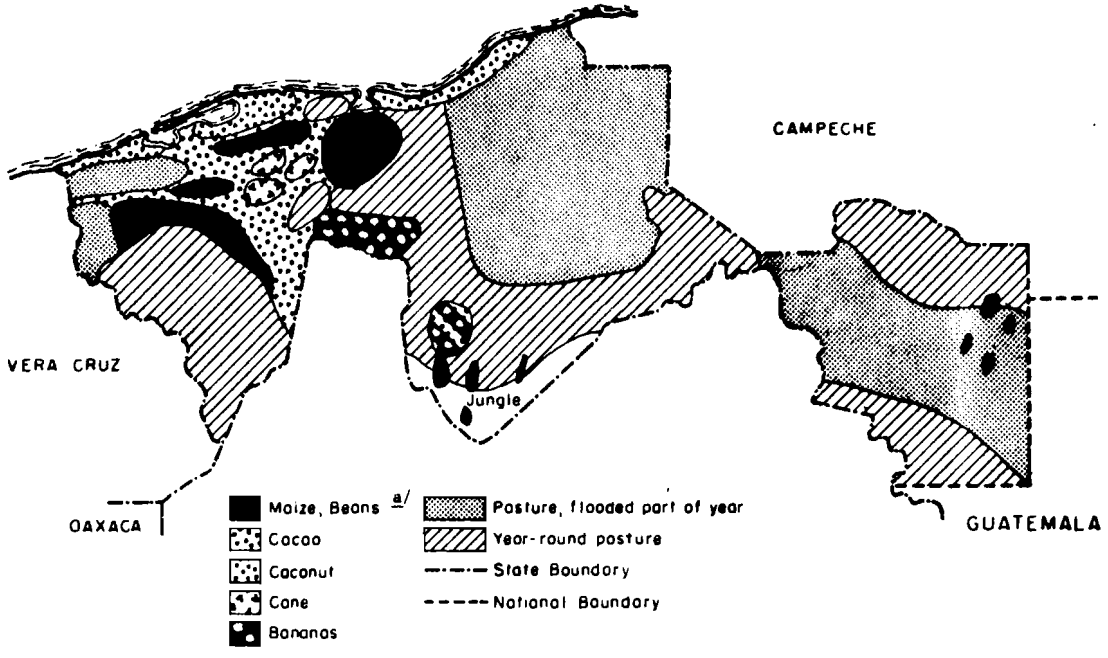
*The road system is a revised version of that found in Map 4 of Eduardo Bolis Villanueva, La Economia del Estado de Tabasco, Banco de Comercio, March 1976. Town population figures were taken from preliminary data of the 1980 National Population Census.

MAP 4. THE NATURAL VEGETATION OF TABASCO*



* West, R.C., N.P. Psuty, B.G. Thom, Las Tierras Bajas de Tabasco en el Sureste de Mexico, Gobierno del Estado de Tabasco, Villahermosa, Tabasco, 1976, p. 76.

MAP 5. CONTEMPORARY LAND USE IN TABASCO*



*Based on SARH, Representacion de Tabasco, "Plan Agricola Estatal," 1979, Land Use Maps.

a/ Note that additional subsistence maize and beans are found throughout the populated regions of the state.

The rivers carry a remarkably huge burden of sediment each year, much of which is left along the floodplain, enriching the already deep alluvium, high in potentially fertile clay soils. On the natural dikes of the Old and New Chontalpa, this forms exceptionally good soils; where the ground water is higher and in the depressions (such as the Chontalpa "Bowl"), soils are often gleyed and have formed impermeable horizons.

The Rivers region whose natural vegetation was either swamps or mixed forest and savannah, is now used for extensive cattle pasture in the dry season, or year-long, depending on drainage. The Sierra region, originally mixed savannah-forest, with rainforest in the southern mountains, is also primarily a cattle zone. Along the Teapa and Tacotalpa river banks, however, are fertile, well-drained soils which can be used for crop production. Like the southern Center region, it is particularly suitable for banana production. Because of higher rainfall and cooler temperatures, the area is less suitable than the Chontalpa for cacao production.

The Chontalpa is the agricultural heartland - and hence historic population center of the state. Except for the mangrove forests and swamps along the coast, now used for coconut plantations, the natural vegetatation of this region was rain forest. But the rain forest has disappeared in all but the most remote corners of the state. On well-drained land, the cacao plantations with their shade trees mimic the natural forest structure, protecting soils from severe erosion and building fertility. A series of huge drains built in the 1950's and 1960's as part of the Chontalpa Plan, opened a large area formerly subject to flooding, to sugar cane, banana, and year-long pasture production.

On other lands, deforestation occurred over many centuries due primarily to burning for agricultural uses. Exposure to leaching and high temperatures led to decreased fertility over large areas and the less fertile, mixed-savannah-forest land turned to pure savannah. These soils, primarily found in the Savannah sub-region, are now used for cattle production.

Traditional Agriculture in Tabasco

Archeological ruins indicating early Mayan and Olmecan settlements are found throughout the Old and New Chontalpa and all along the Usumacinta River. The indigenous population at the time of the Conquest was predominantly Chontal, with some Nahuatl, Popoluca and Zoque populations (169, p. 114). They were concentrated in the Old Chontalpa and less so in the Sierra, along well-drained natural river dikes where the best cacao land was found. Indigenous population estimates for the time of the Conquest run as high as 300,000, but the most likely figure was 135,000 (169, p.115).

Subsistence was obtained through yearly double-cropping of maize, often with slash-and-burn, or in flooded areas, through seasonal movement from flooded to unflooded soils. The main staple was pozol,

a thick liquid mixture of crushed maize and cacao; accompanying foods were the beans, squash, tomatoes and chiles typical of Mexico, plus a number of tropical tubers not commonly consumed farther north, such as sweet potato and cassava.

Cacao was grown in Tabasco as early as the fourteenth century, and the Tabascan cacao variety "criollo" is considered the origin of the species. At the time of the Conquest, there were thick stands along what are today the Cunduacan River and the dry riverbed of what was the San Bernabe River. Seventy per cent of the cacao was located in the Chontalpa; the rest in stands along the Grijalva and Usumacinta rivers, near Villahermosa, and to the south along the Teapa, Tacotalpa and Chilapa rivers (169, p. 130).

Cacao was used as the medium of exchange for trade between the Mayan city states of Yucatan and the Caribbean coast, and the Aztec kingdom. The principal trade cities - Xicalongo, Cimatan and Potonchan - were usually controlled by Aztec or Mayan traders, who handled salt, slaves, cotton cloth, tools and honey from the Guatemalan coasts; decorated cloth, gold and turquoise objects, copper bells, dyes, obsidian tools and slaves from Central Mexico (169, p.116).

Tabasco also sent cacao - a luxury good from which a foamy chocolate beverage was made - as tribute. One document from 1562 reports that 81 tons of dry cacao were sent from Tabasco annually to Veracruz and Mexico City - thirty per cent as tribute; the rest for commerce (169, p.128).

Diversification of the Tabascan Agricultural Economy

Between the indigenous period and the modern era, the landscape and economy of Tabasco changed radically.

The Colonial Period: Cacao, Cattle and Dyewood. After the Conquest, Bernal Diaz himself sought an encomienda of cacao plantations in Tabasco. But with the coming of the Spaniards, the coastal population was decimated through diseases and violence. At the end of the 18th century, the total population of Tabasco was probably no more than 10,000 (29, p.25). The Spaniards themselves fled the lowlands, unhealthy and prone to attack by pirates, to the Sierra where they and mestizos replaced most of the Indian population. The state capital moved from Santa Maria de la Victoria to Villahermosa in 1602, then to Tacotalpa in 1666, and back to Villahermosa - today's capital - in 1796. To fulfill labor needs on the cacao plantations, salaried Indian workers from Chiapas were brought to Tabasco; some stayed, others moved back and forth seasonally.

Tabasco continued to produce cacao. But import competition was fierce from Ecuador and Venezuela, and later from other plantations established by the Spanish in the Caribbean and Central and South America.

Seeking other sources of income, the Spaniards introduced two far-reaching economic changes. Cattle were brought in and served to open interest and settlement in the interior savannahs of Tabasco and the fresh water swamps and fields by the coast. Cattle, skins and tallow became important sources of income for local Spaniards.

The second major change was the exploitation of forest resources, mostly the "pita" (a tropical fiber), sarsaparilla (a medicinal root), Jamaican pepper, and dyewood, a tree which produced a deep red to purple dye, which was by far the most important. Spaniards participated in this trade, but after 1660, English "semi-woodsmen, semi-pirates" began active exploration for dyewood, particularly around the Laguna de Terminos.

Independence: Migration to New Lands. After Mexican Independence in 1821, the main process leading to change in Tabasco came from migration to previously sparsely settled land. This took place in three movements: from Old to New Chontalpa, from Cardenas northwest, and from Huimanguillo east. The population of Tabasco at that time is estimated to be nearly 60,000, of whom half were Indians (29, p.25).

The Chontalpa movements were occasioned principally by major changes in river flows, which are diagrammed in Map 6. Originally, the Grijalva and Usumacinta systems were entirely separate, with what is now called the Grijalva actually the Sierra River. What is now called the Mezcalapa was the Old Grijalva River.

Until 1675, the Old Grijalva flowed nearly north to the sea. After that date, it abruptly turned east, joining the two systems. In 1882, its course broke again to form the Carrizal River, which flowed to the Bar of Chiltepec (through the old Gonzalez River) rather than the Grijalva-Usumacinta system. In 1902, it was diverted once again to the new Grijalva; and in 1932 opened a third west-east branch - the Samaria River - whose water flowed north at times to flood the Chontalpa Bowl. The Samaria River reached the sea through the Bar of Chiltepec, the Carrizal and Gonzalez rivers and the new Grijalva-Usumacinta system.

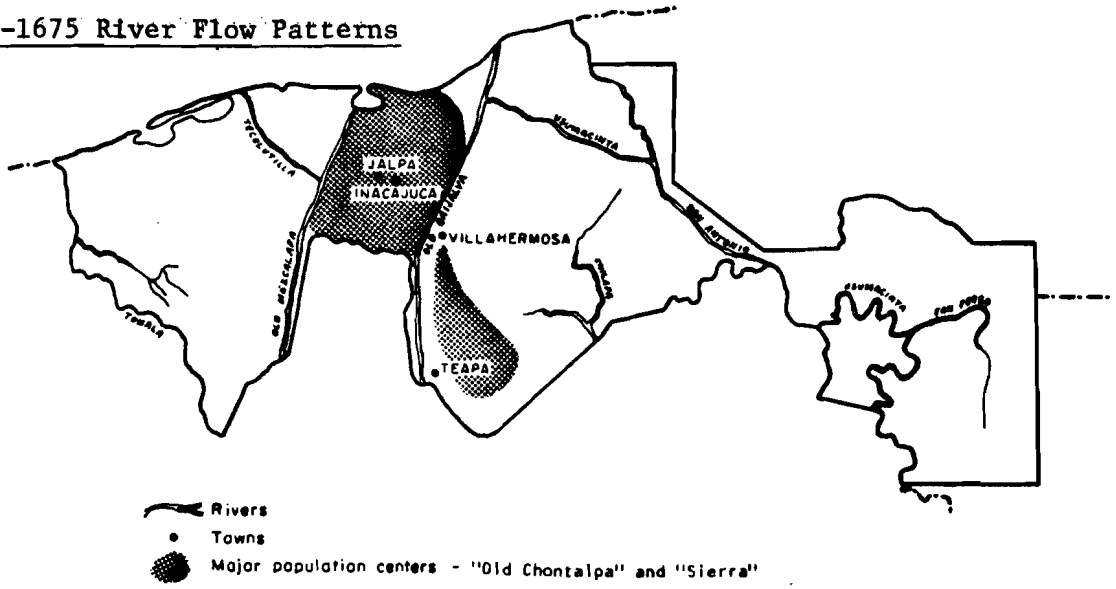
The major effect of these changes in river course was to reduce the productivity of the Old Chontalpa region, while opening up the extremely fertile, now dry riverbed of the Old Grijalva River - the "Rio Seco." Massive emigration began from the former to the latter for cacao planting. In 1823 whites and mestizos settled the town of Paraiso; and in 1827, Comalcalco - right in the old riverbed. By 1854, the region was prosperous and full of cacao (169, p.141).

The second migration stemmed from the town of Cardenas, which had been established in the old Rio Seco at the end of the 18th century. By 1869, 1159 Indians and mestizos had moved along the old tributaries to the Mezcalapa to plant cacao and subsistence crops.

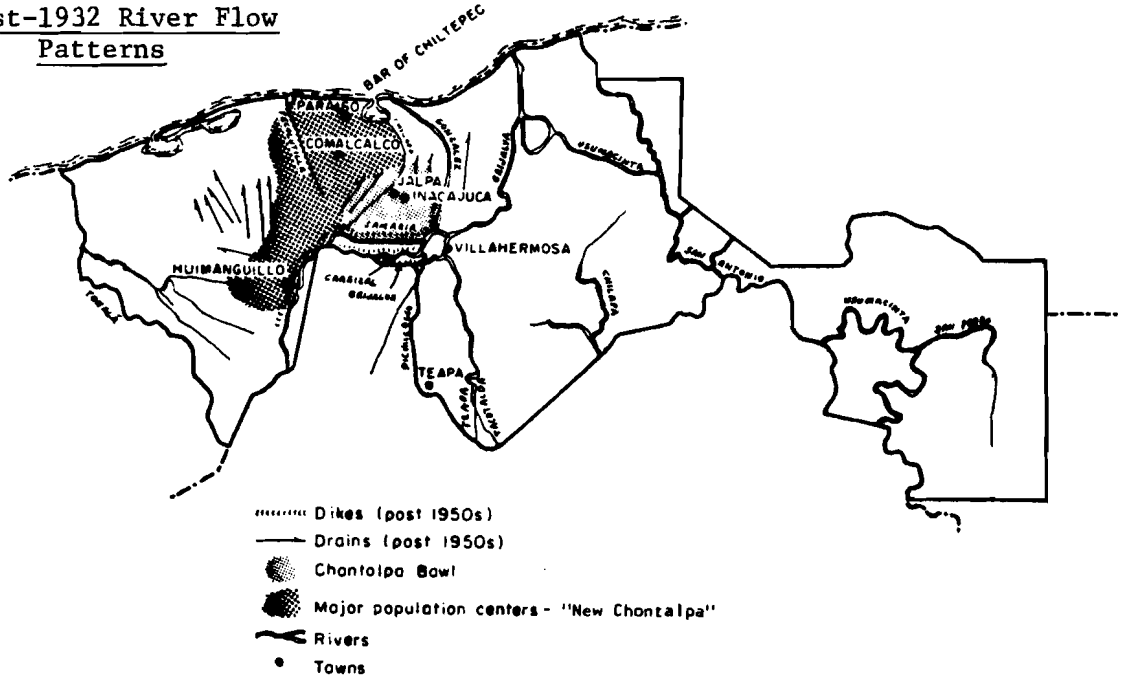
The third route of colonization was of Ahualculco Indians who settled near Huimanguillo and Ocuapan, at the close of the 18th century

MAP 6. HISTORICAL RIVER FLOW CHANGES IN TABASCO*

Pre-1675 River Flow Patterns



Post-1932 River Flow Patterns



*Source: See thesis.

along major rivers west. Their presence established the present border with Veracruz.

These changes brought renewed vigor to cacao activity in Tabasco. Whereas in 1854, the Sierra had three quarters of the cacao trees in Tabasco, by 1890, cacao production in the Chontalpa had once again passed that of the Sierra, which had suffered severely from floods and droughts in the interim (169, p.162). In 1828, Mexico's first chocolate factory using sugar was built; in 1876, the first milk chocolate factory (133, p. 10).

After the Great Dry Spell of 1859-1861 caused a sharp decline in cacao production in the Sierra, large sugar cane haciendas were planted for the first time on the floodplain of the Tacotalpa, producing rum and raw sugar. Hevea rubber, coffee, originally used as cacao windbreaks, and some tobacco near Ocuapan were also planted in the late 19th century in small quantities. The expansion of cattle production, and a vast increase in logging stimulated by United States' demand for mahogany, exterminated most of the remaining jungles, completing the land use changes which took place between Independence and the Mexican Revolution.

Early 20th Century: Bananas, Coconut and Improved Cattle Breeds. Tabascans were active in the Revolution, largely because of the considerable local resentments against largeholders - primarily owners of cane and cattle ranches - who practiced debt peonage and encroached on smallholder land. Nonetheless, new ejidos which were promised by the federal government did not take form until the 1950's.

The major changes in the first half of the century were the introduction of bananas and coconut and the spread of cattle ranching. The most famous of the post-Revolution governors of Tabasco, Tomas Garrido Canabal (1928-1934), a radical populist, organized farmer producer groups for all major products, which have remained active to the present.

At the turn of the century, several landowners, inspired by the lucrative production of bananas in Central America began commercial production of the "roatan" or Gros Michel variety on the well-drained river dikes. At first they cleared previously forested land, but later replaced food, rubber and cacao crops, and encroached upon remaining smallholder properties all along the Usumacinta. By the 1920's and 1930's, a "banana boom" had spread throughout the lower Grijalva, the Sierra rivers and even the Chontalpa. Marketing and transport were organized by the newly formed cooperatives and export shipped to the United States by boats belonging to the large U.S. fruit companies.

Between 1920 and 1930, bananas replaced cacao as the primary source of agricultural wealth in the state. During 1938-1942, however, sudden attacks of the Sigatoka disease (a banana leaf disease) and Panama disease (a root parasite), coupled with lack of space in shipping boats during World War II, led to a drastic decrease in production. Through copper sulfate applications for Sigatoka control, the industry

recovered in the 1940's, but never resumed exports. Usumacinta and Sierra plantations reverted to livestock and subsistence crops; only the Center and Southern Chontalpa zones remained productive (169, p.168).

The first coconut was planted on the Chiltepec and Frontera coasts at the end of the past century, but major production did not begin until World War II, when the normal copra supplies from Asia and Oceania were cut off from the Allies. High prices led to large plantings all along the coast - the first intensive use of this land, which had formerly been utilized only for pasture - and the first population movement there (169, p.170).

Until the 1930's, cattle herds in Tabasco were almost entirely "criollo." In 1932, Brahman cattle were imported, and later Santa Gertrudis, part of a new breeding program of the Cattle Producers Association. Improved pastures had been brought in earlier: Egypt grass (Panicum purpurascense), 1872; Guinea (Panicum maximum), 1900; Molasses grass (Melinisminutiflora), 1923. To permit higher stocking rates of the new crossbred cattle, other new pastures were introduced: elephant grass (Penniseum purpurerum), pangola (Digitaria decumbens), jaragua (Hyperererehenia rufa) and German grass (Echinochloa polystachya).

Land Use Changes After 1950

Middle-aged Tabascans still remember when one prepared for a trip to Mexico City by writing one's will. From the town of Teapa, for example, two to three days in a small boat brought one to the sea, where a precarious sea voyage to Veracruz was followed by a dizzying climb overland past the peak of Orizaba before descending into the Valley of Mexico.

But in 1950, the National Railroad of the Southeast was extended through Teapa and Tenosique on the higher, more stable land above the floodplain to avoid flood risks. Since population centers were located far north of the tracks, the rail line stimulated building of numerous roads north-south. While the railroad was being built in 1948, the state's first all-weather road was built from Villahermosa to Teapa, and a road between Puerto Ceiba and Huimanguillo, through Comalcalco, was gravelled. In 1961, a paved road connected Villahermosa with Mexico City. In 1967 Villahermosa was finally connected by an all-weather paved road to the Yucatan peninsula.

Flood Control. With increasing commercial activity on the Tabascan floodplain, the age-old problem of flooding became an important political issue.

In 1932 and 1952, the Old Chontalpa suffered devastating floods, which turned what had been the second most important producing zone of the state into - for the most part - an area of subsistence agriculture. In response to the disasters, the national government set up

the Grijalva-Usumacinta River Basin Commission in 1951, to control flooding in Tabasco and promote general economic development there.

The Commission completed the Netzhualcoyotl dam at Malpaso, Chiapas in 1964, and dams at Chicoasen and Angostura in the 1970's. Their primary role was electricity generation. Truly effective flood control - even if possible, given rapid silting due to the rivers' heavy sediment loads and potential shifts in river flows - would depend on the construction of several more dams. Still, Malpaso has so far successfully protected the New Chontalpa area and the city of Villahermosa.

Several large drainage structures built to control the Mezcalapa waters are shown on Map 6. The Old Comalcalco road, the Left Dike and Right Dike protect the Rio Seco area and the Villahermosa-Cardenas highway, at the expense of increased flooding in the western zone and the "Bowl." The Samaria, Veladero and K-24 Drains protect much of the area between Cunduacan city and the highway, but have been continually threatened with siltation.

A series of drains were built west of Cardenas in the late 1960's for the Plan Chontalpa to foster intensive agriculture in that formerly ill-drained zone. Expensive infrastructure projects, including paved roads, villages with homes of concrete block and full water, sewerage and electricity services, were carried out for 22 newly-formed ejidos.

Growth of Commercial Agriculture. The improvements in transport, land reform, and drainage, opened new opportunities for commercial agriculture in Tabasco for both formerly subsistence-oriented campesinos and market-oriented farmers. Total land in production rose greatly in the 1950's and 1960's, with livestock production becoming more and more important. Between 1965 and 1972, the value of total foreign exports from Tabasco ranged from $45 to $157.8 m. - ten to twenty per cent of the total value of agricultural production - largely in cacao, coconut and shrimp. The state's overall trade balance was positive and high. But because crop prices during the 1960's were generally stagnant, there were not correspondingly impressive gains in productivity.

There was little increase in the total land put into agricultural use, because the state was effectively cleared by this time. But grazing lands were planted to improved pastures, and newly-drained lands were converted from pasture to crops. Ejidos control over a third of all farmland - more in the agricultural zones of the Chontalpa. Private land ownership in Tabasco is extremely concentrated, with four per cent of owners controlling 59 per cent of private agricultural land. Half the private farmers (with only three per cent of the private farmland) hold under five hectares (111, 1970).

However, most of the large extensions are in the Rivers area or the Savannah; in the rest of the Chontalpa there are few large properties. In fact, the most important agrarian problem there is minifundization, which has been accelerating since the final settlement of the frontiers earlier in this century.

A close interface between cattle farming and the smallholder sector developed in the 1970's. The growth of the cattle industry led to greater demand for forrage, so that ranchers began to contract with ejidatarios and other smallholders for grazing rights in return for keeping half of the year's new calves. This is called "mediania" and is distinct from the other common practice of simply renting pasture-land for a fixed price per hectare per month. Promoted by government loan programs and mediania, livestock are now an important asset of cacaoteros and other smallholders.

The Impact of PEMEX on the Tabascan Economy

PEMEX in Tabasco Before the "Boom"

Modest drilling in Macuspana and Reforma, Chiapas, by private oil companies and PEMEX before 1950 had little impact on the state (169, p.178; 191). But in 1951, the most productive site in the state known before the 1970's was discovered in Macuspana, where PEMEX City, an industry "new town" for 300 employees was set up. Pipelines to send gas to Minatitlan, Veracruz and Mexico City were built. Comalcalco was made District headquarters. Between 1954 and 1958, new sites were found near La Venta, related to the formations of southeastern Veracruz. A second permanent establishment was set up in La Venta by PEMEX, and dozens of temporary "lost cities" sprung up.

The Isthmus salt basin near the Veracruz border also produced some oil and gas; in the area stretching from Macuspana northeast to Campeche, huge gas reserves were found. The first commercial production from Gulf off-shore areas was in 1958. By 1961, the entire Southern Zone, including the Isthmus, was producing 24 per cent of Mexican crude, 24 per cent of natural gas liquids and 44 per cent of the natural gas - with 42 per cent of the nation's wells (89, 90).

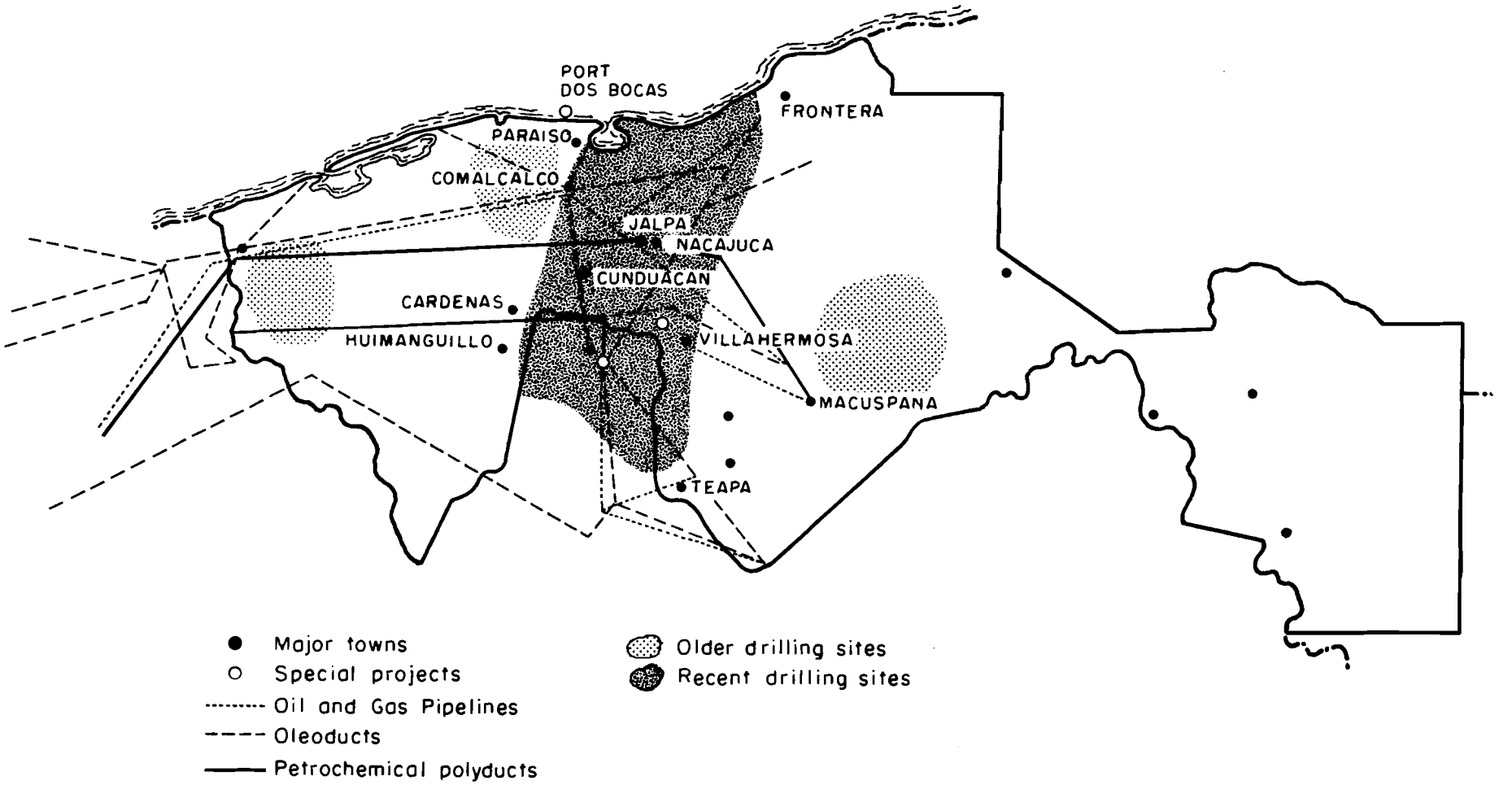
The Oil Boom of the 1970's

In 1970, PEMEX accelerated its drilling activities in Tabasco, and began to work much deeper, at 4500 meters. With wells Sitio Grande #1 and Cactus #1 in 1972 and Pozo #5 in February 1973, they struck high pressure pay (191, pp.4-5). Subsequent exploration wells were drilled with extraordinary success rates and yields per well - the oil boom had begun.

After 1977, PEMEX expanded rapidly. Between 1976 and mid-1978, the number of productive wells rose from 114 in seven fields to 160 in 14 fields, with expectations that by 1983 there would be 477 wells drilled (164 pp.10-11). These areas are shown on Map 7 along with other petroleum infrastructure in the zone and newly planned projects.

A petrochemical plant was built in Cactus in 1973-74 for gas-sweetening and expanded to a capacity of 200 m. cubic feet per day by

MAP 7. PETROLEUM INFRASTRUCTURE IN TABASCO, 1980



*Mexico, Secretaria de Programacion y Presupuesto, La Industria Petrolera en Mexico, 1979, pp. 353-355.

1979. 368.8 kilometers of polyducts were built (including the start of the Reynosa-Cactus gas pipeline), and gasoline pipelines to Cactus from Cunduacan, Sitio Grande and Nispero. A vast network of roads was built through the swampland, 225 kilometers by 1978. Future plans include expansion of the Cactus plant; construction of a new petrochemical center in Gil Perez; a port facility in Dos Bocas capable of exporting 700,000 bbl/day oil; and a 6500 ton/day capacity ammonia plant in Villahermosa, in addition to more pipelines and wells (146, p.6).

Principal Effects of PEMEX on the Tabasco Economy

PEMEX invested billions of pesos in Tabasco during the 1970's, building wells and other infrastructure as rapidly as possible. This activity disrupted Tabascan society in four principal ways: inflating the economy and causing commodity and labor scarcities; stimulating migration and changes in the labor market; subjecting agricultural land to expropriation, trespass and pollution; and disrupting established social patterns and mores. The effects in the Rivers, eastern part of the Sierra and Savannah regions were minimal. The impact was felt most strongly in the quadrangle formed by Villahermosa, Cunduacan, Cardenas and Reforma towns.

But there is a strong temptation to attribute all recent changes in Tabasco to petroleum development, when in fact many socioeconomic phenomena of the past decade are part of longstanding historical trends in the state. The following section summarizes the various changes in Tabasco in the 1970's, and their sources.

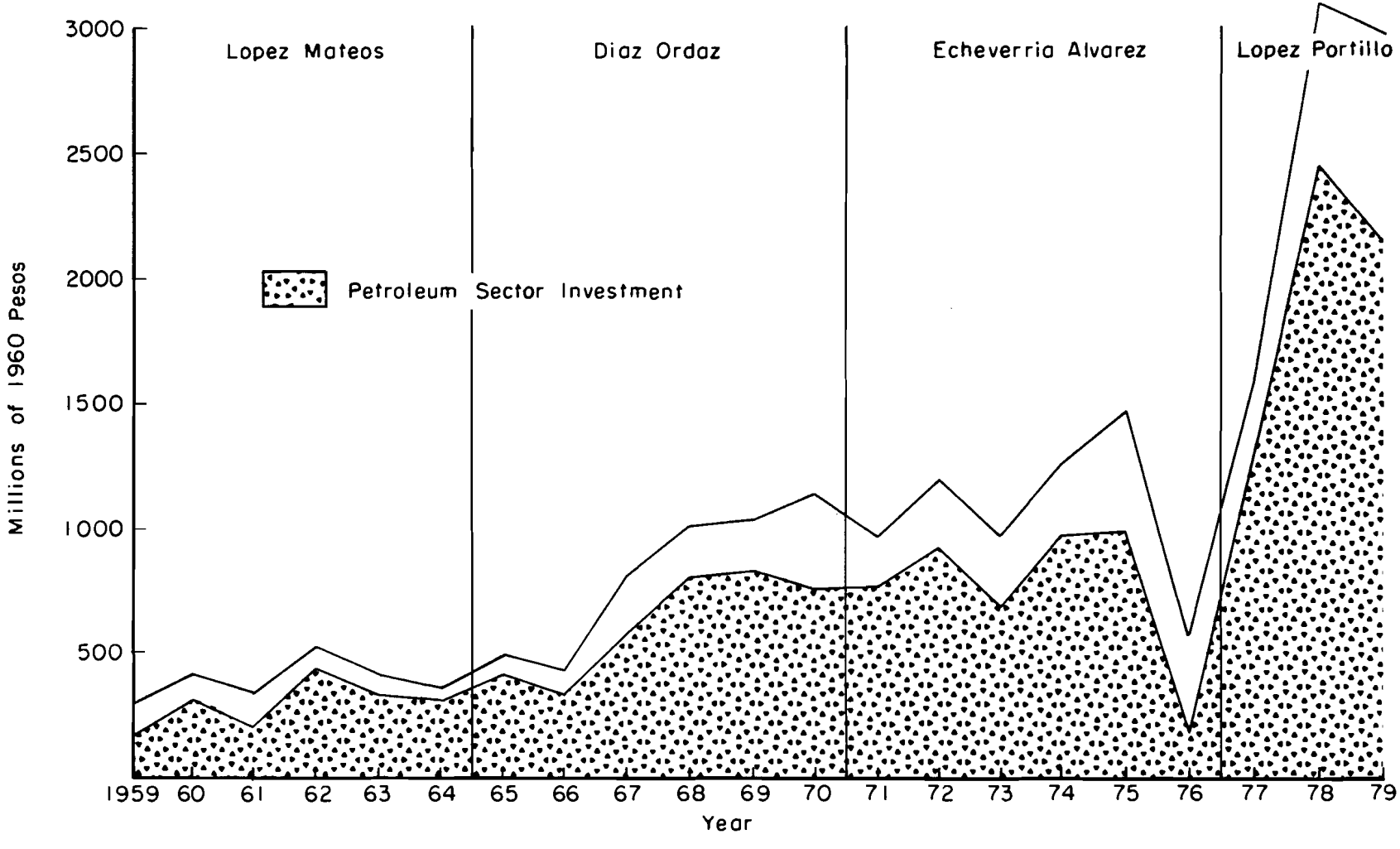
Economic Impact of PEMEX. Total national petroleum investment rose from $4576.1 m. in 1971 to $62,703 m in 1978. Of this, the greatest part was spent in the Tabasco/Chiapas area. Chart 1 shows changing federal investment in Tabasco between 1959 and 1979, and the dominant role of PEMEX. In 1978, PEMEX paid $7.2 m per day in salaries in Tabasco. By contrast, the total value of agricultural and livestock production in the state in 1974 was only between $1500 m and $2000 m (67).

This profile is somewhat misleading, as most PEMEX expenditures in Tabasco were for purchases made elsewhere. An estimated 15.5 per cent were for local wage and salary payments, and 21.9 per cent were for profits and other expenses in state (67, p.59). Most internal economic linkages were for construction work; there were few productive linkages to the non-petroleum Tabascan economy.

PEMEX became the most important taxpayer in Chiapas and Tabasco. Total state and municipal receipts in Tabasco rose markedly (73, p.14):

1973	$ 1.5 m
1974	14.0 m
1975	150.0 m
1976	280.0 m
1977	650.0 m

CHART 1. FEDERAL INVESTMENT IN TABASCO, 1959-1979* (by presidential term)



*Tabasco, Comite Promotor del Desarrollo Socioeconomico del Estado de Tabasco, Analisis de las Inversiones Publicas 1959-1979, Charts 6 and 9.

By comparison, in 1976, the state received only $21.3 m from the cacao sector and $81.5 m from the livestock sector (164, p.63).

This enormous increase in local purchasing power stimulated the commercial and service sectors. The number of established commercial enterprises rose 30 per cent between 1970 and 1978 (compared with 65 per cent 1960 to 1970 for smaller-scale operations). The volume of commerce rose many times this, even without including non-established commerce (such as street vending), which is evidently booming.

Inflation and Scarcities. As a result of this increased economic activity introduced from outside the state, inflation has run rampant. Some items, particularly construction goods, ran 70-100 per cent higher in cost in Villahermosa, Cardenas and Comalcalco than in Mexico City in 1979/80 (70, 78). The cost of food for a family in Cardenas town rose between 22 and 51 per cent between 1976 and 1979, depending on their typical "food basket" (40).

Housing was particularly scarce in the major towns, and extremely expensive, even in squatter settlements. Most available hotel rooms were rented by working people, disrupting the state's tourism program for lack of accommodations.

The state government had made some strides in controlling specific types of inflation, such as food (by building CONASUPO and cooperative stores), transport (building new trucking centers and operating competing bus lines), and housing (operating a small number of direct and contracted building programs). But the devaluations of 1982 are likely to exacerbate inflationary problems in the near future.

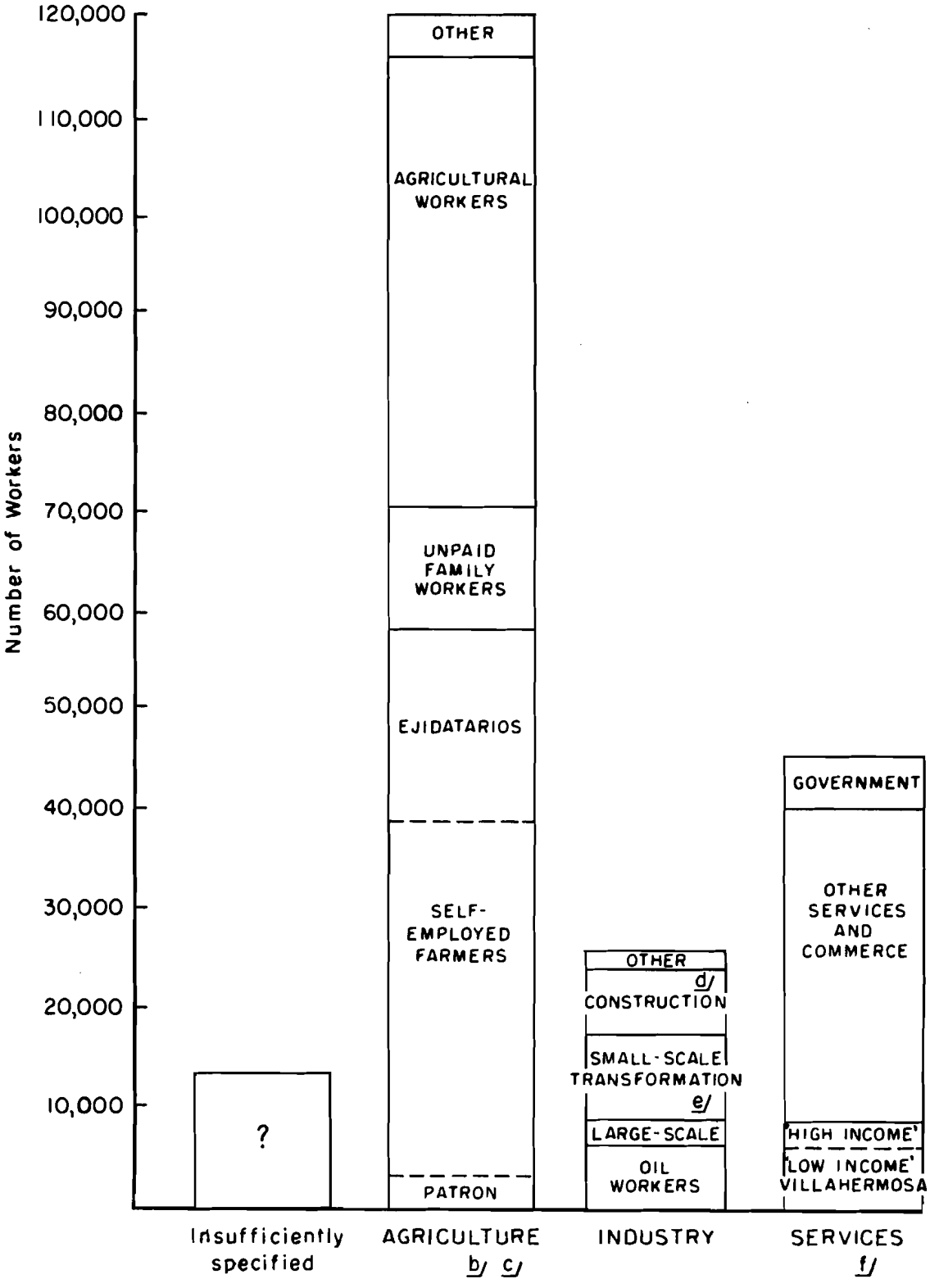
Labor Market Disruptions. In general, wages in Tabasco have increased faster than the cost of living index in the past decade.

PEMEX basic labor payments are well ahead of most other groups. To work full-time ("de planta"), one must be a union member and pay an expensive entrance fee. The union - the Sindicato de Trabajadores Petroleros de la Republica de Mexico (STPRM) - is extremely powerful and plays a large role in running PEMEX. Temporaries ("transitorios") work at much lower rates, yet are chosen by the union whose officials often charge for bestowing jobs. Large-scale contractors also frequently hire through the union.

Direct employment by PEMEX and the construction companies contracting with them rose from about 6000 (of whom two thirds were temporary) in August 1977, to between 40,000 and 50,000 in 1979/80 (164, pp. 13-14). They lived primarily in Villahermosa and Cardenas or near the petroleum operations.

Chart 2 shows the composition of the EAP of Tabasco in 1970. The entire population working in construction at that time was only 6000. Agriculture was obviously dominant. Very few workers earned over M$1000 monthly - a few workers in large-scale transformation activities,

CHART 2. CHARACTERISTICS OF THE 1970 EAP IN TABASCO[a/]



For footnotes, see NOTES, Chart 2.

oil workers, a few thousand participating in high-income service activities in Villahermosa, and a very small percentage of farmers.

By 1980, the proportion in oil-related activities had grown enormously, as had the construction sector as a whole, and urban services. Agricultural employment was much less important.

These statistics, however, indicate only the primary occupation. Other sources, such as the Sociodemographic Survey of Tabasco, show that secondary employment is widespread, including among agricultural workers. It is also extremely common for farmers to leave farming temporarily for a period of weeks, months or years to earn wages off-farm. This was the case for perhaps a fourth of Tabascan farmers during the oil boom.

Of all the rural landless - those who in 1970 were unpaid or paid family workers and those with no ties to the land - we estimate that a third sought some part-time or permanent off-farm employment during the 1970's. In the immediate vicinities of oil production, this ratio is certainly much higher. Combining farmers and landless, we find that some thirty per cent of the 1970 agricultural labor force had participated by 1980 in employment in one of the "new" non-farm sectors. See Chart 3.

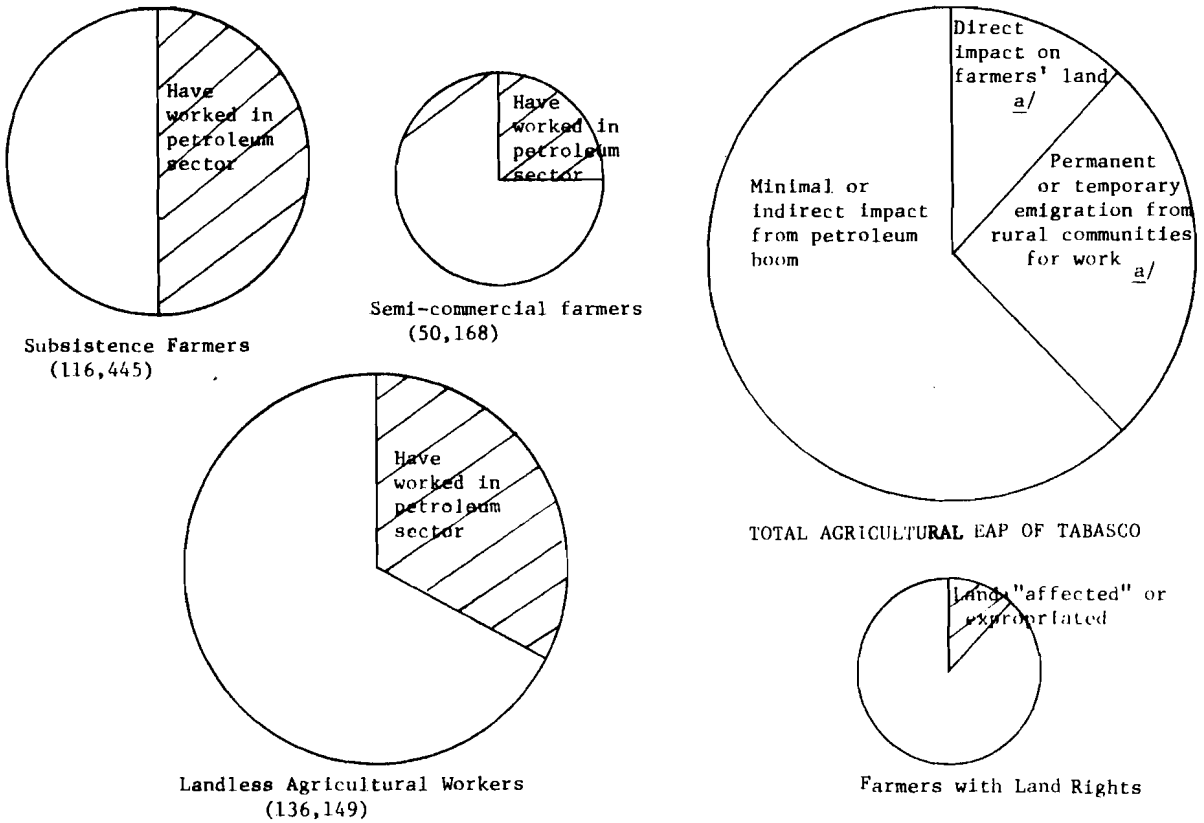
Immigration and Settlement Patterns. The demand for skilled labor for petroleum development, and the general attraction of the economy of Tabasco led to considerable new immigration to Tabasco in the 1970's. Counteracting this trend somewhat, however, was the continued strength of out-migration from Tabasco of natives, and of PEMEX-related workers who came to Tabasco only to finish a particular job.

A PEMEX official of the Cunduacan area estimated that in 1980 perhaps twenty per cent of the transitorios and a little under ten per cent of the permanent workers were Tabascan. He guessed that a fifth of the people then working for PEMEX had also been working for the company in 1970, while the rest were people who were relatives or recommended by former PEMEX workers in Veracruz. New workers since 1978 tended to be Tabascans.

In just the past decade, Villahermosa grew from 99,565 to 107,450 and Cardenas from 15,643 to 31,005, but had reached population peaks in 1978/79 of an estimated 300,000 and 100,000, respectively, due to temporary inhabitants. The urban population accounted for a third of the population and Villahermosa alone for nearly a quarter, whereas in 1970, the population was still predominantly rural, with only a quarter residing in cities of over 10,000 (66, 110).

Of all migrants to Tabascan cities, at least half were from out of state. Whereas in the 1960's, there was considerable migration to rural areas due to frontier settlement and the Chontalpa Plan, during the 1970's there was little migration to agricultural areas, with the exception of the Balancan-Tenosique Plan area in the eastern panhandle (66, 110).

CHART 3. ESTIMATED IMPACT OF PETROLEUM BOOM ON TABASCAN FARMERS AND FARMWORKERS*



*Based on state expropriation information and extrapolations from the Cacao Farm Case Studies, Malaria Control population information, Population and Agricultural Census Information, and the Sociodemographic Survey of Tabasco.

a/There is probably some overlap between these two groups.

b/Note that 30 per cent of the entire agricultural labor force seems to have participated in petroleum-related employment at some time during the decade.

Pollution. Ecologicial impacts of PEMEX include crops and pasture contamination, fisheries destruction, death and illness of cattle, water pollution, human eye and lung ailments from air pollution, corrosion of fence wire and zinc roofs, leaks of chemicals from the holding ponds by drilling sites; and ruined roads from excessive transit by heavy vehicles (69). Some Grijalva Commission engineers project large-scale ecological damage to coastal lakes from the port activities on the coast; and road construction planned by PEMEX which would change floodplain drainage patterns and increase flood risks.

PEMEX did regularize many operations in the late 1970's and improve pollution controls. In September 1977, an Office of Environmental Protection was set up in Villahermosa by the state government to keep check on progress.

Expropriation and "Afectaciones". By 1980, PEMEX had drilled wells or built roads and pipelines on the properties of several thousand ejidatarios and propietarios; perhaps five to ten per cent of all the state's farms. A small percentage of land was expropriated for permanent activities, but most was affected temporarily, as a passage for equipment, for example. Expropriations have been greater on ejidal land than private, because in such cases, the company does not have to pay the value of the land, only improvements. The most serious land use change was the felling of thousands of hectares of coconut plantations near Paraiso for the pipeline and port.

For many farmers, the loss of some land or cattle, or the ruin of annual or particularly perennial crops, was a severe economic setback. Compensation for damages was made according to a formula widely felt to be obsolete. In 1977, ruined maize crops were compensated with $3500 per hectare versus $4090 cost of production; cacao with $17,000 versus $30,000 per hectare; and a one-year-old cacao sapling with $50 vs. $200 production cost.

Due to farmer outrage, a special claims commission was set up in Villahermosa with representatives from SARH, the Ministry of Patrimony and Industrial Promotion (SPFI), the Agrarian Reform Ministry, the state government, PEMEX and the League of Agrarian Communities. Between 1976 and 1978, the value per year of payments for pollution and affectation proceedings grew nearly four-fold; PEMEX had paid over $50 m in compensation by early 1978 (1, pp.44-46).

The fears and insecurities of these farmers have an effect beyond their numbers - in decisions by other farmers not to invest in their land for fear it will be expropriated or ruined.

The Social Impact of PEMEX. The increase in government funds for social infrastructure which accompanied the petroleum boom did indeed have an important positive effect on living standards in Tabasco. Between 1970 and 1980, there was, for example, a sharp increase of piped water and sewerage facilities, and near-total coverage of schooling for school-age children.

But the social fabric of Tabascan society has been rent. Throughout the petroleum areas one hears complaints of violent crime, drinking, pornography. Recreational activities are oriented to young single men with cash, not families. Relations inside families are changing - women are put in charge of farms while husbands and sons leave all week to work in Cardenas; many families have been abandoned.

The active work day for those employed in petroleum activities is longer than in farming. There are long commutes in crowded, dangerous trucks - added to the anxieties of industrial or construction accidents. Diets are changing; cash needs are increasing with inflation. Even where large monetary indemnifications are paid for affected land, lack of experience with cash investing has led to tragic squandering of resources.

There have been few efforts by natives to welcome or socially incorporate newcomers. They are expected to leave within a few years and their own behavior - families left in Mexico city, weekends and vacations spent away - reinforces this.

"PEMEX has brought to Tabasco three things: lots of filth, lots of undesirable people, and lots of inconvenience" was how one native summed it up. More telling still of the deep resentments felt by many toward PEMEX is the emergence of a horrifying myth. There has long been widespread superstition in Mexico that into all large bridges some child must be thrown as sacrifice to ensure that it stands strong. Supposedly the government steals children to provide this protection. The story has been changed now, and I heard versions of it among frightened Mexico City housewives as well as in Teapa, Paraiso and Cunduacan. It is now PEMEX that steals the children - to throw down the oil wells to ensure that the black gold flows.

Social and Political Conflict with PEMEX. The haste with which early PEMEX activities were carried out created lasting resentments in Tabasco: drilling rigs were built on farmland before expropriation papers were ever finished, and payments were delayed for over a year. Roads were destroyed by over-use; the negative impacts described above became obvious.

External control over PEMEX activities was sharply eroded by the 1978 reform of Articles VII and X of Article 27 of the Mexican constitution. This made it impossible to refuse PEMEX occupation or expropriation and gave petroleum production priority over any alternative land use (164, p.33).

PEMEX at one time proposed siting of the new petrochemical plant in a densely inhabited cacao zone of Cunduacan (164, p.31). It was eventually moved to Gil Perez in Centro, after demonstrations and protests by cacaoteros. On another occasion, the army was brought in to squash farmers' refusal to allow PEMEX trucks to enter their rancheria, in protest of low or no indemnification payments. In January 1981, an estimated 10,000 armed campesinos cut off roads in the Chiapas

petroleum zone, in protest of water pollution that had supposedly destroyed much of their cacao crop (176).

The League of Agrarian Communities organized some 3000 individuals in 1980 to improve campesino political organization. The "Pacto Ribereno" is a group of 7500 campesinos who organized legal help to defend their rights and payments of indemnifications (164, p.43).

Temporary workers for major PEMEX contractors have also periodically protested conditions. Attempts in 1974 to organize a union and require transport services and the usual benefits of Mexican working standards led to the firing of 800 workers. The workers' reaction was so violent that 1000 soldiers were called in. Shortly after, a general strike was called that lasted a month - and ended with a contract. But in the next few months, the companies claimed to finish work, closed contracts - and then began work with different people. Other strikes followed, but actions by the PEMEX union and other groups to break up organization were successful. In 1979/80 there were no guarantees at all for transitorios.

Collaboration between state government, the farm producer associations, and supporters in Mexico City led to some restrictions of PEMEX, including an obligation to inform the Tabascans in advance of proposed activities. But the collaboration is shaky. People resent that the main beneficiaries of the boom are the "rentistes, contractors, large merchants, speculators, landlords, bankers, industrialists, PEMEX union officials and privileged PEMEX workers" (164, p.79) - and suspect these of having close contacts with the government.

The Contradiction: An Agricultural Boom

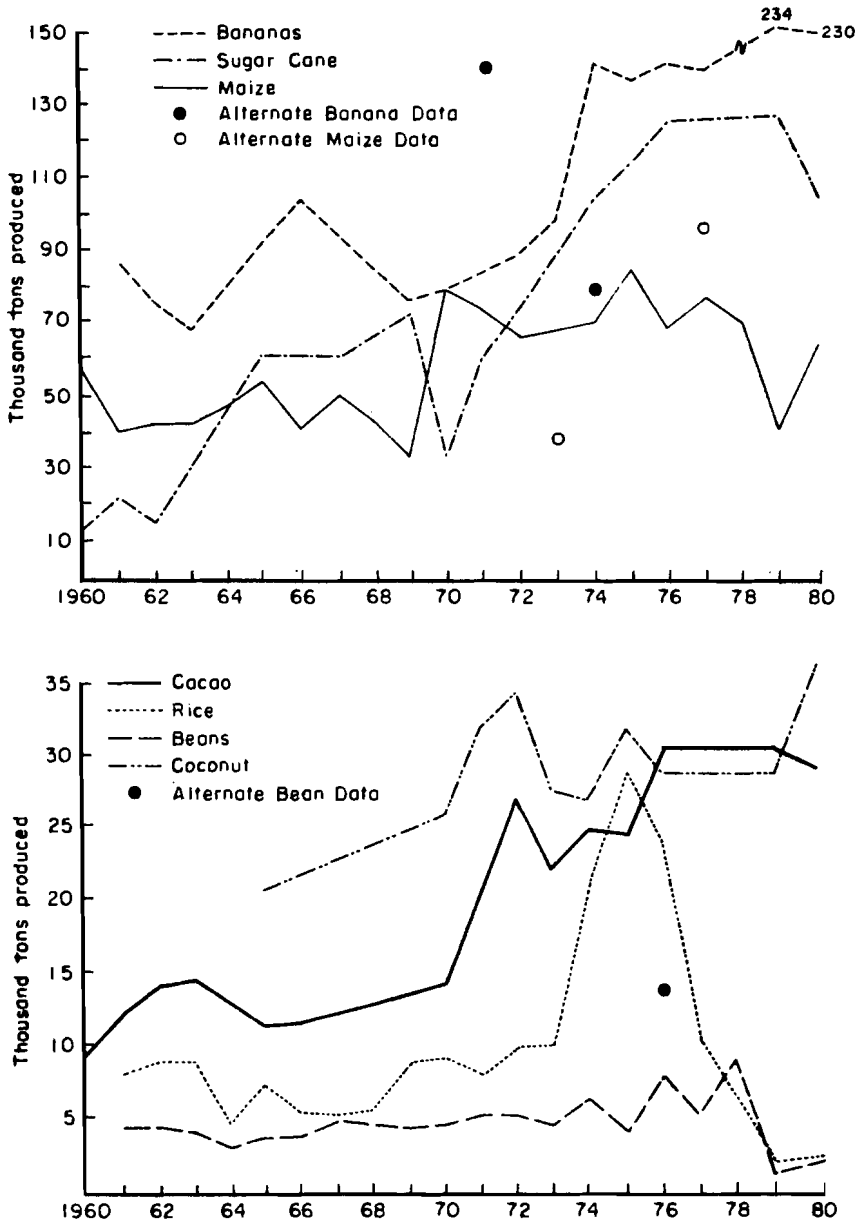
Despite all of the above real problems with petroleum development, the agricultural sector over the same period experienced its own boom. Chart 4 demonstrates that agricultural production during that decade rose for all major products except maize and beans. (The scanty evidence for maize farmers suggests large-scale emigration for off-farm work, whether temporary or permanent is not known).

The generally successful performance of the rest of the sector can be attributed to rising agricultural prices, new agro-processing investments, the state program of assistance to and investment in agriculture, and the flexibility of the smallholder farm sector.

Agricultural Prices

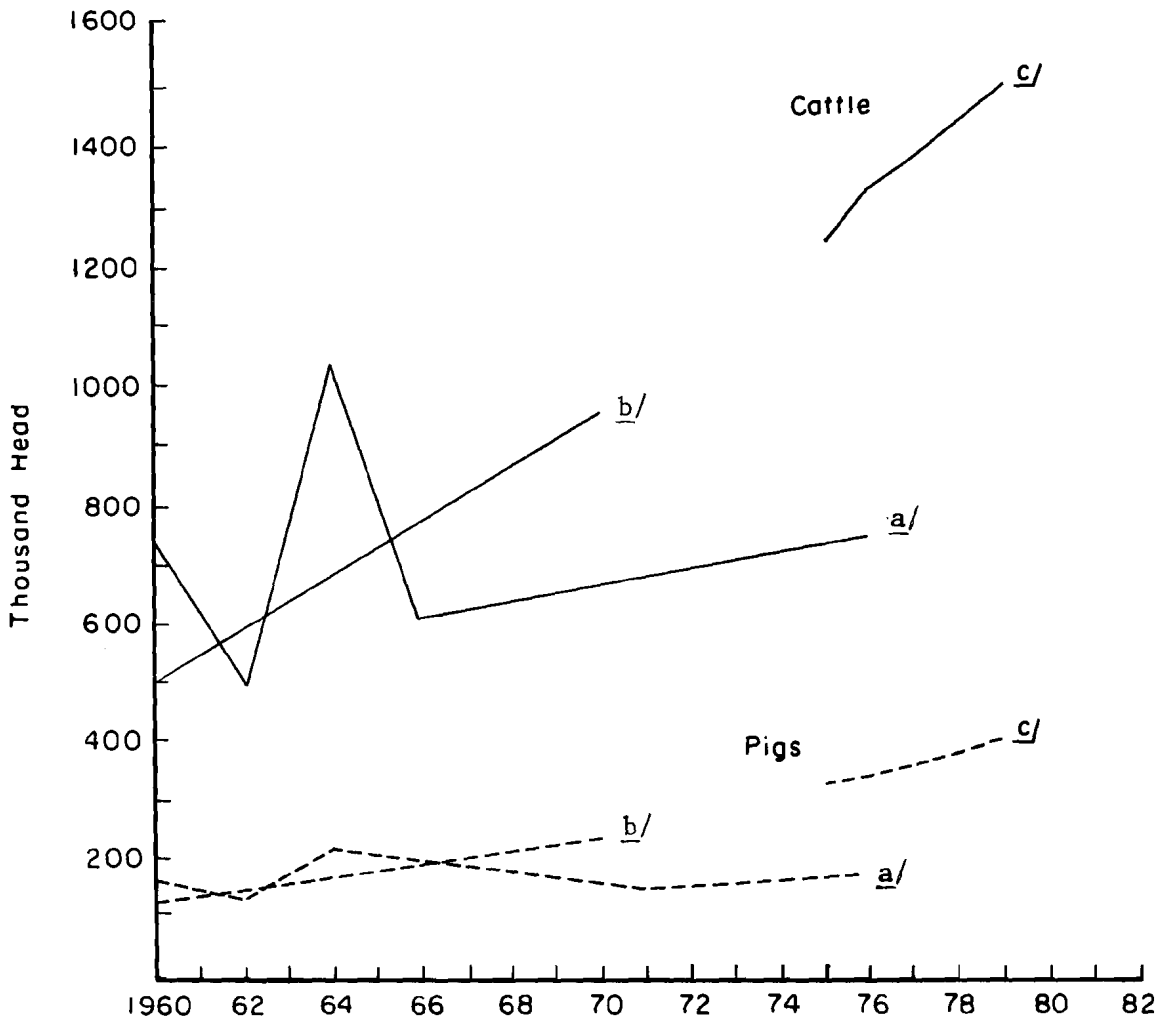
Chart 5 shows changing real prices for selected commercial products. Price levels for cacao and beef were particularly favorable, that for sugar cane, coconut and bananas less so, but still rising in real terms. For the export crops, devaluation of the peso in 1976 helped to spur price increases and production. The contrasting relatively low price of maize, in the context of an inflated cost of living, amply justified maize farmers' negative response.

CHART 4A. AGRICULTURAL PRODUCTION IN TABASCO, 1960-1980*
Crop Production



*Sources: Secretaria de Industria y Comercio, Direccion General de Economia, Censo Agricola, Ganadera y Ejidal, 1960 and 1970, "Tabasco," Cuadro 10, Mexico, D.F.; Eduardo Bolio Villanueva, La Economia del Estado de Tabasco, Coleccion de Estudios Economicos Regionales, Sistema Bancos de Comercio, Mexico, D.F., March 1976; Manlio Tirado, Tabasco y el Gasoducto, (Ediciones Quinto Sol, S.A.: Mexico, D.F.), 1978, pp. 54-60; SARH, Departamento de Economia Agricola, Residencia Tabasco, Villahermosa, Tabasco, statistical records.

CHART 4B. AGRICULTURAL PRODUCTION IN TABASCO, 1960-1980
Livestock Production

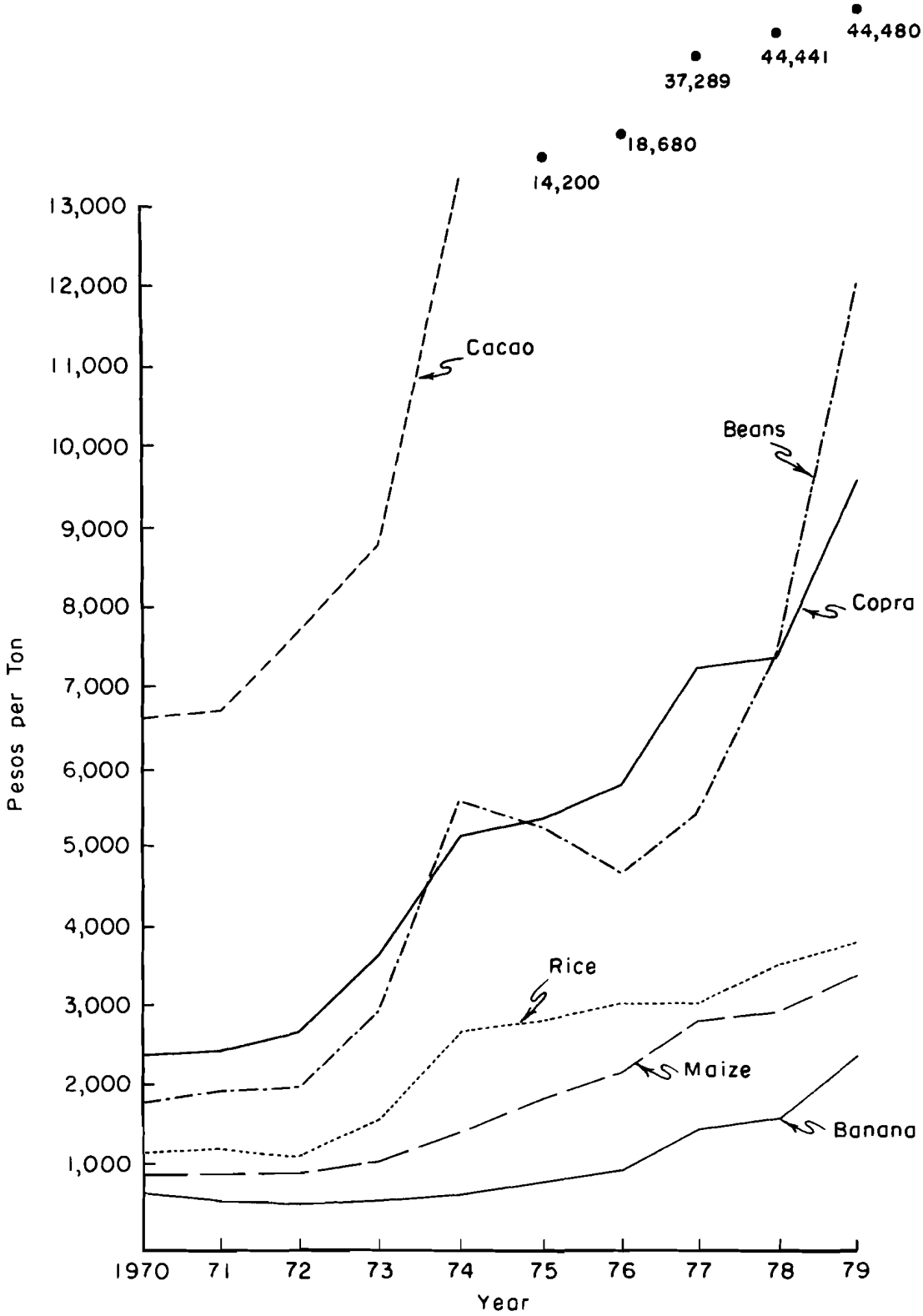


a/ SARH, Anuario Estadistica , years indicated.

b/ Mexico, Secretaria de Industria y Comercio, Direccion General de Estadistica, Censo Agricola, Ganadera y Ejidal, 1960 and 1970.

c/ SARH, Direccion General de Economia Agricola, Residencia Tabasco, Villahermosa, Tabasco, statistical records.

CHART 5. PRICES FOR MAJOR AGRICULTURAL PRODUCTS OF TABASCO, 1970-1979*



* Mexico, SARH, Econotecnia, Vol. IV, No. 8, August 1980, pp. 18-30.

To offset the impact of PEMEX, the program would train skilled workers locally to reduce immigration, bring sports centers and concerts to offset the influence of petroleum workers' cantinas, attract tourists so that petroleum workers are not the only outsiders, strengthen agriculture to offset petroleum dominance of the economy (153, p.12).

The focus of economic development plans for the state was the already densely populated area from Cardenas to Villahermosa, and north to Paraiso. These three cities are to be the major urban centers. The most important investments during the 1976-82 period were the Gil Perez petrochemical plant and the integrated petroleum port in Dos Bocas.

Petroleum led the sectoral distribution of the budget (42 per cent) - followed by industry (19), human settlements (11), agriculture (11) and tourism (9).

A modern new airport for Villahermosa was completed in 1979 and work began on a four-lane highway from Coatzacoalcos to Villahermosa. Also in the capital are "Tabasco 2000," a large-scale urbanization project, and a convention-museum-tourism center.

The "Industrial City" of Villahermosa was constructed in 1972 and began operating in March 1973. Under the "Alliance for Production" an agreement was signed between the Governor and private industrialists for investments there. Over 6000 jobs were expected from the 83 projects under that agreement. By 1978, 28 industries had contracted with the City, of which nearly a third were agro-processors or storage facilities for agricultural products (13, p.46; 81, p.46).

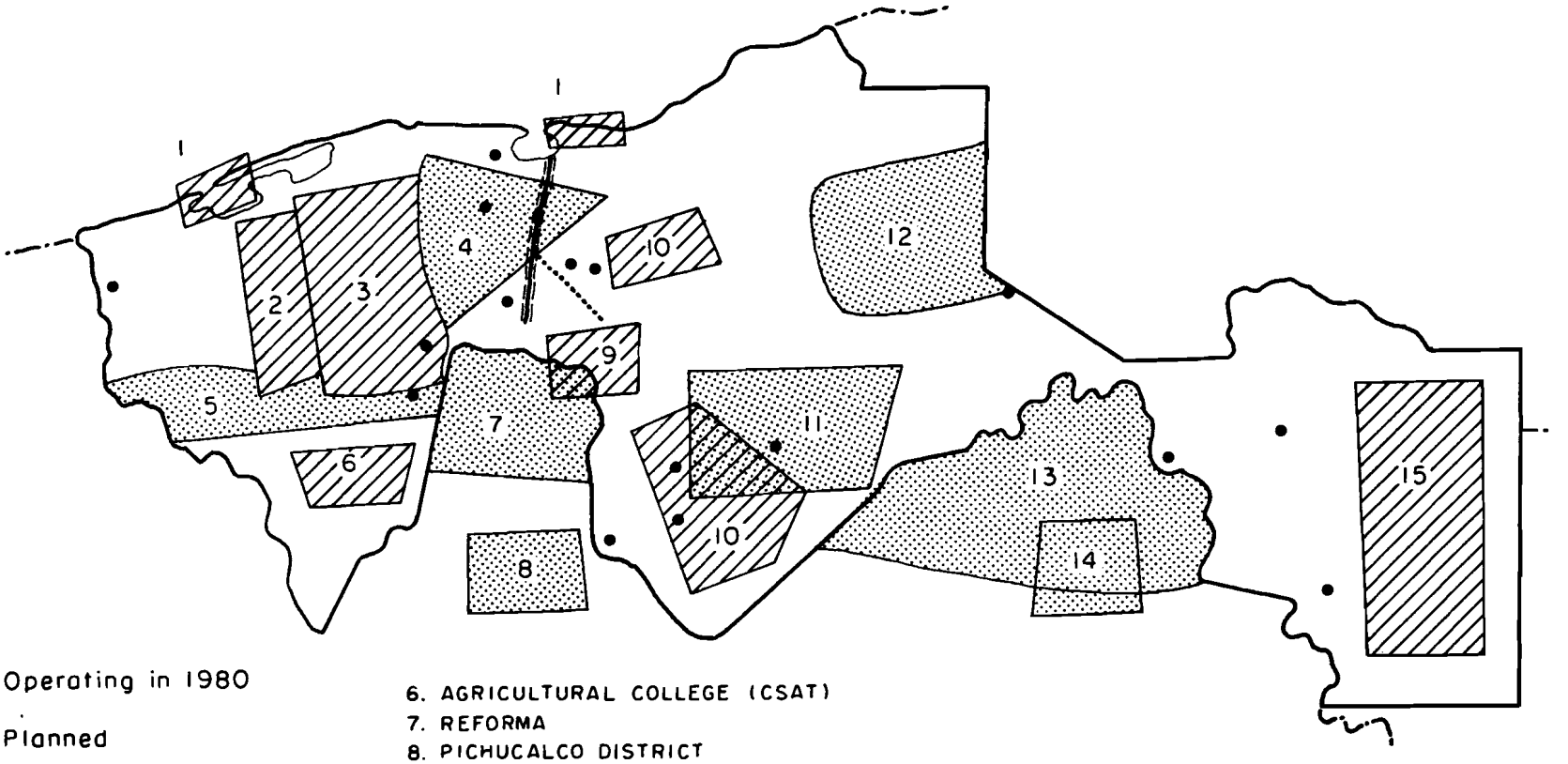
Of $8500 m pesos for Alliance expenditures in 1979, nearly a quarter went to agriculture (mostly production credit), 37 per cent to industry (mostly construction materials), 12 per cent for human settlements, 21 per cent for tourism (67, p.47). Including PEMEX, and other public and private expenditures, total Plan investments in 1979 ran to over $30,000 m (or US$1.3 b dollars). Of this, nearly forty per cent was to have been made by private interests, in return for tax advantages, credit assistance and infrastructure provision.

Of Plan funding, 54 per cent came from the federal government, 30 per cent from federal financing for private investment projects, ten per cent from private sector financing and six per cent state and local financing. The federal sources include a substantial amount of international financing for PEMEX, social infrastructure and agriculture.

Government Investment in Agriculture

Although in relative terms, agriculture represented only 11 per cent of the budget, in real terms this was an unprecedented level of assistance to the sector. Map 8 shows the major agricultural projects in Tabasco in 1980. These include the rainfed agriculture district

MAP 8. AGRICULTURAL DEVELOPMENT PROJECTS IN TABASCO, MEXICO*



*Mexico, COPRODET, "Plan Sectorial: Agropecuario y Forestal," Plan Estatal de Desarrollo , 1979.

programs, the Plan Chontalpa, Plan Balancan-Tenosique, and the Grijalva Commission drainage projects.

District I emphasizes livestock production; District II, agricultural production. SARH runs a series of programs, including input production, research, technical assistance, crop improvement programs for cacao, coconut and bananas; promotion and planting programs for rubber, cassava, cashew, achiote and jamaica; and programs for fruit trees, apiculture and basic crops (72, p.49).

The Chontalpa Plan has been re-organized, and in the late 1970's showed much improved statistics on production, credit repayment and labor absorption. The Balancan-Tenosique Plan - another collective enterprise primarily for cattle production - was begun in 1971 on 61,000 hectares.

The great "Drain to the Sea" was proposed and initiated to protect the Central Chontalpa area from flooding, and open new land for cultivation. This costly project, which would extend from Centro to Paraiso municipios, is highly controversial for economic, political and ecological reasons.

Other drainage projects are underway in Zapotal (a PRODERITH pilot project), Isla and Rio Seco. The Rio Seco project, originally the Chontalpa Plan's second phase, covers 37,000 hectares in the most densely populated part of the state, and requires the completion of the "Drain to the Sea" to be successful. There are a number of other projects to build drains, dikes and bridges, and to desilt drains and rivers, mainly in the Chontalpa region.

The federal Integrated Program for Rural Development (PIDER) operated in 1980 on nearly eight ejidos, with over 4500 ejidatarios, mainly in the Sierra and Old Chontalpa regions. Its projects included drains, roads, fencing, and plantation establishment.

The Planning Commission for Marginal Areas (COPLAMAR) worked in agriculture and social infrastructure with indigenous groups, mainly in the Old Chontalpa semi-flooded areas. Storage capacity for CONASUPO in the state was increased from 1500 tons in 1977 to 21,500 tons in 1979.

In 1979, total agricultural investments amounted to 14 per cent of that year's estimated total agricultural production. In addition, federal agricultural credit guarantees (FIRA) amounted to well over half a billion pesos, mostly for long-term livestock loans (79, p.47).

The Campesino Economy as the Principal Stabilizing Factor in Agricultural Production

But while good agricultural prices and strong governmental support were critical to Tabasco's agricultural boom, they were not sufficient in themselves. For, upon closer examination of the production statistics and widespread interviewing among farmers, it was

evident that large numbers of farmers did respond to the disruptions of the petroleum boom by reducing production. These were the larger farmers who depended upon hired labor for farming; those whose behavior was guided by the objectives of neo-Classical microeconomics. Even where prices were such as to permit profits on such farms, these farmers frequently chose to invest their resources in town, where the returns were higher.

The stability of agricultural production in Tabasco came mainly from the campesino sector, in particular the farms of sufficient size to support a family, yet small enough to be operated predominantly with family labor. Their rationale for production decisions was based on considerations best explained by the theory of "family economy." These farm families both supplied labor on the off-farm labor market, and hired labor at critical times on their own farms. Their supply of labor was so flexible that, when high farm prices and high off-farm wages warranted it, they could expand employment both on- and off-farm.

The peak labor demand periods for major farm activities in Tabasco are March-May and November-December. The main period for construction activity on roads, drains, and other projects, by contrast, is February-May, the dry season. This labor seasonality leads to differing composition and size of the agricultural labor force at different times of the year, and wreaks havoc on macro-statistical analyses of employment in the state.

To meet peak labor demand, a large part of the smallholder sector (nearly sixty per cent of farmers) worked periodically for largeholders, and often for each other, in between work requirements on their own land. Such work relations were often formalized, with largeholders providing credit and help during sickness in return for valuable peak season help - and neighbors joining in godparenthood and work teams.

Many individuals in the "worker" category were in fact sons of smallholders who were paid by parents or neighbors, and probably lived at home, hence not "landless" in the strict sense. Many others are "ejidatarios without land rights." This status, though often literally the case, frequently masks a cooperative situation in which, for example, several brothers farm together, but only one is represented on the ejidal council or on official records.

Permanent hired labor is uncommon, but probably over fifty per cent of all farmers - and this includes many with under five hectares of land - hire non-family labor at some time during the year. The level of demand for such work depends on product price and on yields. When prices are high, it is worthwhile for farmers to hire help for more intensive cultivation. When yields are high either due to natural conditions or to more intensive cultivation, much more hired labor is required at the peak harvest seasons.

Potential family labor not generally utilized provides much of the flexibility. The marked differences in employment figures between the

Population and Agricultural Censuses clearly illustrate the critical role and extent of agricultural labor by family members who do not consider themselves to be principally involved in the agricultural sector (Thesis, Appendix Table E-1). This includes farmers' wives and daughters, children usually in school, and children or cousins with other jobs who help on the weekend and afternoons on the relative's plot at peak labor times. In the cacao-producing municipios of Tabasco, this characteristic is pronounced.

Because the major petroleum zone was so densely populated, good communications with urban centers permitted farm family members to work for PEMEX or the constructoras without leaving home. In the Chontalpa, even farmers who were away all week returned to do farm work on the weekends. Hence, rural emigration rates were relatively low, despite extensive employment off the farm.

In addition, the farm budgets of these family-based farms were organized to minimize the impact from petroleum-induced economic changes. Not only was hired labor a relatively small part of the budget, but the families could sometimes substitute family labor for purchased inputs which became too expensive (such as hand labor for herbicides).

The Cacao Economy as a Case Study

The importance of the campesino producers in offsetting the economic disruptions of petroleum development is clearly illustrated in the case of the Tabascan cacao farmers. The cacao crop requires extremely high labor inputs and farmers would be expected to be particularly sensitive to off-farm wage changes. Yet production has risen and area planted has expanded. Cacao production is still the most important agricultural sector in Tabasco, in terms of income and rural employment.

The next chapter discusses the cacao economy of Tabasco, and introduces the major types of cacao producers in the state. The interplay between farmers, farmworkers, PEMEX, government assistance programs and the general Tabascan economy provides a fascinating example of the nuances of economic development, and a useful case study to illustrate the flexibility of campesino farming systems.

CHAPTER 3. THE CACAO ECONOMY OF TABASCO

"Junto a una taza de te, platicamos; junto a una de cafe, discutimos; con un chocolate, ninos, mozos y viejos, sentimos el placer de la vida."

("Beside a cup of tea, we chat; beside one of coffee, we argue; with a cup of chocolate we - children, adults and older folk - feel the pleasure of life.")

- Enrique Perez Gutierrez (quoted in 133)

"Delicacy of the gods"

- Linneus

Cacao has for the inhabitants of Tabasco an importance beyond the economic - it is one of the identifying features of the Tabascan image. But from the staple component of a traditional subsistence livelihood, its production has evolved into a dynamic part of the state's modern economy with sophisticated processing and marketing components and a structure of production quite unlike that of even a few decades ago.

An Introduction to Cacao

Before discussing this structure and the principal causes of increased production, it would be useful for the reader to get a brief review of the international cacao market, the principal technical characteristics of cacao production, and the role of labor in production.

Cacao is a tree naturally found in the lower stories of the tropical rain forest, from whose seeds chocolate is made. Hernando Cortez, after discovering cacao in the Conquest of Mexico, brought it to Europe. When the Europeans learned to combine the bitter paste with sugar, a popular drink was born, creating a commercial demand for cacao. In the 19th century, chocolate industries developed in Europe.

The principal trade products of cacao are the cocoa bean, typically fermented; cocoa butter, the fatty part of the seed which has numerous food and non-food uses; cocoa powder and cakes used for cooking; cocoa paste; and of course the more elaborated chocolates for drinking or eating.

In 1978, 28 per cent of world cacao production came from South America, half of which was from Brazil. Seven per cent was from Central America; 60 per cent from Africa (Ghana, Nigeria, Ivory Coast and Cameroon), and five per cent from Asia and Oceania (62, pp.2-6). The major consumers are in North America and Europe.

Technical Processes of Cacao Production

Cacao (Theobroma cacao) in the wild is a small tree in the lowest story of a rainforest, about six to eight meters high. Optimum conditions for its production require temperatures of 21-32 degrees Celsius; over 1250 millimeters rainfall with no month under 125 millimeters; altitude under 300 meters; well-drained and aerated, deep soils with a crumb structure (135, p.575). Established cacao is not hurt by flooding for several weeks (166, pp.34-35).

Properly raised and pruned, cacao develops a main stem one to two meters high, at which point it divides into a "fan" or "jorquette" of three to five horizontal limbs. A sucker (or "chupon") immediately below the jorquette on the main stem leads up to a new jorquette. Buds on the stem and leaves are called "cushions", where the flowers arise. After the flower forms, a "cherelle" (or small pod) emerges: only five per cent of these are pollinated (158, p.6). The cherelles attain full size four to five months after fertilization and ripen in a month.

Each contains 20 to 60 seeds (135, p.578). Harvest can take place over two to three weeks, and once harvested, the pods keep for up to a week (135, p.589). In general, the farmer harvests each tree every fifteen days during peak production season and once a month at other times.

There are three main types of cacao: the criollo, the forastero, and their cross. The first produces the highest quality bean, but takes six years to come into production, is susceptible to disease and produces only a quarter kilo of dry beans per tree. The forastero is more resistant, very productive and begins producing in the third year. The clonal hybrid and "Ceylan" (or "grafted") crosses are very tall and somewhat more productive, on average, than the forastero.

The color of the criollo bean is white; the forastero deep purple, their cross, a range between the two. The criollo has a higher fat content, pronounced chocolate flavor after fermentation and is very aromatic. These characteristics are minimal in the forastero and limited in the crosses (14, Chart 9). Mexico began substituting its traditional criollo plantations with forastero and Ceylan varieties in the 1940's.

Shade control is important in cacao management. Seedlings must be grown under shade, both lateral and overhead. After the second year, the lateral shade can be removed and only the main shade trees kept. The desirable level of shade in adult trees is determined by the fertility of the soil. There is an inverse relation between them such that extremely well-fertilized soils need little shade and vice versa.

Pruning is done at the end of the dry season (15, pp.176, 178-179). In Mexico the various prunings are differentiated into the "desmadre" (cutting of the "mother" trunk to leave a stronger principal branch); the "desmamone" (cutting of young shoots); "deschupone"

(cutting off the suckers); and the "poda" (the first formation cutting).

The process of fermentation removes mucilage from around the beans, diffuses the purple pigment of raw beans, and removes astringency. Subsequent drying should decrease moisture content from 56 to six per cent for storage. About 750-1000 cured beans make a kilo (135, p.589).

Cacao plants remain productive for decades, but reach maximum productivity around twenty years of age, and decrease production after forty. Other factors leading to declining productivity are a poor canopy, weeds, loss of leaves through disease, poor or too dense shade, and parasites (15, p.215). In Tabasco, the principal diseases and pests of cacao are: black rot (Phytophthera palmivora), Ceratostomelia, thrips (Selenothrips rubrocinctus), aphids and ants. There is some additional threat now of the fungal disease "frosty pod rot" (Moniliaphthora roreri) which has spread from South to Central America. Insecticides are used to control thrips, and Bordeaux and other copper-based solutions are used to combat fungal infections.

Plantations are renovated by one of three methods: regeneration, rehabilitation and complete replanting. The first method requires planting seedlings under existing trees and removing the latter by stages. The second interplants young trees by sections, every year, then requires pruning existing trees to decrease their yield gradually in favor of the saplings. In complete replanting, old trees are cut down and a new plantation begun from scratch; the new stand is more productive, but the cost is high (46, p.161).

In Tabasco, the average area in cacao is 2.7 hectares. The situation is similar in most producing countries. Of the six leading cacao producers, in Cameroon, the average is 1.2-2.0 hectares; in Ghana, two hectares; in Nigeria 1.4 hectares. Only in Brazil have large-scale plantations in this century been successful: over 80 per cent of land planted to cacao is in holdings of over thirty hectares (181, pp. 9-31).

Labor Use in Cacao Production

Chart 6 illustrates the recommended calendar of cacao production activities for Tabasco. The labor input is considerable; even more so in frontier areas where new plantations must be cleared. November, December and January are the prime months of the "Cosecha" ("Harvest"). A second peak occurs in May (the "Alegron"). Year-to-year variability in both major harvest and minor harvests is extreme, as shown in Chart 7. During the peak month of cacao harvest, production varied from under 4 1/2 million kilos (1977-78) to 8 1/2 million kilos (1978-79).

Labor use is a function of intensity of input applications, weeding and pruning care, requirements for drainage systems, and particularly harvested value of the beans, which determines time spent

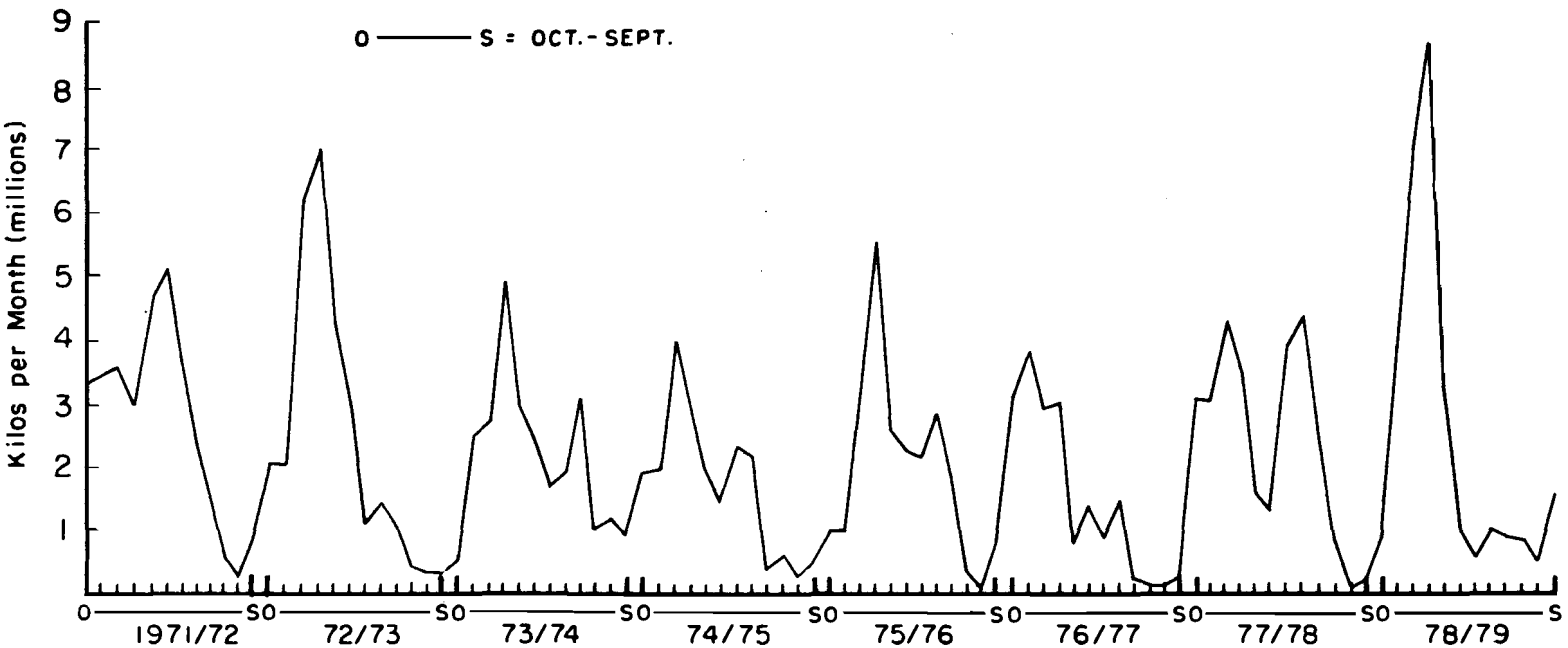
CHART 6 . RECOMMENDED CALENDAR OF CACAO PRODUCTION ACTIVITIES*

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Spray for "black rot" [a/]			Spray with copper sulfate	Fertilize soil	Spray insecticide for "thrips" [b/]	Maintain drains			Insecticide for "pulgon," "salivazo" [c/]		Spray for "black rot"
							Prune			Pesticide for lizard	
							Disinfect pruning cuts				
								Fertilize soil	Resow		
								Remove old trees		Remove excess new shoots	
New plantations									New plantations		
Harvest											

*SARH and Union Nacional de Productores de Cacao, "Calendario para el Combate de Plagas y Enfermedades de las Plantaciones de Cacao y Labores Culturales," Villahermosa, Tabasco, September 1979.

[a/] Phytophthora palmivora Butl.
[b/] Selenothrips rubrocinctus Giard.
[c/] Aphis, gossypii Glover; Stephanoderes guatemalensis Hopkins; Xyleborus affinis Eich.

CHART 7. CACAO PRODUCTION CYCLES IN MEXICO, 1971-1979*



* Mexico, Union Nacional de Productores de Cacao, Boletin Informativo #4, June 1979 and Boletin Informativo #1, 1981,"Produccion Mensual de Cacao por Ciclos Agricolas."

on harvesting and the financial incentive to apply inputs on the plantation. Post-harvest processing such as pod-breaking, bean-washing and drying or fermentation account for a large part of all labor costs. Reported labor use in Africa, the West Indies and Mexico ranges from 27 to 130 man-days per hectare per year, with wide yearly differences due to establishment procedures and yearly harvest increases in the development phase (11, 14, 15, 41, 104, 128, 166).

There is wide variation in the distribution of labor between cacao activities. This is largely because labor can nearly always be substituted for any capital needs of cacao production. Most common purchases are seed, fertilizer, and pest and disease control chemicals. Nearly all of these have labor substitutes (home nurseries and bean collection, hand-picking insects). There are few tools required that cannot be hand-made from low or no-cost materials. Land is, of course, a critical production input. However, there are almost no true economies of scale to large plantation size, because of the inappropriateness of mechanization and in Tabasco, the long history of a central marketing organization. As Kolawole says for Nigeria, "Yield and not size is the principal source of cost economies" (46, p.238).

Yields in Tabasco averaged 538.5 kilograms per hectare in the 1970's, with official yields (1967-1978) ranging between 458 and 841 kilos per hectare (118, 97). Between 1930 and 1971, yields varied from 162 to 439 kilos per hectare; .294 to .798 kilos per tree. The lowest level was in 1930-34; the highest 1962-63 (133, p.90). This compares favorably with international figures: in Venezuela and Cameroon, average yields were only 270 kilos per hectare; in Nigeria 250-300; Ghana 330. As of the mid-1970's, the best new hybrids were producing about 875 kilos per hectare (135).

The Structure of the Tabascan Cacao Economy in the 1970's

Until this century, cacao production took place primarily on individual campesino smallholdings, or on larger plantations using hired or encomendado labor. Marketing was by private commercial intermediaries, often foreign.

The state had 3.5-5.0 million trees in 1854, of which 79 per cent were in the Sierra, mainly Teapa. In 1890, the number was down to three million trees, and the Sierra had 39 per cent. By 1950, the state again had five million trees, 74 per cent of which were in the Chontalpa.

Cacao production in the early 20th century amounted to under 1000 tons per year, on under 3000 harvested hectares. There were probably no more than 1500 producers. Fifty years later there would be about 13,000 producers on 42,000 hectares, marketing over 30,000 tons per year.

Cacao Zones of Tabasco

Map 9 shows the cacao-growing areas of Tabasco. For historical, technical and social reasons, the state can be divided into five cacao regions: Huimanguillo, the Chontalpa Plan (parts of Huimanguillo and Cardenas), the Sierra, the Old (eastern) Chontalpa (along the Cunduacan road); and Rio Seco (along the Cardenas-Paraiso road).

Rio Seco is by far the most important zone now - with half the producers and cultivated area. Its soils are the most fertile and best drained; land is not as sub-divided as in the eastern Chontalpa (with the exception of Paraiso). The "old" (eastern) Chontalpa is more subject to flooding problems and in general is less prosperous. In the Chontalpa Plan, cacao production is divided between collective and private plots. In the former, plantations are operated on a large scale on land newly drained in the late 1960's and 1970's.

Huimanguillo production is on lower quality soils, and tends to be on larger plots of land owned by recent colonists. Sierra growing conditions suffer from higher rainfall, lower temperatures and poorer soils. Table 1 provides details about the regional variation in PEMEX activity, cacao labor scarcity and wages, economic conditions in general and specifically for cacao, and farmer migration patterns.

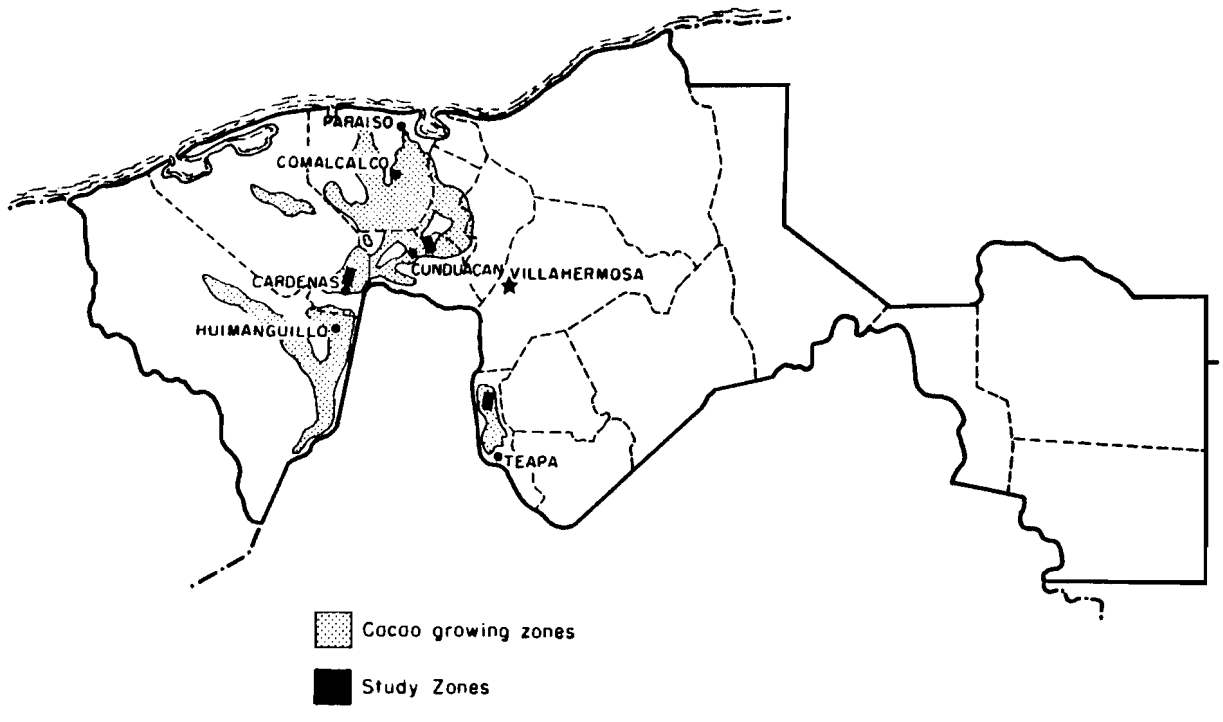
The history of the cacao regions, particularly the changes brought about by new river routings and farmer migration, were discussed in the last chapter. They explain the present distribution of farmers and farm size: the New Chontalpa and older non-flooded zones of the Old Chontalpa are heavily populated and dominated by tiny cacao farms, the minifundia. Areas opened up relatively recently in the Chontalpa are less populated and minifundization is less advanced. In Huimanguillo and Teapa, properties tend to be larger because ejidal settlements are relatively new.

A Cacao Farmer Typology

Throughout the centuries of cacao production in Tabasco, the predominant farm type was that of a diversified subsistence, family-oriented farm household. The amount of land planted to cacao was dependent on the availability of family labor - probably averaging four to six hectares. This general pattern was broken by those farmers who were first opening up new lands to cacao production, who generally had temporarily smaller plots, and by an occasional large-holder specializing in export, with some control over a labor force. With the takeover by Spaniards of indigenous farms in the 1600's and later the commercial farms in the early 20th century, very large holdings developed throughout much of the state dependent on encomendado or debt-peonage labor.

The structure of the cacao economy, however, is now considerably different - the result of population growth and the closing of the agricultural frontier. The temporary phase of growing crops for subsistence while awaiting the cacao plantation's coming into production

MAP 9. CACAO-GROWING ZONES OF TABASCO*



*SARH, Representacion Estatal, "Tabasco," Plan Indicativo Agricola 1978-1982, Villahermosa, Tabasco, December 1977.

a/Cacao Area Planted, by Municipio: (hectares)

Cardenas	6,032	Jalpa	4,435
Centro	72	Paraiso	4,931
Comalcalco	16,258	Teapa	1,148
Cunduacan	6,556	Tacotalpa	101
Huimanguillo	2,368	TOTAL	41,900

b/Cacao Zones, Area Planted, and Number of Producers:

Sierra	1250 hectares	500 producers
Huimanguillo	2300	500
Plan Chontalpa	1000	2,000
Eastern Chontalpa	13,250	2,500
Rio Seco	18,000	7,500
Coast	5,000	2,000
TOTAL	41,000	15,000

NOTE: Area planted estimated from 1978 Cacao Census and from sales data of the Union Nacional de Productores de Cacao. Producer numbers estimated from 1978 Cacao Census, UNPC estimates and the Promotora Chontalpa. The latter are very rough approximations.

TABLE 1. THE TABASCO CACAO ECONOMY - REGIONAL DIFFERENCES

REGION	PEMEX ACTIVITY	CACAO LABOR SCARCITY	CACAO LABOR WAGE
EASTERN CHONTALPA	Most PEMEX activity: 500 workers in union (half transitorios; half permanent); in 1980 - 500 workers in PEMEX-related construction CTM membership (not all PEMEX) - 1978 - 5000; 1980 - 2500 PEMEX work mainly in dry season	Significant labor scarcity; Accelerated substitution of herbicides for machete weeding Most farmers who worked off-farm in 1960's no longer do so because farm incomes have improved Others switched to off-farm construction	Highest wages here - minimum of $120 per day for 6-7 hours day; Wage on ejidos reported higher than on private farms because cacao income is more essential
RIO SECO	Minimal petroleum activity Minimal direct impact of PEMEX on population	Most farmers with under 1000 trees work off-farm part-time, but mostly in agriculture Labor scarcity complaints only near Comalcalco petroleum zone from smallholders; everywhere by largeholders 1975-78, failed attempt to bring in outside workers	$20 per jornal less than in eastern Chontalpa
CHONTALPA EJIDOS	By 1980, several wells drilled within ejidal zone; many more are planned	Labor requirements in agriculture doubled over two-three years; Now minimum labor requirements in cacao on many ejidos; nevertheless, dependent on outside workers	"Libres" paid $75 per jornal, plus housing, social security and other benefits
TEAPA	Several wells drilled in area; more planned. Teapa is important source of labor for petroleum-related construction	Large number of men aged 16-36 participate in off-farm employment; severe scarcity for largeholders Significant new labor demand on ejidal cacao farms due to improvements and higher prices	Similar or lower wages than in Huimanguillo Largeholders unwilling to pay competitive wages to attract workers
COAST	Major disruptions from pipeline construction and development of petroleum port	Most severe labor shortages in state	
HUIMAN-GUILLO	Considerable drilling activities. Rare complaints about pollution High employment of local population in nearby Cactus, Chiapas.	Farmers still tend cacao, but jornaleros have gone to PEMEX and caused shortage for largeholders; Large number of subsistence maize producers now work off-farm	$70 - 100 for a 7-8 hour day
EASTERN CHONTALPA	Widely reported among farm families, usually temporary In northern Cunduacan, most workers from farms with under 1000 trees migrate temporarily for part-time work	Many complaints about pollution; Anger over indemnification procedures and payments Much planting of new cacao	Inflation most acute here Land values have risen wildly
RIO SECO	Smallholders do not seek work far away	More intenaification of production, rather than new planting Most fertile area for cacao in Tabasco Long-active cacao associations Small and medium-sized producers claim cash is greater constraint than labor	Most prosperous cacao region
CHONTALPA EJIDOS	Little emigration of ejidatarios or libres for PEMEX work Sons of ejidatarios and some libres have worked for the constructoras one estimate was 1000 per year	Highest profits for ejidatarios come from cacao; thus general desire to increase production Half of ejidatarios with rights are said to be planting cacao on private plots	General expansion of ejidal economic activity
TEAPA	Much daily and weekly travel to PEMEX construction sites throughout state	Most largeholders have switched from cacao to livestock; production is dominated by ejidos Lower yields due to poorer natural conditions	Non-agricultural economic activity up; improved roads, etc. Subsistence farmers have abandoned plots in large numbers
COAST	Much temporary migration locally	Much more inter-planting of cacao with coconut Problem with older plantations Big effort to organize producers for credit and processing activities	Huge increase in population and economic activity Much agricultural land has been cleared for construction projects
HUIMAN-GUILLO	High temporary migration for PEMEX and constructoras Cacao workers coming in to substitute for migrants, from northern Chiapas, southern Veracruz		Most new land developed is going into livestock production

occurs infrequently. There is now little available land for settlement by the children of cacao farmers, which has led to accelerated minifundization. Meanwhile, many largeholders have moved out of cacao into livestock production, and the average size of the cacao largeholding is much reduced. Furthermore, hired labor for cacao is now extremely common due to growing numbers of landless workers and minifundistas, hence changing the nature even of family-based farms.

The structure that has arisen is basically composed of five groups:

Minifundia have under two hectares of cacao (1000 trees) - the amount a single person with occasional family help can manage. This group accounts for about half the producers and in 1978, 30 per cent of the cacao produced in the state. Off-farm employment is extremely important for this group.

Family farm producers with two to six hectares of cacao (1000-3000 trees) are generally able to cover labor demands with family workers. Labor is hired only during especially busy harvest periods, at times when some family members work off-farm and must be replaced, in a crisis, or when the family is at a life-cycle stage with few working members. Over a quarter of Tabascan cacaoteros are family-based; they produced about a third of the state's cacao in 1978.

Those with over six hectares of cacao depend upon hired labor. These hired labor based producers have a wide range of economic alternatives to cacao production because of their greater resource base. About ten per cent of Tabascan cacao farmers are dependent on hired labor, but in 1978, they accounted for nearly 30 per cent of production.

A fourth type of producer belongs to collective ejidos and may work in both collective plantations and cacao on personal plots. The collective uses separate criteria to hire ejidatarios with and without land rights, and the landless; in general, the collective has many alternatives to cacao production. The personal plot often operates along the same lines as minifundia production.[1/] In fact, the vast majority of collective production comes from the collective plots. This group numbers approximately fifteen per cent of total producer numbers as individuals, but as some are only marginally involved in cacao, this overestimates their importance. Collective cacao accounts for nearly ten per cent of the state total.

The fifth group in the cacao economy structure is composed of landless laborers who reside in cacao-growing communities and work as jornaleros throughout the year on family farms and hired-labor-based plots. They probably number about 4000-5000. They account for a fifth of all workers in cacao. This compares to about 12,000 cacao

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[1/] Collective producers are included among the "minifundistas" in the Cacao Census, because only their private plot production was included there.

farmers (52 per cent of all workers) and another 6000-7000 farm family members who work in cacao.

Chart 8 shows the relative importance of these types of farmers, in terms of numbers, area planted to cacao, and total cacao production in 1978. Analysis of the Mexican Censuses suggests that between 1970 and 1980, the numbers of minifundistas increased, and cacao economy information suggests that the proportion of cacao coming from largeholders decreased through the decade. Minifundia predominate in densely populated Comalcalco, Jalpa and Paraiso and are largely (85 per cent) propietarios.

There are relatively more largeholders in Cunduacan. There, the third of producers with under two hectares produce only a fifth of municipal cacao; in Comalcalco, nearly two thirds of cacao producers are minifundistas, who produce nearly 43 per cent of municipal cacao. Roughly a third of family farms and hired-labor-based farms are ejidal.

Although thirty per cent of farmers plant cacao alone, the rest plant maize, bananas, coconut or sugar cane, or have cattle, as well. It is likely that any appropriate land on the smaller farms was planted to capacity with cacao during the period of high cacao prices. Minifundistas are more likely to produce cacao alone, or combined with maize than are family farmers or hired-labor-based producers.

The Cacao Boom of the 1970's

Throughout this period of structural change (since the 1940's), area in cacao and production continued to increase steadily, mainly through incorporation of new lands due to new settlement and improved communications. Charts 9-11 illustrate these trends.

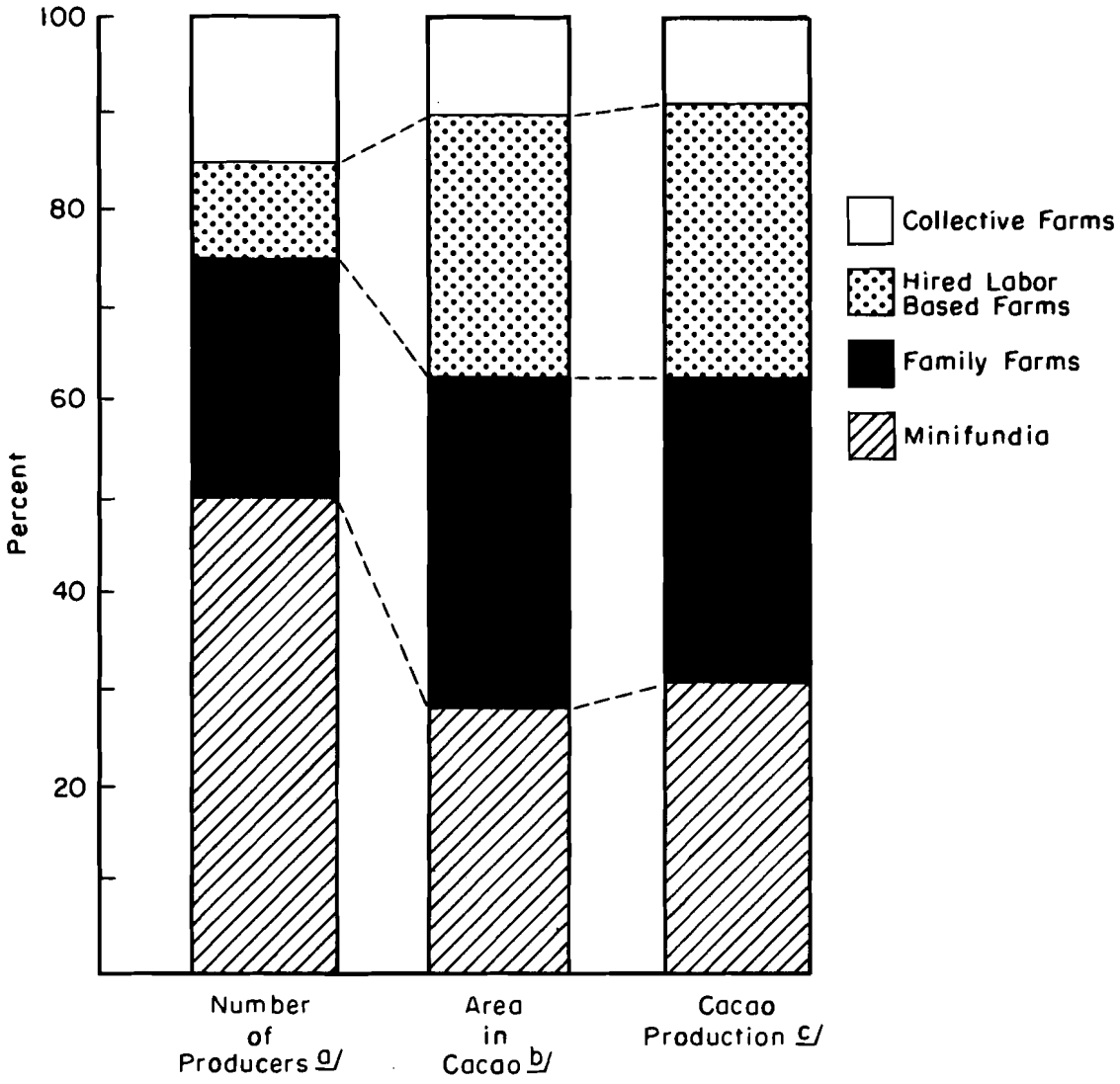
But during the 1970's, cacao expansion took on a different character. Table 2 illustrates the contrast between numbers of producers, area in production, total production, price and extent of fermentation in 1970 and 1980. Total production in 1980 was 14 per cent greater than in 1970 (a fairly good year), 45 per cent greater than 1968.

Responsibility for this unusual growth in production and productivity was three-fold: excellent prices, producer association marketing ventures, and the federal/state government-sponsored Cacao Plan.

A Price Revolution

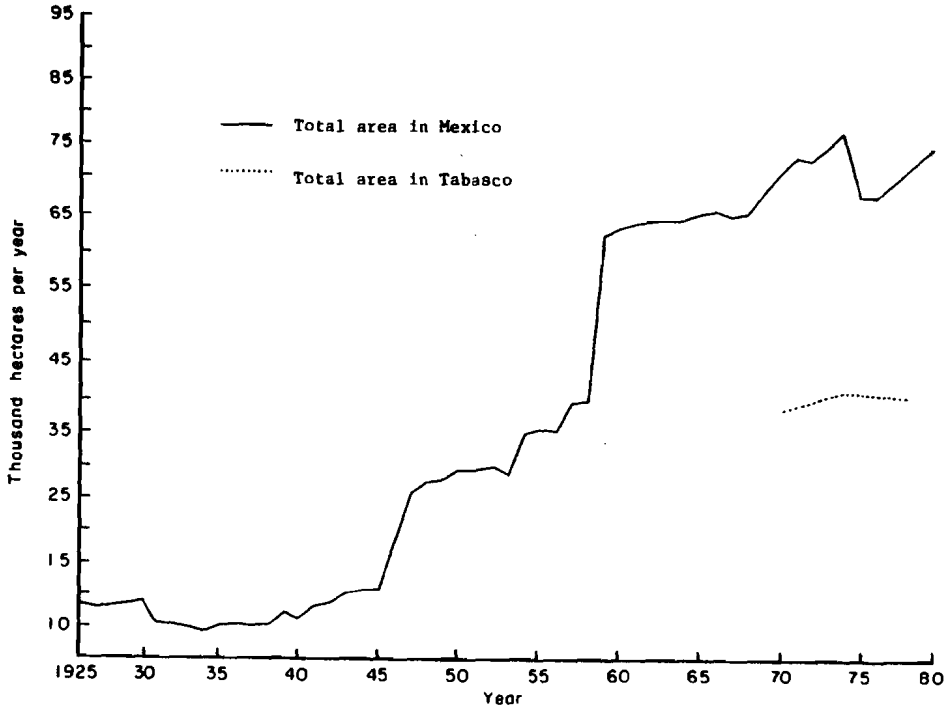
Charts 12 and 13 illustrate cacao price changes in the past decades on the international and national markets. Apart from the two "lows" in world prices in 1960-61 and 1964-65 - the latter offset for Tabascan producers somewhat by government guarantees - prices trended upward for producers, though not greatly in real terms.

CHART 8. RELATIVE IMPORTANCE OF TABASCO CACAO FARM TYPES 1978-80



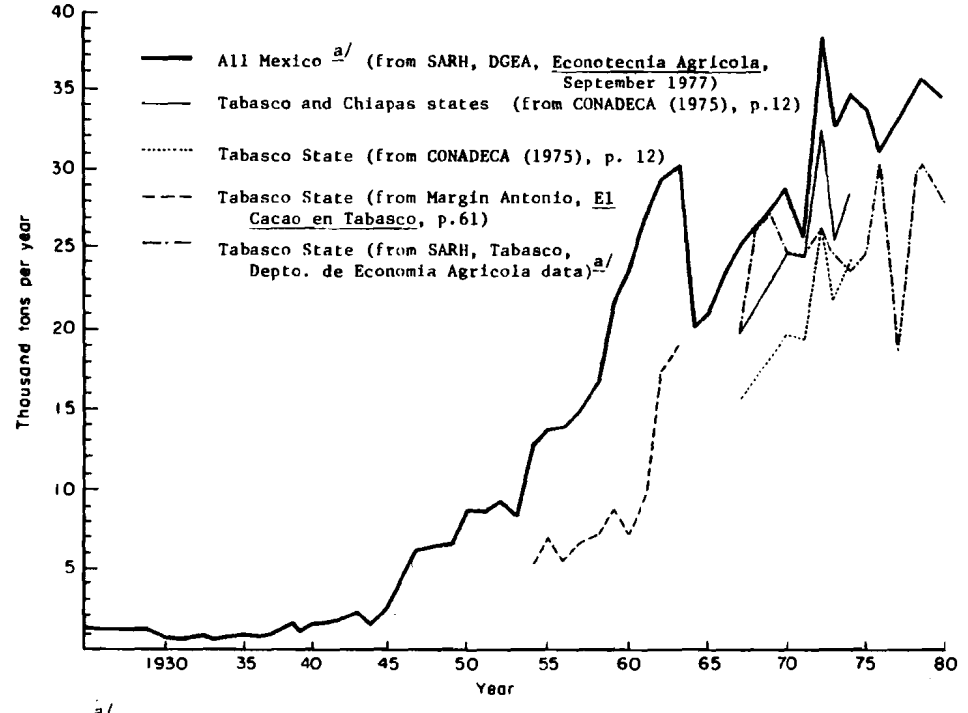
*Estimated from data in SARH, Censo de Cacao de Tabasco, 1978; COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, 1980; SARH, Promotora de la Chontalpa, "Cacao," 1980.

CHART 9. CACAO AREA HARVESTED IN MEXICO, 1925-1980*



* Secretaria de Agricultura y Recursos Hidraulicos, Direccion General de Economia Agricola, Econotecnia Agricola, September 1977, "Cacao."

CHART 10. CACAO PRODUCTION IN MEXICO, 1925-1980



a/ Data for 1976-1980 was taken from the Union Nacional de Productores de Cacao, Boletin Informativo for respective years.

TABLE 2. CHANGES IN THE TABASCO CACAO ECONOMY, 1970-80

	1970	1980	Percent Change
Producers	11,800[a/]	13,000[b/]	+10.2
Area in Production (hectares)	38,000[c/]	42,000[c/]	+10.5
Total Production (tons/hectare)	19,500[d/]-24,900[e/]	28,465[f/]	+14.3-46.0
Average Cacao Price (beans, international market, New York; US$ per pound)	.30[g/]	1.50[g/]	+400
Average Cacao Price (beans, national market; M$ per kilo)	6.50[h/]	44.00-71.00[i/] (53.00-73.00 to international market)	+577-992 +715-1023
Percent Beans Fermented	6[j/]	51.4[j/]	+757

a/ Emilio Bracho Roblin, Ing. Guillermo Vazquez Rodriguez, Ing. Marco Antonio Wing Martinez, "Situacion del Cacao en Mexico," Fondo de Garantia y Fomento para la Agricultura, Ganaderia y Avicultura, Mexico 1972, p. 72.

b/ Comite Promotor de Desarrollo Socioeconomico del Estado de Tabasco, Plan Estatal de Desarrollo (Segunda Version), Plan Sectorial: Agropecuario y Forestal, December 1979, p.

c/ Union Nacional de Productores de Cacao, Boletin Informativo, #10, January 1981.

d/ Mexico, Comision Nacional de Cacao (CONADECA), Indicadores Economicos del Cacao, 1975, p. 12.

e/ Secretaria de Agricultura y Recursos Hidraulicos, Econotecnia.

f/ Union Nacional de Productores de Cacao, Boletin Informativo, September 1980.

g/ International Cocoa Organization, quoted in Union Nacional de Productores de Cacao, Boletin Informativo, #4, June 1979.

h/ Secretaria de Agricultura y Recursos Hidraulicos, Econotecnia, September 1977.

i/ Union Nacional de Productores de Cacao, Boletin Informativo, #10, January, 1981.

j/ Mexico, Comision Nacional de Cacao, Indicadores Economicos del Cacao, 1975, pp. 14, 16.

CHART 11. CACAO YIELDS IN MEXICO, 1925-1980

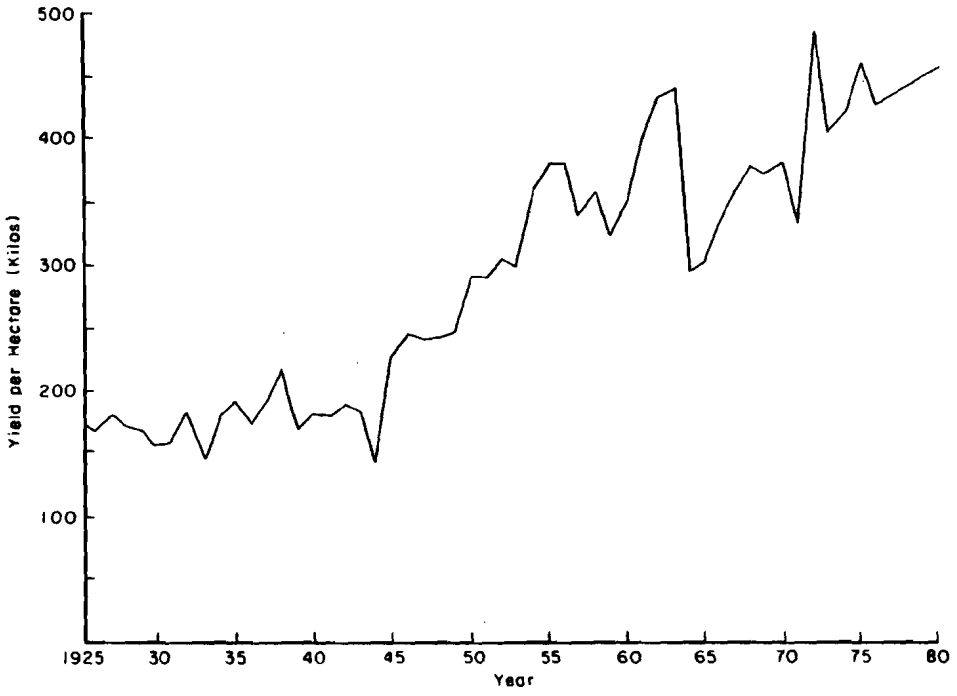


CHART 12. CACAO PRICES IN MEXICO, 1925-1980

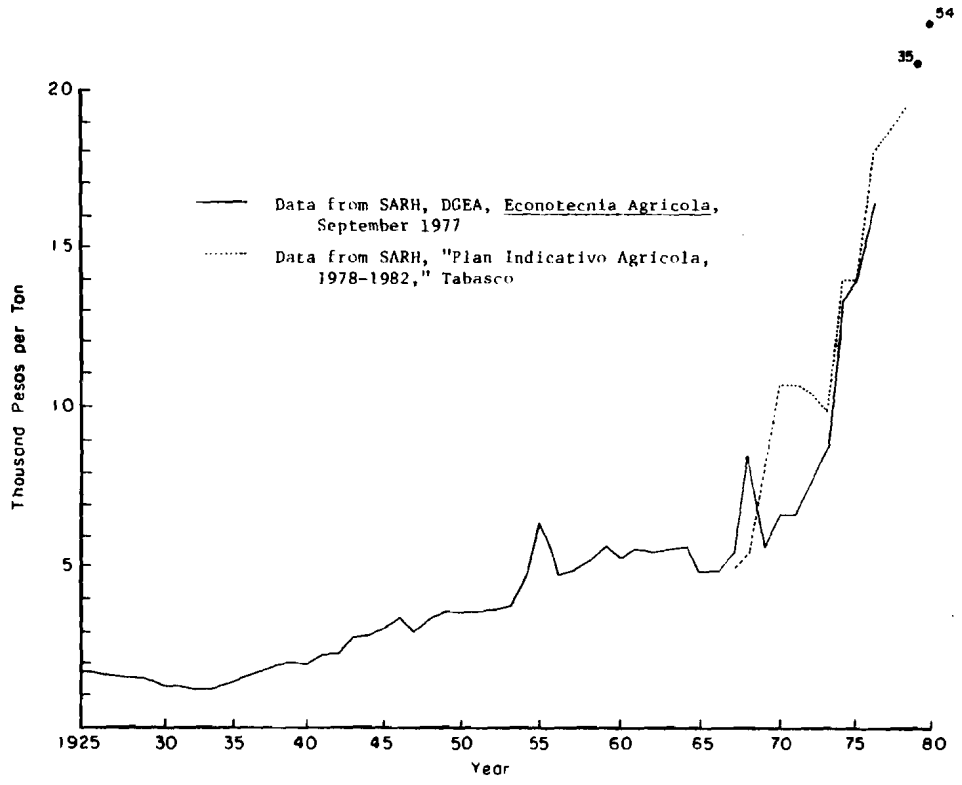
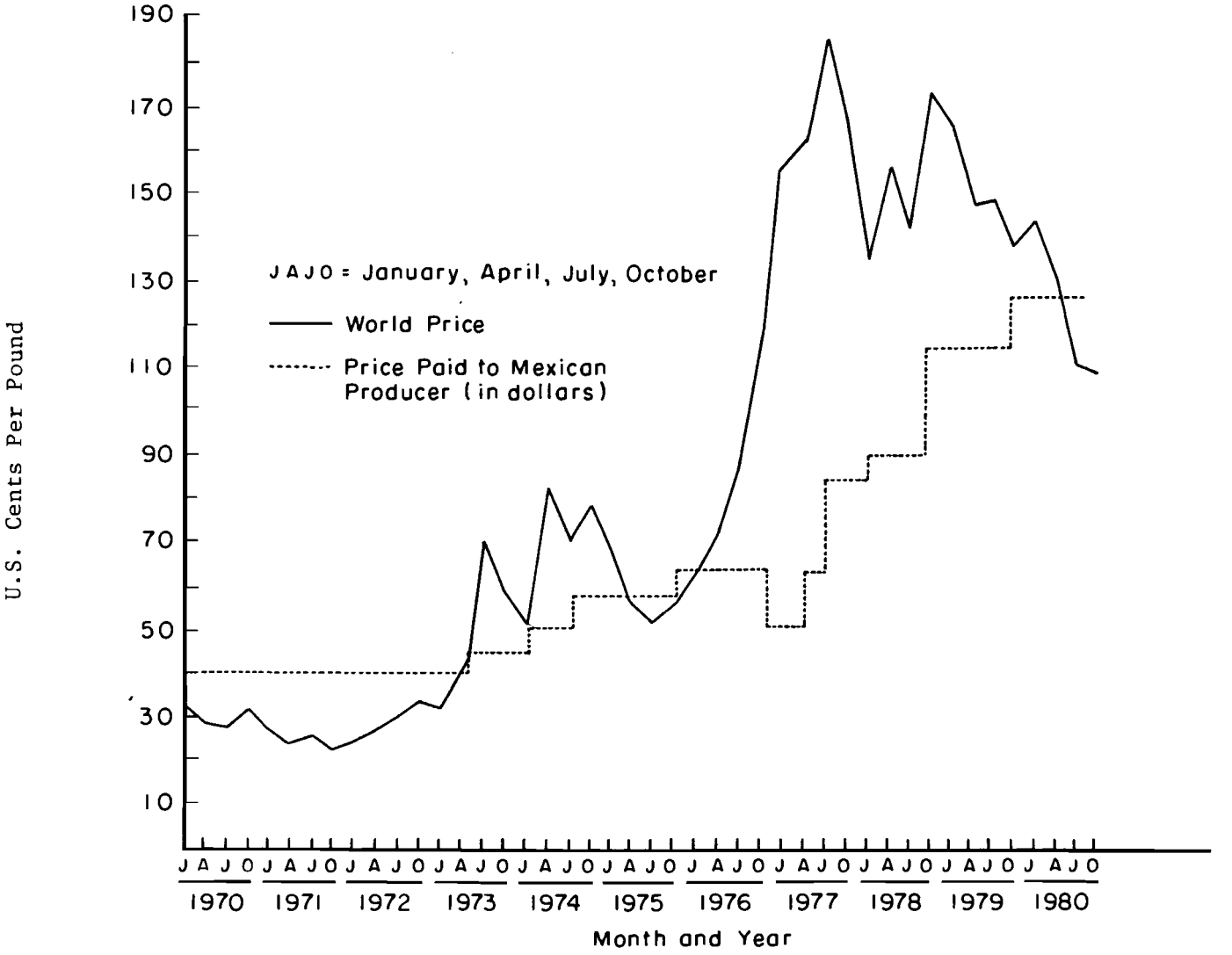


CHART 13. AVERAGE MONTHLY PRICE OF CACAO, 1970-1980*



*Organizacion Internacional del Cacao, Boletin Trimestral de Estadistica del Cacao, "Precio Promedio Mensual, Cacao en Grano," reported in UNPC, Boletin Informativo, June 1979, #4 and January 1981, #10.

The real increases occurred in the 1970's. During that decade the national market price rose from $6.50 to $71 per kilo; the international price from U.S.$.33 to U.S.$1.44 per pound, with a peak in 1977 of U.S.$1.97 per pound. The difference between the national and international prices is due to the establishment of managed prices within the Mexican cacao industry since 1961.

A yearly meeting of the National Cacao Commission with representatives of the Union of Cacao Producers, industrial users of cacao and the Secretary of Commerce sets the internal price of cacao and the portion of supplies to be reserved for national industry. Because of the collective political strength of the cacao producers, these meetings have since 1974 honored the cacaoteros' requests for prices commensurate with their costs of production, high by international standards. Industry is forbidden to import foreign cacao.

The devaluations of the mid-1970's were a great boon to the cacao export market, as the internal price in U.S. dollars was worth nearly double the former quantity of pesos. Producers chafed at the large part of the cacao supply promised to national consumers at a price well below the international price. Since 1979, however, farmers have received well over the plummetting world price from their industry consumers, and most production was sold nationally.

Price increases for cacao during the 1970's were so dramatic as to make fundamental changes in the standards of living of cacao farmers. Their material culture now includes "modern" appliances, entertainment, et al. Children have been taken out of the regular work force to go to school and have achieved educational attainments and job opportunities unthinkable for their older brothers and sisters.

Cacao Producer Organization

The first cacao producers' organization was set up in the 1930's, a part of Governor Garrido's farmer mobilization, primarily functioning as a credit union.

Early attempts to improve cacao quality and processing, and control planting in anticipation of a world glut (recommended by the "Trinidad Commission") were ignored in the face of Rio Seco pioneer settlement and extensive planting of low-quality, high-producing varieties. The producer organization broke up in 1953 when cacao prices and production levels increased, and the need for joint action seemed less urgent.

Achievements of the 1960's. But the anticipated glut indeed began in 1960. The government of Mexico, in response, set a support price for the first time - of $8.60 per kilo for the internal market, and set up import barriers to protect national production (14, p.20). In December 1961, with Governor Madrazo's encouragement, a producer's union with more far-reaching powers was devised to relieve the chaotic results of

the 1960 price tumble; and to take advantage of future international export potential.

The National Union of Cacao Producers (UNPC) began to operate in 1963 with 20 local Tabasco associations and 17 from Chiapas; an individual joins a particular association because of geographic proximity, credit availability, and trust in the leadership, but he may deliver cacao to any association.

Funding from UNPC associates was used to build the Industrializadora de Cacao de Tabasco, S.A. (INCATABSA), the first modern Tabascan chocolate factory, in 1960-64, with a capacity of 10,000 tons of dry cacao per year (3, pp.68-71). Prior to this time there were only three much smaller chocolate processors in the state (14, p.59).

In 1962, Kennedy's Alliance for Progress program funded FIRA in Mexico to, among other programs, increase credit for cacao production. The government of Mexico and UNPC began a new program of research and extension in 1964 to boost cacao productivity. Grafts and "clonal" cacao were popularized; new shade trees recommended; a program was set up to encourage use of chemical pesticides. Fertilization was introduced, but was as yet uneconomical and unaccepted (3, pp.23-25).

In 1968, FIRA-backed private bank loans were made for the Rio Seco Association to build the state's first large processing plant for post-harvest fermentation, to improve bean quality (14, p.94).

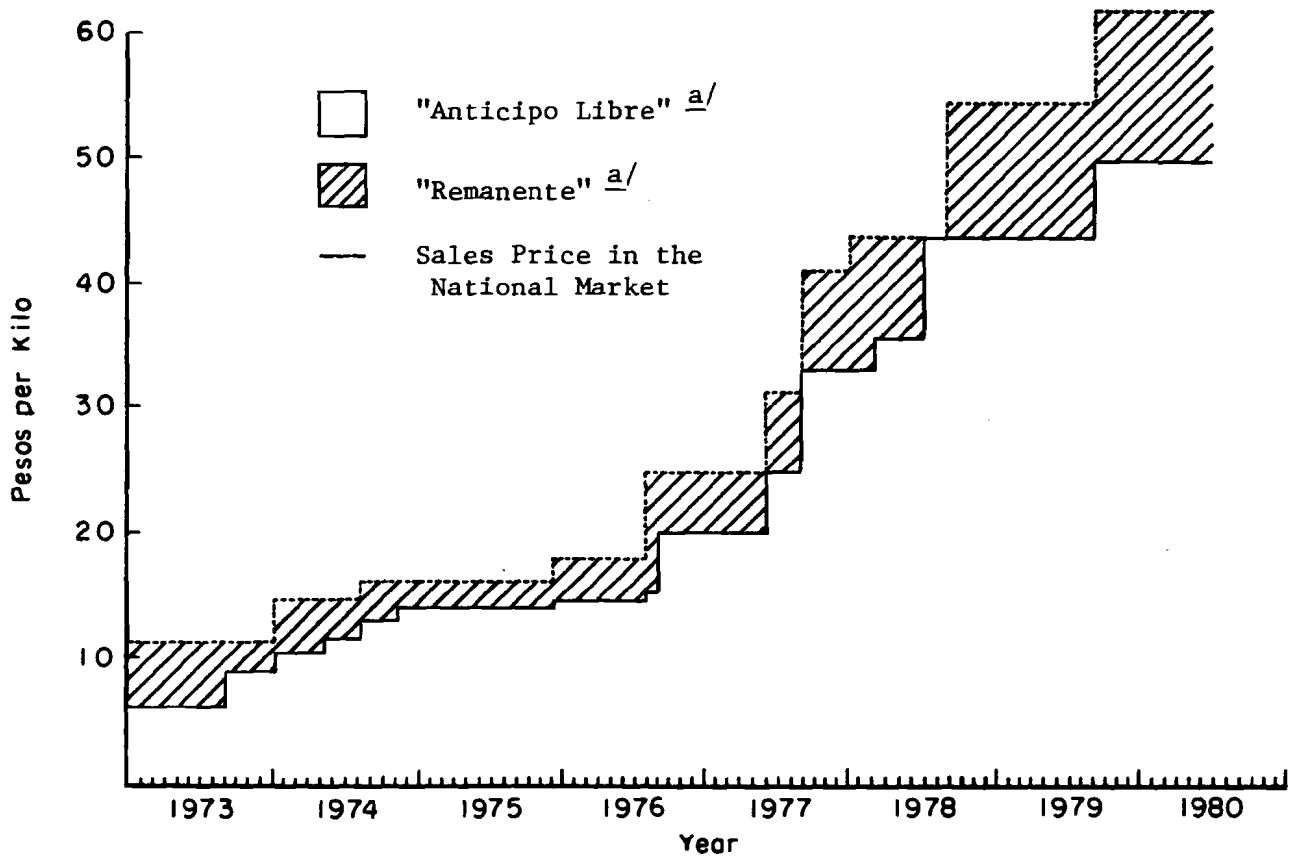
Between 1964 and 1969, total cacao exports - mainly to the United States - rose seven-fold, though nearly all Mexican cacao was primitively processed (only washed and sun-dried).

The 1970's: Market Diversification and Vertical Integration. In its first decade UNPC marketed cacao mainly through private financiers. But as a result of the drop in prices in 1968-69, the newly independent Union found itself near bankruptcy and unable even to pay the advance to farmers upon delivery. UNPC was given direct control over $80 million pesos worth of cacao held by comisionistas, and marketing credit worth $95 million was arranged with the Banco Agropecuario del Sureste, S.A. (174, pp.9-12).

Thereafter, UNPC directly marketed cacao and INCATABSA-produced cacao sub-products to industrial and international consumers. When cacao is brought to the association (or fermenting plant), it is weighed and the farmer is immediately paid an "anticipo" somewhere near the guaranteed price with borrowed funds. The "remanente" is paid after the cacao is sold, often months later. It is the remainder left over after the anticipo, marketing costs, and Union administration expenses are deducted from the sales price. The remanente is basically dependent upon the level of export sales. Chart 14 shows the levels of anticipo and remanente between 1973 and 1980.

As a result of aggressive marketing, Mexico exported to 18 countries by 1977. At the end of 1979, Mexico was the seventh most important

CHART 14. SALES PRICE ON THE NATIONAL MARKET AND "ANTICIPO LIBRE" TO PRODUCERS FOR WASHED CACAO, 1973-1980*



*Mexico, Union Nacional de Productores de Cacao, Boletin Informative #1, November 1978, p.3 ; December 1980; and CONADECA, "Indicadores Economicos", 1977, pp.14-15.

a/ See text for definitions of "anticipo libre" and remanente."

cacao producer in the world (118, #6). By 1980, the market distribution of Tabascan cacao had evolved as follows: 57.1 per cent sold to the national market; .8 per cent export of beans; 29.7 per cent sent to INCATABSA for cocoa butter exports and cocoa powder sales to the national market.

CONADECA and UNPC hope eventually to limit exports entirely to processed cacao products, rather than beans, and to ferment all beans sold internally. This policy seems wise: within a few years, new plantings in Brazil and Ivory Coast will come into production and it appears that this may coincide with a prolonged period of weak demand due to depressed world economic conditions.

Between 1975 and 1977, eight fermenting centers were built and others begun. By January 1981, fermentation capacity had been expanded to 30,000 tons of dry cacao beans: almost enough to meet farmer demand at peak harvest periods. In 1975, only 20 per cent of cacao was fermented; in 1980, 51 per cent (118, 1/81).

In 1978 a cacao drying facility with capacity for 27,850 tons was built. By 1981 INCATABSA had expanded from 6,500 to 12,500 tons capacity, and was operating at 72 per cent capacity. New distribution, storage and transport facilities and new headquarters in Mexico City were built. Construction of a new plant to process cacao sub-products is proposed. The UNPC also joined national industries in a program to encourage domestic chocolate consumption.

Federal and State Support for the Cacao Plan

The state and federal governments supported the cacao producers of Tabasco in several ways: tax relief, construction of needed infrastructure, support in international marketing, support in struggles with PEMEX, and cooperation with the UNPC for a major technical assistance program, the Cacao Plan.

In November 1980, as part of SAM, state and municipal taxes on agricultural production were lifted. Also in 1980, the national government returned all indirect and general export taxes paid for cacao exports. Mexico was a party to the Third International Cocoa Agreement, and lobbied unsuccessfully for its acceptance by international consumers.

The Tabasco State Plan program and federal investments in the state have yielded a number of new infrastructure projects useful to the cacao economy. Roads were built, improving both farm-to-market transport and national marketing. Electrification and education investments (particularly primary school and agronomy studies) assisted cacao farm families. The Cacao Plan gave concrete form to the political backing given by the federal and state governments to the cacaoteros. It demonstrated serious support for agriculture at the very time when petroleum development was most threatening to the agricultural sector.

The present Cacao Plan is part of a nation-wide program inspired much earlier in the decade to plant cacao throughout southern Mexico, increasing total area by 50-100 per cent (Personal communication, Turner Price, September 1982). Hence the program was not a response to the "boom," rather part of earlier agricultural development policies.

The Tabasco program has four parts: establishment of new plantations, rehabilitation of older plantations, technical assistance to improve yields and farmer incomes, and research. The goals are:

1) to increase yields per hectare from .641 tons (average 1974-1980) to 1.3 tons by 1982 on rehabilitated plantations;

2) to rehabilitate 34,900 hectares during 1979-82 (i.e., three quarters of all Tabascan cacao);

3) to establish 2000 hectares per year of new plantations - 10,000 hectares in all by 1982;

4) to achieve production of 49,800 tons in 1982 (Plan, p. 17). [2/]

To achieve these goals, it was estimated that 81 per cent of costs would be borne by producers; the rest by SARH.

Eighteen nurseries were set up throughout the state providing stock free of charge; by 1981, 1850 producers had received cacao and shade plants. Between 1977 and 1980, 6000 hectares of cacao had been planted and 15,000 hectares had been rehabilitated.

The technical assistance program was set up under the Rainfed Agriculture District of SARH. In 1979 seven agronomists and fifty agricultural technicians were working with the cacao farmers specifically - seven-fold more than before the Plan. Still, the average area covered by an assistant was 500-600 hectares.

As of January 1981, some type of extension contact had been made with 10,800 cacaoteros on 30,239 hectares. In addition to the programmed four to five yearly visits to each farmer involved, a weekly radio program was aired by the head of the Plan, which was listened to enthusiastically by every cacaotero surveyed. Research plots were planted in farmers' fields, and on experiment stations; few major findings had yet been reported.

[2/] Planners estimate that without the Plan, production in 1985 would reach only 32,558 tons, worth $1771.2 m; with the Plan, they hope for 57,100 tons worth $3106.2 m: or a total increase of 75 per cent in production, value and farmer incomes. Without the Plan, production would reach a plateau of 33,358 tons in 1982; with the Plan, 63,700 tons in 1990 (104, pp.63,67). Over a ten-year period (1979-1988), total returns would be fifty-six per cent higher with the Plan. The program would cost an extra $4268 m, but would increase the value of production by $9601.3 m, not including multiplier effects to local economies.

Table 3 compares the technical characteristics of Tabascan cacao farms in 1978 with the technical recommendations of the SARH. The chief problems appear to be insufficient weeding, fertilization and pruning; a poor age distribution of cacao trees; and poorer than average condition for cacao and shade trees.

Table 4 compares the costs of production of cacao cultivation with and without rehabilitation. These budgets do not include costs for interest on loans, depreciation for farm equipment or buildings, cacao transport or on-farm processing. Opportunity costs for farmers' labor are assumed to be the same as an agricultural worker's wage. Land is grossly undervalued at $4000 per hectare. With "technification," labor use rises 71 per cent, current costs by 75 per cent, yet the difference in profits (even by these optimistic budgets) is only 5.4 per cent from a 30 per cent estimated yield increase.

Given these statistics, it is rather remarkable that large numbers of farmers have indeed adopted parts of the package. In fact, what has happened is that the family farm group has been the principal adopter of the new technologies, and they have done so under a far different real budget structure. The hired-labor-based producers, for whom this type of budget is more or less applicable, have not adopted the technologies, due to the poor profit possibilities shown above; collectives have had a similar problem. Minifundistas are generally unable to meet the cash requirements of the new program at all.

Impact of the Petroleum Boom on the Cacao Sector

The economic disruptions from PEMEX activities by no means bypassed the cacao farmers. Certain changes affected all farmers negatively: inflation and pollution damage. Other major impacts, however - labor scarcity, production changes and political unrest - varied significantly in their impact according to family type.

Before the petroleum boom, the prices of basic food and goods, as well as farm inputs in the cacao regions tended to fluctuate with the cacao price. After 1976, this was no longer so.

Cacao farms suffered ecological damage from the drainage waters of oil drilling, and cutoffs of drainage canals by PEMEX pipeline and road-building. Industrial smoke and fumes seemed to affect flowering and wear out fencing materials. A number of cacao farms were expropriated for PEMEX projects, and farmers worry that more land could be permanently lost should there be a major oil spill from a pipeline or the Dos Bocas port.

Labor Scarcity and Migration

Labor supply for cacao production has suffered increasing scarcity as well as increasing price, as a result of increasing general wages, increasing cacao prices and worker migration to petroleum zones.

TABLE 3. CHARACTERISTICS OF TABASCAN CACAO PRODUCTION, 1978

(percent, unless otherwise specified)

Characteristics	Present[a]	Recommended[b]
Average number of trees per hectare (number)	567.74	500-600
Average production per hectare (kilograms)	538.5	1000-1300
Area with credit	6.01	20-25
Ejidatario producers	37.3	-
Private property producers	62.7	-
Pruned trees	84.98	100
Producers who fertilize	46.4	100
Producers with spraying equipment	64.0	100
Who use: manual sprayer	56.9	
motorized sprayer	42.9	
Use of insecticides:	80.8	100
Metilico	63.27	
Lindano	13.7	
BHC	12.5	
Parathion	8.9	
Use of fungicides:	80.8	100
Copper sulfate	94.0	100
Tribasic sulfate	2.7	
Cupravit	1.9	
Locide	1.1	
Condition of shade trees:		
Good	37.4	100
Regular	55.7	
Bad	6.8	
Farm needs drainage	26.65	
Farm has drainage (those that need it)	63.8	100
Condition of cacao trees:		
Good	43.1	100
Regular	51.2	
Bad	5.6	
Farmer has cacao nurseries	5.8	Not necessary, since UNPC has set up nurseries
Farm access to all-weather roads	54.7	100
Farmer is literate	82.3	100
Types of cacao planted:		
Criollo	67.4	Highest quality, but low yields
Calabacilla	80.3	
Amelonado	69.2	
Clonal	82.4	
Guayaquil	78.8	
Types of shade trees planted:		
Mote (Erythrina)	76.2	Hope to cut down, due to pest infestation
Saman	1.7	
Cocoite	12.1	Want to increase plantings
Chipilcoite	11.1	

(continued)

(Table 3, continued)

Age distribution of trees:		
0-5 years	8.6	Want to completely replace
6-10 years	34.9	trees after 30 years; have
11-15 years	25.3	continuous cycle of new trees
16-20 years	30.6	coming into production
21-25 years	.3	
26-30 years	.2	
31-40 years	.03	
50 years plus	.03	
Yearly mortality of trees in new plantations		2-5
Weeding[b/]:		
Once a year	21.8	Three or four times a year
Twice a year	49	or enough to keep clean
Three times a year	19	
Four times a year	10	
Pruning[b/]:		
2-3 small branch prunings a year	60	100
One large pruning a year	51	100 every year or two

a/ SARH, "Censos de Cacao," Villahermosa, Tabasco, 1978.

b/ SARH, "Plan de Incremento de la Produccion de Cacao en el Estado de Tabasco," Villahermosa, Tabasco, January 1979.

TABLE 4. COSTS OF PRODUCTION FOR CACAO CULTIVATION IN TABASCO STATE*

Activities	Without Rehabilitation		With Rehabilitation	
	Cost	Man-Days	Cost	Man-Days
	(pesos)		(pesos)	
Weeding	996	12	1,992	24
Pruning	747	9	747	9
Fertilization	207.50	2.5	830	10
Pest Control	996	12	1,660	20
Disease Control	1,245	15	2,490	30
Drain Maintenance	249	3	498	6
Purchase of Pesticides	1,047	-	2,365	-
Purchase of Fertilizer	1,500	-	2,366.25	-
Harvest and Pod-Breaking	2,324	28	3,320	40
TOTAL	9,311.50	81.5	16,268.25	139
Yield:	637 kg./ha.		825 kg./ha.	

Cost Difference: $6,956.75

Yield Difference: 188 kg./ha. @ $44/kg. = $8,272

Profit Difference: $18,715.50 vs. 19,731.75 = $1,015.25

*SARH, Plan de Incremento de la Produccion de Cacao en el Estado de Tabasco, Villahermosa, Tabasco, January 1979, p. 71.

Before the petroleum boom labor prices rose more or less parallel to the cacao bean price, at a rough ratio of one kilo/one jornal (a day's work). Because young men have flocked to jobs in petroleum and construction, the price of labor has been bid upwards. One cacao leader estimated that the cacao/wage ratio had risen to three kilos of cacao/one jornal.

But the impact of these changes was quite different for different groups. Landless workers benefitted from the labor situation, as did minifundistas, many of whom substituted petroleum-related work for wage work on largeholder cacao plots. Because of the boom in cacao prices, there was actually a decline in off-farm employment (both in agriculture and in construction) by workers in family farm households. It was principally the hired-labor-based producers who suffered serious labor shortages which affected both profitability and cacao production. Furthermore, in many places the traditional relations of production between cacao producers and landless workers were altered.

The Sociodemographic Survey documented a significant exodus from cacao work. Between 1965 and 1979, 20 per cent of the EAP with some history of cacao activity (69 per cent of the total EAP surveyed) had ceased working in cacao. Five per cent of all who had ever owned cacao land and 32 per cent of those who had worked, but never owned land, left the sector. (These figures include a small number who simply retired, as well as those who changed occupation.)

A fifth of the surveyed population over seven years of age had experienced a change of residence at some time in their lives. Of all migration, 68 per cent took place between 1970 and 1980. But if we break up this figure into the periods before (1970-75) and after (1976-80) the boom, significantly more moved in the earlier period before cacao prices rose. Migration of men over forty particularly declined in the latter part of the decade.

Cacao Production

These changes in the distribution of the most important input in cacao production - labor - have markedly affected production possibilities for the different farmer types. They certainly suggest that goals of the Cacao Plan for raising labor inputs in production by over 70 per cent in order to adopt more productive technology are ill-conceived. This is particularly so given the modest increase in yield and profit expectations which demand significant increases in cash inputs. Basically, only those farmers who can minimize cash costs - by utilizing family labor in place of hired labor and in substitution for cash inputs such as pesticides - will find it economically rational to adopt the program.

Thus, cacao production from family-based farms did increase, as family members' employment off-farm decreased because of better returns from on-farm work. Minifundistas maintained fairly stable production in most cases, quite limited in their ability to purchase cash inputs, and frequently switched from jornalero to non-agricultural off-farm employment to meet cost-of-living increases.

Farmers dependent on hired labor reduced production. Their former minifundista and landless workers preferred work for PEMEX; and family-based farmers preferred to intensify family cacao production. They were further induced to reduce their efforts in cacao by the sudden availability of numerous investment alternatives created by the petroleum boom.

PEMEX-Cacaotero Conflicts

Direct PEMEX-cacaotero confrontations have taken place over the company's practices of expropriation, trespass and ecological destruction, which were discussed earlier in this chapter. There has been a real increase in levels of personal violence, within families, in communities, between strangers, as a result of increased tensions, frustration, insecurity and the unscrupulous elements of the population that tend to appear in turbulent areas barely under civic control.

Yet the level of political violence among cacaoteros has not been marked. I certainly expected there to be far more, and am still somewhat perplexed. The political system involving Tabascan cacaoteros seems to have worked well to control conflict.

The "uprisings" reported were in fact concerted political moves, by politicians well in control, to show strength in the face of PEMEX or federal intransigence on some issue. Though violence was at times threatened on one side or the other, there were few examples of either the government's unleashing the national guard or police with deadly weapons, or violent destruction of PEMEX property or threats to personnel by campesinos. One wonders if the same would have been true had petroleum development taken place in central Chiapas or Oaxaca, which have a history of campesino repression.

How do the farmers themselves perceive these conflicts? There is little ambiguity about the anger of farmers whose lands have been damaged, who still await compensation. Many farmers in drilling areas are truly concerned about the long-term ecological damage of PEMEX activity, and tend to blame pollution for problems on their plantations.

But for most - even those with relatives working on PEMEX projects - the oil company is very remote and its impacts nebulous: the poorly understood cause of inflation, the source and object of congested highways on the way to Villahermosa. Anger is found mainly among

populations in the Reforma area and parts of Cunduacan and Paraiso directly involved in intensive drilling or processing.

But even this anger was relatively controlled - because there were effective outlets for it. The UNPC associations were forums immediately available for airing and sharing complaints, and the leadership did put its grievance system into action. Municipal, ejidal and rancheria leadership also supported farmers with the governor and others. Decisions to bar PEMEX trucks and other direct actions seem to have been well-organized community decisions approved by some cooperative, political or community group when other routes of action were ineffective.

The effectiveness of cacaotero political action, like that of the rising cacao prices, was essential in protecting the cacao producers during the oil boom. But the most important protections were found at the level of production organization and strategy, especially for the family-based cacao producers. The following chapters explore those family responses to the dizzying economic and social changes brought about by the oil boom.

CHAPTER 4. ANALYZING CACAO PRODUCER STRATEGIES

To understand the response of Tabascan cacao farmers to the petroleum boom requires not only documenting farmer behavior at the global level, but explaining that behavior in terms of on-farm conditions and farmer incentives. A particular challenge is to separate the effects of the "boom" on production from other economic trends or the innate characteristics of the particular farmers. Only by understanding the phenomena at the farm level can we judge the efficacy of development policies or anticipate farmer responses to future changes.

This chapter will briefly examine the methodological problems of this kind of research, and the actual methodology chosen. It then focuses on comparing and contrasting the major farm household types of the cacao economy, mainly in terms of aggregated macrostatistics. This will serve as an introduction to Chapters 5 through 9, which look at these same farm types from a microeconomic perspective and emphasize decision-making strategies.

Methodology, Data Collection and Analysis

There were two key methodological problems for the study of the Tabascan cacao economy in the oil boom. First, how to determine relevant heterogeneity of farmer groups for purposes of analyzing "boom" response; second, how to explain state-level statistical trends in production, employment and migration. This section summarizes the approach that was used to resolve these problems.

Identify Economic Forces in Tabasco

In order to establish what the most important economic trends in Tabasco state were in the late 1970's, macro-data were used which had been collected by COPRODET and PEMEX showing levels of new investment, growth in production, new governmental programs. Past analyses of boom economies suggested collecting information about inflation rates, wage scale changes, migratory flows, urban population growth, product and service bottlenecks, much of which was available from COPRODET and other state studies (38, 44, 123, 132, 137, 160, 165).

This data base was supplemented by a large number of open-ended interviews with major Tabascan businesses, unions, PEMEX, government officials, and agricultural leaders. These provided a sense of which groups were losing and gaining from the boom, and what the major economic and political issues were in the state. Most of the resulting analysis was presented in Chapters 1 and 2.

Identify Major Impacts on the Cacao Economy

Interviews with some twenty key individuals in Tabasco's cacao community - UNPC officials, leading producers, Cacao Plan tecnicos,

BANRURAL credit officers, chocolate industry management - established that labor market disruptions and changes were the principal effects of the oil boom on cacao farming. This was due to the fact that labor was the key input in cacao production.

A second stage of field research involved 48 interviews on rancherias and ejidos with cacao farmers across the state, and access to nine cacao community studies made by the Universidad Autonoma de Chapingo at Puyacatengo in 1979 (193). This regional survey focused on the heterogeneity of cacao economy conditions - variations in wage rates and labor patterns, farm size and technology, politics and prosperity, regional cacao history. It laid the basis for Chapter 3.

Hypothesize Cacao Farm Family Sub-Groups

At this point, the study became focused on the interplay between the oil and cacao economies at the level of labor flows and employment impacts. But standard analyses did not seem appropriate. Marginal analysis relating wage rate changes directly to farmer migration and agricultural production did not explain the preliminary results of the regional survey.

The latter suggested that in some areas larger numbers of cacao family members were indeed flocking to petroleum jobs; but in other areas just the reverse was happening - farmers who used to work off-farm were returning to farm work exclusively. While some farmers were producing unprecedented quantities of cacao (state production levels were at an all-time high), others had nearly ceased all cacao production save maintenance.

The above contradictions were not elucidated by grouping cacao farmers according to land tenure, cacao association, or even directly by size (Thesis, Appendix B charts). However, when grouped by family labor characteristics (hired-labor based, family farm, minifundia, collective, landless), the confusion seemed to be resolved. The "family economy" approach, which will be explained later in the chapter, became central to research.

Establish Appropriateness of Sub-Groups

It was important first to assure that the cacao household sub-groups did indeed represent groups with substantially different behavior. The 1978 Tabasco Cacao Census (CCT) (45) and 1980 Socio-demographic Survey of Tabasco (SST) Cacao Sub-Sample data (75) were utilized for this purpose. The Cacao Census collected data on basic farm and farmer characteristics, cacao production and technology use on nearly 11,000 cacao farms. The SST Cacao Sub-Sample was a more in-depth study of family employment and migration for 408 households, of which 315 possessed cacao farms.

Tabasco Cacao Census cross-tabulations showed few significant differences in variables such as tenure or cacao association, whereas

among family economy-based sub-groups, a number of variables differed markedly. The SST showed even more marked differences in basic demographic and employment characteristics among the different farmer types. These results will be summarized later in the chapter.

Micro-Analysis to Explain Macro-Behavior

Aggregated data do not explain behavior, and particularly cannot determine whether movement of particular variables are caused by long-term trends or short-term phenomena. The disaggregation of different cacao household types alone did not explain the farmers' planning objectives, nor the income/labor use/cost structure of their farms. This required more in-depth field study.

Because cost and labor data are very time-consuming to collect, such a sample would have to be small. The methodological problem involved here was how to maximize heterogeneity with a small number of cases, and yet make the results from those cases relevant to macro-level considerations.

We resolved the former by interviewing in three small communities which had widely different economic conditions: an old cacao-growing area in Cunduacan in the heart of the oil producing region; a newer, more marginal cacao zone in Teapa away from most oil disruptions and in the process of transition to a predominantly ranching economy; a collective ejido with substantial cacao production in the Chontalpa.

Because community interactions, history and economic conditions affect household decision-making and experience, we spent several weeks contacting key informants in these areas for general open-ended interviews, as well as collecting local cacao input cost and marketing information.

The next step was to choose the household cases. Ejido C-29 represented the collective producers, who were studied as a single economic unit. Two farmers in Cunduacan represented the minifundistas (of whom there were very few in Teapa). Six farmers in Teapa and Cunduacan represented the family and hired-labor-based cacao households.

Interview Techniques. Data collection for the collective farm had two parts: personal and group interviews, and use of archives. History, problems, labor use, ejidal organization, were collected through interviewing. The archives contained information on cacao and general production costs, payments of wages and profits, use of hired labor, ejidal income and investments, and cacao production over time.

For the eight case study households, an elaborate questionnaire was devised for application in four visits. The first visit included an introduction, and collection of information on family members, farm layout, history and assets. The second visit covered farm activities and employment by activity, and other employment of family members. The third visit was for collection of farm cost and family income

information. The last visit was for checking incongruities and completing an open-ended questionnaire on personal plans, historical and projected activities and responses to changing cacao production conditions, and farmer-community interactions.

With the exception of most cacao production data, which was corroborated with receipts from the Cacao Association, and generally at the Association offices as well, all information was via recall. Recall appeared to be quite good for specific detail (how much foliar fertilizer was purchased in March), quite poor for summary type statistics (total fertilizer purchased in 1979), therefore the questionnaire was organized to elicit detail.

These data were then analyzed for cost structure and employment patterns, and compared to Cacao Plan budget prototypes. Profit levels under different definitions of income and cost were computed. Principal constraints to further cacao production, both technological and in terms of labor, capital and land assets, were deduced. Questions involving these analyses were referred to the farmers a year later, in a return visit to Tabasco (during a particularly bad cacao season), at which time comparative information on the next year's production and employment were collected.

These questionnaires established the economic levels at which cacao production is carried out on the different types of farms, and the types of expenditures which might be expected.

Document Sub-Group Activities at Macro-Level

The CCT provided overall production information, which showed the importance - in 1978 - of each of the cacao household types, but unfortunately we have no time series of production for the groups. Thus there is no hard macro-level documentation of the decline in hired-labor-based cacao production, the increase in family farm and collective production, the stability of minifundia production.

Historical production data scarcity and unreliability both at the farm level and the Cacao Association level precluded such analysis during a two-year field study. So, rather than concentrate on absolute production levels, this study analyzed the direction and rate of change of economic activity - and the reasons behind those changes - via the various surveys and case studies.

The SST did provide substantial information on migration and employment changes over time for different types of households. Differential migration rates for different age groups were established for the farmer types, which corresponded well with the collective histories (in terms of land settlement, inheritance and farm employment opportunities during different periods) gathered from interviews.

Employment changes between critical economic periods in the state's history - 1965, 1971, 1977, 1978, and 1979 - document the movement of heads of households and of the EAP of cacao families between agricultural wage labor, cacao and other farming, and non-agricultural

activities. Again, these substantiated the overall picture of employment changes revealed in key informant and case study interviews. Together with the farm studies, they form the analytical basis for Chapters 5 through 9.

Analyze Global Cacao Production and Employment Response to Changing Economic Conditions

The final stage of analysis was to examine the combined effects on the state economy of decision-making by farmers of the different types studied. Their response patterns were then related to the problems of economic development in Tabasco - and other zones undergoing similar industrial transitions.

Family Economy Analysis

Farm enterprise studies in the "third world" have generally built upon neo-Classical microeconomics, which worked reasonably well for that sector of third world farm economies which approximated that in the capitalist west - individual or corporate proprietorship on relatively large holdings, oriented toward market production, where relative returns to capital are the guide for farmer investments.

But the methodology breaks down considerably when dealing with subsistence and mixed subsistence/commercial farmers. In the peasant household, some goods are produced for use value (the subsistence sphere) and others are for market (commercial sphere). Labor time and other inputs are not valued the same in the two spheres. Peasants respond to relative price changes in the same way as a capitalist when they produce for the market; but not in the subsistence sphere where meeting minimum subsistence requirements is the guiding rule. Subsistence objectives "distort" resource patterns and inputs and outputs in the subsistence sphere cannot be priced, since they do not enter the market.

With the growing importance of farm management analysis and economic prediction for agricultural prices and production in development policy, various approaches have been devised to deal with these problems. (See Thesis, Chapter 4, for a review of the leading methods). Many of these predicate a distinct production logic for "peasants."

My approach in this study is eclectic. I assume that families have multiple objectives, not necessarily farm profits, and that they behave rationally to achieve those objectives. I also assume that the conditions and constraints on family resources make a qualitative difference in decision-making objectives and strategies.

A number of family characteristics may affect production behavior: the demographic stage or "life cycle" of the family, the dependent-to-worker ratio, family access to land resources and to community and family support. Family members seek to balance the drudgery of

work against a subjective estimate of the marginal utility of output, once a minimum level of production required for subsistence has been reached.

This would include not only minimal food and shelter requirements, but also maintenance of the family's basic farming resources (land, infrastructure, water supplies) and investment in goods, cash or labor in the community support system which, for example, provides insurance against the individual family's disaster (sickness of head of household, e.g.). The minimum acceptable return may be above or below the market wage (42).

The family's resources include the labor of its working members, its land base, cash income, savings in kind. These can be applied to agricultural activity, on-farm non-agricultural activities, off-farm agricultural or non-agricultural employment. Where land is scarce and capital resources are minimal, as is the case for most Tabascan cacao farmers, family labor use becomes the most significant variable input in the family's strategy. The ratio of producers to consumers in the family determines both the labor resources available and the level of production required for family subsistence.

Farm families with different types of resources and at different demographic stages will produce, market, hire labor, and hire out as workers differently.[1/]

For this study, the land:labor ratio was the critical factor used to group farmers, given that labor is of critical importance in the oil boom and in conditions of cacao production. For another study, some other basis for distinguishing farmers might be appropriate.

The family economy approach serves equally well for the "capitalist" farmers - but many considerations dwindle in importance when the farmer has a relative abundance of family resources, hence profit orientation may become dominant. Thus there are easily distinguishable differences between them and campesinos. The classic differences are outlined in Table 5. But that dichotomy is excessively simple: the difference between groups of campesinos may be just as significant, as the contrast between minifundia and family cacao farming will document. [2/]

In Mexico, the theoretical literature on such a "peasant economy" is quite developed. Questions related to agriculture-petroleum interaction in Tabasco are directly linked to the chief concerns of the Mexican debate:

[1/] Pertinent literature includes Berry (1975), Chayanov (1966), Greenwood (1978), Greenwood (1973), Hill (1970), Martinez and Rendon (1978), Ortiz (1973), Popkin (1979), and the collection Relations of Production edited by Copans and Seddon (1978).

[2/] Martinez and Rendon (1978), writing on Mexico, elaborate nearly a dozen types of farmers with distinct production characteristics.

TABLE 5. PRINCIPAL CHARACTERISTICS OF PEASANT AND ENTREPRENEURIAL AGRICULTURE*

	Peasant Agriculture	Entrepreneurial Agriculture
Object of production:	Ensure reproduction of family and the unit of production	Maximize profit and the accumulation of capital
Origin of work force:	Fundamentally the family, and on occasion, reciprocal interchange with other units; exceptionally, wage labor in marginal quantities	Wage labor
Working bond of farmer with farm workers:	Absolute (family ties)	Non-existent, except by legal composition
Technology:	High intensity of labor; low capital intensity and inputs purchased per day of work	Greater density of active capital and greater proportion of purchased inputs in the value of the final product
Destiny of product and origin of inputs:	Partially commercial	Commercial
Criteria for intensification of work:	Maximum total product, even at the cost of declining average product; the limit is at zero marginal productivity	Marginal productivity equal to wage
Risk and uncertainty:	Non-probabilistic avoidance of risk; "algorithm of survival"	Probabilistic internalization, seeking profits proportional to risk
Character of work force:	Marginal or non-transferrable valorization of work force	Only employs work force transferrable according to qualification
Components of income or net product	Indivisible product or family income, realized partially in kind	Salary, rent and profits exclusively monetary

* Adapted from CEPAL, Economia Campesina y Agricultura Empresarial, p. 31.

- the role of the campesinado in national agricultural production strategies;

- the threatened demise of campesino production as a result of capitalist competition for resources;

- the effective transfer of resources from the campesino economy to the general economy due to poor prices for campesino products, high prices for products bought by campesinos from the general economy or low wages in the reserve labor force of the campesinado;

- how to technify campesino farming;

- interaction of campesinos with the urban economy;

- rural-urban migration;

- desirability of collectivization. 3/

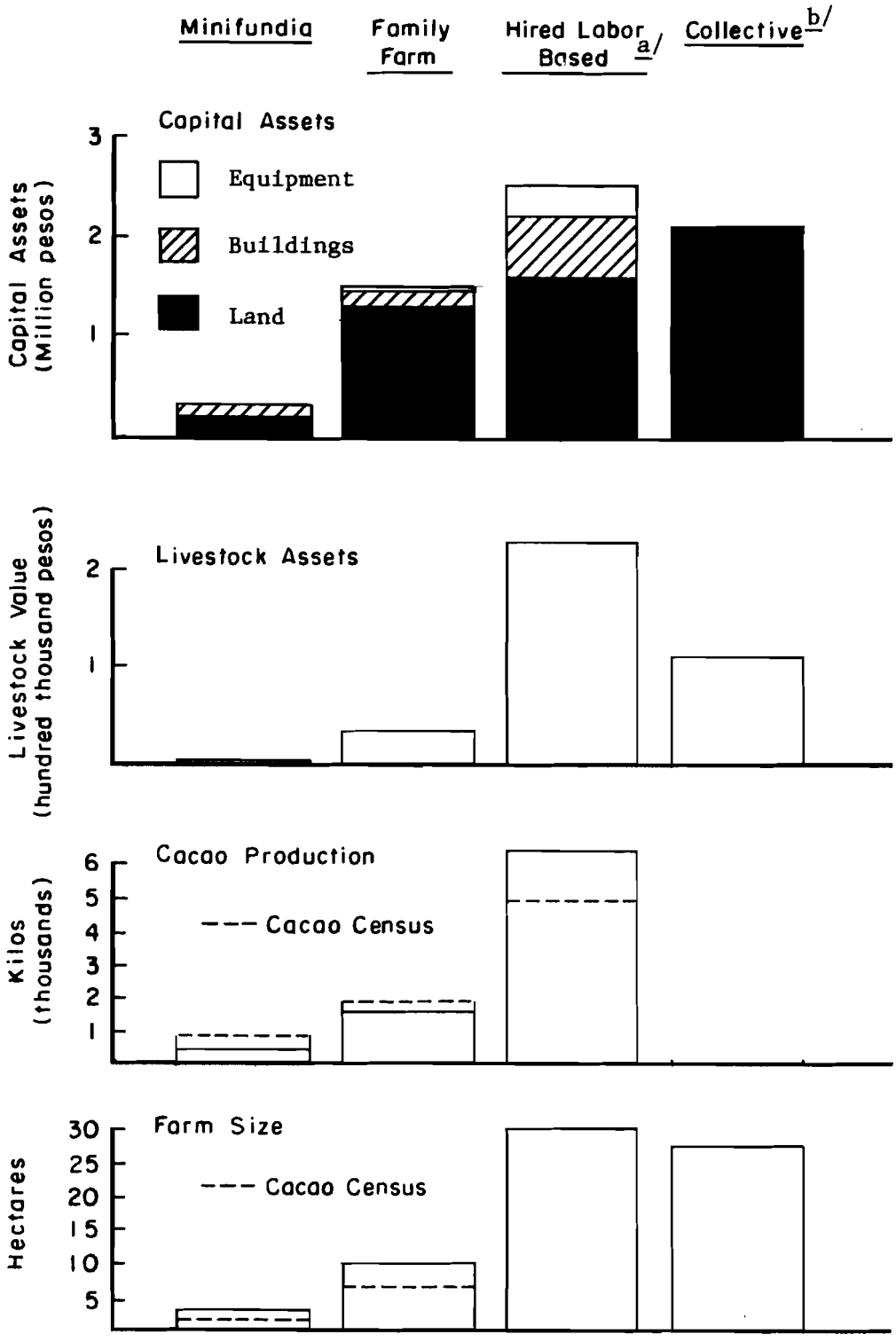
Family Economy Profiles of Tabascan Cacao Farmers

The five kinds of families who participate in Tabascan cacao production - minifundia, family-based, hired labor-based and collective farm, and non-farm families - operate under fundamentally different modes of production. These are conditioned by the asset array available to them and the organization of labor. The charts and graphs in this section summarize the differences, which later chapters will attempt to explain. The principal aspects reviewed here are: farm assets and means of production; farm family characteristics and the demographic cycle; family employment and relations of production; farm processes, production systems and costs; and family strategies for labor use and farm production.

Chart 15 indicates differences in the range of farm assets available to the various groups of families, based on the case study examples. It is important to contrast the value of assets in land - which have been highly inflated in the past decade - with the assets in buildings, equipment and livestock, items far more indicative of wealth. Land belonging to minifundistas and ejidatarios on collectives ranged in value below $500,000, or US$22,000 at the time; family-based farms ranged up to US$50,000; hired labor based between $50,000 on modest establishments and US$1,000,000 on largeholdings planted heavily to cacao. The value of buildings, equipment and livestock totalled well under US$5000 for minifundistas, under $10,000 for family-based farmers, and from $15,000 to half a million dollars for hired labor based producers.

3/ For the considerable literature on the relations between the campesinado and capitalist agriculture, see: Warman (1978), Barbosa-Ramirez (1976), Bienestar Campesina, Ed. by de Navarrete (1971), Estructura Agraria (1974), Esteva (1978), Barkin and Suarez (1982), Warman (1980), Capitalismo y Campesinado (1976).

CHART 15. ASSETS OF TABASCO CACAO FARMS, BY TYPE*



*Composite values based on data in Thesis, Table 9.

a/ This does not include data from the largest-scale farmer.

b/ Data on buildings and equipment were not included.

Farm Assets and Means of Production

The minifundia average a little over a hectare in size, and produce roughly a fourth of the average production on family-based farms, which average about six hectares. The hired labor based farms, by comparison, average about fourteen hectares, and the average farm produces between two and three times as much as the family-based farm. Production per ejidatario on the collective is in the range of the family-based producer.

Farm Family Characteristics and the Demographic Cycle

Cacao-producing families in Tabasco have very similar overall characteristics to the "typical" Tabascan family. Half of all family members are fifteen years of age or younger; slightly over a quarter are aged 16 to 30. Of all family members over seven years of age, 36 per cent are head of household or spouse; 50 per cent were children of the head of household; and 14 per cent had assorted other relationships, commonly grandchild or daughter-in-law to the head of household.

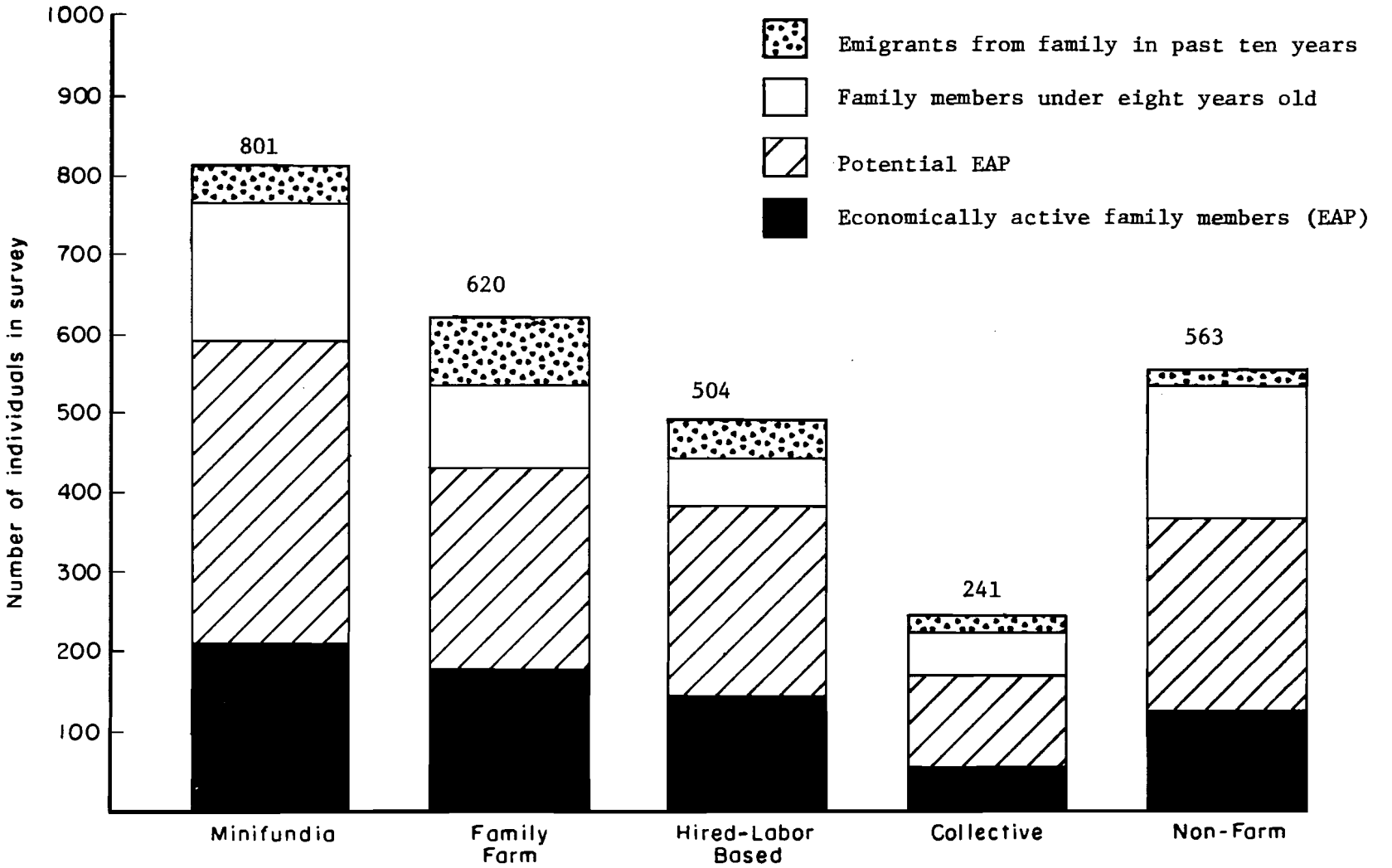
Charts 16 and 17 illustrate the differences between the family types as regards the typical demographic stage. The hired-labor-based producers are generally older, and their children tend to be older as well. The minifundistas tend to be younger, and have more younger children. The population on collectives and without land is much younger than the farm households. Median age of head of household is only 35 in non-farm families, 40 on collectives, 47 on minifundia, 49 on family farms and 55 on hired-labor-based farms.

Largely as a consequence of this configuration, there are relatively more dependent family members in the minifundia, collective and non-farm families, and more family emigrants from family- and hired-labor-based households, since these are generally married children.

This structure is mainly the result of the impact of the demographic cycle on landholdings. Farmers' sons go through a period of working either on or off-farm before acquiring title. Today, the plot they receive is generally sub-divided, of minifundia proportions. Over time, they may increase the size of the plot by marriage or purchase. The older owners of family-based and hired-labor-based farms generally received their plots several decades ago, when the average size was larger. Many will likely transfer land to their children in minifundia form.

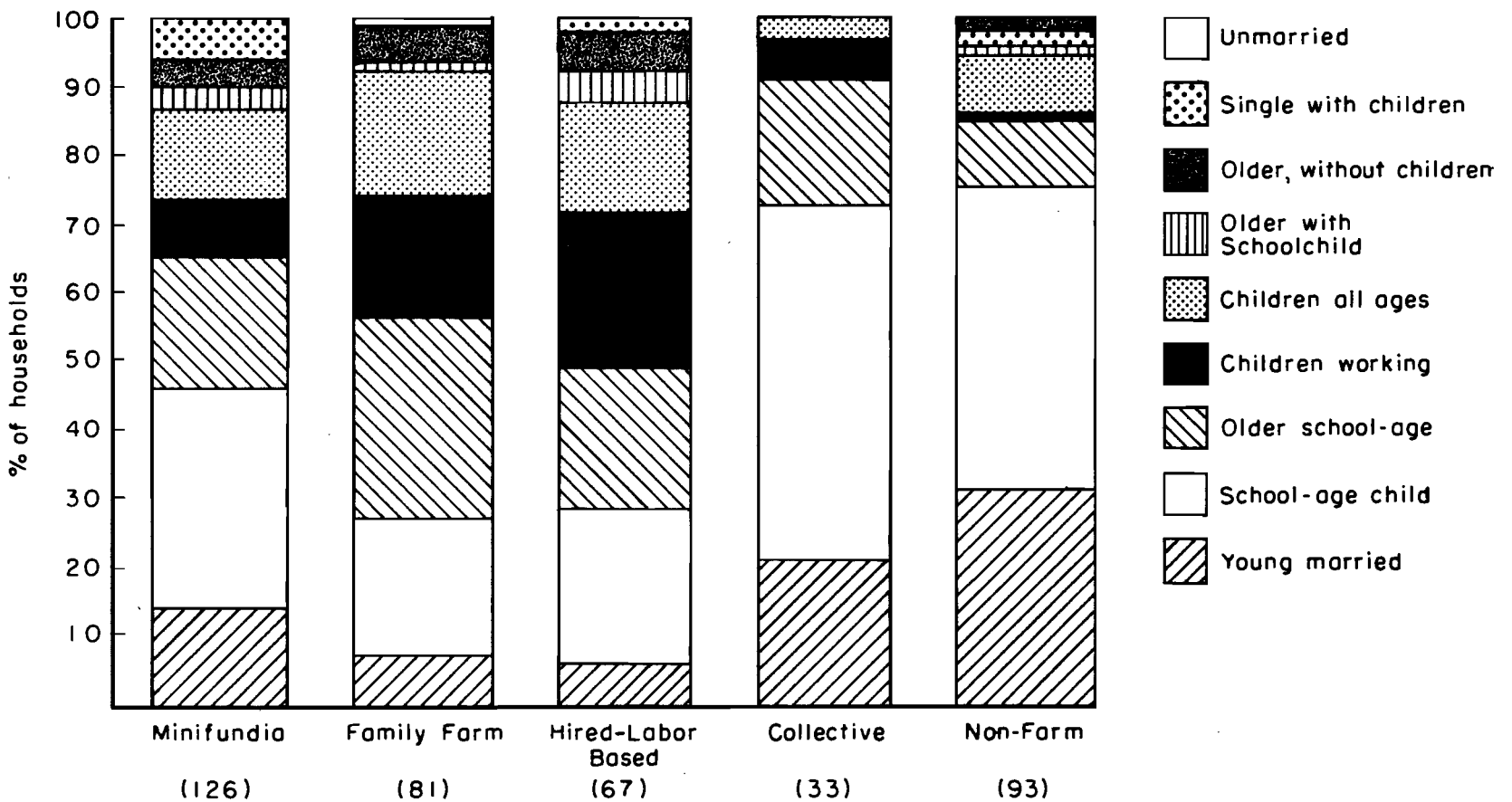
Chart 18 shows migration histories for the family types. Nearly a quarter of all family-based farm household members (over seven years) had a history of changing residence, a fifth of non-farm family members, and nearly two thirds of collective household members (because of the dislocation caused by collectivization). Note that on family-based, non-farm and hired-labor-based farms, residence change frequently occurred after 1976, indicating the impact of petroleum employment-induced change. Minifundistas and collective farm families tended to remain tied to their land, even when active in off-farm employment.

CHART 16. POPULATION IN THE SOCIODEMOGRAPHIC SURVEY OF TABASCO CACAO SUB-SAMPLE, BY FAMILY TYPE*



*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

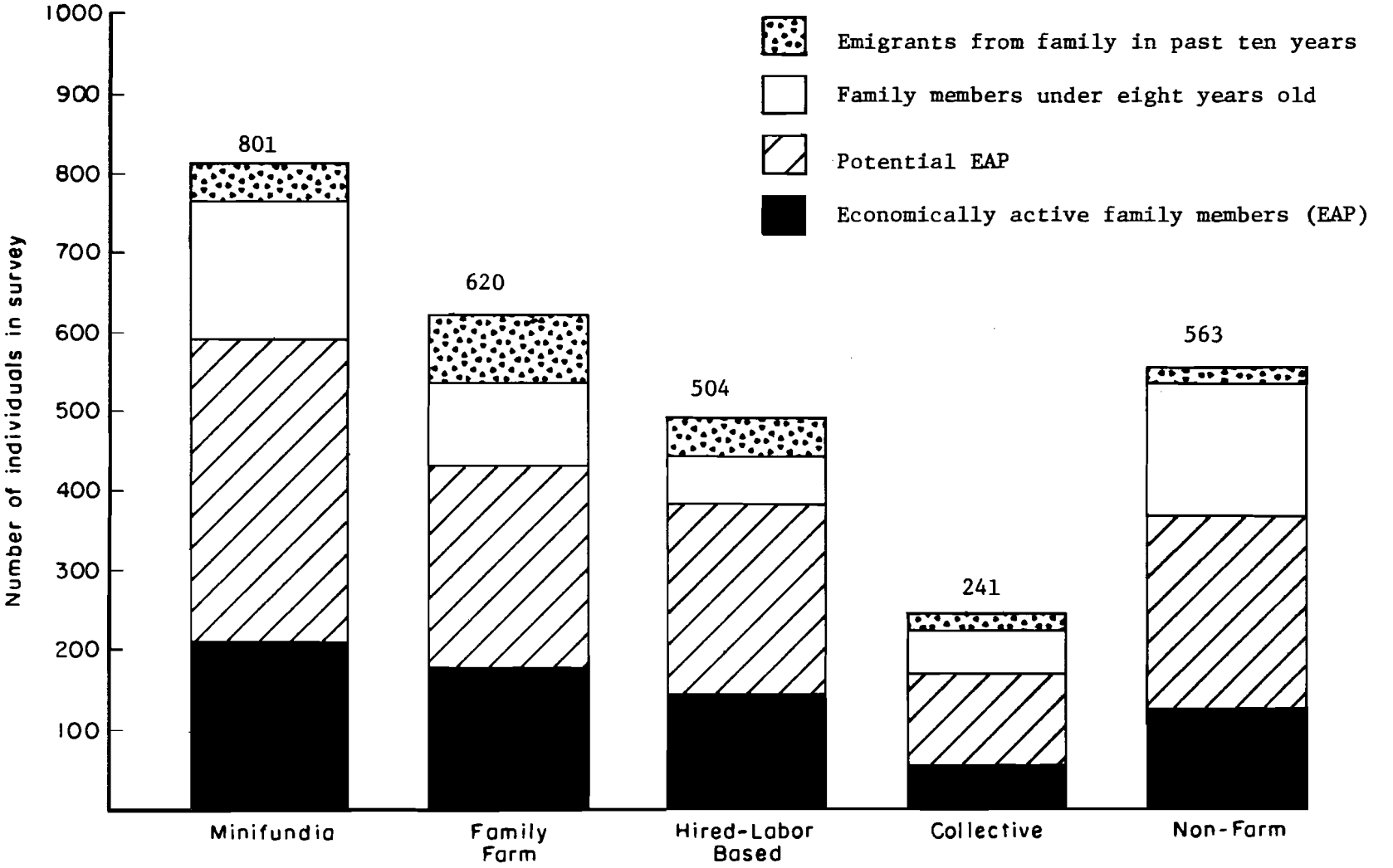
CHART 17. DEMOGRAPHIC STAGE OF CACAO HOUSEHOLDS, BY TYPE* [a/]



*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

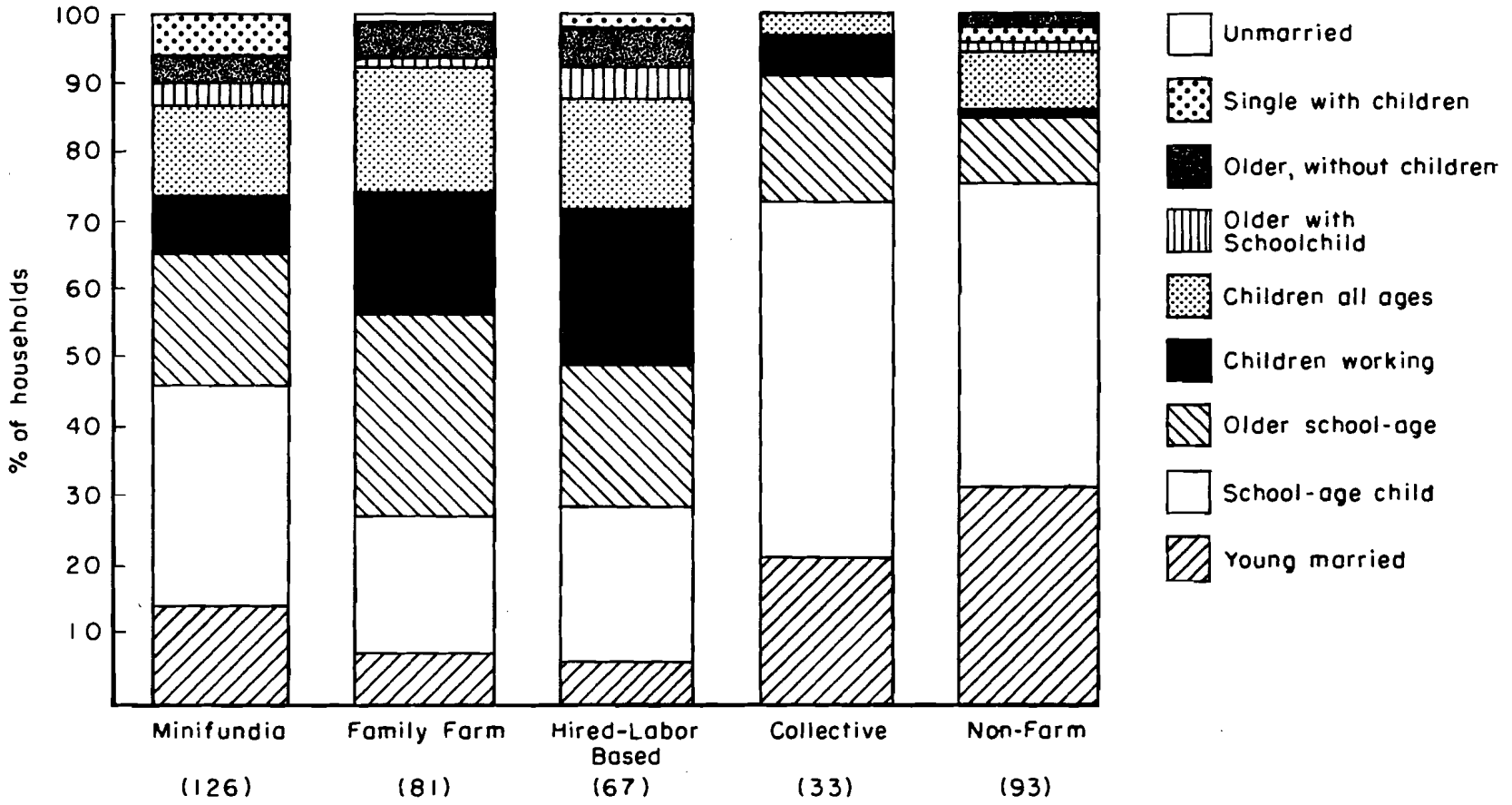
[a/] Definitions for the various stages may be found in Appendix Table C-6.

CHART 16. POPULATION IN THE SOCIODEMOGRAPHIC SURVEY OF TABASCO CACAO SUB-SAMPLE, BY FAMILY TYPE*



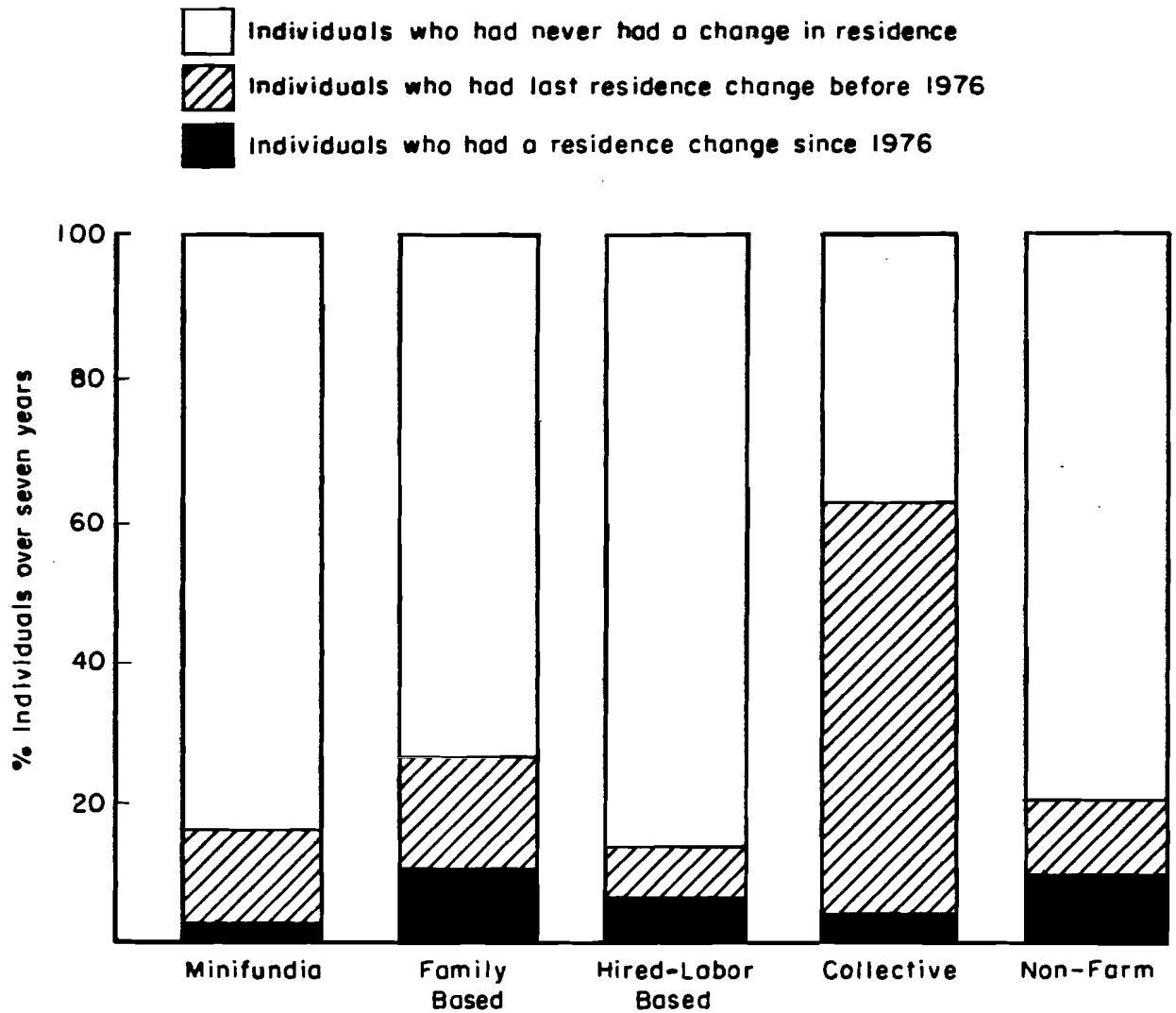
*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

CHART 17. DEMOGRAPHIC STAGE OF CACAO HOUSEHOLDS, BY TYPE* [a/]



*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

CHART 18. RESIDENCE CHANGES IN CACAO FAMILIES, BY TYPE*



*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

Family Employment

Of all the potential EAP (those over 7 years old), a quarter were housewives and a third were students; the rest worked. Chart 19 shows occupation of heads of household by type. A fairly constant proportion of the heads of household (around 75 per cent) were cacao farmers. Relatively few minifundistas participated in other types of farming, but more were involved in skilled trades. Hired-labor-based heads of household tended to participate more in agricultural work, or trades and commerce. Only half the collective farmers claimed cacao farming as their primary occupation, with the rest in farming or agricultural work, almost universally on the collective. Of non-farm heads of household, 72 per cent were in agricultural work.

Almost all heads of household who did not claim cacao farming as a principal occupation, did so as a secondary occupation. The prominence of secondary occupation among collective farmers and its lack among non-farm heads of household is notable.

Charts 20 and 21 show occupations for all working individuals in the families. The minifundista family members tended to work more as cacao farmers (partly because there were few working members apart from the head of household), less in agricultural work, and more in non-agricultural activities. The preponderance of agricultural work by hired-labor-based producer households is partly the result of more older children in the EAP, who work on the family farm.

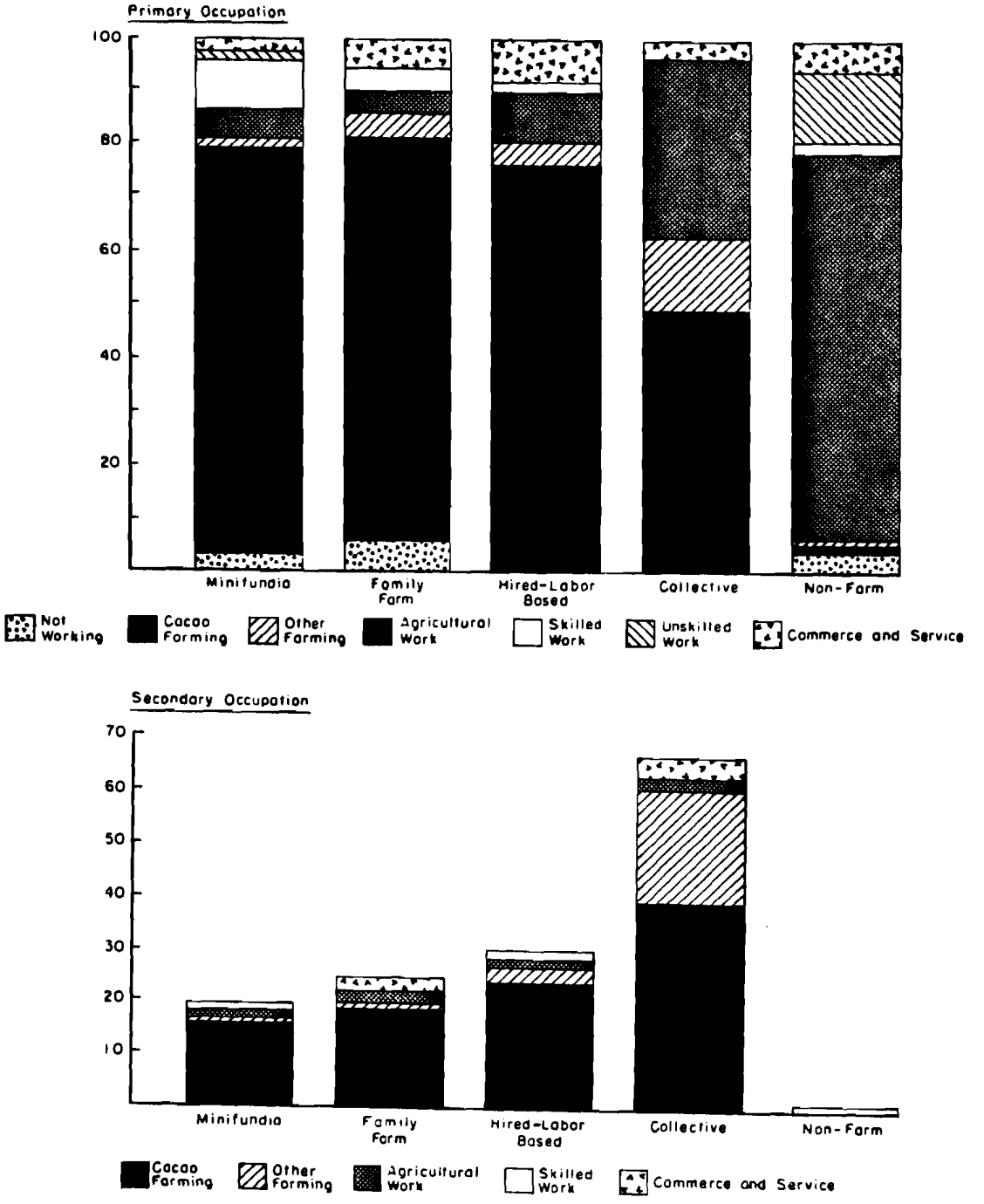
But disaggregating by age of worker in Chart 22 reveals very different patterns within and between the families. Minifundista workers aged 16-20 were much less likely to work in agriculture than those on family or hired-labor-based farms (because they were not necessary to on-farm production). They, like teenagers from non-farm households, frequently worked in non-agricultural occupations. Yet a far larger proportion of 20-30 year olds from minifundia were cacao farmers rather than workers than on the other farms. Note also that by age 30-40, few hired-labor-based producers worked off-farm, relative to the other groups.

Secondary occupation of minifundia workers tended to be in agricultural work for cacao off-farm (not discounting those whose own farm work was the secondary occupation). The other farm types were unlikely to work in cacao as a secondary occupation.

Women's formal participation in the EAP was relatively low - under ten per cent. When women did work, it was in all types of occupations, although participation in agricultural work varied inversely with size of farm. Over half of active minifundia women were cacao farmers - far more than for other types, while family-farm women were most active in unskilled work and hired-labor-based farm women in agricultural work (at home) and skilled work. There was no particular tendency for younger or older women to predominate in the work force.

However, the SST only documented work that lasted for at least thirty days of the year. Field interviewing suggested that female participation in cacao harvests, in particular - or in processing - is very common at peak demand periods.

CHART 19. PRIMARY AND SECONDARY OCCUPATION OF HEAD OF HOUSEHOLD ON TABASCO CACAO FARMS, BY TYPE*



*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

CHART 20. PRIMARY OCCUPATION OF CACAO HOUSEHOLD EAP, BY TYPE

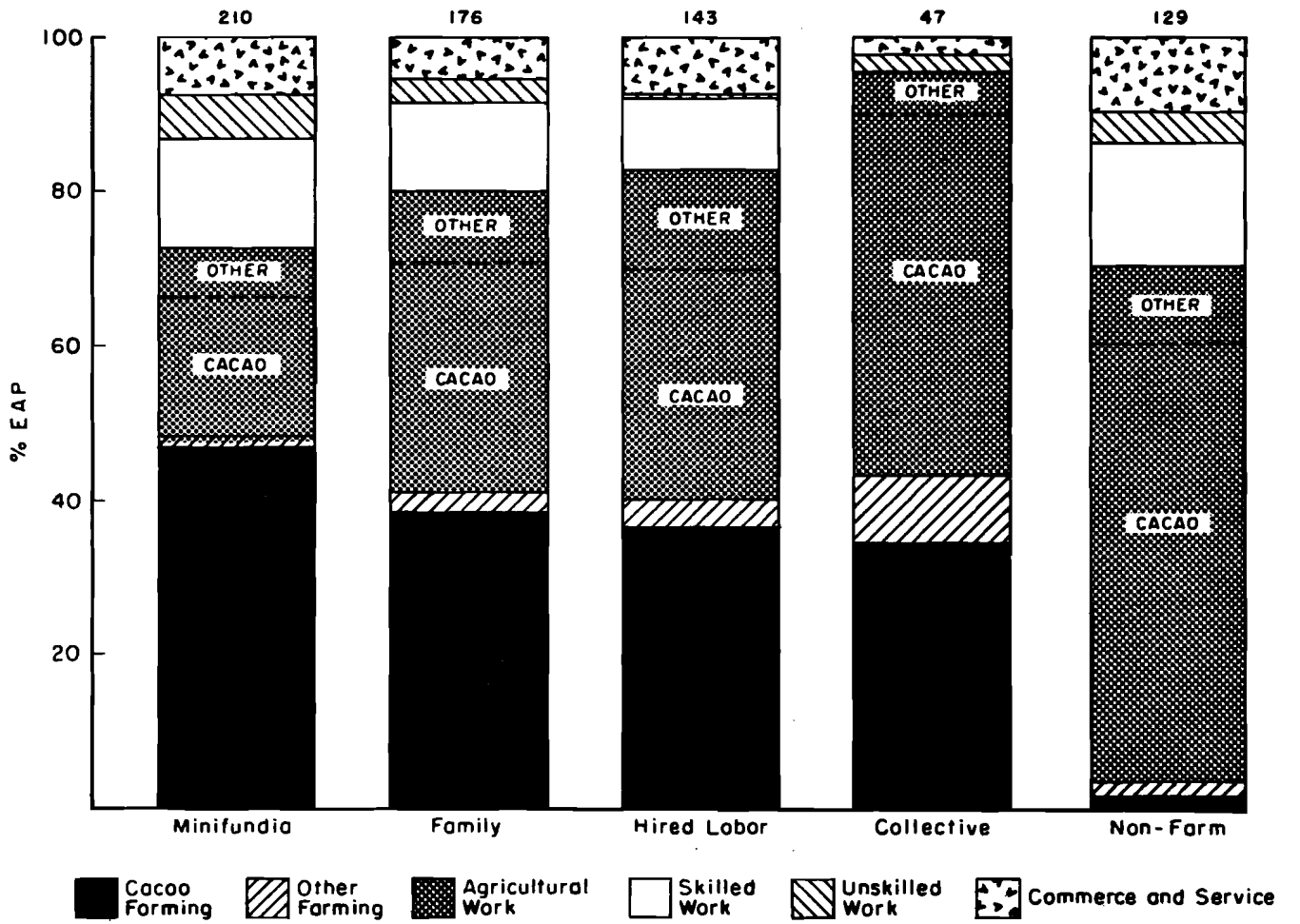
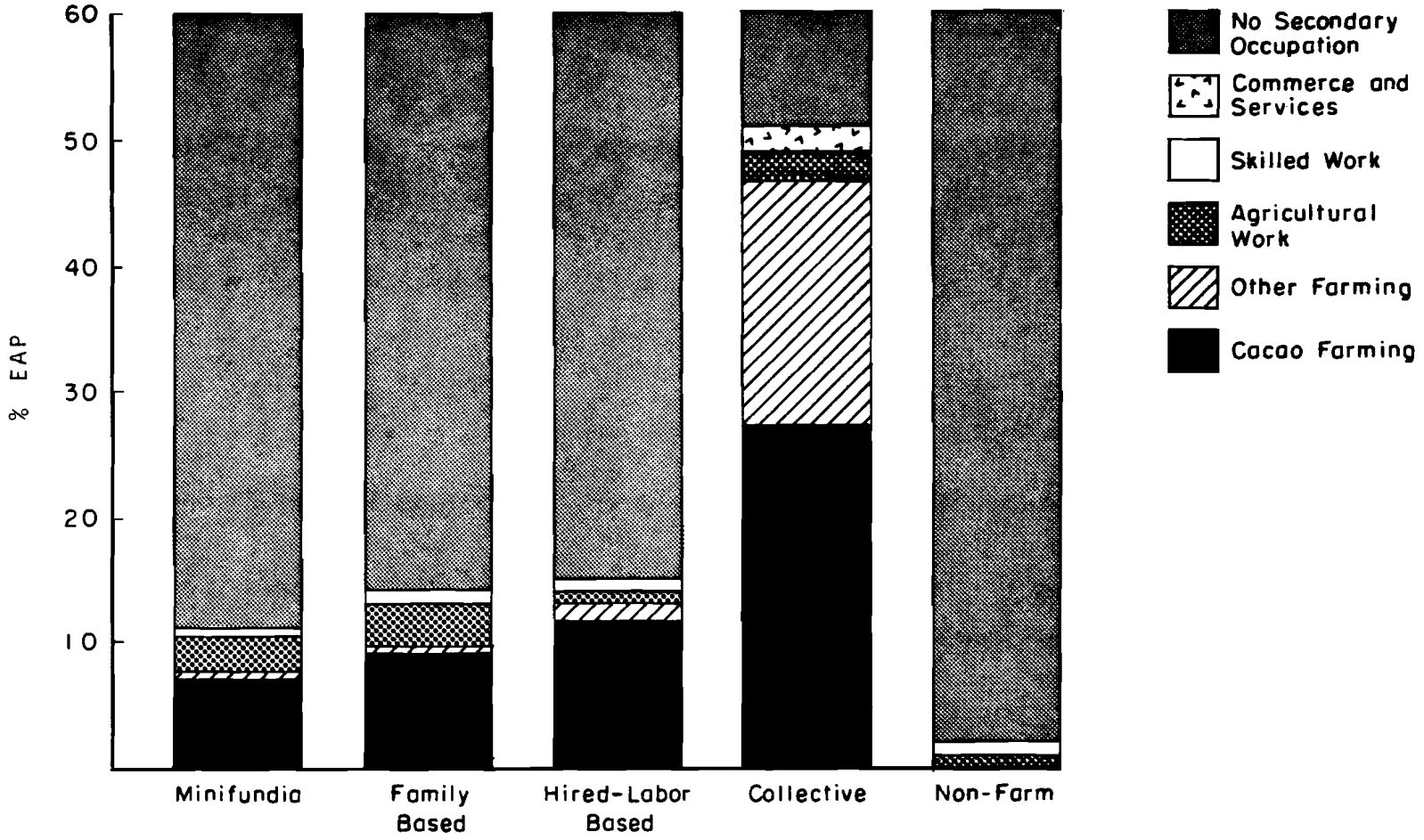
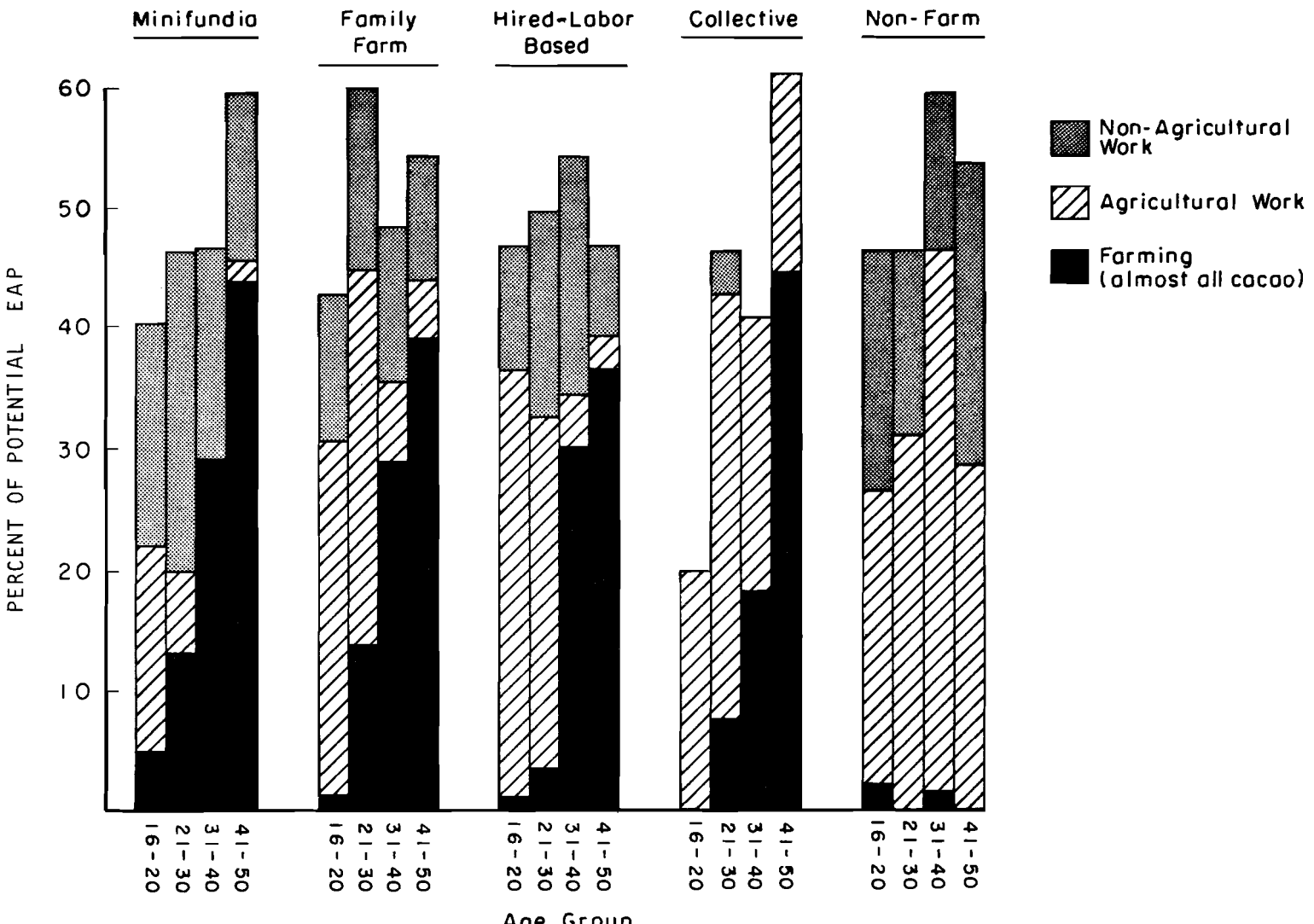


CHART 21. SECONDARY OCCUPATION OF CACAO HOUSEHOLD EAP, BY TYPE *



*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

CHART 22. PRIMARY OCCUPATION OF POTENTIAL EAP, BY AGE* a/b/c/



For footnotes, see NOTES, Chart 22.

*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-sample.

There were only 16 "former cacao farmers" in the sample, who held a variety of occupations. Chart 23 shows the present occupations of "former cacao workers," who represented a third of all non-landholders who had ever been occupied as cacao workers. Nearly a third of the former workers had retired. Remaining minifundistas were doing non-cacao agricultural work or skilled trades. Family-based workers were least active in farm work; hired-labor-based workers least active in unskilled work.

Analysis of historical occupations of cacao household workers showed a general decline in the proportion of cacao farmers, and a corresponding increase in agricultural workers and workers in skilled trades and commerce. The proportion of individuals working off-farm in cacao has gone down. Historical occupation of household heads changed less markedly over time, except for minifundistas and collectives. There were relatively more minifundista cacao farmers than in 1965; among collective ejidatarios, there was an abrupt occupation change coinciding with the start of the Chontalpa Plan project.

Labor use statistics from the case study farms are consistent with the patterns found in the SST. The collective and hired-labor-based producers performed approximately half the required work on the farm, except for the largeholder with 40 hectares of cacao. The family-based producers perform over three quarters of their own work. The minifundistas tended to perform all their own work; the exception in this chart was a young man who still had important responsibilities to work on his father's farm, and consequently hired a young boy to help him on his own plot.

Farm labor is not a large part of total family labor on minifundia. For family-based households it is the leading, but not sole use of family labor. In collective and hired labor-based households, non-farm labor is minimal.

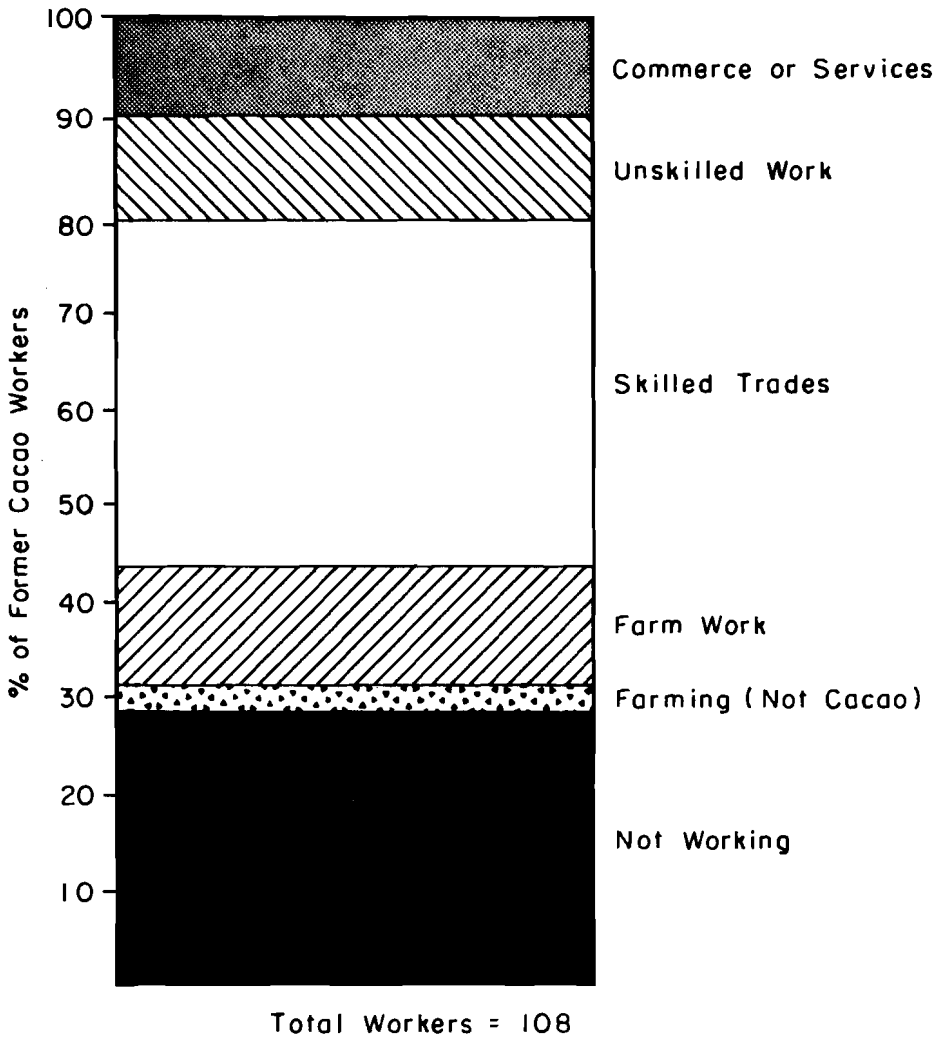
Farm Production and Family Income

The differing assets of the cacao farm types lead to production strategies which utilize very different combinations of labor and purchased inputs. Farming intensity and importance of farm income in total family income differ among them.

Chart 24 shows per hectare costs of cacao production in Tabasco, comparing the farmers' costs with the recommended farm budgets of the Grijalva Commission. Obviously, none of the case study farms reached total recommended input levels, even including the imputed value of family labor. The family-based farmers approached the total most closely by substituting family labor for purchased inputs. The exception was a farmer who refused to hire non-family labor even for important maintenance activities.

Yield data from the CCT suggest that cacao production per tree is slightly higher on minifundia than family farm or hired-labor-based

CHART 23. PRESENT OCCUPATION OF FORMER CACAO WORKERS* a/b/c/



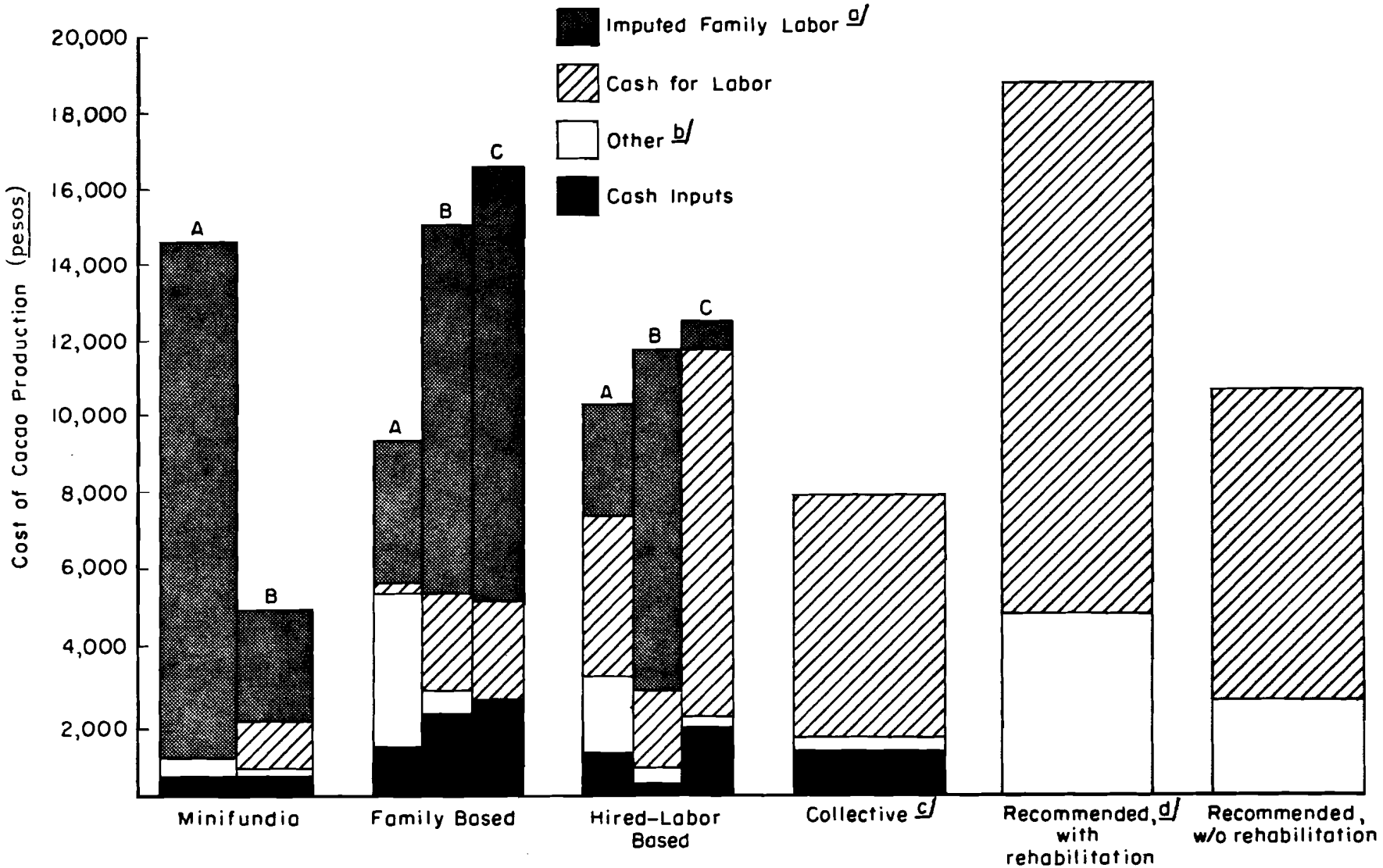
*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1981, Cacao Sub-Sample.

a/ Note that there was one ex-cacao worker on a collective ejido who in 1979 was a farm worker.

b/ This does not include cacao farmers who were cacao workers before acquiring their farms, nor cacao workers who once were farmers.

c/ A total of 337 individuals had a history of being cacao farmworkers, without ever owning a farm; former workers therefore represent a third of the group.

CHART 24. PER HECTARE COSTS OF CACAO PRODUCTION IN TABASCO, BY FARM TYPE



For footnotes, see NOTES, Chart 24.

farms. Production per hectare is considerably higher on minifundia, with family farms slightly above hired-labor-based producers.

The case study yield data show family-based farm cacao yields to be lower on average than those on hired-labor-based farms, presumably due to more effective use of labor, either through better sprayers and other equipment or better condition of plantations. The minifundia yields were somewhat lower than the family-based yields, due to the greatly reduced level of chemical inputs. See Table 6. The individual overlaps between groups were considerable. The case studies support the contention that management and family characteristics are more important yield determinants than farm size.

But for the minifundistas, cacao income comprises less than a third of total income, so the reduced investment costs make sense. Even for family-based households, cacao income frequently accounted for under half of total income, although total income levels from cacao are much higher than for minifundistas. On the hired-labor-based farms, cacao income was extremely important, except for largeholder C, whose income from cacao was lower than that for farmer A, despite many times the area planted to cacao. See Chart 25.

Only the young minifundista earned and spent under $50,000 per year (US$2250). The general range for all but the two wealthier producers was $60,000-100,000 (US$2700-4500). Of particular importance was the very high level of expenditures on food (generally about 50 per cent), and medical expenses. Emergency expenditures for the latter required major family adjustments through debt or changing wage labor patterns.

These figures show only gross income; for most of the farmers, the level of household expenditures was very near - or in some cases, through credit, over - net family income. Savings generally took the form of purchase of livestock or farm investments, which appear in the budget as costs.

Analyzing the Case Studies

The following five chapters provide far more detailed budget analyses for the case study farms and landless workers, in order to understand the decision-making principles used in the production process, and in entering the off-farm labor market. The petroleum economy enters into many of these decisions through changes in off-farm wage levels, inflation in the cost of living and farm input costs, and inflation in the value of land. Through the personal stories of families trying in their individual ways to protect and promote the family welfare - and the statistical story of many families organized like them - those chapters will attempt to model the family economies of Tabasco's cacaoteros.

TABLE 6. CACAO YIELDS ON TABASCO CACAO FARMS, BY TYPE

(kilos)

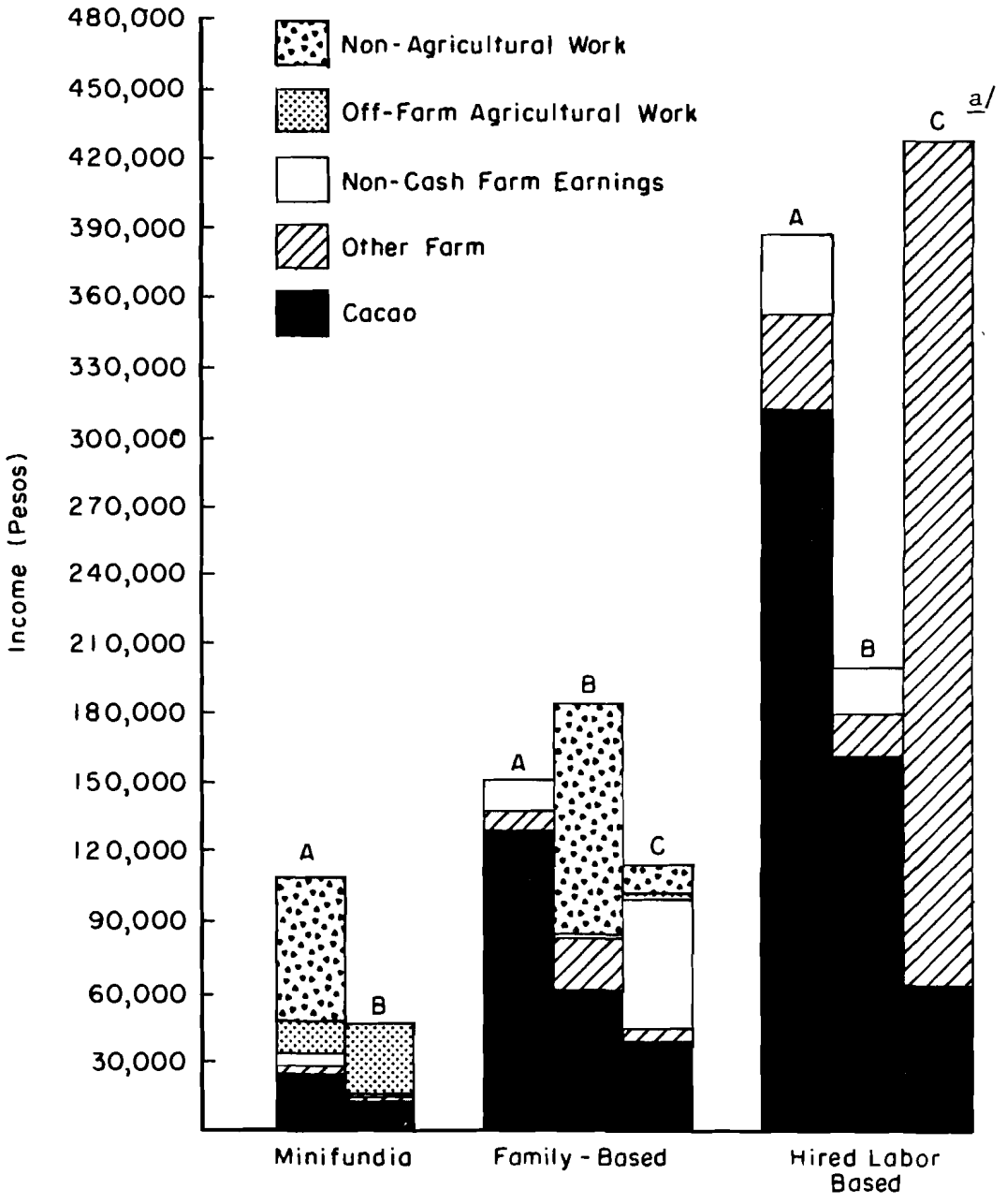
Yield Measure	Minifundia	Family Farm	Hired Labor Based
Case Studies[a/]			
Production per tree	.28-.45	.35-.77	.42-2.21
Production per hectare	170-301	173-340	254-1106
Cacao Census[b/]			
Production per tree	1.0-1.2	.9	.9
Production per hectare	617-785	510	498
Recommended[c/]			
Production per hectare (without rehabilitation)	637	637	637
Production per tree (with rehabilitation)	1.0-1.3	1.0-1.3	1.0-1.3
Production per hectare (with rehabilitation)	825	825	825

a/ Sara J. Scherr, Tabasco Cacao Farm Case Studies, 1979-80.

b/ SARH, "Censo de Cacao," Villahermosa, Tabasco, 1978.

c/ SARH, Representacion Tabasco, "Plan de Incremento de la Produccion de Cacao en el Estado de Tabasco," 1980.

CHART 25. FAMILY INCOME ON TABASCO CACAO FARMS, BY SOURCE AND FARM TYPE*



*Author, Tabasco Cacao Farm Case Studies, 1979-80.

a/ Multiply all figures by '10' for this family.

CHAPTER 5. HIRED-LABOR-BASED CACAO FARM PRODUCTION STRATEGY

The Profit-Motivated Farmer: Historical Focus of Development

The hired-labor-based (HLB) farmer in Tabasco represents the prototypic entrepreneurial farmer. Production is almost entirely geared to the commercial market and exchange value. Use of hired labor is fundamental for production due to the quantity of land resources and the production process. For cacao farmers, this latter criterion applies to farms with over 5-6 hectares of cacao, due to the high labor intensity of the crop. This relatively small group - ten per cent of producers - was responsible in 1978 for about 30 per cent of state cacao production. Their proportion of production has declined since then.

There is a conceptual difference between the "farmer," represented by the vast majority of hired-labor-based cacaoteros in Tabasco, and the "largeholder" whose resource base both provides important local economic and political power, and the potential (and frequent preference) for utilizing substantial resources outside of agriculture. Both are considered here.

The chief objective of production for this type of farmer is profit maximization, that is, return to total investment including land and equipment. The strategy of production is to increase or decrease the application of labor and of cash inputs to various farm products in response to relative price changes.

HLB farmers are the focus of typical agricultural development projects and policies because of certain advantages. They have greater ease of technology adaptation than farmers with fewer resources and less financial security. They have sufficient family resources to provide self-financing for many new operations or programs. They are quite willing to alter production patterns and crop choices where it is evident that over-all market returns will increase. Under conditions of general economic growth, rising farm prices, and good communications, it is argued that this category of farmers is most likely to experience farm "development" and increasing family incomes.

What has been less well studied and observed is the response of HLB farmers to more difficult economic conditions - confusing market signals, structural disruption, recession. Classic studies of capitalism in "crisis" suggest that there tends to be a high level of failures of the least competitive enterprises, then a concentration of remaining operations into fewer, larger firms.

Hired-Labor-Based Production in Tabasco

It is unlikely that during the 19th century many farms in the campesino sector in Tabasco hired "free labor," given a generally non-monetary economy, tight community organization, and traditions of

labor exchange. The larger plantations set up by descendants of the Spanish were predominantly based on hired labor or debt peonage. Workers were usually permanently employed; where extra labor was required at harvest time, indigenous workers were hired. The owners themselves performed very little of the actual work; rather, they organized and supervised work, though this was often left to overseers. During the period when the Sierra dominated production, these "largeholders" probably produced a larger percentage of the state's cacao than is the case today.

This situation underwent basic structural change during the last few decades, as the cacao frontier disappeared, active markets in labor and land developed, and many largeholders changed to cattle activities. The appearance of large numbers of landless workers and minifundistas who need part-time work off their own cacao farms coincided with the growing use by campesinos of hired labor. With the exception of a few very large latifundia-type farms, most cacao farms are relatively small in area, rarely over 20 hectares. Many of these "farmers" have close family ties with campesino producers, and became HLB producers via a gradual accumulation of resources from a campesino base.

The Survey results summarized in Chart 26 show that hired-labor-based cacao producers are mainly older farmers (their average age was 55), with large families, and children of working age. The large farm is the result of a lifetime of consolidation efforts, and partly made possible (as well as necessary) by a large number of dependents who could help in farm work as the farm was developed. Most farmers received their land as inheritance decades ago when the average plot size was larger.

These farm entities are not stable over time. Land inheritance, whether taking place during the lifetime of the farmer or after his death, in many cases breaks up the cacao plantations into family or minifundia type holdings. These may grow to be hired-labor-based farms again under fortuitous circumstances.

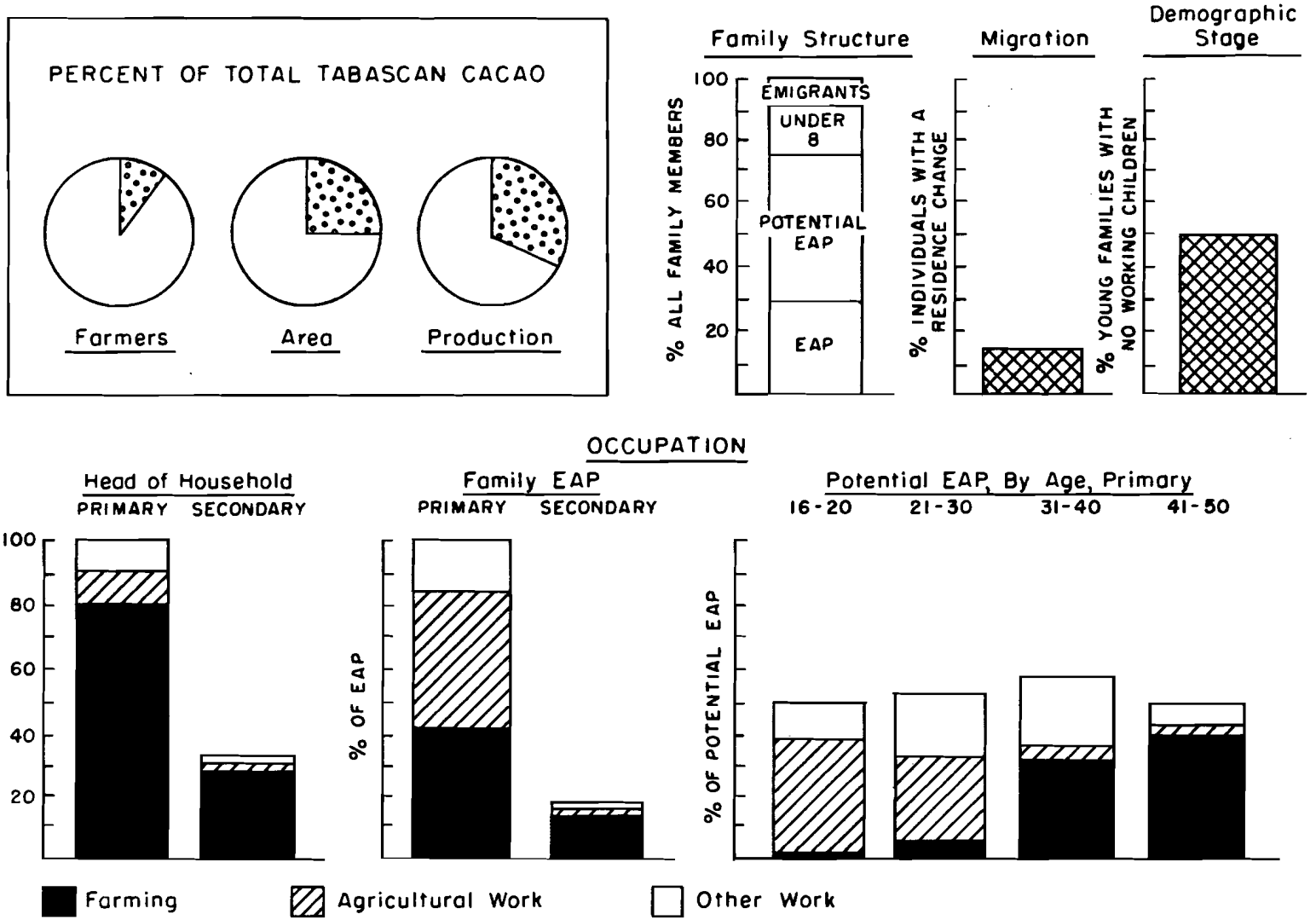
Typical HLB Households: Case Studies

The families chosen for in-depth analysis represent three of the major kinds of hired-labor-based farmers - the wealthy largeholder, the recent urban investor in cacao farming, and the traditional farmer who amassed a large number of plots over time.

Sr. Prado[1/] was an ambitious largeholder and rancher from Teapa; Sr. Ramirez, a very urban and enterprising cacaotero from Huimango town; Sr. Gomez, a barely literate campesino who through good management and inheritance acquired a large farming base.

[1/] Please note that all names of case study farmers have been changed, to protect their privacy.

CHART 26. DEMOGRAPHIC AND EMPLOYMENT CHARACTERISTICS OF HIRED-LABOR-BASED CACAO FARM HOUSEHOLDS



Data collected from the farm questionnaire are presented in a series of tables accompanying the text. More extensive data on employment, family labor use, household expenditures and monthly income flows may be found in the Thesis. Tables 7 and 8 show cacao inputs and production costs; and Table 9 all-farm production costs.

All financial information is in 1980 pesos. Because land prices are so important in budget analyses, all calculations were made for both high and low estimates for land value. Note the significant differences between cacao costs and all-farm costs. Depreciation costs were assigned to a specific enterprise or, where asset use was shared, equally between enterprises.

Costs are measured in three ways to permit analysis from various points of view. The first is "cash costs," which counts only those inputs for which cash was paid, and does not include family labor. The second, "full costs," includes depreciation; the third, "costs with equity deduction" adds an arbitrary capital cost of seven per cent of assets to represent the income which could have been made had all assets been sold and the proceeds invested in the bank.

Table 8 on cacao production costs shows total costs, then analyzes per hectare costs, to permit comparison with other farms and with "recommended" budgets. This extracts the cash costs for inputs and the imputed cost of family labor (at the going wage rate for agricultural labor), then recomputes cash cost per hectare, full costs (including depreciation and imputed family labor), and costs with equity deduction (which also includes imputed family labor costs).

Prado Family

Sr. Prado was born and raised in Teapa. He rose from peon to wealthy politician through his work on the land. He is 59, married, and has four children, three of whom are college-trained. None lives at home.

Landless until 1949, he worked two untitled lots of ten hectares each, which were later enlarged and made part of an ejido. He bought additional land in 1960, 1962, 1964, and 1971, all on credit. In 1980 he owned 40 hectares of cacao and 250 hectares of pasture. His assets - all agricultural - were worth over US$1 m , with over 3/4 in land, the rest in buildings and equipment. He owned 39 adult pigs and their offspring, and a cattle herd of 500.

Sr. Prado works independently, although one son helps him with cattle activities and he has helped another son invest in a hog operation. But he has 27 permanent year-round workers, of whom 12 are occupied in cacao. Of these, 14 are over 50 years old and have been working for Sr. Prado for a long time. Due to feelings of obligation, he retains several who are no longer very productive. Half live on his property in houses constructed by him. Note that only the old prefer "resident" status; younger workers prefer freedom to find the best-paid work.

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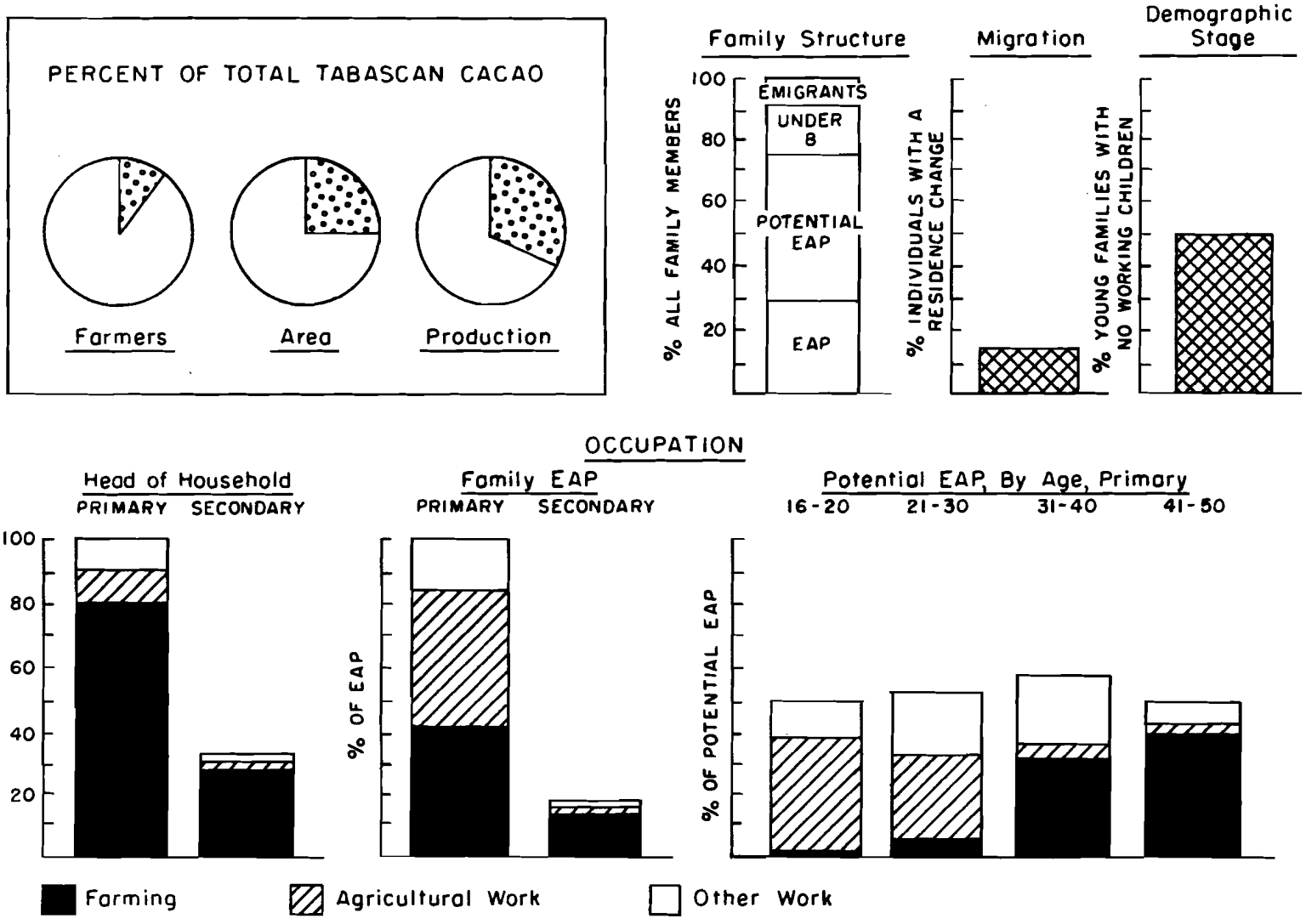

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TABLE 7. INPUTS FOR HIRED-LABOR-BASED CACAO FARMS, 1978-80

	Prado Farm	Ramirez Farm	Gomez Farm	RECOMMENDED: b/ W/O Rehabil.	With Rehab
PRODUCTIVITY					
# Trees	24,000 (600/h)	3,000 (662/h)	5,300 (662/h)	600/h	600/h
Age 1	40 years - 14,400	4 years - 375	15 years - 2800		
Age 2	10-20 yr - 9,600	15 years - 2625	10 years - 2000		
Age 3	-	-	6 years - 500		
PDN/Tree	.424/tree	2.21 kilos/tree	.6 kilos/tree	Avg. 1.3/tree-1.3 (Cacao Cene	
PDN/Hectare	254.5/h ($12,750)	1106 kilos/h ($55,300)	395 kilos/h ($19,750)	Avg. 538 kilos/h 637	835 kg/h
Man-Days/Hectare	82.5-87.5	52.6-60.6	61.9-76.7	81.5	130
Pruning, clearing	20 (overestimated)	18	2	21	24
Drains	5.5		3.7	3	6
Fertilizer		3.0	3.4	2.5	10
Insecticide	14	6.3	6.9	12	20
Fungicide		5.3	7.7	15	30
Harvest & Pod-Breaking	43(48)	20(28)	38.2(53)	28	40
Inputs/Hectare					
Fertilizer					
Urea	-	1 X (with metilico)	-	-	2 X/year
18-9-18	-	1 X	-	-	-
15-15-23	1 X/yr	-	-	-	-
Floren	-	-	1 X/year	-	1-2 X/year
Nutrisol	-	2 X	-	-	-
Gro-Green	-	(with metilico)	-	-	-
Crescal	-	-	-	-	-
Insecticides					
Trident	-	2 X/yr	-	-	-
Metilico	-	2 X/yr	2 X/year	-	2-3 X/year
Foley	-	-	2 X/year	-	-
Folidol	2 X/yr	-	-	-	-
Folimac	-	-	-	-	-
Polidor	-	-	-	-	-
Fungicide					
Lime & Sulfate	(Used to do 10 X/yr)	4 X/yr	3 X/year	-	5-8 X/year
Cuprasol	-	-	-	-	-
Pruning	(Used to do 5-6 X/yr)	3-4 X/year	2 X/year	-	2-3 X/year

*Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

a/ kg = kilograms; yr = year; h = hectares; x = times.

b/ This data is from estimates in the SARH, Plan de Cacao, 1979.

TABLE 8. COSTS OF CACAO PRODUCTION ON HIRED-LABOR-BASED CACAO FARMS, 1979-80

				(RECOMMENDED)[a]		
INPUTS	Prado Farm	Ramirez Farm	Gomez Farm	Grijalva[a]	Plan Unrehab.[b]	Plan Rehab.[c]
LABOR	$390,000	$ 25,920	$ 14,575	$ 9,400	$ 8,100	$13,900
Interest	-	-	-	-	-	-
INPUTS:	75,600	9,800	3,715	5,075	2,547	4,731
Misc.	24,500	2,800	1,525	-	-	-
Fertilizer	19,000	2,680	250	3,200	1,500	2,366
Urea	-	80	-	-	-	-
18-9-18	19,000	2,200	-	-	-	-
Floren	-	-	250	-	-	-
Gro-Green	-	-	-	-	-	-
Nutrisol	-	400	-	-	-	-
Insecticide	12,600	2,120	1,400	675	1,047	2,365
Follmac	-	-	-	-	-	-
Tridente	-	1,280	-	-	-	-
Metilico	-	-	-	-	-	-
Methyl	-	840	1,000	-	-	-
BHC	-	-	-	-	-	-
Foley	-	-	400	-	-	-
Polidor	-	-	-	-	-	-
Folidol	12,600	-	-	-	-	-
Fungicide	19,500	2,200	540	1,200	-	-
Lime	1,500	200	-	-	-	-
Sulfate	18,000	2,000	540	-	-	-
CASH COSTS	$465,600	36,020	18,290	14,475	10,647	18,631
DEPRECIATION	11,900	9,145	800	-	-	-
FULL COSTS	477,500	45,165	19,090	14,475	10,647	18,631
EQUITY DEDUCTED[d]	563,115- (355,155)	90,457 (48,457)	112,560 (56,560)	14,000 (10,500)	14,000 (10,500)	14,000 (10,500)
COSTS WITH EQUITY DEDUCTION	(830,615) 1,040,615	135,622 (93,622)	131,650 (75,650)	28,475 (24,975)	24,647 (21,147)	32,631 (29,131)
No. Hectares	40	6	7	1	1	1
PER HECTARE TOTAL CASH COSTS	11,640	6,003	2,612	-	10,647	18,631
FAMILY MAN-DAYS/ HECTARE	5.2	23.5	69.	-	-	-
IMPUTED COST FAMILY LABOR	624	2,820	8,280	-	-	-
CASH FOR INPUTS	1,890	1,166	530	-	2,547	4,731
WITH DEPRECIATION[h]	11,937	7,526	2,727	-	10,647	18,631
WITH EQUITY DEDUCTED[i]	$ 26,015	$ 22,603	$ 18,807	-	24,647	32,631

For footnotes, see NOTES, Table 8.

TABLE 9. ALL FARM PRODUCTION COSTS ON HIRED-LABOR-BASED CACAO FARMS, 1979-80 *

INPUTS	Prado Farm	Ramirez Farm	Gomez Farm
Labor	$ 965,000	$ 33,600	$ 17,250
Cacao	-	25,920	14,575
Cattle	-	7,680	1,600
Maize	-	-	-
Cacao chemicals and misc.	39,600	7,000	2,715
Vehicle[a/]	133,000	1,200	1,500
Cattle Feed, etc.	755,000	1,800	5,460
Veterinary services and medicines	60,000	-	2,000
Equipment		-	-
Cattle purchases	50,000	-	-
Interest on loans	170,000	14,000	-
Rent land, equip.	177,000	5,300	-
Miscellaneous[b/]	-	-	1,125
CASH COSTS	1,405,600	62,900	30,050
Depreciation	288,000	37,500	4,100
Cacao	11,000	9,145	800
Cattle	-	18,366	300
Maize, etc.	-	-	-
Presents of products	-	12,000	-
FULL COSTS	1,693,600	112,400	34,150
Equity capital costs	1,050,000-1,775,795	210,207-294,557	86,800-147,770
Cacao	353,115-563,115	48,457- 90,457	56,560-112,560
Cattle	747,425-1,044,925 Pigs-27,055-34,055 + animals - 481,000	117,450-159,800	6,860- 8,960
Maize, etc.	-	-	-
COSTS WITH DEDUCTION OF 7% ON EQUITY CAPITAL	2,743,600-3,469,395	312,607-396,957	120,950-181,920

*Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

[a/] This value includes tractors, trucks, etc.

[b/] F. = fuel; T. = transportation.

Full-time wages varied considerably from $40 for a young person for milking cows twice a day, to $700/week ($116/day) plus $10 per pig produced, for the pig manager. Part-time workers are paid $70/half-day and $120/day to work from 8:00 to 4:00. This is the going rate for Teapa fieldworkers, but rather low for cacao harvesting.

Sr. Prado's priority until very recently was cacao, but he has been steadily expanding cattle operations and is presently putting most of his resources into the pig operation. It is very hard to interpret his labor use, since our statistics only include labor hired, and many man-days are of dubious productivity. He has "abandoned" his cacao plantations due to high labor costs and applied very few inputs.

During the past twenty years, cacao production varied widely. When prices were very low in the early 1960's, Sr. Prado renovated most of his plantations. In the mid-1960's, he only harvested and gave minimum maintenance to his cacao, emphasizing banana production then. He also sold a lot of cacao land to build up his cattle herd. But he cut down ten hectares of bananas in the early 1970's to replace with cacao as prices rose. He increased pest control and new plantings, reaching maximum production in 1978, but since then pig production, labor problems and lower cacao prices have led to diminished attention to cacao. Maintenance operations continue, to prevent infestation or deterioration of the plantations. Should prices go up again sharply, he might try to set up an irrigation system which has intrigued him recently and renew extensive use of chemical inputs.

Meanwhile, well over half of all farm production cash costs go to cattle enterprise expenses.

Measuring Farm and Family Income. Table 10 shows gross household income. This is measured in three ways: "cash income," the cash value of farm products marketed; "total farm labor earnings," which include an imputed value of farm produce consumed, and any change in the livestock inventory; and "total income" which adds to these any income from off-farm sources. Although these hired-labor-based producers denied any off-farm income, it is possible that in fact there was some investment or financial income (which was common among other HLB producers interviewed).

Table 11 provides the most important financial statistics - net family and farm income, measured by a number of alternative methods. The principal measures show net cash income, labor earnings disregarding invisible equity costs, and labor earnings after deduction of equity costs.

Values are given for the principal farm enterprises and off-farm income sources. Then the average value of labor in the enterprise is computed - both to all labor used (i.e., an implicit wage, though not equivalent to marginal costs, only to average costs), and specifically to family labor used. These were used to compare income-earning alternatives for the families between farm enterprises and between farm and non-farm income sources. The final variables reported are the proportion of labor costs in cacao and whole farm expenses.

TABLE 10. HIRED-LABOR-BASED CACAO FARM HOUSEHOLD GROSS INCOME, 1979-80*

SOURCE	Prado Family		Ramirez Family		Gomez Family	
Cacao	(14.6%)	$626,728	(80.0%)	$311,070	(80.4%)	$162,156
Poultry		-		-		-
Garden		-		-		-
Cattle	6 bulls @ $20,000	120,000		35,000		10,000
	50 cows @ 50 kg @ $22 kg	165,000				
	150 calves @ 6,500	975,000				
	20 heifers @ 7,000	140,000				
		$1,400,000				
Rent Pasture		-		-		-
Pig Sales	600 @ 90 kg @ $36/kg	1,944,000		5,000		1,750
Cattle		-		-		-
Milk		120,000		-		-
Pepper		-		-		-
Bananas		-		-		-
Zapote		7,000		-		-
Wood		120,000		-		-
Coconut		-		-		5,000
Oranges		-		1,600		-
Car Rental		-		-		1,250
Misc.		-		-		-
TOTAL FARM CASH INCOME		$4,289,728		352,670		$180,156
Farm Produce Consumed	Products	50,000		1,000	Pigs	500
	House	150,000			House	10,000
		200,000			Cacao, coconut, banana	1,000
						11,500
Change in Livestock Inventory	Pigs	+15,000	Cattle	+37,500	Cattle	+10,000
	Cattle	+200,000		- 2,500		
		-500,000		35,000		
		-285,000				
Misc.		-		-		-
TOTAL FARM LABOR EARNINGS		$4,274,728		$388,670		$201,656
Off-Farm Agricultural Work		-		-		-
Off-Farm Non-Agri. Work		-		-		-
Loans		-		-		-
TOTAL INCOME		$4,274,728		$388,670		$201,656

* Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

TABLE 11A. FAMILY AND FARM INCOME ON TABASCO CACAO FARMS, 1979-80, PRADO FARM*[m]

Income Measure[a]	(RESULTS) Cash Income[b]	Labor Earnings[c] (w/o Equity Return Ded.)	Labor Earnings[d] (w/ Equity Return Ded.)
a. Net farm ___	$1,939,128.00	$1,446,128.00	-$329,667.00
b. Net off-farm agricultural ___	-	-	-
c. Net non-agricultural ___	-	-	-
d. Net total ___[e]	1,939,128.00	1,446,128.00	- 329,667.00
e. Net farm ___ per hectare	6,780.17	5,056.39	- 1,152.68
f. Net farm ___ per man-day on farm[f]	311.25	161.67	- 71.03
g. Net farm ___ per family man-day on farm[g]	3,006.40	2,242.06	- 511.11
h. Net non-agricultural ___ per family man-day worked outside agriculture[g]	-	-	-
i. Net agricultural off-farm ___ per family man-day worked[g]	-	-	-
j. Net total ___ per family man-day worked[g]	3,006.40	2,242.06	- 511.11
k. Net cacao ___ per man-day in cacao[f]	144.48	123.85	21.82 (38.86)[j]
l. Net cattle ___ per man-day in cattle[f]	145.97	86.43	- 92.72 (-202.71)[j]
m. Net pig ___ per man-day in pig work[i/f]	3,967.66	4,102.34	4035.00 (3963.00)[j]
n. Net ___ ____ per man-day in ___[f]	-	-	-
o. Net cacao ___ per family man-day in cacao[g]	497.86	174.79	- 1423.02
p. Net cattle ___ per family man-day in cattle[g]	956.00	112.36	- 2151.00
q. Net pig ___ per family man-day in pigs[g]	30,900.00	32,382.80	30,841.00 (30,356.00)
r. Net ___ ____ per family man-day in ___[g]	-	-	-
s. % labor in cacao expenses[h]	81%	82%	47%
t. % labor in whole farm expenses[h]	36%	32%	23%

TABLE 11B. FAMILY AND FARM INCOME ON TABASCO CACAO FARMS, 1979-80, RAMIREZ FARM*[n/]

Income Measure[a/]	(RESULTS) Cash Income[b/]	Labor Earnings[c/] (w/o Equity Return Ded.)	Labor Earnings[d/] (w/ Equity Return Ded.)
a. Net farm ____	$289,770	$276,270	-$8,289 (79,063)
b. Net off-farm agricultural ___	-	-	-
c. Net non-agricultural ___	-	-	-
d. Net total ____[e/]	289,770	276,270	-$8,289 (76,063)
e. Net farm ___ per hectare	6,036	5,755	- 172 (1,584)
f. Net farm ___ per man-day on farm[f/]	573	549	44 (194)
g. Net farm ___ per family man-day on farm[g/]	988	942	- 28 (259)
h. Net non-agricultural ___ per family man-day worked outside agriculture[g/]	-	-	-
i. Net agricultural off-farm ___ per family man-day worked[g/]	-	-	-
j. Net total ___ per family man-day worked[g/]	988	942	- 28 (259)
k. Net cacao ___ per man-day in cacao[f/]	685	664	458 (554)
l. Net cattle ___ per man-day in cattle[f/]	180	396	- 1,128 (-1,678)
m. Net pig ___ per man-day in pig work[f/]	-	-	-
n. Net ___ _____ per man-day in____[f/]	-	-	-
o. Net cacao ___ per family man-day in cacao[g/]	1,185	1,146	756 (937)
p. Net cattle ___ per family man-day in cattle[g/]	478	1,758	- 7,276 (-10,534)
q. Net pig ___ per family man-day in pigs[g/]	-	-	-
r. Net ___ _____ per family man-day in____[g/]	-	-	-
s. % labor in cacao expenses[h/]	71%	57%	19-27%
t. %labor in whole farm expenses[h/]	53%	21%	8-10%

For footnotes, see NOTES, Table 11.

TABLE 11C. FAMILY AND FARM INCOME ON TABASCO CACAO FARMS, 1979-80, GOMEZ FARM*

Income Measure[a]	(RESULTS) Cash Income[b]	Labor Earnings[c] (w/o Equity Return Ded.)	Labor Earnings[d] (w/ Equity Return Ded.)
a. Net farm ____	$137,586.00	$151,286.00	$50,786 (-10.18)[j]
b. Net off-farm agricultural ___	-	-	-
c. Net non-agricultural ___	1,250.00	1,250.00	1,250.00
d. Net total _____[e]	138,836.00	152,536.00	52,036.00
e. Net farm ___ per hectare	15,287.00	16,809.00	5,642 (-1,131)[j]
f. Net farm ___ per man-day on farm[f]	258.51	222.94	78.28 (-23.34)[j]
g. Net farm ___ per family man-day on farm[g]	354.14	365.43	122.67 (-24.60)[j]
h. Net non-agricultural ___ per family man-day worked outside agriculture[g]	156.25	156.25	156.25
i. Net agricultural off-farm ___ per family man-day worked[g]	-	-	-
j. Net total ___ per family man-dey worked[g]	329.00	361.46	123.31 (-21.17)[j]
k. Net cacao ___ per man-day in cacao[f]	272.37	271.63	167.86 (65.10)[j]
l. Net cattle ___ per man-day in cattle[f]	1.87	211.27	99.01 (52.86)[jk]
m. Net pig ___ per man-day in pig work[f]	-	-	-
n. Net ___ _____ per man-day in_____[f]	-	-	-
o. Net cacao ___ per family man-day in cacao[g]	354.14	353.08	203.46 (55.31)[j]
p. Net cattle ___ per family man-day in cattle[g]	-46.81	222.64	80.69 (22.36)[jk]
q. Net pig ___ per family man-day in pigs[g]	-	-	-
r. Net ___ _____ per family man-dey in ___[g]	-	-	-
s. % labor in cacao expenses[h]	52%	50%	17% (10%)[j]
t. % labor in whole farm expenses[h]	42%	36%	13.7% (9.3%)[j]

For footnotes, see NOTES, Table 11.

Prado Family Income Analysis

Sr. Prado's farm "cash income" per family man-day worked was $3006, with $497 per family man-day in cacao, versus $956 in cattle and $30,900 for pig farming. Inventory changes in cattle, non-cash payments to workers and depreciation caused "labor earnings" to decline - to $174 per family man-day over-all. Adjusted for equity return, this gave a negative farm income and a loss of over $1000 per hectare per year. Only in hog production were returns to family labor positive.

The main constraint on cacao production was difficulty finding dependable labor, almost certainly a result of his reluctance to pay a "competitive" wage. This is so even though it would almost certainly be profitable to hire more, even at the higher wage, and retain the old workers. The principal reason that he does not do so is that the hog operation is so very much more profitable, without requiring the always difficult labor management of cacao.

Sr. Prado considers that his children's most important inheritance is their education. One son is interested in cattle, and one in the pig operation, but neither cares about the cacao - a personal disappointment for their father who has been active in cacao politics. This succession problem is probably an important reason why the plantations have been neglected.

Ramirez Family

Sr. Ramirez, 54, was born in Cunduacan town, where he worked in accounting and business. At age 22, he and his wife moved to Huimango 1º to open a store, the proceeds from which were invested seven years later in two hectares of cacao land. Ten years later he gave up the store to concentrate on cacao production and ranching, after adding 18 hectares of pastureland, and his wife's inheritance of four hectares of cacao. In 1978, he bought another 24-hectare ranch. The couple has 11 children, of whom three are married and in urban occupations; three are in professional schools and five are school-age.

The Ramirez assets are estimated to be worth around US$130,000-180,000, again around 3/4 in land. The family cattle herd includes 67 animals. There are no longer any significant off-farm assets.

Sr. Ramirez works without any full-time assistance, despite time-consuming involvement in community and cacao politics. For four months of the year, the farm requires less than one full-time worker. During May, July, October, November and April, two are required for at least part of the month. But January through March, the farm is a four-worker operation; fifty per cent of all labor is performed at this time. 42 per cent of all labor involves cacao harvest or post-harvest operations, for which most labor is hired.

All family labor, except for the wife's minimal participation in pod-breaking, takes place in the afternoons or weekends, secondary to other activities. Note the very large number of hired laborers used (20), most of them yearly, and for a relatively high wage ($20 per hour at the lowest level). Relations between Sr. Ramirez and his workers are the most "business-like" of the three farmers.

He also fertilized and used insecticides more heavily than the others. The Ramirez farm came closest to fulfilling Plan recommendations. Net cash farm earnings were high: $1699 per family man-day (US$75) versus $1003 over-all on the farm and $478 in cattle. Labor earnings were $977 per family man-day; $1644 in cacao, $1758 in cattle. With equity included, the average family man-day earned between $27 and $315 over-all, $1099-1352 for the cacao enterprise. The cattle operation showed a loss, mainly because building up the herd permitted few sales.

Sr. Ramirez' main temporary constraint is lack of capital, as he went into debt to finance the expanded cattle operation. But after cattle sales begin in earnest, finance should not be a problem. The cacao operation is pretty efficient, and he claims to need no more labor.

But when the college-age boys are out of school, only two sons will remain to help out part-time. Taking a long view, it seems that hiring a full-time assistant would be worthwhile. Even with social security, an assistant's pay would not be above $42,000 per year; extra harvest labor would also be needed in January-March, assuming higher yields. Total costs would increase by $20,000, but by so doing, calving care could be given, and cattle and cacao would not compete for attention during the cacao harvest. It would take the marketing of only two extra steers per year, or an increase in cacao yields of 200 kilos (three per cent), to justify the expense.

The family might also consider renting pasture in the dry months to supplement their own, and hence increase the carrying capacity of their land.

This farmer supported ten people, at an average expenditure of $31,568 per person (two to three times subsistence levels). 44 per cent of the budget went for food (clothes were not included, because almost none were bought that year); educational expenses followed in importance.

Like Sr. Prado, Sr. Ramirez considers that his children's chief inheritance will be their education. Indeed, none seems interested in a career farming the land. While the father would like to buy more land, the lack of labor and of children's interest restrains him.

Sr. Ramirez is very sensitive to issues of alternative investments and profits, which is indicated in his historic response to cacao conditions. He acquired his cacao land in 1955 and 1962; since then he has concentrated on increasing production by renovation. He replanted three hectares around 1965 and another in 1976. During the

1960's, he says that he produced less, but that goods were less expensive; and he supplemented production with income from the store.

As cacao prices rose, he got rid of the store; in 1975 he ceased maize production. If consumer prices continue to rise and cacao prices fall, he would seriously consider opening a modern butcher shop. He says he would abandon his plantation if the price went as low as $30 per kilo. If cacao prices increase, he plans to add more chemicals and do more careful pruning, and particularly, renovate his drains.

Gomez Family

Sr. Gomez is 78, with no formal schooling. He is the son of one of the first campesinos to settle in Huimango 2º. While single and a young married man, he worked primarily as a jornalero. When he was forty, he received his share of eight hectares of his father's land, of which he sold the four hectares of pastureland. When he married, his in-laws gave one, and later sold eight hectares to him. In 1972, he bought another one-hectare parcel, which he sold in 1978.

Sr. Gomez and his wife have six children, none living at home. The four daughters married young and are housewives. Both sons work in cacao; the youngest, Antonio, with his father. None has formal schooling past the third grade.

Sr. Gomez' assets were worth nearly US$90,000, nearly all in land. He had a small herd of cattle, and assorted small livestock. His farm was a one-man operation May-August, two-man September and January, required three men in March and April, four in December, and five full-time workers in the high harvest months of October-November.

Only Antonio was fully employed on the farm. Sr. Gomez was semi-retired; he worked only 2/3 of the year and admitted his productivity was only half that of his son. Yet only in October, November and March did Antonio work a longer-than-usual (25-day) month, under pressure. For five months of the year, he worked less than 15 days per month. In addition to farm work, he rented out their truck about eight times a year for trips to Cunduacan and Comalcalco.

Sr. Gomez hired 13 different men, half of whom had some blood or social relation to him. One old man who cleaned drains, his compadre, was offered work more out of charity than necessity. His wage was approximately $16 per hour for a long day. For digging drains or weeding pasture the wage was much higher, but paid for a completed job, not by the hour. During 1980-81, when yields went down significantly due to the weather, the amount of labor hired dropped, despite the fact that the father's worsening physical health meant that his participation stopped. Sr. Gomez feels he has no control over wages, particularly at harvest; he absolutely must have the assistance, so he pays the price.

Sr. Gomez' cash income in 1979-80 was $137,586, or $332 per family man-day worked, with the cattle business operating at a loss.

Labor earnings were about $365 per family man-day, and cattle returns were healthily positive. With a low estimate for equity return deduction, returns were $123 per family man-day - barely the going minimum wage, although the cacao enterprise earns $203 per family man-day. Because of a high equity estimate, returns were negative over-all and only $55 per family man-day in cacao. These negative values were mostly attributable to four hectares of land underutilized in maize, an expensive house and a truck.

For Sr. Gomez, labor is a significant constraint, because only one full-time worker is available for a plantation which half the year requires over three full-time people. The family would like to find a permanent worker, but is unwilling to pay the necessary cost. They would still need part-time labor at harvest, and the man would be extraneous for four months. Now, they cannot find "reliable" labor, witness the fact that for a total of under one man-equivalent, 13 workers were hired in the year, half of whom had never worked there before. Given the very high returns to labor in this operation, it seems that Sr. Gomez would be wise to offer higher-than-competitive wages to attract steadier workers.

Capital is also a constraint for the Gomez family. For two years in a row breeding stock was sold to pay for medical care. But Sr. Gomez' credit is very good and investment potential high. His budget supports only himself and his wife, spending $41,500 per person, apart from recent housing investments. Even if Antonio gets paid out of farm earnings, there would be sufficient income for savings and farm investment.

Sr. Gomez substituted Guayaquil for Criollo on the cacao land he received earliest. After 1500 cacao trees began to produce in the late 1960's, he ceased maize production to concentrate on cacao. His production steadily increased over the next ten years. During the low-price years of the mid-1960's, he claims that he just worked a bit harder and depended on subsistence production.

He believes that even if the price of cacao should drop to above $20 per kilo, he would still produce, but with fewer inputs. Antonio, on the other hand, would probably go to work elsewhere if the price dropped much at all. While Sr. Gomez feels that it is "better to be working than to put your money in the bank" and would not consider other investments outside agriculture, Antonio clearly has a more "business-like" attitude about future investments and diversification.

Sr. Gomez, who is now retiring, has strained relations with most of his offspring. If Antonio keeps working with him and they get on well, chances are that he will get the remaining undivided land, and the other children will receive money as their principal inheritance. Already two sons have been given use rights over one hectare each. If Antonio left, Sr. Gomez would be tempted simply to give each child a hectare and sell the rest. He considers retiring to town. Note that in the 1970's, nearly all of net income went to consumption, rather than new investment.

Summary of Case Studies

The HLB families' capital assets were comparable in value to a middle- or upper-middle class U.S. home. The buildings and other infrastructure represent substantial investment. The average farm size is 14 hectares, and on average, the HLB farm produces two to three times more cacao than do family-based farms and more than eight times as much as the minifundia. Cacao is usually the principal activity. Fourteen per cent of the farms in the SST sample included livestock production among the two most important activities.

Production conditions are similar among hired-labor-based farms. It is remarkable that per hectare imputed cash costs (valuing family labor at $120 per day) were nearly the same for all three of our case studies. Also, they compare roughly to the $10,647 per-hectare cost estimated by the Cacao Plan as "traditional production without rehabilitation."

This is despite a relatively low level of chemical input use per hectare ($530-1890 compared to the recommended $4731). This low level is surprising given that this group has the greatest access to capital, and was paying inflated prices for chemicals. According to the CCT, HLB farmers tend to have more spraying and other types of cacao equipment and use more fertilizer than do other farmers. More farms had their cacao and shade trees in good condition than the minifundia, though not as many as among family farms. The critical limiting factor appears to be labor costs or availability for chemical application and cultivation care.

Except for Sr. Prado, depreciation costs were not high relative to total costs. But costs for the use of equity capital, estimated at a very low seven per cent (banks are now paying 15-25 per cent on simple deposits) accounted for 2/3 to 3/4 of all costs not relating to family labor use for the three producers. Including imputed costs of family labor, the figure was 40-50 per cent, approximately that in the "recommended" budget.

None of the farmers had a major cash flow problem, largely due to diversification of farm enterprises. All three case study producers covered cash costs and depreciated costs and still showed cacao earnings. Sr. Ramirez and Sr. Gomez both covered equity cacao costs as well, earning $8.43 and $7.24 on every peso invested. Even Sr. Prado earned $2.50 per peso invested. Cacao was in fact extremely profitable for these farmers.

Hired-Labor-Based Family Economic Strategies

The HLB farm families share a number of common production, investment and employment strategies, and tend to have very specific responses to the economic changes brought about by the petroleum boom. Their basic goals are: to maximize profits, minimize labor supervisions and promote upward mobility in family employment.

Profit Maximization

The hired-labor-based producers seek profit maximization in a conscious way and are not excessively risk-aversive. The farm is managed in such a way as to produce as much cacao as possible with the fewest inputs. The cacao enterprise must produce profits comparable to or greater than the average farm or non-farm alternative in terms of returns to capital invested and returns to family labor to justify farmer interest in improved productivity. Also, if returns to cacao are less than those in other farming or off-farm activities, the farmer will respond by transferring resources to those activities. Return to family labor is a much less important consideration than return to capital.

Mobility of Assets

The families have sufficient assets that they are not, for reasons of security, or access to cash or means of production, restricted from entering alternative occupations or investments. A notable feature of this group has been the transfer of resources out of cacao in recent years, in favor of cattle production or non-agricultural investment. Despite the profitability of cacao indicated above, these other activities are more attractive to farmers. The phenomenon is especially interesting, since several years ago the trend was for businessmen (successful outside of agriculture) to purchase cacao farms with their non-farm incomes and profits.

Minimizing Labor Supervision

Another factor pushing these farmers away from cacao is the desire to minimize their use of hired labor. This is not due to unusually high costs. Labor earnings per man-day in cacao were greater than the typical wage paid for cacao work, and except for Sr. Prado, far higher even than the highest quoted wage for harvest, drain-digging or other higher-paid work. Rather, unwillingness to supervise labor, the costs involved in search time, and uncertainty about stability, mean that labor will rarely be hired to the point where marginal returns equal the wage. Indeed, the marginal value product of hired labor is impossible for farmers to estimate, even roughly, given the multitude of factors which affect yields.

In the days when labor costs were quite low and fairly stable in Tabasco, before the 1970's, considerations of labor use in enterprise decision-making were minimal. Labor demand was directly related to cacao prices and yearly harvest levels. This relation no longer holds. Yet many employers are philosophically outraged at the evolution of high labor payments, which are felt to be undeserved or likely to be wasted. They are averse to dealing with large numbers of workers whose bargaining position is suddenly strong, while their own social control has weakened.

And unlike other types of farm families in which total family income is in part derived from off-farm wages, increased labor prices are always negative for the hired-labor-based family. Higher general wages may improve the internal family bargaining position of sons who work on the farm, however.

There is a clear inverse relation between access to capital and use of family labor. Cash costs per hectare on the Gomez farm were only half that of the Ramirez farm and a quarter that of the Prado farm. Family labor as a percentage of total labor was 2/3, 4/9 and 1/20 respectively. Under conditions where the wage is extremely low, hired labor would substitute for family labor almost entirely.

Otherwise, family and hired labor are to a certain extent complementary. Even minimum maintenance on these larger plantations requires use of hired labor. Increased producer family-labor use, over a wide range of inputs, implies greater demand for hired labor - at least during the harvest period. Similarly, increased use of hired labor to increase production may increase the demand for work from family women and children who do pod-breaking, washing, drying or sorting activities.

Family Employment Strategy: Upward Mobility

The HLB farm households are socioculturally less tightly bound to the farming way of life than are the campesino types of producers for whom the land represents security in a very fundamental sense. HLB family employment strategy, even when families are dedicated to farming, includes a continual search for improved personal and family options.

On the typical HLB farm, the farmer and his family perform nearly half of the required farmwork. The exact proportion is determined by the demographic stage, and related issues: number of older sons available, the sons' decision to work on or off the farm, total labor demanded on the farm, and the degree of farmer participation, i.e., his choosing to work on the farm rather than in alternative businesses.

On smaller farms, family women participate in cacao production, but this activity is minimal and rarely includes physically demanding activity, which might be seen as a sign of diminished family status. On the other hand, many educated daughters seek employment in services, commerce or the professions, which confers considerable status.

Fifteen per cent of heads of household on HLB farms do cacao farming as a secondary occupation. These heads of household tend to have a diverse employment background. Those who did not recently enter farming were jornaleros in their early years. But today one rarely sees a HLB farmer over 30-40 working as a low-status jornalero.

A high number of older sons do agricultural and cacao wage labor, but it tends to be on the family farm, rather than on other properties. A tension exists between father and sons about the role of sons on the farm. After age 16 or so, sons become concerned with earning their own incomes and determining future professions, and we see the

development of multiple individual strategies rather than a single "family strategy" of investment and employment. According to the SST, 18 per cent of the total EAP from HLB farms - nearly a quarter of non-head of household EAP - worked outside of agriculture in 1979.

Basically, HLB farmers and their families consider their principal role on the farm once reaching their mid- to late 20's to be that of manager rather than worker. As a result, few family members not in a managerial role will remain on the farm. Those HLB workers who left cacao farming usually changed to skilled trade occupations or employment in commerce and services.

Those farmers who did very well financially have encouraged their children to seek a future off the farm, and become upwardly mobile. But as a result, they became totally dependent on hired labor. To some extent, this has reduced the pressure to sub-divide properties. On the other hand, the greater independence of sons caused by the changing economic environment has forced many families who need and want children's participation on the farm to depend instead on hired labor.

Hired-Labor-Based Farm Household Response to Change

Price Response

The petroleum boom appears to have disrupted the cacao economy in ways that are likely to permanently reduce production by HLB farmers: the economic position of cacao relative to other economic activities in the state has declined, and the cost and availability of labor greatly constrain the potential for growth for farmers dependent on hired workers.

Hired-labor-based cacao producers are quick to increase production when real prices increase and also quick to reduce their efforts when prices fall. In the past, if the future price of cacao relative to other potential products looked positive, the hired-labor-based producers continued basic maintenance operations, despite low prices; but otherwise they were strongly tempted to replace plantations with pasture, given the less demanding labor requirements of cattle-raising.

Wage Response

If wage rates do drop, hired-labor-based producers would definitely wish to increase their use of labor in cacao production, assuming stable cacao prices. But although profits would improve, it is unlikely that there would be a corresponding improvement in productivity (i.e., use of more inputs) given the importance of labor costs in most alternative enterprises.

If wages continue to rise, very large landowners would likely abandon plantations and turn to other activities. The "farmers" would probably reduce cultivation care and yields. Should cacao prices

increase, labor use would increase, but not at as fast a rate as general input use.

Appropriate Policy Toward Hired-Labor-Based Cacao Farming

Technical assistance programs are helpful for hired-labor-based farmers, but the types of research done now in Tabasco assume unrealistic access to labor, as do the present recommended farm budgets. The profit level needed to inspire hired-labor-based producers to add new inputs is greatly underestimated.

The Plan and the UNPC should work together to try innovative solutions to labor scarcity. Some possibilities might be the organization of traveling work units (composed of landless and minifundia workers) which charge normal wages, but guarantee high quality work. Should HLB producers find themselves tempted to move out of cacao farming altogether, arrangements might be made to transfer property and cultivation rights temporarily or permanently to smallholders or landless workers, or for a fair rental system to be institutionalized.

The HLB family tendency to move many or most children into non-farm activities dovetails nicely with long-term Tabasco State Plan employment objectives. But the Plan must not lose sight of the potential danger to agricultural production of a generalized preference against agriculture and cacao farming by the hired-labor-based sector, which is after all still responsible for a large share of state production.

The Role of HLB Producers in Agricultural Development

The very source of the capitalist farmer's advantage in stable economic conditions - rapid and extensive response to price incentives - is the source of poor performance in difficult times or under uncertain economic conditions, such as the petroleum boom in Tabasco. In Tabasco, the response to relative price changes in wages and in crops and farm/urban price relationships led to a large-scale decline in production and transfer to urban investments.

Because wage labor is such a large part of farm costs, HLB farmers are extremely responsive to real wage-level changes. Hence increasing wages may lead to a big drop in local employment and investment strategies to substitute for labor in the long term, regardless of the short-term nature of the wage changes.

An increase in the proportion of cacao farming by hired-labor-based producers at the expense of the campesino type farmer - as is sometimes recommended - would probably lead to an over-all reduction in employment. This group is the least labor-intensive at all but very intensive levels of production because the internal rationality of entrepreneurial farming continually pressures the farmer to reduce his wage burden.

CHAPTER 6. FAMILY FARM CACAO PRODUCTION STRATEGY

The "Campesino": Focus of Recent Development Efforts

The Tabascan family farm producer represents the "campesinado," or smallholder population, with sufficient land to support the family. They account for over a quarter of all cacao producers in the state, and a third of all production - and that proportion is growing. This type of farm family has very modest means, and thus gives high priority to ensuring the family subsistence. This frequently means a large percentage of farm production goes to family-consumed goods.

Strategies of agricultural development all over the world have consistently been oriented toward encouraging a shifting balance on such farms toward greater commercial production and marketed surpluses. Most programs aimed to convert them - if not replace them - with the "profit-motivated" type of farmer.

In earlier years this population group was felt to have an important role in general economic development - that of increasing productivity so as to release labor for use in other sectors. Today, under conditions of slow employment growth even in rapidly developing economies, this goal has been reversed to foster retention of labor on farms. Under the best of conditions, this assumes increased productivity to ensure reasonable returns to such extra labor.

Unfortunately, most new farm technology development has been oriented to increase labor productivity in ways that are labor-replacing. Technical assistance programs for hired-labor-based producers do not address the special needs of campesino-type families.

But farm families for whom survival strategy demands guaranteed employment for family members and maximizing returns to the family would be theoretically amenable to this new policy objective. And there is increasing evidence that under specific conditions, campesino farming has these characteristics. This is in fact the justification for new international programs focusing on peasant farming, despite the considerable rhetoric emphasizing welfare consideration for the "marginados."

Apart from their potential for achieving acceptable levels of production and employment growth, the campesinado plays a complex role in times of economic stress. With farm systems evolved specifically to protect the family and keep the farm going under adverse conditions, they tend to weather economic storms with impressive results. The gist of the debate raging in Mexico over the existence or not of a tendency for the campesinado to disappear hinges precisely on the question of capitalist and campesino performance and interaction during periods of expansion versus periods of stress.

The striking case of the Tabasco family-farm cacao producer affirms the particular advantages of campesino farming in times of stress and rapid change. The degree to which these conditions were

unique to the cacao farmer in this specific time period and the degree to which the experience represents the real potential of the campesinado will be discussed in the concluding Chapter 10.

Family Farm Production in Tabasco

Family-farm cacao production has probably been the predominant historical form of cacao production since the time of the Mayas. Given the relative abundance of land, there was no reason why producers could not plant as much cacao as family labor resources would permit.

The area today where this type of farm predominates is in the zones newly opened up late last century, in areas of colonization, and where land was granted to ejidos. The most common story told in the regional survey was that parents or grandparents moved from an area of dense population in the Old Chontalpa to frontier areas where they cleared land, planted subsistence crops, and then established cacao plantations - on all land that could be opened through use of family labor.

Because these areas were sparsely populated, there were few landless laborers for hire. Community mutual aid patterns between families, compadres or neighbors developed to meet labor peaks. The typical lack of schooling for children meant that, at a young age, they participated in cacao harvest and pod-breaking.

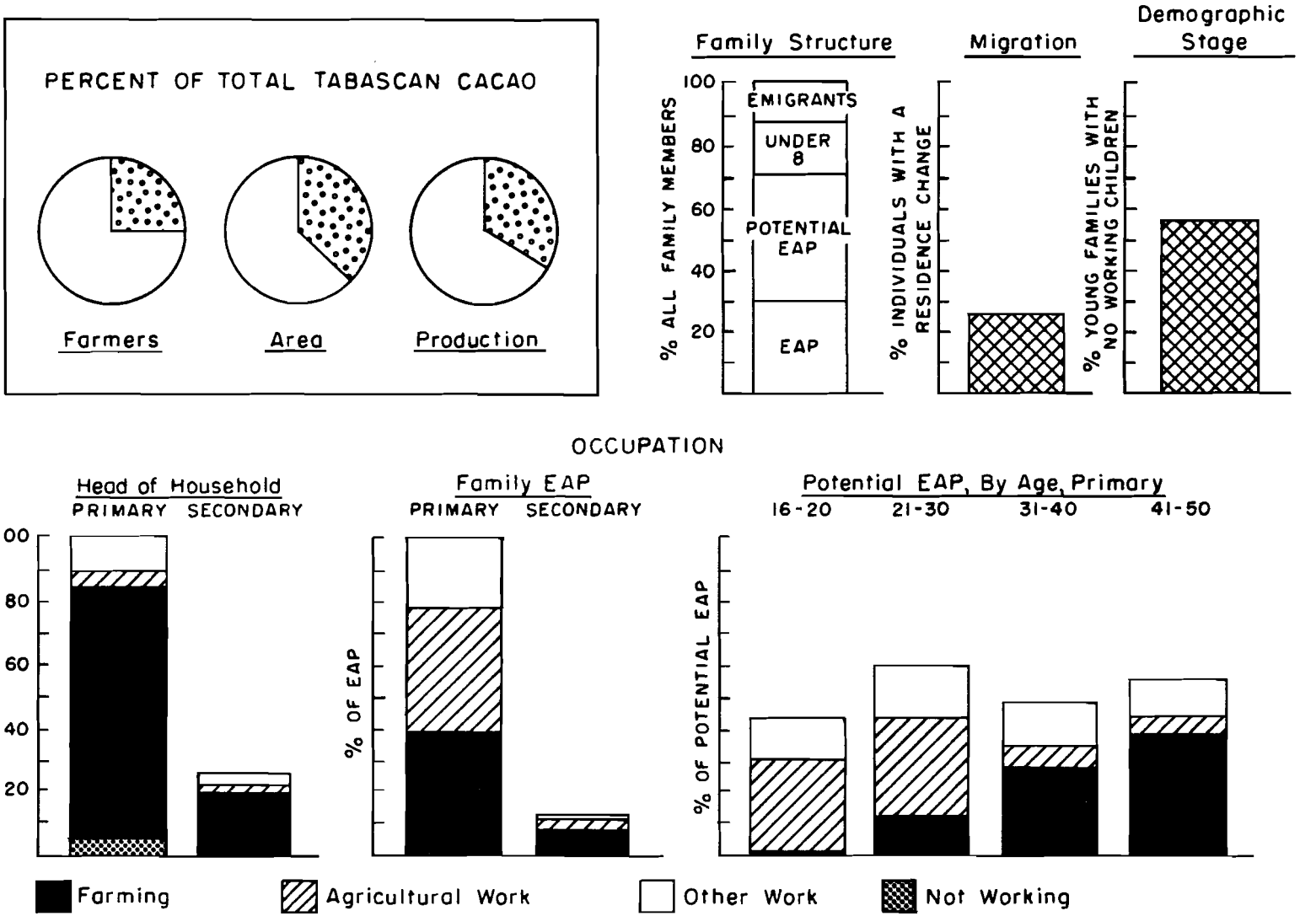
In the past several decades (with increasing population density, the rise of minifundia and improved communication) relations between the three types of producers have increased markedly, including the use of hired labor on the family farm, and hiring out to largeholders when cash is short.

The family farm mode of cacao production is closest to the conceptual "peasant mode of production" which posits the family as the basic unit of both consumption and production. The family economy changes over time with the demographic cycle.

For Tabascan cacaoteros, the paradigm must be adjusted for active labor and product markets. Concern for subsistence and the secure reproduction of family and farm is paramount, but the last generation of farmers found these conditions satisfied through combined production for home use and commercial cacao. Hired labor is used, but only when family labor is temporarily insufficient.

Demographic and employment traits are tightly interwoven; Chart 27 summarizes the relevant data from the SST. The demographic cycle as it operates among Tabascan cacao farming families can be summarized as follows. Young men, sons of cacao farmers, still single or newly married, work on their father's plantations, but also as jornaleros to earn cash for future investment or setting up a household. Their sisters also help on the farm and may earn cash washing, sewing, or providing other services.

CHART 27. DEMOGRAPHIC AND EMPLOYMENT CHARACTERISTICS OF FAMILY CACAO FARM HOUSEHOLDS



At marriage, the son receives his own parcel of land to use. As soon as it provides sufficient income to support his family, he ceases jornaleando except as a source of emergency money.[1/] He may continue to help his own father in these early years. As soon as his own children are old enough to help in the fields, farm production goes up markedly, and so does the need for and ability to afford hired labor.

When sons are in their late teens, the need for hired labor goes down. The trade-off between sons working for the father or off-farm depends on relative earnings, desire for independence, and family ties. As children grow older and devote more attention to their own affairs, the farmer must again seek supplementary hired help. The SST shows a high incidence of migration for these families, particularly for individuals aged 16-20. If, over the years, the family acquires considerably more cacao area via inheritance or purchase, or the combining of assets, it may emerge as a hired-labor-based farm.

Thus we see the family farm household typically headed by a middle-aged couple with several children out of elementary school, just breaking the severe cash constraint caused by a large number of dependents per family worker, blessed with many willing hands whose labor need not be paid. On average, the family farm has more working-age members than other family types. Just over six per cent of heads of household in the SST sample were female.

Typical Family Farm Households: Case Studies

The three farm households studied in detail belonged to Sr. Luna and Sr. Sandoval, ejidatarios in Huimango 2º in Cunduacan, and Sr. Rama, a private property owner newly turned ejidatario in Galeana 2º in Teapa. Data collection for another family in Quintana Roo was not completed. Tables 12 through 14 summarize management data for these family cacao farms.

Luna Family

Sr. Luna, 76, was born in Jalpa town. He lives with his wife Elena, two sons and two daughters ages 17-26. Three married sons, ages 35-43 work with their father on the land; the fourth son has a small plot of his own. The three married sisters who live nearby are housewives. All the children were born in Huimango 2º; none has more than a third-grade education.

1/ The pattern has changed slightly from the days when most young men were establishing new plantations, rather than improving established ones; there is not the same need for supplementary income while waiting for trees to first produce.

TABLE 12. INPUTS FOR FAMILY CACAO FARMS, 1979-80*[a/]

	Sandoval Farm	Luna Farm	Rama Farm	RECOMMENDED: [b/] W/O Rehabil.	With Rehab
PRODUCTIVITY					
# Trees	2,500 (435/h)	3,500 (500/h)	3,000 (500/h)	600/h	600/h
Age 1	40 years - 1400	25 years - 1200	15-20 yrs - 2000		
Age 2	20 years - 500	28 years - 1000	10 years - 500		
Age 3	16 years - 600	35 yr - 1000, 2 yr -300	6-7 years - 500		
PDN/Tree	.68 - .77	.557 - .675 ($13,930-15,435)	.346 kilos	Avg. 1.3/tree-1.3 (Cacao Cens	
PDN/Hectare	340 ($17,000)	278.6-308.7	173 ($8650)	Avg. 538 kilos/h 637	835 kg/h
Man-Days/Hectare	135(163)	27.3	59.1	81.5	130
Pruning, clearing	28.8	4.5	23	21	24
Drains	1.8	.5	11	3	6
Fertilizer	7.1	-	10.6	2.5	10
Insecticide	.5	1.2	.6	12	20
Fungicide	28.8(57.6)	1.1	1.3	15	30
Harvest & Pod-Breaking	68	20	12.6	28	40
Inputs/Hectare					
Fertilizer					
Urea	-	2 X/year	-	-	2 X/year
18-9-18	-	-	1 X/year	-	-
15-15-23	-	-	-	-	-
Floren	2 X/year	2 X/year	-	-	1-2 X
Nutrisol	-	-	-	-	-
Gro-Green	-	-	1 X/year	-	-
Crescal	-	-	-	-	-
Insecticides					
Trident	-	-	-	-	-
Metilico	2 X/year	1 X/year	2 X/year	-	2-3 X
Foley	-	-	-	-	-
Folidol	-	-	2 X/year	-	-
Folimac	1X/year	-	-	-	-
Polidor	-	1 X/year	-	-	-
Fungicide					
Lime & Sulfate	8X/year	4-6 X/year	3 X/year	-	5-8 X
Cuprasol	-	-	2 X/year	-	-
Pruning	1 X/year major + frequent min	1 X/year major + 1 minor	1 X/yr major + frequent minor	-	2-3 X

*Author, Cacao Farm Budget Studies, 1979-81, Tabasco. Mexico.

a/ kg = kilograms; yr = year; h = hectares; X = times.

b/ These data are from estimates in the SARH, Plan de Cacao, 1979.

TABLE 13. COSTS OF CACAO PRODUCTION ON FAMILY CACAO FARMS, 1979-80*

				(RECOMMENDED)[e]		
INPUTS	Luna Farm	Sandoval Farm	Rama Farm	Grijalva[a]	Plan Unrehab.[b]	Plan Rehab.[c]
LABOR	$ 1,000	$ 12,550	$ 7,200	$ 9,400	$ 8,100	$13,900
Interest	-	-	12,000	-	-	-
INPUTS:	9,360	13,290	8,598	5,075	2,547	4,731
Misc.	-	8,000 (rent, transport)	4,000 (equip. transport)	-	-	-
Fertilizer	[g]	100	2,860	3,200	1,500	2,366
Urea	-	-	(960)	-	-	-
18-9-18	-	-	(1,480)	-	-	-
Floren	-	(100)	-	-	-	-
Gro-Green	-	-	(420)	-	-	-
Nutrisol	-	-	-	-	-	-
Insecticide	4,800	540	1,600	675	1,047	2,365
Folimac	-	-	(880)	-	-	-
Tridente	-	(380)	-	-	-	-
Metilico	(?)	(160)	-	-	-	-
Methyl	-	-	-	-	-	-
BHC	-	-	-	-	-	-
Foley	-	-	(720)	-	-	-
Polidor	(4,800)	-	-	-	-	-
Folidol	-	-	-	-	-	-
Fungicide	4,560	4,650	2,638	1,200	-	-
Lime	(960)	(150)	(138)	-	-	-
Sulfate	(3,600)	(4,500)	(2,500) - est.	-	-	-
CASH COSTS	10,360	25,840	30,198	14,475	10,647	18,631
DEPRECIATION	1,000	-	1,000	-	-	-
FULL COSTS	11,360	25,840	31,198	14,475	10,647	18,631
EQUITY DEDUCTED[d]	50,076	36,127	44,033	14,000 (10,500)	14,000 (10,500)	14,000 (10,500)
COSTS WITH EQUITY DEDUCTION	61,436	61,967	75,231	28,475 (24,975)	24,647 (21,147)	32,631 (29,131)
No. Hectares	7	5	6	1	1	1
PER HECTARE						
TOTAL CASH COSTS	1,480	5,168	4,616	-	10,647	18,631
FAMILY MAN-DAYS/ HECTARE	32.7	95	83	-	-	-
IMPUTED COST FAMILY LABOR	3,925	11,400	9,960	-	-	-
CASH FOR INPUTS	1,337	2,658	2,058	-	2,547	4,731
WITH DEPRECIATION[h]	5,547	16,568	15,159	-	10,647	18,631
WITH EQUITY DEDUCTED[i]	$ 12,701	$ 23,793	$ 22,497	-	24,647	32,631

For footnotes, see NOTES, Table 8.

TABLE 14. ALL FARM PRODUCTION COSTS ON FAMILY CACAO FARMS, 1979-80*

INPUTS	Luna Farm	Sandoval Farm	Rama Farm
Labor	$ 1,000	$ 12,550	$ 17,200
Cacao	-	-	7,200
Cattle	-	-	10,000
Maize	-	-	-
Cacao chemicals and misc.	9,360	5,290	4,818
Vehicle[a/]	-	-	-
Cattle Feed, etc.	14,000	5,250	-
Veterinary services and medicines	1,500	-	-
Equipment	-	-	3,000
Cattle purchases	-	-	-
Interest on loans	-	(47,500)	12,000
Rent land, equip.	-	1,000 sprayer	-
Miscellaneous[b/]	585 T.	7,000 T.	150 T.; 1,000
CASH COSTS	30,145	32,090 (78,590)	37,948
Depreciation	3,000	-	2,666
Cacao	-	-	-
Cattle	-	-	-
Maize, etc.	-	-	-
Presents of products	-	-	-
FULL COSTS	33,145	32,090	40,614
Equity capital costs	66,213	36,127	84,533
Cacao	50,076	-	44,033
Cattle	-	-	-
Maize, etc.	-	-	-
COSTS WITH DEDUCTION OF 7% ON EQUITY CAPITAL	99,357	68,217	125,247

*Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

a/ This value includes tractors, trucks, etc.

b/ F. = fuel; T. = transportation

Initially landless, Sr. Luna was one of the original settlers on the ejido in 1939, receiving rights to six hectares in 1943. During the Trujillo administration, he received help from the Ejidal Bank to plant cacao. Maize for subsistence was produced until around the mid-1960's, and rubber and coffee in the late 1970's. The three married sons who help Sr. Luna received land in Huimango 1° ten years ago, but it was of low quality, unsuitable for cacao.

Total capital on the Luna farm was valued at nearly $1 million pesos (US$42,000) mostly in the value of the cacao trees. The ejidal land does not "belong" to the family, therefore only improvements count as assets. If land value were included, his total assets would increase to $1.2 - 2.0 million pesos. The small herd of livestock was worth $91,000.

The percentage of hired labor in farm production for Sr. Luna was only two per cent, yet this expenditure accounted for 32 per cent of cacao and 45 per cent of total costs. Most hired workers were related to the family and lived on the ejido.

Farm labor needs are unevenly distributed: May-October, the farm supposedly requires only half a man-month equivalent; November-April, 1/2 to 2 1/2 man-month equivalents. The 24 hectares jointly operated by the three men thus seem underutilized. Sr. Luna is semi-retired and is now active mainly in farm administration.

Cacao yields in 1979 were lower than normal, because the farm had suffered a severe insect infestation. The family had not fertilized, and the time spent in general spraying was much less than recommended. Cash seemed to be the most important constraint to increasing production.

Assets were tied up in cattle and land, and the sons were for some reason unwilling to pay more attention to cacao - causing a labor shortage either for lack of inputs, or because they had some alternative employment undisclosed (or unknown to) their father. Cacao played only a minor role in individual family strategies. To reach recommended levels, cash for inputs would have to increase five-fold.

Family cacao farm income data are shown in Tables 15 and 16. Sr. Luna and his sons sold their cacao jointly and he distributed one tenth of the proceeds to each son, retaining the rest for himself. Returns per hectare were $6650, giving a value per family man-day worked of $136-174. This value jumped to $150-192 when simple labor earnings were computed; labor earnings with equity return deducted reduced the value of the family man-day worked to only $29-71. This does not include potential income from selling steers in the near future, despite half of cash costs going to the livestock operation.

The Luna family's consumption during 1979/80 amounted to $61,010, for six people, or an average of $10,100 per person.

TABLE 15. FAMILY CACAO FARM HOUSEHOLD GROSS INCOME, 1979-80*

SOURCE	Rama Family	Sandoval Family	Luna Family
Cacao	$61,480	$22,158 (direct sale) 15,000 (sale to creditor)	$128,866
Poultry	-	-	-
Garden	10,000	-	-
Cattle	-	-	8,000
Rent pasture	11,520	-	-
Pig sales	-	3,000	-
Milk	-	-	-
Pepper	-	540	-
Bananas	-	2,400	-
Misc.	-	138	-
TOTAL FARM CASH INCOME	$83,000	$43,236	$136,866
Family produce consumed	1,300	8,400	2,040
Change in livestock inventory	-	-	12,700
Misc.	-	47,500[a/]	-
TOTAL FARM LABOR EARNINGS	$84,300	$99,136	$151,606
Off-Farm Agricultural	-	1,200	-
Non-agricultural	96,000 Store (net)	16,200	-
Loans	-	-	-
TOTAL INCOME	$183,300	$116,506	$151,606

*Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

a/ Additional worth of cacao sold to creditor (see text).

TABLE 16A. FAMILY AND FARM INCOME OF FAMILY CACAO FARM HOUSEHOLDS, 1979-80, LUNA FAMILY*

Income Measure[a]	(RESULTS) Cash Income[b]	Labor Earnings[c] (w/o Equity Return Ded.)	Labor Earnings[d] (w/ Equity Return Ded.)
a. Net farm ___	$114,911	$126,651	$ 60,438
b. Net off-farm agricultural ___	-	-	-
c. Net non-agricultural ___	-	-	-
d. Net total ___[e]	114,911	126,651	60,438
e. Net farm ___ per hectare	6,550	7,036	3,357
f. Net farm ___ per man-day on farm[f]	174	190	91
g. Net farm ___ per family man-day on farm[g]	174	192	92
h. Net non-agricultural ___ per family man-day worked outside agriculture[g]	-	-	-
i. Net agricultural off-farm ___ per family man-day worked[g]	-	-	-
j. Net total ___ per family man-day worked[g]	175	192	92
k. Net cacao ___ per man-day in cacao[f]	208	205	117
l. Net cattle ___ per man-day in cattle[f]	-	-	-
m. Net pig ___ per man-day in pig work[if]	-	-	-
n. Net ___ _____ per man-day in ____[f]	-	-	-
o. Net cacao ___ per family man-day in cacao[g]	210	207	118
p. Net cattle ___ per family man-day in cattle[g]	-	-	-
q. Net pig ___ per family man-day in pigs[g]	-	-	-
r. Net ___ ____ per family man-day in ____[g]	-	-	-
s. % labor in cacao expenses[h]	8.7	7.7	1.6
t. % labor in whole farm expenses[h]	3.3	6.9	1.2

*For source and footnotes, see NOTES, Table 11.

TABLE 16B. FAMILY AND FARM INCOME OF FAMILY CACAO FARM HOUSEHOLDS, 1979-80, SANDOVAL FAMILY*

Income Measure[a]	(RESULTS) Cash Income[b]	Labor Earnings[c] (w/o Equity Return Ded.)	Labor Earnings[d] (w/ Equity Return Ded.)
a. Net farm ___	$ 12,146	$ 20,546 (60,046)	$-15,631 (31,869)
b. Net off-farm agricultural ___	1,200	1,200	1,200
c. Net non-agricultural ___	16,200	16,200	16,200
d. Net total ___[e]	29,546	37,946 (85,446)	-31 (49,269)
e. Net farm ___ per hectare	2,112	3,573	- 2,718 (11,834)
f. Net farm ___ per man-day on farm[f]	17	28 (93)	- 25 (43)
g. Net farm ___ per family man-day on farm[g]	19	33 (108)	- 25 (51)
h. Net non-agricultural ___ per family man-day worked outside agriculture[g]	120	120	120
i. Net agricultural off-farm ___ per family man-day worked[g]	180	180	180
j. Net total ___ per family man-day worked[g]	41	53 (119)	0 (69)
k. Net cacao ___ per man-day in cacao[f]	17	17 (85)	- 34 (34)
l. Net cattle ___ per man-day in cattle[f]	-	-	-
m. Net pig ___ per man-day in pig work[f]	-	-	-
n. Net ___ _____ per man-day in ____[f]	-	-	-
o. Net cacao ___ per family man-day in cacao[g]	20	20 (99)	- 39 (40)
p. Net cattle ___ per family man-day in cattle[g]	-	-	-
q. Net pig ___ per family man-day in pigs[g]	-	-	-
r. Net ___ _____ per family man-day in __[g]	-	-	-
s. % labor in cacao expenses[h]	49.2	49.2 (49.2)	20.7 (20.7)
t. % labor in whole farm expenses[h]	40.4	40.4	18.9

*For source and footnotes, see NOTES, Table 11.

TABLE 16C. FAMILY AND FARM INCOME OF FAMILY CACAO FARM HOUSEHOLDS, 1979-80, RAMA FAMILY*

Income Measure[a]	(RESULTS) Cash Income[b]	Labor Earnings[c] (w/o Equity Return Ded.)	Labor Earnings[d] (w/ Equity Return Ded.)
a. Net farm ___	$ 42,552	$ 41,186	$-43,447
b. Net off-farm agricultural ___	-	-	-
c. Net non-agricultural___	96,000	96,000	96,000
d. Net total ___[e]	138,552	137,186	52,553
e. Net farm ___ per hectare	2,836	2,745	-2,896
f. Net farm ___ per man-day on farm[f]	71	69	- 73
g. Net farm ___ per family man-day on farm[g]	85	82	- 87
h. Net non-agricultural ___ per family man-day worked outside agriculture[g]	333	333	333
i. Net agricultural off-farm ___ per family man-day worked[g]	-	-	-
j. Net total ___ per family man-day worked[g]	156	155	59
k. Net cacao ___ per man-day in cacao[f]	68	66	- 32
l. Net cattle ___ per man-day in cattle[f]	-	-	-
m. Net pig ___ per man-day in pig work[f]	-	-	-
n. Net ___ _____ per man-day in ____[f]	-	-	-
o. Net cacao ___ per family man-day in cacao[g]	82	79	- 39
p. Net cattle ___ per family man-day in cattle[g]	-	-	-
q. Net pig ___ per family man-day in pigs[g]	-	-	-
r. Net ___ _____ per family man-day in___[g]	-	-	-
s. % labor in cacao expenaes[h]	29.7	28.8	12.1
t. % labor in whole farm expenses[h]	42.5	39.9	13.5

*For source and footnotes, see NOTES, Table 11.

Sandoval Family

Sr. Sandoval, 50 years old, was born in Rancheria Huimango 2°. His parents received land (5 3/4 hectares) on the ejido when it was formed to meet the needs of Huimango's expanding population. Sr. Sandoval inherited the land in 1969. The family initially planted maize, soon after planting shade and cacao nursery trees. By 1960, 1800 trees were planted; by 1970, 2500; by 1979, 100 banana trees and forty pepper trees had been added on remaining vacant land. The family had eight head of cattle which died during the hoof-and-mouth disease epidemic in 1952.

Sra. Sandoval, 48, was born nearby. Three of their ten children are married (ages 20-24) and live on the ejido. The two sons work for PEMEX and help their father on the farm. A nephew lived with the family until a year ago; he is now occupied in construction. Of the seven children residing at home, the eldest sons help their father, the eldest daughter her mother. Three, aged 10-14 are in school; the two youngest are pre-school. The older children did not attend school beyond the fourth grade.

Sr. Sandoval's cacao plantations comprise his entire assets, which are worth $.5 million. Were he a private farmer, the land value would add another $.5 million. The family also has a small number of small livestock.

Of total gross income for the family in 1979, the farm provided 3/4, almost all from cacao. $1200 was earned from infrequent off-farm jornalero work by sons Pascal and Guadalupe; $16,200 was earned by the sons working for PEMEX.

Hired labor on the Sandoval farm performed 14 per cent of the work, and was responsible for 48 per cent of cacao and 40 per cent of all farm costs. The family's farm used one man-equivalent for the months of May, July and August; two for September and March; three to four for the rest of the year.

Sr. Sandoval faced two major problems during the 1979-80 seasons. A cacao fungal infection was luckily treated at negligible cost by a Cacao Plan/Cacao Association special spraying squad. Worse, illness forced the family to borrow a large sum of money from a local merchant, with the condition that they sell a certain amount of the cacao harvest at an extremely low price.

Under these conditions, only 41 per cent of income was from the farm; labor earnings with equity return were negative; and labor earnings per family man-day worked in cacao were only $20; for hired labor, $17. "Interest" on the borrowed $15,000 was 300 per cent.

By contrast, valuing all cacao produced at market figures, 80 per cent of family income came from the farm; the labor earnings value of a man-day in cacao was about $85 and of a family man-day, $40.

The main production constraint for the Sandoval family is cash. Their technology seems to be good, and Sr. Sandoval consulted with all the scientific people in Tabasco, listened faithfully to the Cacao Plan's radio program, and attended a special cacao class. He received bank credit for five years, until 1978-79 when a bumper harvest made it unnecessary. He planned to seek credit again in 1980, to cover fertilizer and hired labor expense. He needs to improve drain control, increase weeding, begin soil fertilization - which he dearly wants to do - and improve labor efficiency in fumigation and harvesting.

In the medium-term, his sons could provide more labor, but the elder may well decide to devote more time to PEMEX activities. A severe labor problem could develop unless Jose remains full-time. Yet presently Jose brings in more cash income ($180/day) from his off-farm job than he "produces" in farm work.

Total consumption expenditures for the Sandoval household in 1979-80 were over $100,000, but a third of this represented unusual, emergency medical expense. The rest went to support the family of nine, at $7,333 per person.

Rama Family

Sr. Rama, 57 and Sra. Rama, 51 are native Teapanecos, originally from town, who worked full-time in their dry goods store until 1976. At that time, they bought three hectares of land on a rancheria, which they sold in 1978 to buy six hectares of rundown cacao land, and eight hectares of pasture on the ejido. They live on the farm now with Sra. Rama's mother (79) and two sons, Sergio (27) - a full partner with Sr. Rama in the farm - and Javier (13). Four other children 21-29 were scattered throughout the state and northern Mexico. Two are studying agronomy; one is an accountant; another an architectural assistant. Sra. Rama and Sergio work full-time on the farm.

Land improvement assets for the family (mainly cacao trees) were worth $670,000 pesos in 1980. The house and other constructions were worth another $181,000. With equipment, total assets were worth US$38,655. Were the property private, the land assets alone would be worth between $875,000 and $1.29 million.

Of the family's gross income, worth US$23,209, only 11 per cent was from cacao; only 15 percent from the whole farm. The rest still came from the family store in Teapa.

Sr. Rama hired 16 per cent of farm labor, representing a third of cacao costs. This was primarily for non-production operations, construction, machine work. None of the hired laborers was a relative. Note that Sra. Rama performed a very large share of the work, including much heavy labor.

Two workers were needed on the farm in all months except July, August and September (which required one) and February, March and April (requiring 4-5 workers). Sr. Rama is presently giving a great deal of attention to basic activities such as storage and drain

construction which took time away from cultivation. But given that, he did well, and is obviously interested in reaching "recommended" levels of input use as soon as time and complete plantation rehabilitation permit. He already uses both soil and foliar fertilizer.

Of net total cash income for the Rama family, a third is farm income from cacao. The value of a man-day of work on the farm was only $75 which rose to $90 per family man-day - still hardly competitive with agricultural labor rates in the area. Even if Sra. Rama's labor is counted half as productive as the son's, the value of the family man-day rises to only $108. By contrast, Sr. Rama's work in the store was worth $333 per day.

However, if we deduct the long-term investment work (a third of all cacao labor for 1979), the value per man-day rises to $103 and the family man-day to $106. Labor earnings including deduction for return to equity, show a negative return, although only slightly so for cacao. In order for the value of a family man-day to rise to $100 per day, cacao yields would have to double.

The Rama farm's main constraint was labor - hired labor was not yet profitable, yet family labor had to be directed to renovating the farm. Because there was little cash flow yet from the farm, Sr. Rama planned to remain with the store for a few more years; after that his labor will be fully available. The main jobs which need to be done more intensively are pruning, shade clearing and spraying - all of which are supposed to take place during the family's busiest months.

Knowledge is probably also a constraint, since Sr. Rama and Sergio have limited practical experience with cacao. They are eager to be educated and have the advantage of two family members who are agronomists. The cash constraint - caused primarily by building their new house - will be relieved soon and presumably more hired labor and more inputs will be purchased.

During 1979/80, the Rama family spent almost $64,000 for consumption. Of this a third went to support children in school. The rest was for the family of five resident in Galeana, an average expenditure of $8394 per person. Total consumption was actually higher than this; access to wholesale goods at the store kept total food expenditures extremely low.

Summary of Case Studies

As a result of the availability of family labor, these family farm households showed more intensive use of purchased inputs and of cacao cultivation than did the hired-labor-based farmers with their high labor costs. On our three case study farms, the relatively low yields were a result of infestation, and lower than desired quantities of chemicals due to cash shortage. Imputing a value of $120 per family man-day, expenditures were midway between the Plan's "traditional" and "recommended" levels.

Cacao is the pivot of farm production for these households, but economic diversification is fundamental. Note that for all our case study households, whole farm costs were far above cacao costs. Cacao income helped to subsidize Sr. Luna's growing livestock enterprise, Sr. Sandoval's pig feeding, and Sr. Rama's new farm infrastructure.

Depreciation costs - the costs of replacing buildings and equipment - were negligible on the farms, but interest on equity represented nearly half the total costs for Sr. Sandoval and Sr. Rama, despite their being ejidatarios.

None was covering equity costs for production, although labor earnings were comparable with market wages for family labor. But this was not a source of concern to the family, which does not base its economic strategy on returns to capital. The wage paid to hired workers was generally higher than their average product, which implies that workers were employed only to break bottlenecks in family labor.

Family Economic Strategies

The basic goals of family farmers are: meeting family subsistence requirements; ensuring perpetuation of the farm to subsequent generations; maximizing inheritance to children; cooperation among the extended family; risk reduction; and maximization of returns to family labor.

A family production strategy to meet these goals can be hypothesized wherein on-farm agricultural and non-agricultural production, off-farm wages and other activities of all members are coordinated to maximize the "implicit wage," family labor earnings. This goal is constrained by some considerations of risk, and minimal demands for farm reproduction.

It is quite distinct from an objective strategy to maximize "profits", or return to investment or capital. It is also distinct from the simple Chayanov model of fixed cultural aspirations. Tabasco cacao farmers who have lived through the economic growth period of the past twenty years are oriented to improve the family's standard of living. The greater economic security of having a crop much more remunerative than subsistence crops, with price guarantees, has at least temporarily relegated subsistence farm production to a sideline.

Living Standards

Cacao family farm households had unprecedentedly high incomes in the late 1970's compared to the very modest, near-subsistence conditions obtaining before. Expectations of material standard of living have risen tremendously. The most common use of cacao profits for this group of farmers is for brick house construction. Embarrassed at still living in a thatched home, Sr. Sandoval apologized: "We're not in the sticks anymore; Huimango 2º is getting citified; we ought to have a more civilized house." Income changes have led not to incremental

change, but to transformation: the first use of home appliances, the first generation of children educated; the first bus and transport service.

Will this new consumerism be a drain on potential farm investment, or a stimulus to increasing farm productivity? Family cash incomes are still very low; for our three families, US$2000-3500 in 1980 dollars. This is not very far above minimum subsistence requirements. They will not easily face reversion to subsistence. If cacao prices should plunge, they may be expected to seek alternatives very actively, particularly a younger generation less tied to the land. The subsistence role of the farm would again be enhanced.

Maximizing Returns to Family Labor

The family-based cacao farm requires one to two persons working year-round and three to five during peak times of the year. Where those extras can be gathered from a large family (in the middle and later stages of the demographic cycle), resident children are unpaid; older children share in income. Non-resident children are usually paid if they provide a large share of the work. But for short periods - especially at harvest and pod-breaking time - work is more of a family ceremony, and there is no pay.

Young sons are rarely available now for full-time farmwork. They are in school or sometimes in petroleum work, but they still usually partipicate in the cacao harvest. Few family members now work for largeholder cacao producers, because of the good return for work on the family plot. Heads of family farms practically never work as jornaleros. If no sons are available to help, the farmer may "adopt" a young man as junior partner, who will later inherit part of the land.

Women participate in pruning and weeding, as well as harvest and pod-breaking, but not in heavy work such as spraying, ditch-digging, or tree-felling. In the early years of marriage, they may provide a large share of total labor. They are also generally responsible for small livestock care.

The most striking aspect of family labor use for these farm households is its fluidity. The supply of family labor is extremely elastic. Sons hold a wide variety of jobs on and off-farm. On the Huimango ejido, there were many families whose young men had travelled to the U.S., Yucatan, and northern Mexico in search of jobs, as well as other parts of Tabasco. Many worked for PEMEX. New small-scale enterprises, such as cattle-raising, can be undertaken, dependent only on labor available on the weekends or late afternoons, when children are home from school or work. At critical points in the farming calendar, the family farm has priority. At other times, family members choose jobs which provide greater return for their work time.

Under such conditions, the warmth and loyalty in the parent-offspring relations determine availability of family help. Due to the transformation of the Tabascan economy, sons can no longer be forced

to obey their fathers, as they could in the days when farm inheritance was the most promising - or only - future. Today fathers pay their sons generously, support them in seeking outside training or work, and actively woo them for partnerships.

Statistical employment trends are seen quite clearly in the SST employment statistics. Of all cacao farm heads of household, those from family farms had the lowest rate of participation in the agricultural sector, as a principal occupation, though they were nearly always self-employed.

Relative to other cacao families, this group had the lowest proportion of jornaleros and high proportions of paid and unpaid family workers, and the lowest over-all participation in commerce and the skilled trades. 95 per cent of cacao workers were aged 9-30; between ages 20-40, family workers included a very high proportion of skilled tradesmen.

Activity rates in PEMEX were similar to those of minifundistas and non-farm workers. Female participation in the work force was over ten per cent, mainly in agricultural and unskilled work.

One third of all the EAP - a very high proportion - had a secondary occupation, predominantly in cacao farming for heads of household working in other sectors. Only a fifth of secondary jobs were for agricultural wage work.

There has been a slight increase over time in the proportion of cacao landowners doing cacao farming as a principal occupation, as would be expected. But there was a steady increase in the percentage of all individuals working outside agriculture (especially in skilled trades and the tertiary sector), from 2.5 per cent in 1965 to 9.8 per cent in 1979.

Farm Inheritance

The sensitivity of parent-child ties carries important implications for farm continuity and inheritance. Traditionally, land rights passed from father to son at the father's death. Today fathers who want their sons to be farmers must respect their new independence and offer land rights much sooner.

But land succession has long been associated with family feuds, occasionally resulting in violence - which all parents fear. It is rare that there is a single child interested in cacao farming, with siblings totally uninterested and the farm succession clear. Given the predominance of assets in land, there is little else left to divide among siblings who forfeit the land. Even on ejidos, where legally the land cannot be broken up, the "heir" usually just represents the flock, who may or may not work the parcel as a single unit.

This sub-division threatens the future of the family farm and threatens to turn the mass of Tabascan cacao farms into minifundia, which the next chapter will show are far less likely to provide stable, high-input cacao production than are family farms. Perhaps the greatest advantage of the new high cacao prices for these families has been the opportunity for parents to offer some sons an alternative inheritance to farming - an education, an apprenticeship, a help in business. Continuation of a healthy off-farm labor market is thus critical to maintenance of economically viable cacao production units.

Managing Risk

The insecurity in cacao farming, of depending on a volatile international trade good when one's family is not far from subsistence, is high and has been made higher by the petroleum boom. Insecurities mentioned in Chapter 2 (pollution, expropriation) have made investment look less promising and agriculture generally look less profitable. Community support networks have been weakened, and most farmers claim that only their family (or occasionally the Cacao Association or some local businessmen) could be depended upon to respond to a family emergency or sudden economic disaster.

The family response has been: to renew family maize production and production of other goods for home consumption; to transfer resources from cacao to cattle or off-farm investments; to educate children for non-agricultural careers. Unlike hired-labor-based farm households, however, the family-farm households will continue to rely very heavily on cacao to meet cash needs.

In the SST sample, 78 per cent of family-farm producers had cacao as the principal product; only six per cent had maize. Three quarters of the farms had some secondary product, generally cacao, maize, or livestock for fattening.

The farmholding is itself the most important source of long-term family security; and will be guarded jealously. These families have a heavy stake in improving incomes and income security by increasing cacao yields, more so than any other group of farm households.

Family-Farm Response to Economic Change

Family-farm households respond to changes in cacao price, input prices, and wages differently than do hired-labor-based producers.

Price Response

The most severe constraint to production for these farmers is lack of cash, and, hence, restricted ability to purchase chemical inputs. For this group, input subsidies on insecticide, fungicide and fertilizer can be expected to induce sharp increases in their use. Because they are "chemical-hungry," their level of input application

has more do with income received in the prior year (i.e., availability of cash) than with the present price of cacao. The relatively low cost of marginal inputs of family labor for input applications means that these will be more intensively used on family farms than on hired-labor-based farms.

If the price of cacao should rise, farmers would, for the reasons explained above, use many more inputs, and, hence, increase production significantly. Should the price decline, farmers would restrict input use, and after a point, start looking for supplementary off-farm employment. Indeed, during the period of low cacao prices in the 1960's, almost all family-farm workers earned a large part of their income off-farm. Their supply response to declining prices is slower than hired-labor-based producers, but faster than minifundistas because they have more alternatives.

Wage Response

The response to changing wages differs between those families with temporarily little available family labor and those with substantial family labor resources. Both types differ from hired-labor-based producers in that most increases in production will come through a high ratio of labor to purchased inputs.

The short-handed household has a fairly straightforward response. If wages decline (relative to the value of family labor on the farm), they hire much more labor per unit of land than do hired-labor-based producers under similar conditions, because they do not have the latter's problems with labor management. If wages go up, family finances may suffer at harvest time, but as this is critical to their own income, they will not reduce their hiring. Investments in drains or other infrastructure projects may diminish with a wage increase.

Families with many able hands have a much more convoluted response to wage changes, because they both employ and are employed. If the wage decreases, sons will be willing to work more on the farm, and farmers will correspondingly need to hire less labor, and be even less likely themselves to seek short-term wage labor. During the past decade, heads of family farms rarely worked off-farm in agriculture, which contributed greatly to labor scarcity for largeholders.

If wages increase (relative to the value of family labor on the farm), sons will be induced to work more off-farm; total family income may not change and basic family labor resources will still provide for farm production at lower levels, but the composition will differ. At very high wage levels, of course, producer family labor on the farm will diminish to mere maintenance operations, then increase slowly as wage rates fall. Once rates approximate the level of return to family labor for cacao, family participation on the farm will increase sharply - it is preferable to work for oneself than as a jornalero. As wage rates fall further, off-farm work will drop off until diminishing returns set in on the farm.

Appropriate Policy Toward Family Cacao Farming in Tabasco

A modest program of technical assistance is potentially quite relevant for this category of producer, who has a fair amount of resources for investment, plenty of labor, and lots of interest in cacao. The policy of price stability has met an enthusiastic response in terms of production and new investment, despite threatened tenure security in petroleum zones.

The central problems not really satisfactorily dealt with in the present program are the cash constraint and the threat of minifundization.

There is little official appreciation of the cost effects on a family-based operation of a jump in use of hired labor for increased input applications and harvest. Family strategies to meet this cost may be quite diverse - including, perhaps, an increase in off-farm employment in order to come up with the needed cash. Provision of small amounts of short-term consumption credit to cacao farmers needs to be encouraged. This would get them over the troughs in cash flow, and allow greater input appplications even in cash-short months. The production credit now supplied is of such a large amount relative to family cash expenditures and incomes that many interested producers must refuse it.

The legal changes in land ownership patterns for Tabasco just introduced in 1980 were intended to combat minifundization in the state. But they were designed as though for maize-farming in the Central Plateau, not the tree crop farmland of Tabasco. Projected minimum plot size is too large. The five-hectare cacao farm is a highly viable production unit; in light of recent experience, far more stable than a 20-hectare farm. The ejidatario with six hectares of cacao must be legally allowed to employ workers on his farm. What are needed are accepted systems to reduce the number of land managers, and provide alternate recompense (apprenticeships and scholarships, perhaps) to family members who are bypassed.

In cacao production, and other intensive crop production, this family farm - big enough for diversified production, and for adequate investment resources, small enough to induce intensive crop care, snugly intermeshed in the state's labor market as an important source of both workers and employment - seems to be the best hope for a lasting Tabascan agriculture in the current and future petroleum economy.

The Role of Family Farms in Agricultural Development

The family-farm sector can be a very stabilizing factor in agricultural economies. Such households lack sufficient resources to provide sharp increases in production when prices increase, but they also refrain from major farm disinvestment under almost all circumstances, including very low relative prices. Under the frequent

conditions of abrupt regional economic change or recession, policies oriented to support and promote this type of farming may be very wisely directed.

In Tabasco, family farm employment characteristics were the key to the stability. These characteristics will differ from area to area depending upon the demographic characteristics of the campesino group; participation in off-farm labor markets; labor demand characteristics of the principal farm products; and other factors. So these positive results are by no means guaranteed.

But the Tabascan case shows the potential of the family-based campesino farm with moderate level resources. The multiple employment and high temporary migration levels of the Tabascan family farm households did not seem to signal deterioration; if anything they offered hope that minifundization could be stemmed.

Their story is also positive regarding the questions we posited earlier regarding the development of the campesinado. This campesino group underwent the stress of economic dislocation fairly successfully; experienced a net reversal in the direction of accumulation between their sector and other regional economic sectors; and showed a significant capacity for technical change and productivity increase.

CHAPTER 7. MINIFUNDIA CACAO FARM PRODUCTION STRATEGY

The Minifundia: Perennial Problem for Development Policy

The cacao minifundia of Tabasco represent nearly half of the state's cacao farmers, and their numbers grow steadily, mostly at the expense of the family farm sector. In 1978, they accounted for about thirty per cent of cacao production and were stable producers in the past decade.

We define the minifundia as the type of campesino holding which has a resource base too limited to provide for family subsistence. Obviously, in parts of Asia the 1-2 hectares we deal with in Tabasco minifundia would represent average paddy producer farm size. But in the Mexican context they are truly minifundia; indeed, rainfed-maize producers consider a much larger plot to be too small for subsistence.

Minifundistas must by definition seek part of the family income off-farm, but that does not necessarily reduce the importance of the farm plot in the family strategy, for both economic and social reasons.

Traditionally, the minifundia have been relatively ignored in agricultural development programs. Mexico has bemoaned the processes of minifundization in the Central Plateau for decades, without devising serious policy to offset the trend. Ejidalization has probably been the single most important brake on minifundization in the country, but even on ejidos, plot division is common and the reduction of the average farm family resource base is a serious constraint on production.

Minifundia in Mexico tend to be basically subsistence producers; the small home plot provides a source of maize and beans for the family, while wage labor is utilized to provide other consumption items. The plot rarely covers total consumption requirements, but rather acts as a sort of insurance policy for the family. Under conditions of severe economic stress, such families tend to increase the search for wage labor, or intensify subsistence production, or both.

In Tabasco, cacao, which had long been an integral part of the Tabascan subsistence farmers' activities, became transformed into a cash crop more valuable than ever before. Minifundia response to this situation, in the midst of an unprecedented wage labor market, provides a very provocative case study of the production potential - however limited relative to other types of farmers - of the minifundia. It brings to the fore questions of precisely where the weaknesses of the minifundia mode of production lie - whether within the family structure, the farm structure, the relationship with the wage economy, or relative prices.

Minifundia Cacao Farming in Tabasco

The existence of large numbers of farms with too few cacao trees to support a farm family seems to be a relatively recent phenomenon. It probably dates from the 1940's population increase and ejidal settlement, after which land hunger could not be satisfied through cheap land purchase or colonization. Instead, land was sub-divided within families to provide the needs of the younger generation. This occurred earliest in Comalcalco and Paraiso, the most densely populated cacao zones, but has since increased throughout the cacao-producing area of Tabasco. Because of legal impediments to sub-dividing on ejidos, 84 per cent of minifundia farms are private properties.

Chart 28 summarizes the demographic attributes of minifundia cacao households in Tabasco. Most families have 4-6 members, as do family farm households, but they tend to be much younger, with predominantly school-age children. Only a quarter of the families were composed of young married couples with no or a few young children. There were more families with 3-4 working-age members (hence a low average potential dependency ratio), but where economically possible, children were in school.

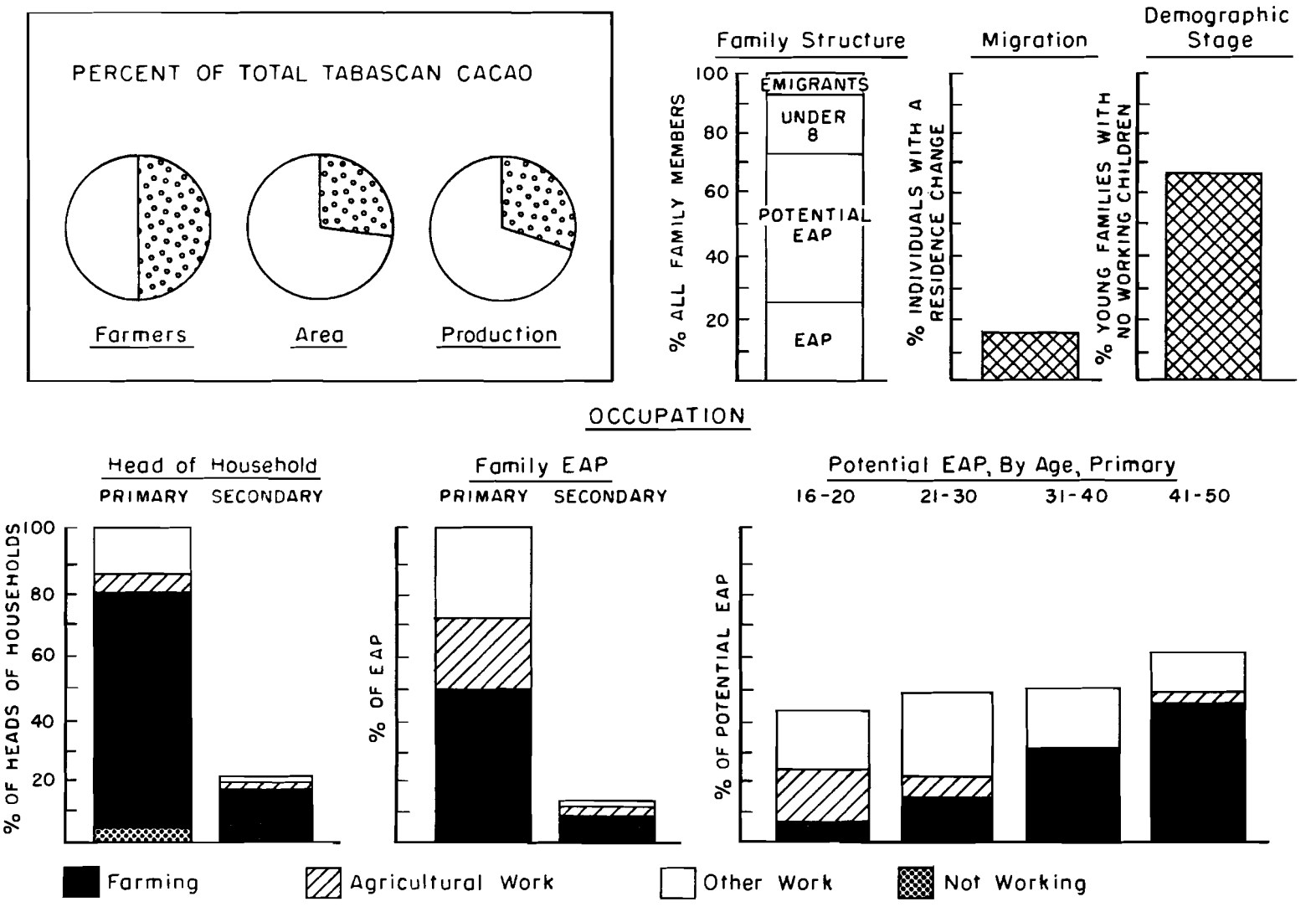
The demographic cycle in minifundia farming is slightly different than for the family farm. The young single person travels constantly looking for work; once married, there is a period of very intense work as jornalero or piecework-type jobs with high focus on cash availability, and if possible, renting land for maize production. Once land control is achieved, some time is spent on farm, with increasing employment of children as soon as they reach productive age. Once children can largely support themselves through jornalero work, the parents give full attention to the farm, and retire from the off-farm labor market.

The long period when farming must be sacrificed to cash income increases the intergenerational family ties. Sons are more dependent on working with their fathers. Older sons can experiment with or prepare for different careers, falling back on the family farm in ebb work times and emergencies.

This brings up an important question about the minifundia in Tabasco. When land was more available in the state, the minifundia were for many merely a stage in the demographic cycle, representing a period of limited personal resources and dependence on wages. With savings, family inheritance, and some time, they would generally evolve into family farms.

This can no longer be the case for most minifundistas, as the land market has become almost inaccessible to individuals with limited means. Hence the minifundia become a permanent condition, to which the family moving through its own demographic stages must adjust. Wage employment will probably be important for most of the lives of minifundistas, at least until children help with family support.

CHART 28. DEMOGRAPHIC AND EMPLOYMENT CHARACTERISTICS OF MINIFUNDIA CACAO FARM HOUSEHOLDS



Typical Minifundia Cacao Farm Households: Case Studies

Our two case study minifundia provide examples of the younger farmer - Sr. Galvez - still tied closely to his "family farm" producer father; and the older farmer - Sr. Aleman - who is now watching his own sons seek their way in a land-short world. Tables 17, 18, and 19 summarize farm production and cost data from the case study field analyses.

Galvez Family

Sr. Galvez, 20, comes from a family of ten children, all of whom live nearby. His father has five hectares of cacao. Sr. Galvez is married to 20-year-old Adelina, daughter of a cacao producer, and they have two children. In 1973, Sr. Galvez' father bought him two hectares of grazing land, which the father has since utilized for pasturing his own cattle.

In 1975, Sr. Galvez bought the two hectares of land on which the family now resides. It was already planted to cacao, but in poor condition. He replanted 200 trees in 1978. In addition, he planted four "manos" of maize in Pechucalco, on land belonging to his father.

Capital on the Galvez farm was worth M$270,000-500,000 (over US$10,000) in 1979. But there was very little non-land capital or livestock. Gross farm labor earnings were $15,972, of which 78 per cent was from cacao.

In no month did the Galvez farm use a full man-month equivalent. Yet Sr. Galvez was fully occupied, as most of his time was spent working for pay for his own father. During peak periods in August, February and March, he worked very long days in both places, requiring help on the farm from young Jose Dolores, whom he paid $100 per day. Adelina worked at home nearly all the time, rarely leaving even to shop. September through April she helped in the cacao harvest several afternoons and in the Saturday pod-breaking.

Tables 20 and 21 show minifundia income data. For the Galvez family, net cash income per family man-day of work in cacao was $204; per general man-day $131. If a deduction for equity was made, however, these values plummet into the red. Cash income for the farm as a whole, meanwhile, was $173 per family man-day and $103 per general man-day. Nevertheless, total cash income per family man-day worked, including non-farm sources, was only $129 - approximately the going local wage - because of Sr. Galvez' work with his father. Immediate returns from this latter work are not competitive with returns on work at his own farm.

Sr. Galvez experienced cash deficits in April, June, July, September and December, but they were not major, and were interspersed between surplus months. This was due entirely to his access to unlimited employment opportunities with his father to make up any deficit. A subsistence level income estimated at $25,000-30,000 for his family

TABLE 17. INPUTS FOR MINIFUNDIA CACAO FARMS, 1979-80*

	Galvez Farm	Aleman Farm	RECOMMENDED: b/ W/O Rehabil.	With Rehabil.
PRODUCTIVITY				
# Trees	1,250 (625/h)	1,200 (1000/h)	600/h	600/h
Age 1	2 years - 250	8-10 years - 700		
Age 2	10 years - 1000	20 years - 500		
Age 3	-	-		
PDN/Tree	.283 kilos	.376 kilos (.452 for trees in full prod.)	Avg. 1.3/tree-1.3 (Cacao Cene.)	
PDN/Hectare	170.2 kilos ($8500)	301.4 kilos ($15,070)	Avg. 538 kilos/h 637	835 kg/h
Man-Days/Hectare	40	50	81.5	130
Pruning, clearing	13	2	21	24
Drains	1	29 (and shade)	3	6
Fertilizer	1	10-20	2.5	10
Insecticide	1	6-11	12	20
Fungicide	1½	6-11	15	30
Harvest & Pod-Breaking	16½ (or 22, if divided by 1½)	5½	28	40
Inputs/Hectare				
Fertilizer				
Urea	-	-	-	2 X/year
18-9-18	-	-	-	-
15-15-23	-	-	-	-
Floren	2 X/year	2 X/year	-	1-2 X/year
Nutrisol	-	-	-	-
Gro-Green	-	1 X/year	-	-
Crescal	-	1 X/year	-	-
Insecticides				
Trident	-	2 X/year	-	-
Metilico	2 X/year	-	-	2-3 X/year
Foley	-	-	-	-
Folidol	-	-	-	-
Folimac	-	-	-	-
Polidor	-	-	-	-
Fungicide				
Lime & Sulfate	1 X/year	4 X/year	-	5-8 X/year
Cuprasol	-	-	-	-
Pruning	1 X/year	1 X/year	-	2-3 X/year

* Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

a/ kg = kilograms; yr - year; h - hectares; X - times.

b/ This data is from estimates in the SARH, Plan de Cacao, 1979.

TABLE 18. COSTS OF CACAO PRODUCTION ON MINIFUNDIA CACAO FARMS, 1979-80*

			(RECOMMENDED)[e]		
INPUTS	Galvez Farm	Aleman Farm	Grijalva[a]	Plan Unrehab.[b]	Plan Rehab.[c]
LABOR	$ 2,700	-	$ 9,400	$ 8,100	$13,900
Interest	-	200	-	-	-
INPUTS:	-	-	5,075	2,547	4,731
Misc.	-	-	-	-	-
Fertilizer	-	-	3,200	1,500	2,366
Urea	-	-	-	-	-
18-9-18	-	-	-	-	-
Floren	720	-	-	-	-
Gro-Green	-	120	-	-	-
Nutrisol	-	-	-	-	-
Insecticide	-	-	675	1,047	2,365
Folimac	-	-	-	-	-
Tridente	-	200	-	-	-
Metilico	480	-	-	-	-
Methyl	-	-	-	-	-
BHC	-	240	-	-	-
Foley	-	80	-	-	-
Polidor	-	-	-	-	-
Folidol	-	-	-	-	-
Fungicide	-	-	1,200	-	-
Lime	5	-	-	-	-
Sulfate	40	200	-	-	-
CASH COSTS	3,945	1,040	14,475	10,647	18,631
DEPRECIATION	168	382	-	-	-
FULL COSTS	4,113	1,422	14,475	10,647	18,631
EQUITY DEDUCTED[d]	28,000 (14,000)	14,000 (7,000)	14,000 (10,500)	14,000 (10,500)	14,000 (10,500)
COSTS WITH EQUITY DEDUCTION	32,113 (18,113)	15,422 (8,422)	28,475 (24,975)	24,647 (21,147)	32,631 (29,131)
No. Hectares	2	1½	1	1	1
PER HECTARE TOTAL CASH COSTS	5,700	21,440	-	10,647	18,631
FAMILY MAN-DAYS/ HECTARE	-	-	-	-	-
IMPUTED COST FAMILY LABOR	4,822½	14,293	-	-	-
CASH FOR INPUTS	622½	560	-	2,547	4,731
WITH DEPRECIATION[h]	2,056½	948	-	10,647	18,631
WITH EQUITY DEDUCTED[g]	16,056 (or 9,056)	10,281 (5,614)	-	24,647	32,631

*For footnotes, see NOTES, Table 8.

TABLE 19. ALL FARM PRODUCTION COSTS ON MINIFUNDIA CACAO FARMS, 1979-80*

INPUTS	Galvez Farm	Aleman Farm
Labor	$ 3,200	-
Cacao	2,700	-
Cattle	-	-
Maize	500	-
Cacao chemicals and misc.	1,245	840
Vehicle[a/]	-	-
Cattle Feed, etc.	1,560	4,320
Veterinary services and medicines	-	
Equipment	-	500
Cattle purchases	-	
Interest on loans	-	200
Rent land, equip.	-	-
Miscellaneous[b/]	-	-
CASH COSTS	6,005	6,040
Depreciation	348	752
Cacao	-	-
Cattle	-	-
Maize, etc.	-	-
Presents of products	-	-
FULL COSTS	6,353	6,792
Equity capital costs	17,500-35,000	9,590-17,640
Cacao	14,000-28,000	-
Cattle	-	-
Maize, etc.	-	-
COSTS WITH DEDUCTION OF 7% ON EQUITY CAPITAL	30,206-47,706	16,382-24,432

* Author, Cacao Farm Budget Studies, 1979-81, Tabasco, Mexico.

a/ This value includes tractors, trucks, etc.
b/ F. = fuel, T. = transportation.

TABLE 21A. FAMILY AND FARM INCOME ON MINIFUNDIA CACAO FARM HOUSEHOLDS, 1979-80, GALVEZ FAMILY*[s/]

Income Measure[a/]	(RESULTS) Cash Income[b/]	Labor Earnings[c/] (w/ Equity Return Ded.)[g/]	Labor Earnings[d/] (w/ Equity Return Ded.)[g/]
a. Net farm ___	$ 8,217.00	$ 9,619.00	-$31,734 (-14,234)
b. Net off-farm agricultural ___	26,400.00	26,400.00	26,400
c. Net non-agricultural ___	-	-	-
d. Net total ___[e/]	34,617.00	36,019.00	- 5,334 (12,166)
e. Net farm ___ per hectare	2,054.00	2,404.75	- 7,933.50 (-3558.50
f. Net farm ___ per man-day on farm[f/]	103.35	120.99	- 399.17 (-179.04)
g. Net farm ___ per family man-day on farm[g/]	172.99	202.50	- 668.08 (-299.66)
h. Net non-agricultural ___ per family man-day worked outside agriculture[g/]	-	-	-
i. Net agricultural off-farm ___ per family man-day worked[g/]	120.00	120.00	120.00
j. Net total ___ per family man-day worked[g/]	129.41	134.65	-118.63 (-53.21)
k. Net cacao ___ per man-day in cacao[f/]	131.42	128.82	-305.29 (-88.23)
l. Net cattle ___ per man-day in cattle[g/]	-	-	-
m. Net pig ___ per man-day in pig work[i/] [f/]	-	-	-
n. Net ___ ___ per man-day in ___[f/]	-	-	-
o. Net cacao ___ per family man-day in cacao[g/]	204.26	200.21	-474.48 (-137.13)
p. Net cattle ___ per family man-day in cattle[g/]	-	-	-
q. Net pig ___ per family man-day in pigs[g/]	-	-	-
r. Net ___ ___ per family man-day in ___[g/]	-	-	-
s. % labor in cacao expenses[h/]	68.4	65.6	8.4
t. % labor in whole farm expenses[h/]	53.3	50.4	6.7

*For source and footnotes "a" through "h", see NOTES, Table 11.

SPECIFIC NOTES:

q/ The value in parentheses reflects lower estimated value of land resources.

s/ Irregularities in the Galvez budget include:
a) Uncertain fungicide use;
b) Exact number of days worked for his father unknown:
c) Uncertainty about the level of maize purchases in 1979-80.

TABLE 21B. FAMILY AND FARM INCOME OF MINIFUNDIA CACAO FARM HOUSEHOLDS, 1979-80, ALEMAN FAMILY*

Income Measure[a]	(RESULTS) Cash Income[b]	Labor Earnings[c/f] (w/o Equity Return Ded.)	Labor Earnings[d/g/f] (w/Equity Return Ded.)
a. Net farm ___	$ 20,548	$ 26,248	-$15,218 (2282)
b. Net off-farm agricultural ___	13,920	13,920	13,920
c. Net non-agricultural ___	63,740	63,740	63,740
d. Net total ___[e]	98,208	103,908	62,442 (79,942)
e. Net farm ___ per hectare	10,274	13,124	- 7,609 (1141)
f. Net farm ___ per man-day on farm[f]	156 [or 120]	200 [152]	116 [88] (17[13])
g. Net farm ___ per family man-day on farm[g]	156 [or 120]	200 [152]	116 [88] (17[13])
h. Net non-agricultural ___ per family man-day worked outside agriculture[g]	166.80	166.80	166.80
i. Net agricultural off-farm ___ per family man-day worked[g]	102.30	102.30	102.30
j. Net total ___ per family man-day worked[g]	150.3 [or 141.2]	159.12 [149.51]	95 [89](122[j/][114])
k. Net cacao ___ per man-day in cacao[f]	241 [173]	196 [150]	79 [61](133[j/][102])
l. Net cattle ___ per man-day in cattle[g]	-	-	-
m. Net pig ___ per man-day in pig work[i/f]	-	-	-
n. Net ___ ___ per man-day in ___[f]	-	-	-
o. Net cacao ___ per family man-day in cacao[g]	241 [173]	196 [150]	79 [61](133[j/][102])
p. Net cattle ___ per family man-day in cattle[g]	-	-	-
q. Net pig ___ per family man-day in pigs[g]	-	-	-
r. Net ___ ___ per family man-day in ___[g]	-	-	-
s. % labor in cacao expenses[h]	0	0	0
t. % labor in whole farm expenses[h]	0	0	0

*For source and footnotes "a" through "h," see NOTES, Table 11.

SPECIFIC NOTES:

j/ The value in parentheses represents the higher of two cost estimates for cacao production.

- or $2100-2900 per month - could be earned in 18-25 days at $120 per day of full or near-full off-farm employment. Farm income was largely supplementary.

Aleman Family

Sr. Aleman, 54, has a 1.5-hectare cacao farm in Huimango 2°. He also rents three "manos" of milpa nearby "al tercio:" by working the land, he receives a third of the harvest. He lives on the farm with his wife Josefa (52) and seven of their children, aged 6-24.

Another three children, aged 18-26, are married and live nearby. The children over 20 studied only through third grade; the five younger were in secondary school or planned to go there when of age. Two married and one unmarried sons were masons; another unmarried son was a carpenter, and another had his own cacao plantation. The married daughter was formerly a nurse, but now is a full-time housewife.

Sr. Aleman's father was a jornalero who, through savings, managed to acquire four hectares of land when his son was 12. When Sr. Aleman married at age 22, this land was divided between him and a brother, and the father bought three hectares elsewhere, where he now resides. The Aleman's sold one "rial" (10 "manos") fifteen years ago, but otherwise there have been no land use changes.

His capital was worth between M$137,000 and $252,000 in 1979, depending on land valuation. His non-land capital was six times greater than Sr. Galvez'. Gross total farm labor earnings were $32,488, of which 80 per cent was from cacao sales, and almost 20 percent from family use of farm production.

Sr. Aleman worked primarily in cacao; he no longer does jornalero work, which in earlier years kept him busy. The others did cacao work on weekends. Yet of all the children, only Santo (the carpenter) and Salomon (part-time cacao worker, part-time mason) seemed to work full-time. Only a quarter of all family work for cash income was directed to the farm.

Josefa used to be active in cacao production. But since her older daughter married in 1978, she has been quite overworked. She cooks, washes and cleans for four working men and three students, with only occasional help from her sons.

The net cash farm income per man-day worked was $120-156; $173-241 per man-day in cacao; $141-150 per family man-day for all activities, including off-farm agriculture and non-agricultural work ($102 and $166 respectively). It is not clear economically why more time was not spent on the farm relative to off-farm agriculture. It may be because cacao income is for the most part shared among the family while the sons' off-farm work is claimed primarily by themselves.

Perhaps cash flow constraints are to blame. Total income varied from nearly $15,000 in December to $5000 in May, although average

monthly family and farm expenses were $8000-9000 (including sons' personal expenses). From February through July there was a cash deficit, only partly relieved by a $3000 personal loan in February.

Summary of Case Studies

Cacao yields for both Sr. Galvez and Sr. Aleman were well under state averages, even though they used recommended levels of foliar fertilizer and insecticide. Sr. Galvez used an unsually low level of fungicide. Input costs per hectare were only a quarter to a fifth those of Plan "traditional" levels; only 1/7-1/9 of the "recommended" level.

The most notable departure of cacao production systems from both "traditional" and "recommended" systems was the far lower labor input, most surprisingly for those items requiring least associated cash input: fungicide application, pruning, desmamone, drain and shade control. This is so despite the fact that minifundista farmers rarely pay family members for their share of cacao work, beyond room and board. Even when the head of household works full-time off-farm and installs his son as main producer, the son may be paid a share of the proceeds, rather than a daily wage.

Whole farm costs were considerably above cacao enterprise costs, due to the large amount of purchased feed for domestic livestock. As this was mainly for their own use, it should perhaps be accounted for under consumption rather than production. Depreciation costs were negligible because of the lack of fixed capital; but costs with equity return deducted were 1.5 to 5 times greater than full costs.

Due to Sr. Galvez' hiring labor, his cash costs were nearly four times those of Sr. Aleman, for only a third more cacao land. However, if we add imputed family labor costs at $120 per man-day, then Sr. Aleman "spent" twice as much as Sr. Galvez, and nearly three times more per hectare of cacao, yet his yields were only 77 per cent higher per hectare.

Note that these two families were at points in their life-cycle when the home farm held especially low priority among the family income-producing options. The yield evidence from the CCT, which showed higher yields for minifundia than for larger holdings, are probably due to two factors (apart from Census-takers' excessively high expectations). First, most minifundia probably fall in a range between Sr. Galvez and Sr. Aleman's families, when much more family labor is applied to cacao; secondly, off-farm wage opportunities were fewer two years earlier, and hence competition for labor was less.

Minifundia Family Economic Strategies

The basic objectives of the minifundia family seem to be the following: 1) maintenance of long-term income at or above subsistence

and reduction of risk to that income; 2) use of land as a family economic and social "base;" and 3) maximization of returns to labor from all sources.

Subsistence Concerns

The family consumption budgets reveal how very close to subsistence these families live. The hospital visit by Adelina could only be paid for by her father-in-law's generosity, not the family's own resources. Fifty to sixty per cent of the budget was spent for food. Thus the importance of on-farm production; were this included in the budget, the proportion spent on food would be even higher.

A continuing balance between on-farm subsistence production, farm production for cash and off-farm cash employment is made by these families to keep real income - and particularly food consumption - above the subsistence line. Not unexpectedly, the main evidence of improved standard of living is more diverse diets, and an increase in meat consumption to once or twice a week in recent years.

In the SST sample, 84 per cent of minifundia had cacao as the primary product; an additional 11 per cent had maize or coconut as the principal crop. (There are more maize and coconut farmers among minifundistas than any other group.) Because of space limitations and the recent option of a high value cash crop, over a third of the farms had no product other than cacao. A fifth had maize as a secondary crop. Many more plant small amounts of maize as a tertiary product, but this was not picked up in the SST.

Subsistence concerns are made even more important because of the demographic composition of most minifundia households. Despite fewer resources than family farm households have, the dependency ratio is higher, imposing greater burdens on workers.

Minifundia have female heads of household somewhat more frequently than do other family types. But over-all, female economic participation rates are low because so many are mothers with many young children. Half of those women who did work were heads of household.

Land as a Family Economic and Social Base

This generation of minifundistas does not view the land as a marketable item. It is not capital, not a redeemable asset, except under the most extreme of economic emergencies when land must be sold for lack of other recourse. Nor can they hope to increase their holdings when cacao land costs $200,000 per hectare.

"Returns to the land" or "capital" is therefore not a part of their economic calculations. Estimates of labor earnings with equity deducted are simply not relevant to their calculus, and they are perfectly content to have "negative" incomes by this criterion.

Apart from its role as security, the land provides the potential to revert to home production of a considerable part of the family food needs in case of economic upheaval or cacao bust.

The land is not seen as the principal economic support of the family. It is certainly not a form of long-term security for younger members of the family. Land cannot be passed on to a child for use before the parents' death, unless the parent has alternative retirement support, which is very unusual. Even the heir's future would be precarious, much less that of siblings. Where parents feel obliged to sub-divide the land further, the resulting fractions can be only marginal to the family economy.

But the land has another role as well. Presently there is extremely high job mobility among the younger generation of cacao producer families, though mobility is of a diferent type than their parents'. Few individuals had a history of permanent migration, according to the SST; those who did were largely over 40 years old. (That age group had experienced more migration than any other farm type.)

The younger generation nearly always returns to settle near home - for cultural reasons, for the lower cost of raising very young families under an in-law's roof, the lower cost of building a house on family property, and the availability of family help in erecting a home.

As off-farm income increases and the variety of income sources increases, many of these farms acquire the characteristics of a home base for circular migration, rather than a productive unit (179, pp. 17-19). Thus, even the tiniest cacao minifundia can be important in population settlement.

The Role of Off-Farm Employment

In traditional agricultural studies, off-farm employment by farmers is associated with proletarianization and with farm neglect. Griffin states (186, p. 198):

> minifundias have little land, often are unable even to produce the subsistence requirements of the family and thus are forced to derive a significant proportion of their income from hiring themselves out for wage employment and engaging in other off-farm activities.

De Janvry and Deere suggest that the profit rate for these farmers is close to zero and at the extreme, explicit wages are the dominant source of income - suggesting a continuum leading to near-complete proletarianization (21, p.19).

These explanations are highly misleading for the case of Tabascan minifundia producers. They first assume that production of a cash crop replacing a subsistence crop is a sign of the breakdown of the subsistence

orientation of the family. They next assume that off-farm employment is necessary because on-farm production will not provide subsistence requirements, and that off-farm employment is a sign of deteriorating economic conditions for the family.

Unlike all hired-labor-based producers and some family farmers, minifundista families have maintained and for the foreseeable future will maintain a subsistence-oriented economic strategy; they must because of the scarcity of their means. But the very size limitations which define them make an autarkic "subsistence" farm impossible. Indeed, the true, diversified, self-sufficient "subsistence" farm of the literature is the family farm (described in Chapter 6) until a decade ago.

The minifundia family of today must guarantee both a minimum food supply and a minimum cash supply for non-food and bought-food needs. Trade-offs between farm maize and cacao production on the one hand, and between cacao production and off-farm employment on the other have been made in this context for decades. The decisions depended historically in part on relative crop prices, in part on the availability of off-farm income supplements and in part on the on-going historical increase in area of established cacao plantations. Family labor power can be re-allocated easily to cause major shifts in farm cost and income structures.

Diversity of income sources is also a means of spreading risks, although the short-term non-contractual nature of most off-farm jobs means this source is not always dependable and valuable time may be lost in searching for jobs. Sons are far more willing to do this than are their fathers, because few of them foresee an economic future on their father's farm.

Effect of Off-Farm Employment on Farm Production. Off-farm employment does not always mean an abandoned farm. Martínez and Rendon assert (21, p.669):

> Forgetting that real income is not always equal to the cost of farm reproduction and that paid work may fulfill different functions according to how different types of campesinos carry them out, leads to the erroneous conclusion that the greater the quantitative importance of wage income, the greater the tendency to proletarianization.

Wage labor may even be complementary with on-farm production. Sr. Aleman had a long-term relationship with a neighbor whereby he sprayed her cacao trees and received, in addition to a wage, free use of her sprayer for his own trees. When she died and he couldn't find a similar arrangement, he went to work in PEMEX construction for a year, to make enough money for his own sprayer, at which point he returned to full-time farm work.

This utilization of non-farm employment for specific cash goals is very widespread. Repayment of debt is a common reason, as is

purchase of livestock. Farmers' sons may work off-farm to earn cash to set up a carpentry shop or pay for an apprenticeship, to assert independence or learn to manage their own budget, or because their parents are unwilling or unable to continue to support them.

Off-farm employment does not even necessarily mean less attention to the cacao plantation. With few trees, family members can readily replace much of the labor at certain demographic stages. This is so particularly when children are in their early to mid-teens: the mother is free from infant care and sons are not yet anxious to earn money off-farm, or indeed may still be in school or apprenticeship. This was the case for Sr. Aleman several years ago.

Also note that to the extent off-farm employment is used to meet critical cash constraints, higher wages and increased off-farm employment opportunities may increase the number of days available to the farmer for working in cacao, or his level of cash for investment on the farm.

Implications for Cacao Production. Both cash and labor are important constraints to increased cacao production on minifundia farms, and they are intimately intertwined.

Let us assume the "recommended" techniques of the Cacao Plan - achieving yields of 825 kilos per hectare by using $5000 per hectare of purchased inputs and all family labor - are to be applied on the 1 1/2 hectares that both Sr. Galvez and Sr. Aleman had in production. The total family cacao income would be $54,375 - four times that of Sr. Galvez, twice that of Sr. Aleman.

Yet this would require a doubling or tripling of family labor use on the farm and an 8-10 fold increase in cash costs. This income would be delayed until harvest, and would carry enormously greater risk. If the extra 50-90 days of work required for intensification were instead spent in off-farm employment, the family would earn far more.

Instituting the Cacao Plan recommendations on a "typical Tabascan farm" would require an extra 57.5 days of labor, resulting in additional cacao income of $1015. If the same number of days were worked off-farm at the given wage of only $83, income would increase by $4772. At 1980 wage levels of $120, the difference is even greater; and the minifundia farmers must work an additional 90 days on their farm in order to reach recommended levels.

Since family savings are usually ear-marked for long-term investment or large consumption items, cash for purchase of new inputs which markedly increase productivity must be acquired elsewhere. The risks are substantial. Sr. Aleman had the opportunity to borrow $18,000 from the bank for 1 1/2 years to cover cacao costs (his credit is very good), but was too afraid of the consequences of a poor harvest and future debt.

On the other hand, it did not make sense to work an extra 40 days off-farm specifically for purchase of additional cacao chemicals. For to the $5000 in chemical costs, must be added the opportunity cost for the extra sixty days of work required to apply the inputs. Yields would have to increase 340 kilos per hectare just to break even.

Sr. Aleman instead borrowed $3000 as a personal loan during his low income months, mainly in order to purchase chemicals through March with his income from the harvest. It was preferable to raise investment funds through a small loan; interest payments were far less than the opportunity cost of the extra labor.

Statistical Employment Trends

Chart 28 provided data on the employment characteristics of the minifundia, which largely correspond to the strategies sketched above. It showed a high percentage of farmers with their principal occupation off-farm. A quarter of these farmers had a secondary occupation, most commonly as jornaleros.

Minifundia owners were more likely than other farmers to work in skilled trades and construction. Minifundia families had the highest over-all employment in unskilled work and very high participation in non-agricultural work (20 per cent of males). Because of the importance of stable off-farm employment, they had the lowest proportion of agricultural workers.

Only ten per cent of those who did work as jornaleros were heads of household. 84 per cent of these workers were under 30 years old; most were under 20. On the other hand, a high proportion of individuals over fifty years old were jornaleros, relative to other cacao groups.

Nearly a quarter of the EAP ever in cacao had left cacao work. Nearly a third were no longer working; a third were in non-cacao agricultural work; and nearly a third in skilled trades.

Between 1965 and 1978, there was little change in the number of minifundia farm owners working outside agriculture as their principal occupation, but between 1978 and 1979 there was a big increase. But note that there was no change between 1965 and 1979 in the proportion of minifundistas whose principal occupation was agricultural worker.

Minifundista Response to Change

The response of minifundia farm families to changes in input subsidies, cacao prices and wages differ from the other two types of producers primarily due to the importance of off-farm wage employment in the family strategy.

Price Response

As cacao prices increased, farmers planted land formerly in maize to cacao, and increased input applications. Land availability is the main factor restricting total production as the price rises. Minifundia are capable of greater labor intensity and hence higher productivity because of the higher average worker / land ratio, but this is so only at stable wages lower than the value of a family man-day in cacao. Otherwise, family farms will generally outproduce them.

If the real price of cacao goes down, there will be a doubly negative effect on minifundia family workers. To maintain incomes, they would have to increase work off-farm; this very addition to the labor force, coupled with reduced labor demand from larger-scale cacao producers, would be likely to reduce the average wage and further increase the number of days that must be worked to maintain the standard of living.

But the cacao plantations would not be abandoned until the price went considerably lower than the level at which other producers would stop, particularly if the wage level declined leaving few alternative sources of cash.

Wage Response

The wage response of minifundistas is complicated, as implied above. But there are several clear differences between minifundistas and other types of producers. First, unlike on the family farm, the labor use function does not include number of family members available to work (since there are by definition enough), and does not include the wage for hiring cacao workers.

The family standard of living is always improved by an increase in the wage rate. All increases in cacao production will be associated with more labor than cash (chemical) inputs, although the rate will depend on the ratio of workers to dependents, as it does for family farms.

If the wage increases, there may be a decrease in the number of days worked off-farm to meet specific cash needs, and a corresponding increase in labor on the farm at least for the principal farmer. Younger sons may still prefer to work with "faceless" corporations or as city employees, where they have more independence and status, rather than work under an overseer on ranches and large cacao farms.

If the availability of off-farm, non-agricultural employment decreases (or the wage decreases) workers will return to the hired-labor-based producers if they still need cash, and increase attention to their own cacao.

Should both off-farm wages and the price of cacao decline, the minifundista may revert to old subsistence patterns, with greater emphasis on maize, greater sibling rivalry over who gets access to the

plot; and the consequent likelihood of increased permanent (as opposed to the now-frequent temporary) migration.

Appropriate Policy Toward Minifundia Cacao Farmers

Increased cacao prices have led minifundistas to adopt foliar fertilizers and increase insect and fungal control to an unappreciated extent. However, levels used are pitifully low due to the cash constraint on production. For financial reasons, the Cacao Plan program is simply out of reach for most of these producers - both the costs of inputs and the opportunity cost of their own labor.

A number of approaches could be tried. The present practice of providing some input subsidies is effective for this group of farmers. More cacao associations should be encouraged to provide inputs on loan, their costs to be deducted from the pay at harvest time. But loans made entirely in the form of inputs would possibly lead to the family's selling off inputs to meet consumption needs at critical times.

The program of producer loans needs to be adjusted substantially for the minifundistas. They cannot responsibly take on the large sums loaned by the banks for cacao production. But loans for much smaller amounts, perhaps distributed by the cacao associations, would be useful, and definitely encourage greater production and input use by removing cash constraints during periods of input application or plantation maintenance. These sums should not be restricted to use directly in cacao production, but be applicable to personal needs as well.

Minifundistas in the Petroleum Boom

The most important effects so far of the petroleum boom on minifundista families have been the sharp increases in cash needs due to inflation, and in the number and quality of jobs available for minifundistas outside agriculture. In the short run, the availability of petroleum-related employment has not reduced cacao production by this group of farmers, because of the seasonal nature of the jobs, and because most families can easily find substitute or assistant cacao labor. Cash transfers from petroleum and construction work for investment in cacao sprayers or inputs is widespread in what is so far basically a complementary relationship.

Further sub-division threatens to turn those plantations into mere garden plots. Such a system could come to resemble the lucrative, intensive Japanese garden plots tended by families of city workers. Or it could lead to the disappearance of commercial cacao production over a large area.

In the long run, the coupling of high cacao prices and ample non-agricultural employment could slow down the sub-division. Where the family farm child can aspire to a college education, the cacao mini-

fundista's offspring can aspire to mastery of carpentry, masonry, mechanics - all skills urgently needed for Tabascan economic development. The State Plan and the Cacao Associations should encourage this trend, while simultaneously encouraging minifundista managers to consider farming a priority.

Meanwhile, the minifundia plays a critical role in retaining population in the countryside and preventing excessive rural-urban migration. A principal state policy goal should be to ensure that these holdings remain cacao producers as well as bedroom communities for PEMEX.

The Role of Minifundia in Agricultural Development

The Tabascan study brought up a number of points which have bearing on the potential role of minifundia in agricultural development. First, the evidence reinforced the position that there are quite severe constraints on minifundia as regards technification that requires significant cash inputs. Credit is a poor solution, given the high costs of providing small amounts of credit, and the minifundistas' incapacity for absorbing or risking larger amounts.

What the story did show, however, was the potential for stable and slowly rising production in response to positive price incentives, via greater family labor investment on the farm. This was particularly provocative in Tabasco because the slight cacao production increases were accompanied by substantial increases in the amount of off-farm employment by minifundia families. Certainly under conditions of good agricultural prices and good off-farm wages, the minifundia mode of production can be quite a stable one.

An additional point is that when wage levels decrease substantially, rather than result in greater commercial farm production among these families, there is a real possibility that the family will be forced for reasons of security to revert to greater subsistence production on the farm.

It is important to look at minifundia - as well as the other types of farms - from the perspective of demographic stage in determining their response to economic conditions. The production system varies more than for other farm types over the life-cycle of the family. Although the minifundia farm is almost by definition a labor-surplus unit, there may be specific periods of time when labor scarcity will be a constraint on production.

Regarding our earlier questions about the future of the campesinado, the minifundia present a perplexing picture. Their numbers are likely to increase continually in the future without major land tenure controls. Even should a great many "disappear," their numbers will remain high and hence the sector must be treated seriously as a permanent part of the agricultural scene.

Any trend toward "disappearance" will come from long-term conditions of very low agricultural prices relative to high off-farm wages. Under conditions of either low prices and wages or high prices and wages, there will be a tendency for minifundistas to maintain the farm as a central part of family economic strategy. Similarly, the degree of "exploitation" of minifundia families depends equally on relative wage conditions and relative prices.

CHAPTER 8. COLLECTIVE FARM HOUSEHOLD PRODUCTION STRATEGY

In Tabasco, collective cacao production is responsible for a small, but rapidly growing part of total state production, with about eight to ten per cent of the total area planted to cacao. It is an important source of ejidal employment and income. Experience and policy on the collectives, furthermore, have important lessons for the rest of the cacao sector regarding appropriate development policy.

Collective ejidal production in Mexico dates back to some of the earliest ejidos organized in the country in the 1930's. Collective organization was seen by many as the only practical way to restructure the large private holdings which had been expropriated complete with central machinery plants or processing units.

Others in favor of collectivization stressed social continuity with indigenous collective production forms; still others supported collectives on the basis of socialist ideology.

A considerable literature on collective production has built up over the past fifty years, and the fortunes and numbers of collective ejidos themselves have fluctuated considerably from one presidential sexenio to another. The periods of greatest support for them occurred during the Cardenas years and more recently during the presidential term of Luis Echeverria Alvarez (1970-76). (Particularly good references on collectivization are Eckstein and Reyes Osorio et al. (22, 139).)

The theoretical production advantages of collectives principally involve issues of scale. Larger scale permits more mechanization, risk-sharing, better access to credit, more efficient marketing systems, more efficient use of labor, and easier application of scientific and mechanical methods developed for large-scale private agriculture.

The results of collectivization, however, tell a mixed story, not only in Mexico but throughout the world. Criticism of collective farming takes a number of forms. Some maintain that private, individual control of property leads to more effective farmer management and greater incentives for responsible work and higher returns. Others emphasize the potential political and economic problems of direct government control over production decisions. Not only may profitability and efficiency take second place to political expediency, but central control may deprive farmers of any real voice in production decisions - effectively turn them into state workers - and hence defeat one of the purposes of collectivization.

Finally, many observers are cynical about the workability of the democratic forms required to maintain collective decision-making. Systems may lend themselves to manipulation or corruption, resulting in poor farmer morale and consequent declining production.

Collectivization received much less attention in the Lopez Portillo administration, a situation which is likely to continue into

the de la Madrid administration. Nevertheless, all of the above issues relating to collective farming have bearing on Mexican agricultural development.

Policies to promote farmer cooperation, credit societies, rainfed and irrigated agricultural district organization must deal with similar problems, particularly the proper degree and type of government intervention, maintenance of democratic decision-making, improving efficiency of bureaucratic decision-making, farmer organization, morale and incentives. The case study of Ejido C-29 of the Chontalpa Plan and the evolution of cacao production there provide a practical look at the working out of these problems and some lessons for agricultural development projects in general.

The advantages and disadvantages of being part of a major governmental development scheme in a petroleum region also highlight some of the political choices which can or should be made in resolving agriculture-petroleum conflicts.

The Chontalpa Plan

Nearly all of the collective cacao production in Tabasco is located in the "Chontalpa Plan" ejidos, an area drained in the 1960's as part of the state's first agricultural project under the auspices of the Grijalva River Basin Commission.

The original "Plan Limon" was organized in the early 1960's to increase agricultural production in a major subsistence area, and increase real incomes and living conditions for smallholders through drainage and irrigation on about 40,000 hectares. In 1965, an enlarged project called the "Chontalpa Plan" was funded by the Inter-American Development Bank for 6000 families. The following year the Commission began to expropriate land (eventually from nearly 7000 individuals) for the project. This land was organized into new ejidos, based on individual plot control, and credit through "Solidarity Groups."

Drain construction was finished by 1970. A year earlier, production was undertaken by "Local Societies for Collective Ejidal Credit" and the 15 hectares of land earmarked for each family was henceforth divided into two hectares for a family private plot and 13 hectares for the collectively-run plots.[1/]

In mid-1972, the Fideicomiso Plan Chontalpa was set up to reorganize the ejidos financially, with the Grijalva Commission still chargedwith technical and social assistance. By 1975, over half the planted land was in pasture, and a large part in cane. By this time,

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1/Presidential Resolutions legislating collectivization were passed in 1971 for Cardenas municipio ejidos and in 1973 for Huimanguillo.

all 22 "poblados" had been set up, complete with paved roads, brick housing, bus service, medical care and schools for ejidatario's children. Numerous professionals such as social workers and crop technicians were active in attempting to smoothe the transition from dispersed subsistence production to highly controlled, collective "modern" agriculture and "town" living patterns. Between 1959 and 1975 infrastructure investment in the Plan as a whole was M$1,150,825,615, or an average of $52.3 million per ejido (approximately US$4.2 m).

In 1977, another reorganization gathered all responsibilities for the collectives under a single "Promotora del Complejo Agro-industrial de la Chontalpa," which answered directly to the President. Its mandate was to increase production and industrialization, and to work with the "Union of Ejidos" - the ejidatarios' organization - gradually including them in decision-making until full self-management was achieved.

Land Use Changes in the Chontalpa Plan

Throughout the 1960's the project emphasized intensive agricultural production. When President Echeverria came to power, several factors led to a change in orientation: 1) national presidential priority for increasing ejidal yields; 2) a crisis in the national sugar sector requiring increased area in cane and improved productivity; 3) a national beef shortage arising from large-scale beef exports to the U.S.

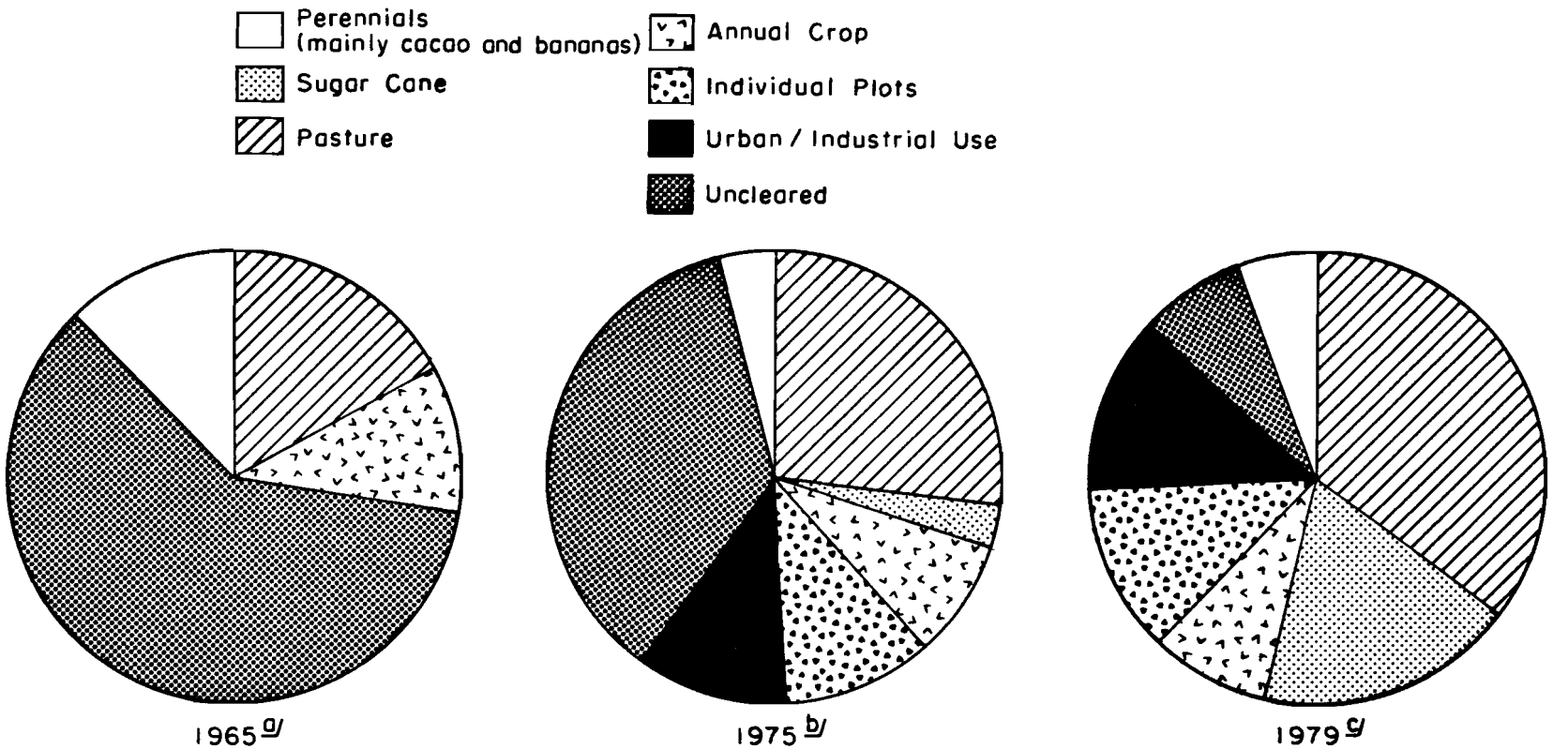
Production was radically reallocated to pasturing cattle and planting cane, with the erection nearby of a cane mill. Herd size in the Chontalpa rose from 1042 in 1969 to 41,930 in 1975. These decisions were reinforced by poor initial production results in agriculture and a belated recognition that Chontalpa soils, with the exception of some alluvium, suffered permeability problems. Given very high rainfall, tractor use was extremely problematic and is still a very high-cost input.

In 1980 and 1981 there was again a push to produce subsistence crops, particularly maize, as part of the Sistema Alimenticia Mexicana. Heavy losses in these years due to extremely high rainfall and consequent flooding finally led to the initiation of parcel-level drainage construction, which has long been needed for more precise water control.

Chart 29 illustrates land use changes in the Chontalpa since 1965. Thousands of hectares of cacao were cut down in the early years when emphasis was on annual crop production; cacao prices were low and division of land into large blocks of monocultivated plots was technically appealing. Area in cacao dropped from 6150 hectares in 1965 to a low of 2535 hectares in 1971.

As cacao prices rose, plantings began anew, reaching 3835 hectares in 1975 and by 1979, 3337 hectares on communal land. Individual plot cacao plantings also increased. 500 hectares were planted on

CHART 29. LAND USE CHANGES IN THE PLAN CHONTALPA, 1965-1979



a/ Rosario Casco Montoya, Manejo del Agua en un Ecosistema Tropical: El Caso de La Chontalpa, Centro de Eco-Desarrollo: Mexico, 1979.

b/ Rene Barbosa-Ramirez, La Ganaderia Privada y Ejidal: Un Estudio en Tabasco, Centro de Investigaciones Agrarias: Mexico, 1974.

c/ "Promotora del Complejo Agro-Industrial de la Chontalpa: Programa Para 1979" (pamphlet), PCAIC: Cardenas, Tabasco, 1979.

collective plots in 1979-80; about the same on private plots. Fifteen Chontalpa ejidos today produce cacao; on ten, over 100 hectares are in production or development.

In 1980, the ejidos planned to plant 1015 hectares of new cacao; by the end of the sexenio in 1982 they expected to have planted a total of 3500 new hectares.

History and Description of Ejido C-29

C-29, or as it is formally, but rarely called, Ejido General Vicente Guerrero, covers approximately 5000 hectares in the south-eastern part of the "Plan." Maps 10 and 11 show land use changes on the ejido between 1965 and 1980. The ejido is entirely agricultural, with no agro-industry but the washing and drying of cacao.

The zone was originally one of small ranches and minifundia, with at least 1000 hectares planted to cacao on over half the individual holdings. In 1979 the ejido had 600 hectares of cacao plantations (two thirds on communal land), 80 of sorghum, 1100 of sugar cane and 850 of pasture. Its cattle herd numbered 1660; 526 were cows producing milk for Nestle.

The collective ejido has two entirely separate production systems for the communally-worked fields and for the two-hectare private plots per family.

By far the largest capital asset of C-29 is land, which legally belongs to the government, not the ejidatarios. At 1980's inflated prices, the land was worth $420 m. pesos. Equipment was valued at under half a million pesos. The 160 ejidatarios with rights generally own concrete block houses, but the "libres" and poorer ejidatarios without rights still have homes of guano.

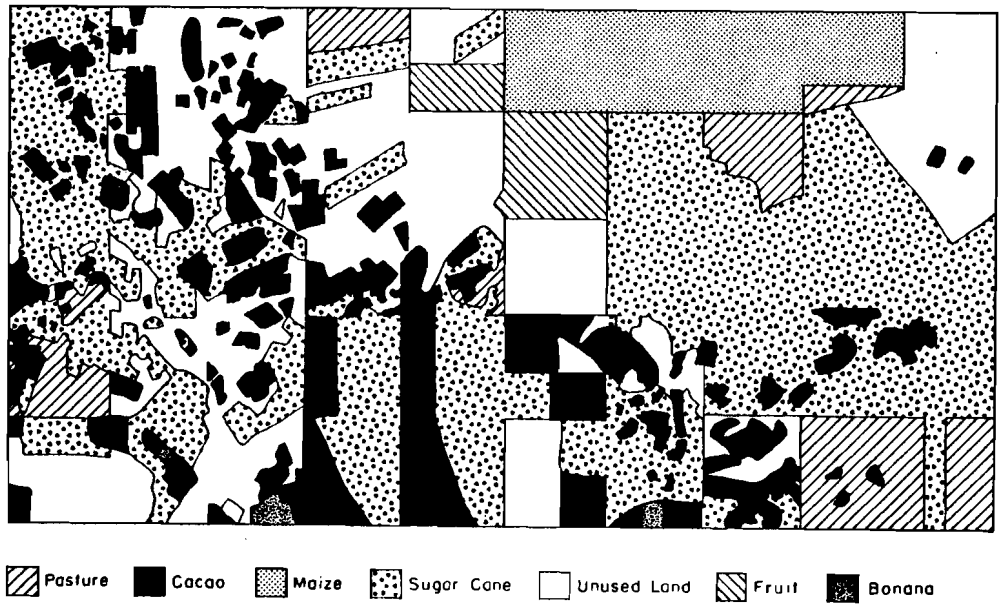
In 1972, the ejidal population was estimated to be 700 individuals in 121 families (6, p.145). The total population in 1976/77 was 1220, of whom 650 were men and 570 women. 357 of these were school-age children. Literacy rates for the parental generation were relatively high, although the average schooling for heads of household was only two years. Nearly all children aged 9-16 were in school; some older students had reached university level.

29 of the families living in the poblado of C-29 were interviewed by the Sociodemographic Survey in January 1980; see Chart 30.[2/] All the collective families in that sample were young, most with school-age children, and the dependency ratio was thus very high.

[2/] Approximately ten per cent of poblado families were randomly chosen, but they are unrepresentative of the ejidal population as a whole, as the sample did not include the "libres" who live mostly outside the poblado center.

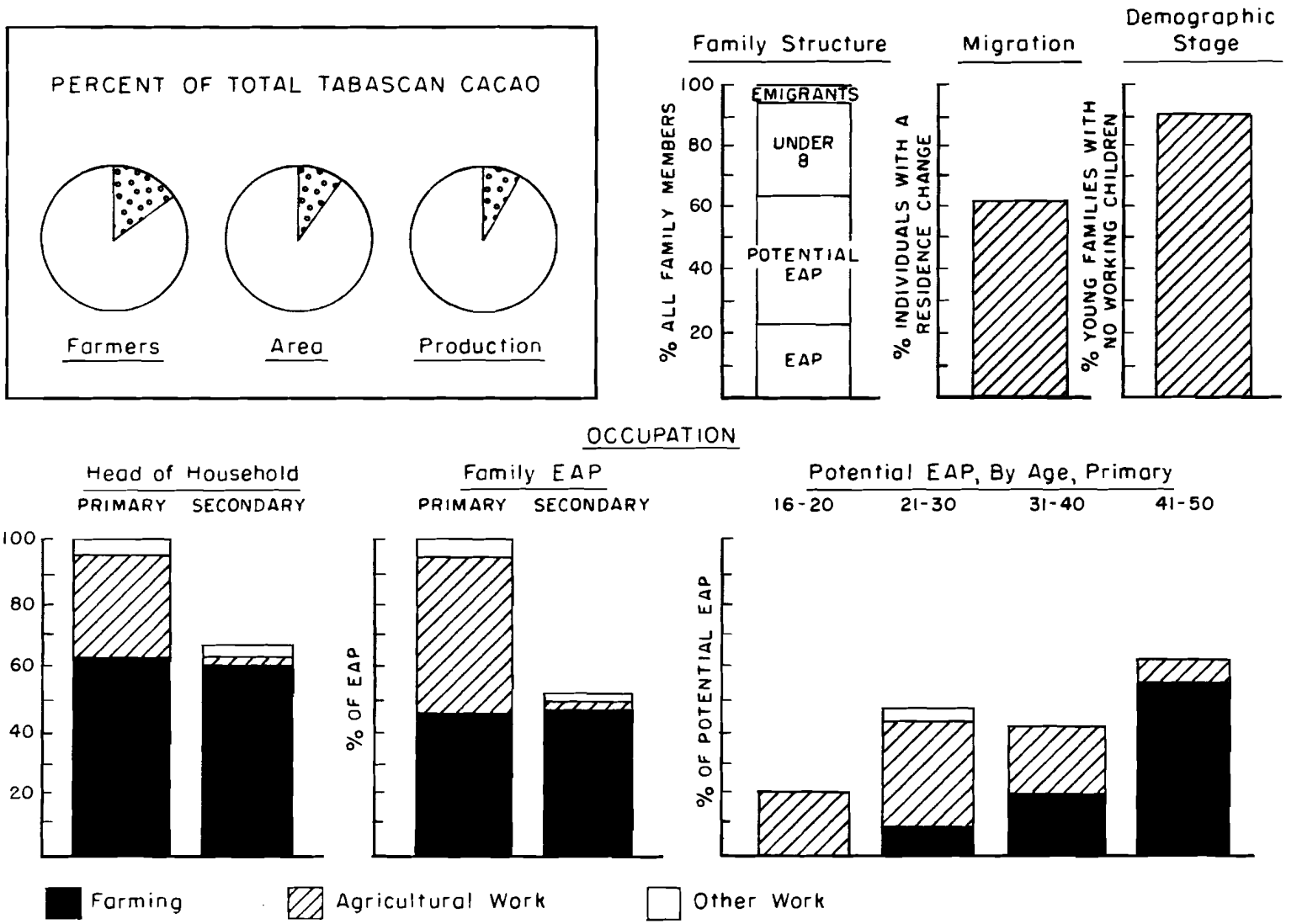
MAP 10. LAND USE ON EJIDO C-29, 1965*

MAP 11. LAND USE ON EJIDO C-29, 1980*



*Mexico, SARH, Promotora de Complejo Agroindustrial de la Chontalpa, "Uso de Suelo C-20, 1965" and "Uso de Suelo, C-29, 1980."

CHART 30. DEMOGRAPHIC AND EMPLOYMENT CHARACTERISTICS OF COLLECTIVE CACAO FARM HOUSEHOLDS



Most ejidatarios were original inhabitants of the area, whose land was expropriated for the project. Of the original ejidatarios in the entire Plan, some twenty per cent had emigrated and been replaced by landless workers; this estimate probably applied to C-29 as well. At least fifteen ejidatarios there still owned outside properties, and hence worked only part-time on the ejido, compared with 20-25 per cent Plan-wide.

Collective Cacao Production

Table 22 shows the 1980 agricultural program planned for C-29. Cacao provided half the value of total agricultural production (itself 97 per cent of all production value), while accounting for only a quarter of ejidal costs and capital. Three quarters of ejidal profits came from cacao; a quarter from cane.

Most of C-29's collective cacao had been planted in old maize, banana and cane fields. There was no credit available for cacao until 1972, but between 1972 and 1975, $12 m. was borrowed to meet variable costs for cacao and $4.0 m. for investment. In 1980 however, only C-40, C-26 and C-17 used cacao credit. This was due both to greater capacity for self-financing and resentment of the tight production controls required by credit agencies. In 1979, the collective sector of C-29 had 179,993 mature cacao trees on approximately 280-300 hectares, and 9749 trees on 56 hectares of newly established cacao.

Cacao Technology

The ejido did not apply insecticides, and only recently began a good program for pruning; very little fertilizer and fungicide were used. The cacao tecnico complained of a 20 per cent loss of pods on the tree from rodents, although cacao bean storage losses were low.

Since they began fertilization, the C-29 growers claim that yields have responded vigorously. 20-30-10 is used for flowering and 54-27-54 (scantily) for the soils. Weeding was done three times a year and fumigation twice, but during 1980 the collective was far behind the recommended schedule on these activities, due to preoccupation with cane.

Shade used in the Chontalpa was predominantly mote. There was growing interest in replacing Eyrthrina valutina, which is subject to many pests and diseases, with Erythrina glauca. Chipilin was used only for temporary shade. Most planting was on a 4 x 4 grid, but some areas had triangular or other spacing.

The Cacao Plan tecnico attributed the poor technology to lack of funds, particularly the distribution of profits rather than their reinvestment; and also to competition with cane for labor. The ejidatarios were not particularly interested in increasing inputs

TABLE 22. 1980 AGRICULTURAL PROGRAM FOR EJIDO C-29*

	Sorghum	Cacao	New Cacao	Sugar Cane	Livestock[a/]	TOTAL
Land Area	100	579	21	1166	589	2455
% Area	4.1	23.6	.9	47.5	24.0	100.0
% Agricultural Capital	3	26	1	71	-	$19,825.9
% Value of Production	2	49.5	-	45.6	3	100.0
% Cost of Production	2.9	24.7	-	67.5	5	100.0
% Expenses of Costs	9	67	-	43	48	-
# Man-Days	546	36,773	799	65,692	10,886.7	114,696
% Man-Days	.5	32.1	.7	57.3	9.5	100.0
% Profits	1.0	72.5	-	24.5	2	100.0
Net Income (including labor payments)	$173,432	$19,151,516	-	$11,413,064	-	-
Value per Man-Day Worked	$317.64	$520.80	-	$173.74	$37.00	-

* Source: Promotora del Complejo Agro-industrial de la Chontalpa, "Programa 1980," 1980, Ejido C-29.

a/ The program for livestock had the following characteristics:

Number of head - 1660
Cows: heifers - 1:.72
Culling rate - 1:8.77
Bulls: cows - 1:20
Number steers sold: herd - 1:23
Cows: calves - 1: .8
Number animals sold: herd - 1:12.6

for cacao, rather in stabilizing inputs to keep cash investment relatively low.

Production data are not very reliable, but records show that in 1978-79, a very good cacao year, the ejido averaged over a kilo per tree, 657 kilos per hectare, which is fairly good. By historical comparison we find that overall Chontalpa Plan cacao productivity rose from 150 kilos per hectare in 1965 to 320 in 1970, dropped to around 190 kilos in 1971-73, and rose to 370 kilos in 1975 (94). Due to the heavy rains in 1980-81, there was a 30 per cent decline in cacao yields from the 1979-80 period.

Only about 60-70 per cent of C-29 cacao was sold through the Collective Ejidal Cacao Association #23. Producers preferred to send cacao where they were paid in cash, rather than by check. Sales to Associations 23 and 2 were frequent. The multiple outlets make data on monthly production difficult to collect.

In 1975, the first collective fermenters were installed in neighboring C-28, but C-29 did no fermentation and sold all its beans sun-dried. This was ostensibly due to lack of warehouse space, labor shortage and uncertainty about price differentials. There was talk about the Union of Ejidos erecting another fermenting plant on a collective ejido, but details have not been worked out.

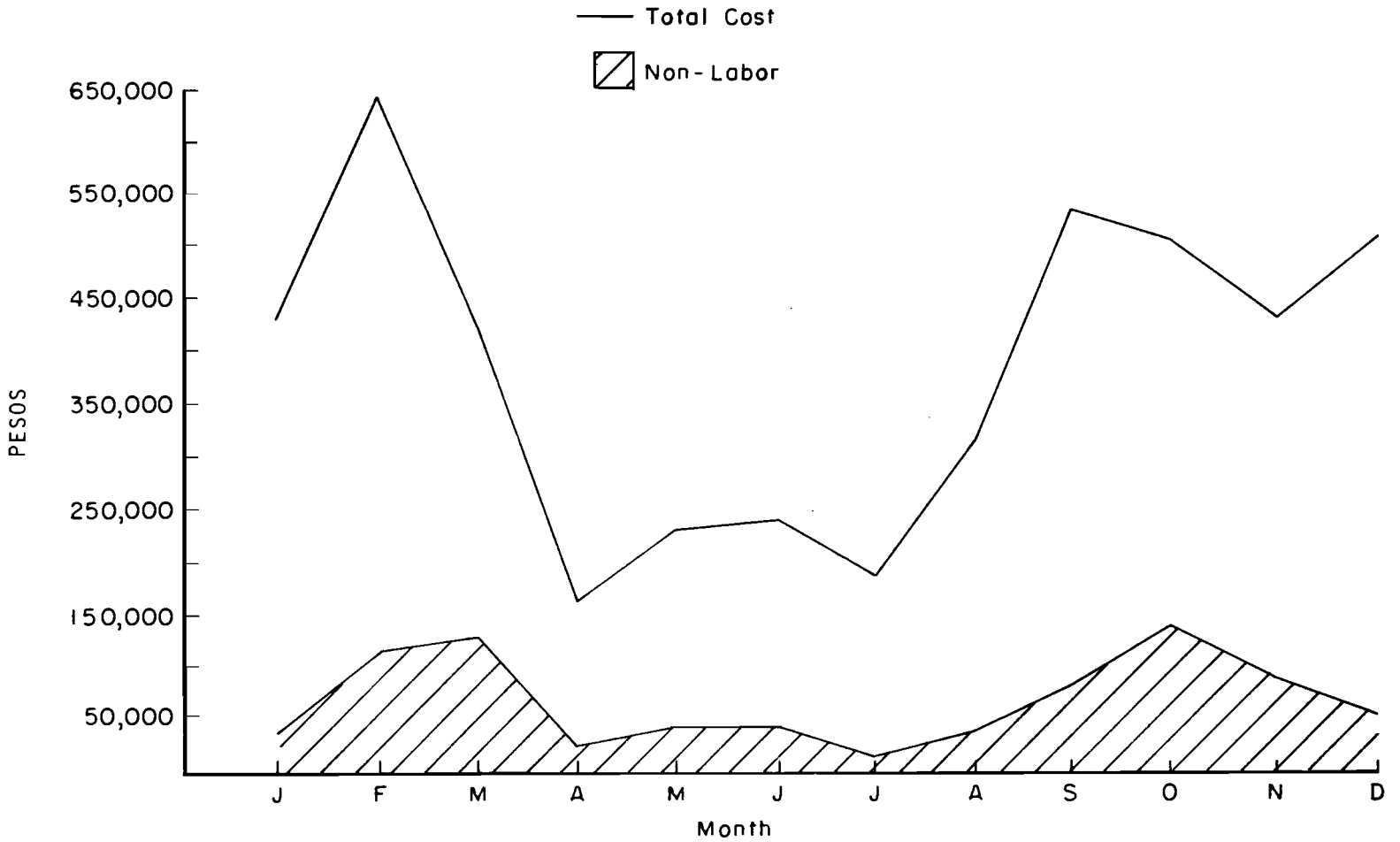
Production Costs

Chart 31 shows costs of cacao production on C-29. In 1978-79, the ejido earned nearly $11 m. from cacao. Of this, a third went to labor costs; half of which was paid to ejidatarios with rights. An additional 38 per cent went to pay profits to the ejidatarios with rights, proportional to number of days worked. A fifth of the proceeds was reserved for a capital fund which pays labor costs for the following year and provides investment capital.

Of cash expenses 1978-79, a fifth was for non-labor inputs, a third for harvest labor and nearly half for non-harvest labor. Cash expenses were highest in February, September, October and December (over $500,000), and lowest from April to July. Non-labor costs were greatest in February and March during fertilization and October for chemical spraying. Overall, in 1979, C-29 had higher costs and income than any other collective ejido.

The proportion of labor in total costs was high, even considering the low level of inputs. Even if input costs were to triple, the labor share would decline only to 67 per cent. This compared to a labor share in cane production of 43 per cent, for sorghum of 9 per cent and for cattle operation (not investment) of 86 per cent. Nevertheless, corresponding cost estimates for 1972 show salaries as 99.5 per cent of costs.

CHART 31. CACAO PRODUCTION COSTS ON EJIDO C-29, 1979*



* Tabasco, Ejido C-29, "Libro de Contaduria, Cacao, 1979."

Organization of Labor on C-29

As the population density of the Chontalpa rose with ejidal settlement, a chronic labor surplus developed. Early agricultural efforts largely failed, and the movement to cattle did not, after the first infrastructure investments, provide adequate employment.

During the late 1970's, however, a number of factors led to a labor shortage: increasing capitalization, increased land in use, the predominance of labor-intensive cane and cacao production, and an active off-farm labor market. These factors were particularly marked on C-29, and acted as a major constraint on ejidal production.

Historical Labor Use

In 1972, C-29 ejidatarios worked only 18 man-days per month and 216 days per year. At that time, the value of cacao production per man-day was only $19 vs. $184 in sugar cane (8, p.143). Labor use that year was only one quarter the level projected for 1980, although there were 121 ejidatarios then, only a quarter less than at present (5, p.148). Nevertheless, C-29 had the highest level of employment in the Chontalpa Plan at that time.[3/]

In 1976, two thirds of the labor for collective production were provided by ejidatarios, 28 per cent by libres and six per cent by women. Labor requirements varied from 4700 to 10,000 man-days per month. Between 1975 and 1980, the amount of labor generated by the ejido rose 29 per cent; labor demand in the peak month of February rose 40 per cent (8).

In 1976, 14 types of workers in the Chontalpa[4/] included (8):

1) directors (political, administrative, foremen);

2) representatives of support institutions (e.g.credit);

3) specialists such as machine operators, cattle managers;

4) ejidatarios working year-round in stable jobs such as storehouse caretaker or cowboy, for wages and a share of profits;

5) ejidatarios doing jornal work on their own ejidos, under the supervision of zone chiefs, for wages and a share of profits;

[3/] Average employment at this time was 11 days per month and 140 per year (8, p.148).

[4/] Prior to collectivization, there were other types of work relations, such as the tequio and convite. Because of the earlier scarcity of labor and difficult access to peons, even largeholders were involved in shared work. There has been a steady decline in the use of tequio and convite, and a subsequent rise in importance of compadrazgo, involving mutual work obligations and favors, usually on private plots.

6) ejidatarios' sons over 16, who were paid an established wage, but no profits, and who worked on the family plot as well;

7) non-ejidal jornaleros used as substitutes, who were paid wages and sometimes a share of profits (especially by the female ejidatarios);

8) ejidatarios working as jornaleros outside their own ejido, who got priority over libres, but no profit share;

9)"enganchadores" who arranged for groups of jornaleros to work, especially in the cane harvest;

10) "libres" who may or may not live permanently on the ejido, who received wages but no profits or social security;

11) jornaleros (usually ejidatarios or their sons) contracted by institutions especially for machinery operation, who got no profit share, but did receive room, transport, tools and a wage much higher than minimum;

12) jornaleros contracted by individual ejidatarios for work on the private plots;

13) women working in the women's collective plot, on collective work operations, or at the banana packing plant;

14) technical personnel paid by the ejido, but usually contracted by institutions (such as teachers).

Labor Patterns in 1979-80

On C-29 in 1979, the labor force included the 161 ejidatarios working full-time (or hiring replacement labor), perhaps 100 sons of ejidatarios without rights, 40-70 resident libres (of whom 30 work permanently in cacao, receiving housing and social security as well as a wage); and 10-20 "eventuales" living near the ejido who came regularly for work. This local pool satisfied the ejido's labor needs six months of the year; In December-March, August and October, large numbers of outside workers were needed.

Total labor used by ejidatarios with rights in 1979 was 38,572 man-days. Monthly labor use ranged from a low of 2656 in December to a high of 3692 in October. See Chart 32. The average number of days worked per year by ejidatarios with rights was 241; of these almost two thirds were in cacao, filling half the cacao labor requirements. Over-all, cacao accounted for 40 per cent of all labor use.[5/]

5/Note that labor-use data for 1979 for all 22 ejidos showed at most 1,067,250 man-days worked by ejidatarios with rights, and at least 3,769,480 worked by others - over 3/4 non-ejidatarios.

Employment for most ejidatarios varied through the year. First cacao harvest, then pruning occupied January-March, at which time the ejido employed outsiders for the cane harvest. When the latter returned to their own subsistence farms for the maize planting, ejidatarios completed the rest of the cane harvest, which lasted through June. Cacao work at this time was often done by outsiders. Beginning in August, there was a sharp and steady increase in cacao activity by ejidatarios and by many hired workers.

Ejidatarios and even local libres were reluctant to cut cane - an extremely disagreeable job - despite a premium wage. Ejidatarios with rights in 1980 were required to cut 200 tons of cane each, at 4 to 5 tons per jornal. They were allowed to employ others to meet their quota. Canecutters came from Michoacan, Guatemala, Guerrero, and from Jalpa and Cupilco locally. In 1979, 100 people came from Michoacan to assist some 70 socios and a few local jornaleros. Because of a ten per cent loss in cane production due to heavy rains in 1980-81, the ejido did not hire contracted cane laborers that season. The price of cane was such that the higher wages needed to induce workers to cut cane would effectively wipe out operating surpluses.

The main employer of women on all the ejidos was the banana packing plant. The season was January-August with a maximum number of days worked in 1975/76 in July (1553) and a minimum (242) in August. Unfortunately, at the end of 1981, the packing plant was shut down. Whether there is alternative employment on the ejido for these women - mostly single mothers - is unknown.

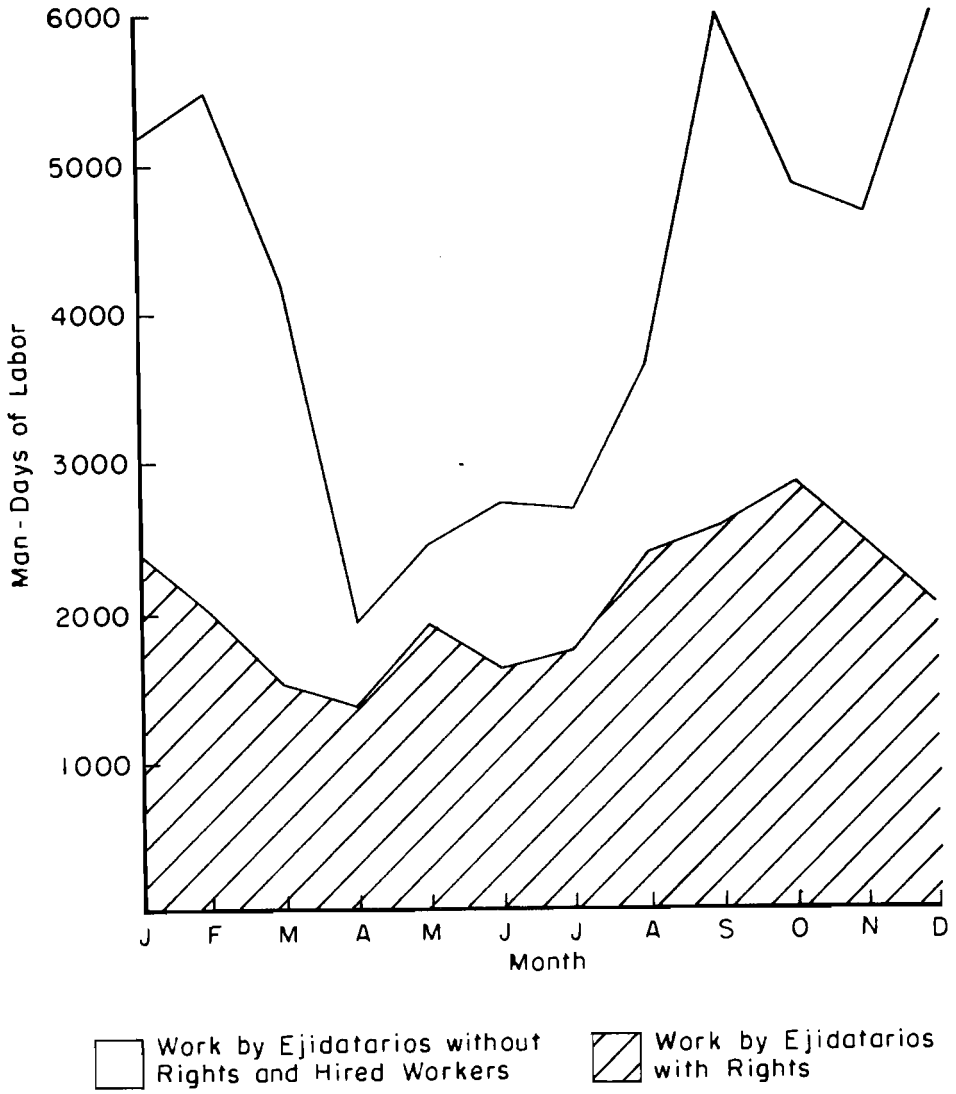
Labor Use in Cacao

Until 1980, cacao plantations on C-29 were typically organized into seven divisions, each with a chief chosen by the ejidatarios and a supervisor over them all. The chief daily chose the men who would work with him for a given chore; at harvest each managed a group of 12-20.

Of all man-days dedicated to cacao, illustrated in Chart 33, a third were spent on the harvest, nine per cent in processing (pod-breaking, drying, sorting, carrying); a quarter in pruning; 14 per cent in weeding, and six per cent each in administration and chemical spraying. Because there was no month when ejidatarios with rights were unemployed, there was little internal pressure to add activities such as improved pruning, because the labor would have had to come from hired workers.

The lack of individual responsibility for the condition of the plantations led to disappointing production results, even with the addition of new inputs. Cacao is not mechanized, so cultivation is dependent on careful hand work; the collective system was not tailored to this type of production system.

CHART 33. LABOR USE IN CACAO ON EJIDO C-29, BY TYPE OF WORKER, 1979*



*Tabasco, Ejido C-29, "Libros de Contaduria, Cacao, 1979."

In 1980, the system was changed experimentally to one used earlier in C-09 and C-10, in which each ejidatario was given responsibility for a particular area in cacao. Plantations were divided into areas of 4800 trees between four ejidatarios with rights, with each responsible for 1200 trees. They did not receive a jornal, but were paid for the harvest. The ejido provided urea (charged at the harvest); the other inputs farmers bought from their own income. Farmers hired whomever they wished to help with the cacao. A chief cacao manager checked the plantations to ensure that production was going forward as it should. If certain technical requirements were not met, the farmer would be relieved of his plot.

According to the agreement with the Secretaria de Reforma Agraria, whose job it is to assure compliance with national regulations governing ejidal organization, the farmers must rotate plots every 18 months. Early results from the new program were promising.

Off-Farm Employment

Ejidatarios with rights did very little work outside the ejido, even where such work might be well paid (with the exception of those who still own agricultural land outside the collective). There were strict rules against work outside the ejido for them; permission from the ejidal assembly is required and the ejidatario loses all rights to profits. If he continues such activity for a longer period of time, he may lose his position as an ejidatario with rights. There were similar restrictions for the resident libres. In 1979, six or seven libres had taken leave to work full-time for construction companies; they had to pay house rent - which is usually free of charge - during that time.

Wives of ejidatarios did not seem to be as active either in outside work or home work for pay as they were in other types of producer families. The hunting, fishing and gathering activities prominent as supplemental income sources before the Chontalpa Plan began had slackened considerably.

The sons of ejidatarios did seek work in a wide variety of occupations, but were far less likely to work as jornaleros in agriculture outside the ejido. The Benito Juarez sugar cane mill began to hire many sons of C-29 ejidatarios around 1976-78. They earned $165 per day as a part-time libre, more if they were unionized and had permanent work.

Some were employed in the technical education centers within the collective ejidos; a few in ejidal administration. The rest were employed on private ejidal plots.

Between 1978 and 1980 many sons of ejidatarios (one estimate is about half, or 100 individuals) turned to work in petroleum boom-related construction. But this was certainly not true of the core population of the ejido poblados. In 1979, of the 47 economically active individuals in C-29 surveyed in the SST, only two worked

outside agriculture, one in tire-making, the other in house construction. Only four individuals had ever worked outside agriculture in the past - and that was in 1965.

Earnings and Income

Sources of earnings for C-29 residents included wages for labor, profits for ejidatarios, remaining indemnification payments, off-ejido work activities and properties, private parcel product sales. Wages in 1979 were $70-75 per day, with pay for piece-work of $25 per sack of broken pods, $1 per tree weeded. Pay rose to $92 per day in 1980. This was the same for all workers (except enterprise managers) for a day lasting from 7:00-12:00/12:30. In addition, some resident libres received Social Security benefits (as did all ejidatarios), plus a house (worth at mimumum $5000) and the right to a maize plot (estimated worth $50,000).

Imported laborers earned $120 daily for cane-cutting, as well as housing and a maize ration. If there was no work on a given day, the latter still received $50 and the maize ration. (Alternatively they received a straight $50 per ton cut.)

Almost all the indemnification money had been used up or invested by 1980, but the properties outside the ejidos probably brought in more money than what the owners earned as ejidatarios. Incomes from private plots ranged widely. For the plot with only maize and some home vegetables, the total value of production was only a few thousand pesos. For those ejidal families lucky enough to have cacao land and whose trees were in full production, additional family income could amount to $20-30,000.

Until 1976, only cacao production had shown any profits project-wide. In 1979 it was certainly the best earner in C-29, as $5,256,000 were distributed as profits. Cattle operations also distributed profits, but much less. Each product was considered a separate "line;" those in charge may decide to distribute profits one to four times a year. Barkin wrote in 1976 of the importance of profit distribution (6):

> The socios are always anxious for the distribution of profits; they await it so desperately that on various occasions the Fideicomiso has made the distribution without there having been any profits, charging the sum to the standing debt of the ejido.

The total level of profit distribution throughout the Chontalpa ejidos was $38 m. for 1978, $80 m. for 1979 and $118 m. for 1980. On C-29, in 1980, $3 m. of profits were divided among 162 ejidatarios. Note that of the ejido's $4 m. cattle debt, half had been paid off, and some forgiven by the government, leaving C-29 in a fairly enviable financial position as of the early 1980's.

In 1980 the average Chontalpa Plan family earned $54,000 (94), $27-28,000 per worker (personal interview, director of Promotora). The

directors of C-29 estimate that the average earnings for an ejidatario with rights was $50-60,000 per year in profits and $25,000 in labor, giving an income of $75-80,000, roughly comparable to many family farm households. Incomes on C-29 were probably higher than on any other collective ejido.

Private Plot Production Strategy

Although they belonged to a collective that many strongly believed in, the ejidatarios operated also as independent families. That independent life was centered on the use of the private plot.

The plots originally emphasized subsistence crops such as maize and bananas; others produced some cane, coconut, cacao, cattle and small livestock. But in 1980, according to the directors of C-29, 40-80 per cent of the ejidal private plots had cacao. From no more than thirty hectares in 1975, there were almost 200 hectares in 1980.

The cacao tecnico estimated that the age distribution of private ejidal cacao plantations was similar to that in general in the Chontalpa project: 30 per cent of trees in production, 40 per cent a year old, 30 per cent 1-3 years old. In general, yields on private plots were higher than on collective plots. Many families even use fertilizers bought from FERTIMEX now and buy insecticides from private stores.

The ejido gave credit for cacao produced on personal plots; four to five ejidatarios had to group together to receive it. But in 1980, very little use was made of such credit.

The family has the following objectives:

1) Maximize returns to family labor from all sources;

2) Maximize use of the private plot land;

3) Maintain the position of official ejidatario in the collective;

4) Maximize protection for the family from economic swings in the collective.

There was a difference of opinion on whether the private plots competed with collective labor needs. The answer depended on how much access to family labor the farmer had. Under most conditions, the afternoon and a few weekends were sufficient for an ejidatario and one family member to complete all the necessary activities on the private plot. However, as of 1980, most of this cacao was newly planted and hence did not require harvest labor. Under the present collective schedule, the private cacao harvest would conflict with both peak collective cacao harvest and peak cane harvest.

Costs of production and organization are very similar to the minifundista family farms. (The corresponding "off-farm activity" in this case is collective farming.) Regardless of family interest in increased chemical input applications, the cash constraint is significant. Farm management will always show a high ratio of labor used relative to cash inputs. The need for cash on private cacao plots adds to the unwillingness of farmers to re-invest profits in the collective plantations. They would rather receive the remanente to invest in cash inputs on their own family plantation.

Basic Strategies of Production on Collective Cacao Farms

Decision-making for the collective ejidos of the Chontalpa requires monumental trade-offs to work out economically and politically. There are five basic objectives:

1) Meet production goals for politically determined products;

2) Maximize land utilization on the collectives;

3) Pay back initial debt of the ejidos;

4) Maximize returns to the ejidatarios;

5) Maximize employment for ejidatario families.

These criteria rarely point to the same pattern of resource allocation; hence there is continual institutional conflict between the body of ejidatarios, their directives, the Union of Ejidos, the Chontalpa Promotora, the Banco de Credit Rural and the national SARH, over which activities will be promoted and how resources are to be distributed between wages, profits, investments, production costs, and social services.

Politics in Production Goals

As the history of the Chontalpa Plan land use (earlier in this chapter) shows, there has been continuous change in product focus. Decision-making about investments and land use has been almost completely bureaucratic, largely out of Mexico City. The huge investment made in the Plan Chontalpa could only be justified politically if the collective farms made a major impact on national agricultural shortages. Thus the initial agricultural emphasis changed first to livestock and now is re-orienting itself to stress basic foods production, despite earlier failures.

Cacao is the only major exception to this. Along with melon, cacao is not a national priority, nor are there shortages. Its production has been encouraged due to its profitability, foreign exchange revenues, and farmer tradition. But the ejido must continue to be responsive to national needs, at least until most of the debt is paid off.

Optimizing Land Use on the Collectives

Again, the enormous cost of the project and its supervision by national leadership put pressure on the collective ejidos to intensify land use and maximize production as much as possible. The collective nature of the experiment, and the fact that most of its chief political backers are fond of collectivization, means that these pressures tend to sacrifice private plot production for collective production when there is a trade-off to be made. And because production goals are more visible and compelling than financial goals, there is a tendency for official tecnicos and directors to push for high production levels at the expense of profits. Due to increased ejidatario participation in the past several years, however, this problem is diminishing.

Paying Back the Initial Debt

Government and banking representatives have played an important role in organization and production decisions over the years. The Chontalpa ejidatarios are limited in their independent decision-making because of the large federal debt which they owe for ejidal development - land clearing, drainage, other infrastructure, cattle development.

Cane profits and part of recent cacao profits have generally been directed to repaying past debt. Most cacao profits have gone to internal financing of cacao expansion. Earlier losses from the basic grains projects were absorbed by cacao and cane operations.

Many of the basic development loans have been forgiven the edjiatarios as being well beyond their financial abilities. But the ejidos have come quite a way toward paying off their cattle debt. If this can continue several more years, the credit crunch so severe in the early 1970's should ease. It will be interesting to see whether the national banking institutions will indeed permit the ejidos to become financially independent, as this will significantly reduce outside influence on ejidal production and investment decision-making.

Maximizing Returns to the Ejidatarios

Ejidatarios have sometimes complained that they do not feel like owners or farmers anymore; that effective decision-making has been wrested from them by the many institutions involved in the Chontalpa Project, and yet they are saddled with debt and most of the risk. There is some basis for this in fact, and the resulting "worker" mentality of the ejidatarios is in large part justified. This attitude definitely hurts productivity and the long-run capitalization of the project.

Ejidatarios with rights expect a return comparable at least to that which they would have as an ejidatario with rights on an individual plot ejido. On other case-study farms (with only one exception) such returns are certainly higher than $92 per day. Indeed, they

ranged from $90 to $332 per day. Demands for remanentes are thus not unreasonable, particularly when we consider that the per capita land base for a Chontalpa ejidatario is much larger than his neighbors'. With the remanentes, the average income per day worked in cacao by an ejidatario with rights comes to $200. Ejidatarios are unwilling to sacrifice these profits to investment, whose returns may go to others, or which could be absconded by a dishonest leader.

Maximizing Ejidal Employment

As we have seen, there is presently no employment problem for the ejidatarios with rights, who have first priority on jobs. But they are now far outnumbered by their offspring, whose access to work is less certain. On C-29, a large number of them can be employed almost year-round, but the wage is so much lower than the going wage in the surrounding area, that to achieve a comparable income, they need to work many more man-days.

But this ejido has certainly fulfilled the goal of producing jobs. Using 1980 project figures - which do not include labor used on private plots, nor employment of resident non-ejidatarios in Union industries - the number of man-equivalents per hectare for the entire 5000 hectares was 12.2. If we estimate that indicator based on land in use (subtracting 1300 hectares of acahual), the figure drops to 9.0 meq/ha; and subtracting all land not in commercial production (a total of 3320 hectares), it drops to 8.1. Considering the importance of cattle activities, this is a very commendable rate of labor intensity, though not as high as the minifundia cacao farms just outside the project limits, which of course have lower capitalization and lower incomes.

The ejido has been transformed into a large-scale employer, quite incongruent with the standards for individual-based ejidos, which are based on the concept "land to him who works it." There has been an attempt in the case of ejidatarios without rights and some favored libres to confer secure employment and extra benefits, to avoid the exploitation associated with capitalist employment, but the line between ejidatario and non-ejidatario is blurring, to the dissatisfaction of those with nominal rights. The collective ejidos of the Chontalpa already operate essentially on the basis of corporate capitalism in their dealings with the rest of the economy, and the importance of non-ejidal workers is in direct contradiction to the precepts of ejidal development.

This is a critical issue, because labor is the principal constraint to increased production on C-29. Resolution of the labor constraint can only come from further incorporation of non-ejidatarios. If the Chontalpa ejidos are intended to be government projects to maximize economic and social benefits for the agricultural population, their employment policies will be different than if they are expected to maximize incomes to ejidatarios with land rights on the ejidos.

Increasing Productivity

Experiments now with new cacao technology are intended to reduce some of the above frictions by increasing productivity. A major new item is the cross between Guayaquil and Criollo to yield a variety which begins to produce at two years, and has experimental yields of 5 kilos per hectare at 4-5 years. The Union has talked of aerial spraying for cacao, similar to that frequently used in Tabasco for large banana plantations, but such a technology requires compact squares of 100 hectares of trees to be profitable, and presently, most Chontalpa cacao is quite dispersed.

There is substantial interest in expanding cattle production because a relatively small increase in employment could yield significantly higher profits. But it is limited now by a shortage of feed, especially in the dry season when ~~the~~ ejido must sell animals for this reason. The ejido plans to increase the area in improved pastures (African Stargrass, Aleman, Elephant Grass) from 380 to 880 hectares. There is a little supplemental feeding of animals with grains and cane by-products. Earlier experimentation with silage failed. The technical constraints for increasing the feed base are significant.

The collectives certainly have some potential advantages for implementing new technologies to improve productivity. But the organizational and employment problems must be dealt with first. The technology available is already far superior to that which is in use; indeed family farm cacao technology is better than that used on the collectives.

Response of Collective Cacao Farmers to Change

The economic and social patterns of the Chontalpa ejidos have changed drastically in the past decade. Mid-decade studies indicated little improvement in real living standards among collective ejidatarios. But there is certainly much greater prosperity today than there was then, and greater contentment.

Price Response

Collective farmer response to changes in prices and wages, and the general reaction to the petroleum boom, were far different from those of other groups. Because of the capitalistic nature of the cooperative enterprise, the ejidatarios were extremely responsive to changes in product prices - once basic production requirements set by SARH or Mexico City had been met. If cacao prices continue to rise there will be a greater shift in resources to cacao production maintaining minimum levels of cane production. As it is, all land capable of transformation to cacao is now being planted.

If prices decline, however, the ejido will be under tremendous pressure to improve cacao productivity, which may not be possible without a several year period of declining profit distribution in

favor of investment. Whether this is possible without coercion during a time of declining total incomes is debatable. There may be a strong temptation to transfer resources instead to cattle-raising and pasture care, particularly if labor scarcity continues. Since the ejidatarios do little work off the collective now, they would not be much affected by the decline in general cacao labor demand which would occur if prices decline.

Immediate investment plans indicate a balanced interest in diversification. Cacao area is to increase by about 400 hectares. But much unused land will be cleared for pasture; land along the drains (whose use was formerly restricted) will be used for subsistence maize production, and the ejido will increase its investments in cooperative agro-industry within the Union of Ejidos. Between 1981 and 1984, Ejido C-29 plans to add a hog operation.

Response to Change in Off-Ejido Wages

With the large increase in cacao area, livestock enterprises, and subsistence production, there will be a sharply increased demand for labor on the ejido by 1984-85. The ejido hopes to mechanize more, particularly in cacao spraying and fertilization. But the demand for non-ejidatario labor will certainly continue to rise. The collectives as a whole promise to be among the principal employers in the region.

As such, they will be very sensitive to the going wage rate for agricultural and non-agricultural labor. And since it is unlikely that ejidatarios would ever submit to being paid less for a jornal than hired non-ejidal companions, any increases in the general wage will inflate labor payments to ejidatarios as well.

The increased demand from the collectives will itself push wages higher; if this combines with significant employment by PEMEX drilling on ejidal land, the ejidal budget could be sorely beset by labor costs - in a manner somewhat similar to the hired-labor-based producers today. There would likely be very strong pressure to reduce sugar cane production; more intensive cacao technologies are unlikely to be successfully introduced in such a scenario.

The ejido's response to declining wages would also be similar to that of hired-labor-based producers - at least so long as hired non-ejidatario labor is important in breaking production bottlenecks. If wages went quite low, of course, ejidatarios without rights would probably demand greater employment on the ejidos, which would partially displace hired non-ejidal workers.

Impact of Petroleum Boom on Collective Farmers

As of 1981, there were 15 oil wells situated on C-29 land; some 70 others were planned for some time in the future, probably not immediately. On each of these, the ejido loses the use of three to four hectares around the well; land cleared for road-building (even

some cacao has been cut) and some land from clogged drains. Land tenure is secure, but indemnification payments - like those to all ejidatarios - cover only land improvements, not land value lost to them.

Despite PEMEX employment of ejidatarios' sons, the self-contained internal economies of the collectives have been sheltered from the petroleum boom's effects. Only the cost of living impact has been marked, since nearly all commercial activity relating to ejidatarios takes place in Cunduacan and Cardenas, two of the most expensive places in Tabasco due to oil activities. It is not clear why there is not more resident commerce in the poblados; nor why farmers without cacao on their private plots do not supply more fruits, vegetables, root crops, or other products for sale within the collectives.

Role of Collectives in Agricultural Development

Agricultural production on the Chontalpa collectives is one of the few economic variables in the State over which the government has some control. Success in this project is desirable for several reasons: its controversial politics, its potential role in resolving local agricultural shortages, its importance as a symbol of government competence, its role as example for tropical agricultural development.

Several conclusions seem clear from the study of C-29, regarding guidelines for tropical project development, the distribution of activities between private and collective jurisdiction, and the role of the collective in the labor market.

1) As has been often stated of tropical projects in Mexico - but cannot be stated too often - it is of fundamental importance to understand the environmental characteristics and constraints of the land before undertaking expensive, semi-permanent infrastructure investments. Some land use changes in the Chontalpa were due to political priorities; too many were due to inadequacies of soil and water control. Production still suffers from the early decisions taken from mistaken agronomic information. Precipitate action like the destruction of so many cacao plantations which represented years of investment is extremely unwise, particularly in a new project.

2) There are many activities which can be undertaken by collectives more efficiently, productively and equitably than by individual farmers. Large-scale infrastructure management and investment, input purchases, product processing, organization of schools, bus lines and other local services are examples.

However, basic agricultural activities and decision-making are much better left to the farmer. It is the essence of farming to make decisions on details. Success in farming, more than in most other productive activities, is dependent on constant care, day-to-day flexibility, and sophisticated management of micro-environments.

Decentralized decision-making is essential to success, and any comparison of the successful smallholder cacao farmer with his collective counterpart - who has far more resources, but less production - bears this out. Recent organizational changes in C-29 making individual ejidatarios responsible for specific cacao plots is certainly no betrayal of the community-based production system - rather a strengthening of it.

3) The role of the collectives in the Tabascan labor market has been ignored, largely because of ideological discomfort with the hiring of non-ejidatarios on the collectives. Ejidatarios on individually organized ejidos are not allowed to hire workers full-time, yet the collective has been forced to do so, and will continue to expand such employment. This may require a complete re-thinking of the use of hired labor on all ejidos.

There are political problems which will need to be resolved about the status of these workers, their rights and rewards. But the solution certainly does not lie in restricting such employment; the positive benefits for landless workers in the state and for the general economy are overwhelming. It is also desirable to increase agricultural production on the collectives, without holding back due to labor constraints. That would be a tragic waste of opportunity given the long-term national and regional thirst for jobs and agricultural production.

CHAPTER 9. FARMWORKERS IN THE CACAO ECONOMY AND LANDLESS EMPLOYMENT

The composition of the labor force in Tabasco cacao production is undergoing fundamental changes as a result of both the petroleum boom and long-term trends within the cacao sector itself.

Participation of the landless in cacao production is surprisingly limited, underscoring the fact that Tabasco's heartland remains predominantly smallholder with proletarianization as yet not far advanced. This also suggests that landless workers are seeking employment elsewhere.

But on-going changes have important implications for state employment, in particular, the exchange of workers between the cacao and non-farm economic sectors. The cacao-growing families form a huge potential reserve of new workers for the general economy, yet under certain circumstances are also a potential sponge for absorbing excess workers.

This chapter briefly discusses the role in state cacao employment of farm family members from different types of households, then analyzes the state-wide supply and demand for landless agricultural workers as they relate to the cacao sector.

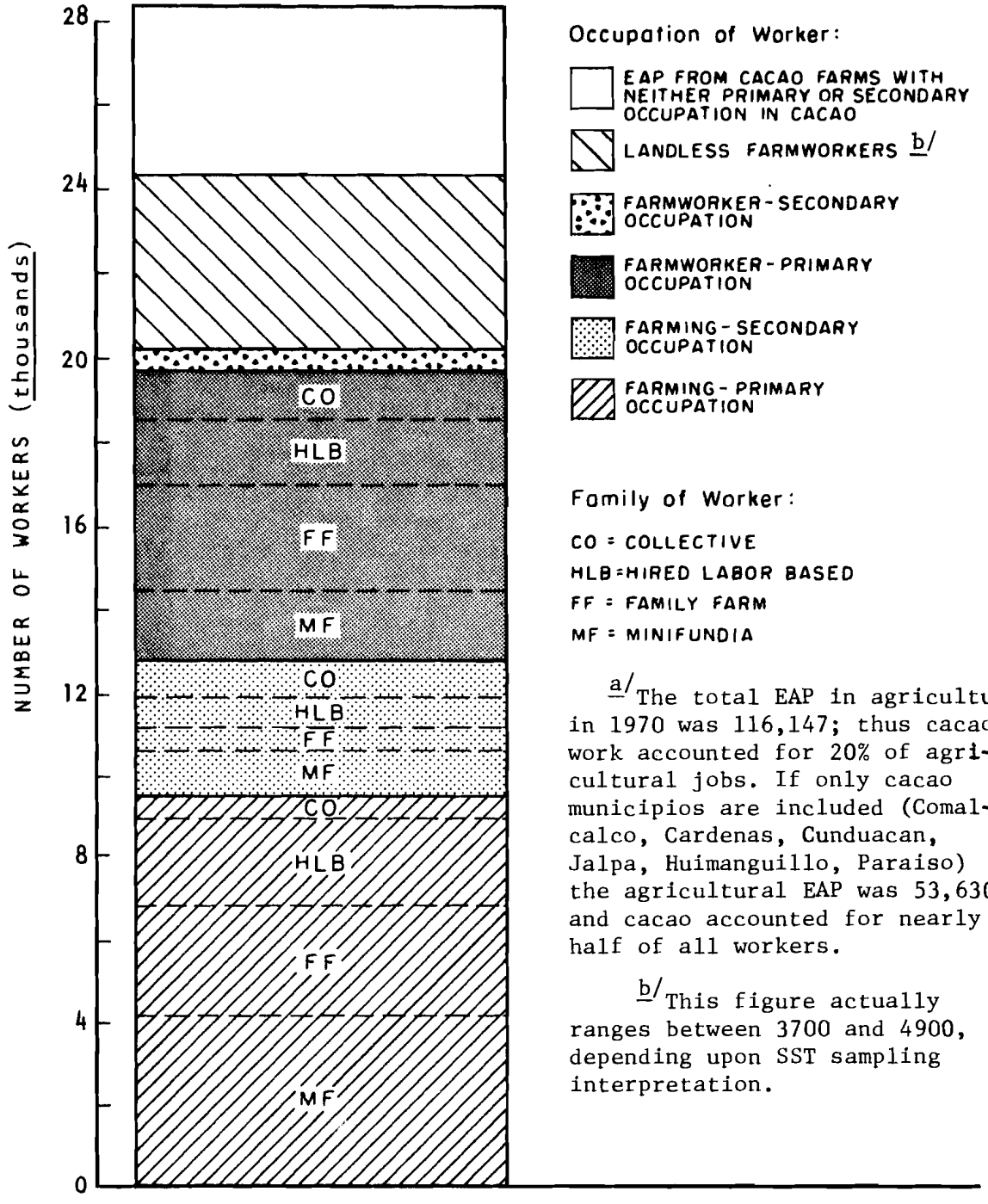
The Composition of the Cacao Labor Force

Chart 34 illustrates the total number of workers in the cacao labor force in 1979/80 estimated from the SST. Including secondary occupations, it numbers about 25,000 workers - some 16-20 per cent of the state's EAP in agriculture; and 35-45 per cent of the EAP in the six principal cacao-growing counties. Of this total, about 52 per cent were farmers (as either the primary or secondary occupation); 29 per cent were farm family members (working either on their family's or others' farms); and only a fifth (perhaps more, if our figures are underestimated, as suspected) are workers from landless families.

Of the labor force from farm families, 39 per cent came from minifundia, 32 per cent from family farms, 19 per cent from hired-labor-based farms and 10 per cent from collectives. Note particularly that though the estimated 12,649 farms (including collective private plots) had under 23,000 active workers, the potential EAP from these families was 64,886. Even if children 8-14 are excluded, there is obviously considerable labor available over-all that could be tapped should labor returns warrant their employment.

Furthermore, a fourth of cacao farms have no worker whose primary occupation is in cacao farming. A quarter of the actual EAP on cacao farms work outside agriculture as their primary occupation, usually in skilled trades or in commerce and services.

CHART 34. THE CACAO LABOR FORCE IN TABASCO, 1979/80* [a/]



[a/] The total EAP in agriculture in 1970 was 116,147; thus cacao work accounted for 20% of agricultural jobs. If only cacao municipios are included (Comalcalco, Cardenas, Cunduacan, Jalpa, Huimanguillo, Paraiso) the agricultural EAP was 53,630, and cacao accounted for nearly half of all workers.

[b/] This figure actually ranges between 3700 and 4900, depending upon SST sampling interpretation.

*COPRODET and CONAPO, Encuesta Sociodemografica del Estado de Tabasco, Villahermosa, Tabasco, January 1980; extrapolations from Cacao Sub-Sample.

These statistics clearly support our earlier impression that the family work force available for cacao production is extremely flexible. If half of each of these categories of individuals were to dedicate themselves to cacao farming, an additional 24,000 workers could be added to the available labor force - or almost two per farm in the state. This is obviously equivalent to well over ten per cent of the entire labor force in agriculture in Tabasco - enough to make a major impact on wages and the tightness of the agricultural labor market.

Characteristics of Cacao Farm Workers

The SST provides a profile of cacao farmworkers, summarized in Chart 35. Cacao workers tended to be from larger than average families, with more members of working age. They were more likely to come from hired-labor-based and family farm households, and less likely to be from minifundista families than was the typical worker.

Nearly a third were heads of households - but these came almost entirely from collective and non-farm households. The rest were children of household heads and, as would be expected, are young. About half of all cacao farmworkers were under twenty years of age.

But there was a big difference in age distribution by household type, with nearly three quarters of those from minifundia families under twenty; about sixty per cent from family and hired-labor-based farms, contrasting with only 23 per cent on collective farms and 19 per cent in non-farm families. Only 2.6 per cent of cacao workers were also cacao farm owners in 1979.

The large number of workers from family farms and HLB families who were aged 21-30 is due to sons' seeking independence prior to receiving their share in land, as explained in Chapters 5 and 6. They worked off-farm even when their efforts would have been highly productive on the farm.

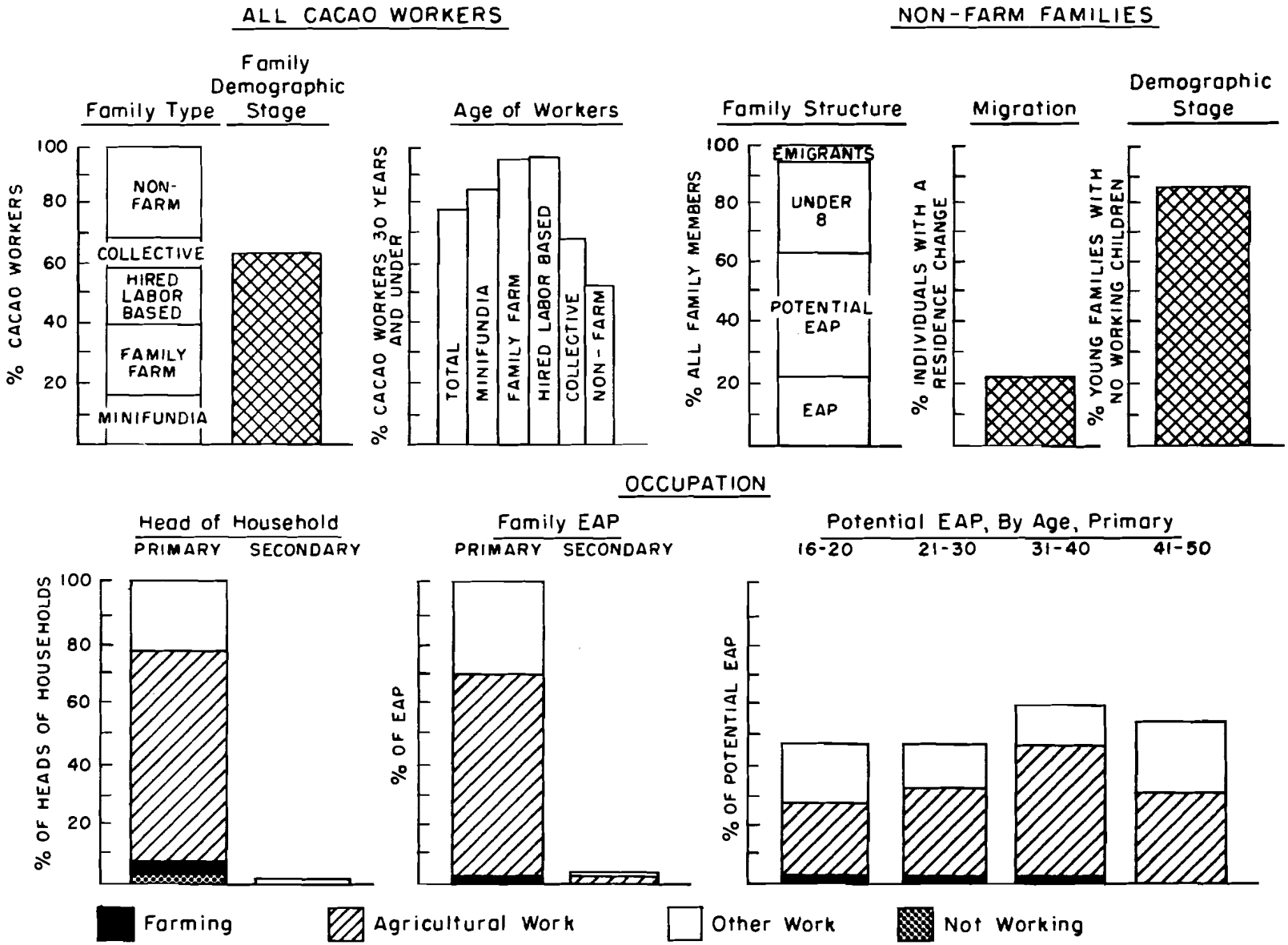
Changes in Employment for Agricultural Workers

There are four factors which have combined to change the employment patterns of landless rural workers in the past decade: increasing numbers and proportion of landless workers in the working population; tightening of the land market; increasing prices for local agricultural products; and the great labor demand of the petroleum boom.

The "Supply" of Landless Labor in Tabasco

The EAP in Tabasco in agriculture grew from around 100,000 in 1960 to 116,000 in 1970. The number of farmers alone grew by 10,000, accounting for most of the increase. During this period, most of the remaining frontier areas of the state were settled and the large family cacao holdings were first broken up to accommodate children who had no possibilities of settling on new lands.

CHART 35. DEMOGRAPHIC AND EMPLOYMENT CHARACTERISTICS OF NON-FARM HOUSEHOLDS



Ejidalization did not begin in force in Tabasco until the 1950's, and during the 1960's there were still many ejidal extensions being made. In the 1970's, by contrast, little land was distributed, despite the large extensions of privately-owned land in the southern and eastern parts of the state which could be so utilized. The petroleum boom reduced the urgency behind such action, by diverting landless workers to urban-type activities.

The 1970's again saw an increase in the number of farmers, but this was largely a result of minifundization, and thus there was a simultaneous large increase in the number of workers. For the first time in Tabasco, there existed a large group of landless workers who were not part of a landowner's immediate family, waiting to become landowners themselves through inheritance or eventual purchase of unimproved land.

Tabasco is making the transition from a state dominated by smallholder farms to one dominated by the landless. In 1960 and 1970, workers and unpaid family workers accounted for half of all agricultural EAP. But whereas in 1960, farmers accounted for 34 per cent of all state workers, and in 1970 for 30 per cent of all state workers, in 1980, farmers accounted for closer to a quarter of the working population. The average farm size in the agricultural zone of the state had grown considerably smaller.

These same processes led to tremendous upward pressure on land prices, exacerbated by high agricultural product prices and PEMEX activity which led to speculation, greater urban demands for land, and general price inflation. A fundamental change in possibilities for the landless has taken place. Whereas in 1975 a hectare of unimproved land may have cost $15,000 in the petroleum/cacao areas, in 1980 it cost $80,000. Cacao land which formerly cost $25,000 per hectare cost up to $300,000.

This price increase has effectively destroyed access to land for agricultural jornaleros, who in earlier times could often look forward to purchasing their own land after years of hard work. This was one of the principal reasons for minimal class conflicts within the cacao sector. Land acquisition is now possible only for individuals who find non-agricultural types of high-paying work, for example in petroleum or skilled trades.

Trends in the "Demand" for Landless Labor in Tabasco

But economic conditions in the past decade have brought some compensation to the landless. The large increase in labor demand induced by the agricultural boom, state infrastructure development and the petroleum boom increased labor scarcity. As a result, the proportion of agricultural product price which goes to labor appears to have increased.

The agricultural minimum wage for Tabasco did not accurately reflect the market situation in cacao. The minimum wage was generally

paid for a five-hour day, whereas a full day would cost closer to $150 in 1980. By contrast, the wage in ranching was much lower, with ranchers paying only $50-60 in 1979 for a five-hour day. The ratio between cacao farm wage and cacao price changed from $20/day:$30/kilo in 1970 to $40:$65 in 1975 and $150:$50 in 1980.

Also, the ratio between the agricultural minimum wage and wages for relatively highly-skilled jobs (Level VI) narrowed from only .43 in 1970 to .47 in 1975 and .56 in 1980.

The effect of PEMEX activity was important, but should not be over-estimated. At its peak, over 50,000 workers were employed on PEMEX projects, but the majority of these were from out of state. After a period of a couple years, most were gone and with them much of the urban bloat of Cardenas and Villahermosa. There was not much permanent migration to the state which would compete with local workers. Many of those who did migrate had specialized skills which - had Tabascans been trained for them - would have been superfluous at the end of the "boom." Thus the influx did not have a depressing effect on local wages; newcomers took newly-created jobs.

The thousands of Tabascans who did participate helped increase labor scarcity within agriculture and were responsible for significant money transfers to rural areas. Most workers were involved only intermittently. This was in part due to the restrictiveness of the STPRM (the petroleum workers' union) which cost a small fortune to join. Most Tabascan workers were limited to "transitorio" positions with contracts of only weeks or months at a time.

Standard of Living of Landless Workers

A landless worker who was fully employed, working 250-280 days per year at $120 per day, earned $30,000-34,000 yearly in 1980. This income was considerably below that of all cacao farmers surveyed, as seen in Chart 25 in Chapter 4. Even adjusting for two full-time workers in the family, income barely reached that of the minifundistas. This resulted in a fairly precarious economic situation because of the rapid inflation in consumer goods prices, especially food. The value-added tax begun in the 1970's further decreased the buying power of the landless. Many landless families rent small maize plots, but rent for these has also gone up. The abundant fishing and hunting which was an important income supplement not long ago, has disappeared in all but a few areas of the cacao heartland.

There have been offsetting factors, however. Most important is the abundance of non-farm income supplements available, particularly related to construction. Also, about twenty per cent of women in landless households earned some income via formal jobs, trading, or provision of food, sewing, cleaning or laundry services.

Most children of the landless in the cacao areas now finish primary school. Though this still entails great sacrifice to the family, the result is a major shift in employment potential. Another

sign of improved welfare is the reduction in female wage labor on the cacao plantations.

The increase in urban occupations and especially in work for PEMEX constructoras has led to life-style changes. Many construction workers are gone during the week and return on weekends. Where travels range farther, money is usually sent to the family at intervals. But there is a distressing incidence of family abandonment as well.

The daily schedules of jornaleros, factory workers and Villahermosa construction workers differ considerably. The jornalero wakes at 4:30 like the others, works from 6:00-9:00 and 9:30-11:00, lunches at noon, and then rests, visits or does household chores until supper at 7:00. The factory worker rises at the same time, but must spend more time traveling. He works from 7:00-12:00 and 12:30-3:00, taking lunch at noon, and supper after getting home at 4:00. When working overtime, he may not get home until 6:00-7:00 in the evening. The Villahermosa worker labors 7:00-9:00, 9:30-12:00 and 12:30-3:00, eating his big meal at 5:00 after getting home.

The physical demands of PEMEX-related jobs are often greater than the average day in field work, and because of longer hours, are more exhausting. Such jobs are also associated with the greater risks described in Chapter 2, such as explosions and chemical burns. Workers weigh these factors, and also lost transportation time, against the higher wages, overtime pay, occasional social security benefits and greater status of petroleum work, in choosing between such work and agricultural jobs.

Worker Organization

By far the vast majority of landless workers are unorganized; they seek work and arrange working conditions individually. There has been, however, a surge in unionization and worker organization in the past decade.

The League of Agrarian Communities, an off-shoot of the CNC, has been organizing workers, ejidatarios and employees to demand better wages and provision of benefits such as social security. Some ranchers and large cacao farmers do participate in such programs, but they are a minority. The focus of the new League program is on non-farm occupations filled by campesinos. They want to strengthen their bargaining position to prevent transitorios being dismissed at the employers' will, and to lengthen their contracts to permit payment of legal benefits.

All workers in civil construction belong to the CTM or CROC unions. Even when hired as libres they become union members automatically. Only the PEMEX union requiresworkers to be members first. The constructoras do not have to use only union personnel. In Cunduacan in May 1980, of the 5000 "de planta" union members, 70 per cent were from the municipio and the rest from out of state.

Finding Work

The process of finding work is itself quite time-consuming. For agricultural activities, workers often group together and go from farm to farm seeking work. In other communities, the farmer visits the neighboring ejido's main square announcing he has work and offering jobs. Where an individual has the custom of working with a particular patron, the two devise a system for communicating when work is available or required. Sometimes if the worker's family is in difficult economic straits, the patron may offer extra work. In general though, the practice of significant non-wage benefits or gifts for workers from long-time patrons is disappearing.

To find PEMEX or constructora work, workers listen for radio ads, for public and printed announcements, and visit the potential places of employment regularly to see if jobs are being filled. Very frequently, personal connections are required in order to be granted one of these jobs. Sometimes the job search involves repeated visits to Villahermosa or Cardenas.

STPRM operates offices in Cunduacan, Villahermosa and elsewhere. In Cunduacan, it provided ten drilling teams of thirty people each, plus about 450-500 other workers in May 1980. About 100 libres were also hired, for hauling chemical materials. They received minimum wage for that category of work, and were employed through contratistas. Half the union members there were employed de planta; the rest were transitorios who were hired by the well or for 90 days.

The chief of personnel in Cunduacan believed that at most ten per cent of the petroleum work force was from Tabasco - perhaps as much as twenty per cent of transitorios.

About a fifth of the people working for PEMEX in 1980 were also working in 1970. Most of the rest were people whose relatives were former PEMEX workers in Veracruz. 1979/80 saw a big increase in new members from Tabasco.

For other types of jobs, specialized individuals arrange employment. The "enganchador" charges the hiring company payment for each qualified worker he brings in. This system is also used in cane-cutting and some other agricultural activities.

The "contratista" arranges with the company to do a particular job, then is himself "patron" to the workers he hires, called "destajistas." There is no direct contact between company and workers.

Landless Family Strategies

The landless guarantee their subsistence and family well-being through multiple employment. The head of household has several sources of income and/or his wife and children, including schoolchildren, participate in economic activities. They rarely have savings accounts, their only economic back-up being the common raising of small

livestock for sale when needed. They usually live on other people's land, except for a few who own their own solares.

The frequency of dual occupations (so commonly found in the regional survey) was often not picked up in the SST, because the survey's definition of an occupation was restricted to activities which took place at least thirty days in the year. In addition, application of the question on secondary occupation was erratic in early interviews.

The non-farm families in the SST had nearly twice as high a frequency of two economically active members as did the over-all average. But there were fewer families with five or more active members (38 versus 51 per cent on average).

The dependency ratio tended to be much higher than for the average cacao farm family. This was because the predominant demographic stages were the young married and school-age child stages. In general, the population was younger, as evidenced by the age distribution of household heads. Nearly three quarters were under 40, versus about a third on average.

For the landless population as a whole, cacao work and agricultural work in general has been declining in importance. This was particularly so for younger family members, whereas heads of households and workers over 30 tended to be involved in agriculture.

The SST showed that of the actual EAP in non-farm families, three quarters worked for a patron and ten per cent for the family. But only 57 per cent were jornaleros and 12 per cent were themselves employers. Less than three per cent worked for PEMEX or a constructora. Although seventy per cent did work in agriculture in 1979, large proportions worked in skilled, unskilled and commercial sectors (15.5, 4.7 and 9.3 per cent, respectively).

Of those who formerly worked in cacao plantations but did so no longer, a fifth were no longer working at all. Of the rest, only 18 per cent still worked in agriculture; over half were in skilled trades (see charts in Chapter 4).

A career in a skilled trade is by far the most lucrative and stable of all the possibilities open to the landless worker. But the apprentice system is generally used and the master must be paid for the apprentices' training time. The financial resources and time required to develop these skills put the landless at a distinct disadvantage in comparison with the offspring of farmers.

Families seek work over a wide geographical area, if sufficient work is not found locally. This includes travel to far parts of Mexico and the U.S., although the latter was more common among older individuals. Migration statistics for the non-farm families showed very high levels of migration for the age group 16-40, and very low levels for those 51-80, substantiating the reported tendency of the young to migrate (often with their families) in search of better employment.

Employment opportunities for the landless were certainly available in the booming economy of Tabasco. But this did not negate the extreme precariousness of much of the employment and the vulnerability to slight swings in economic growth, particularly of the construction industry, and changes in agricultural price levels. The lack of organization and minimal job protection meant that much of the burden of economic dislocation was borne by this group.[1]

Role of the Landless in Tabasco State Development

Tabasco has enjoyed several decades of relative economic prosperity and political calm, largely because it was a zone of smallholders with ample land at their disposal and periodically reasonable crop prices. The Tabascan landscape is fundamentally changing now, in part due to demographic and geographic reasons, in part due to the changing economic structure toward petroleum activities.

Once the boom is over here - which should begin in the mid-1980's - labor demand from the petroleum sector is likely to shrink markedly. The effect which this will have on the landless population is not as negative as it might seem, because much of the labor force was imported. But the reduced construction which will occur, if the State Development Plan to strengthen other economic sectors does not take place, will have more serious consequences for the landless. These will be more or less severe depending upon demand for labor from the agricultural sector.

As Tabasco's economy acquires a more diversified structure, serious retraining programs for agricultural laborers must be established in the skills required for tourism, for agricultural infrastructure maintenance, for housing construction, for commercial activities and in the professions. The state university was over-extended in 1980 and suffered both from a shortage of teaching personnel and from students ill-prepared in secondary school. Tabasco has succeeded in greatly increasing its number of students; it must now attract higher quality teachers who will provide them with acceptable educational standards.

The state has several skilled-trade training centers, but they are still largely showpieces and do not produce enough trained people to make much of a dent. Subsidization of this type of training is essential, particularly to place landless young people in a competitive position with those from the farms.

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[1] An excellent discussion of the nature of landless work opportunities can be found in the essays of CASUAL WORK AND POVERTY IN THIRD WORLD CITIES, edited by Bromely and Grey. Although oriented to urban situations, these are highly applicable to employment in regions like Tabasco, where due to good transportation systems and geographic proximity, rural people form a large part of the work force for urban activities.

Meanwhile, the potential for land reform in Tabasco is not exhausted. New lands should be settled by the truly landless, children of ejidatarios and minifundistas. Policies to counter minifundization - which is a less effective and productive system for increasing the labor intensity of land than is intensification on family-farm-size holdings - should be promoted.

Regulation regarding urban development should be loosened to promote a freer atmosphere for the casual and part-time economic employment which is so critical to the landless. Government contracting should consider the possibility of providing certain types of urban services through small-scale local providers, rather than large-scale national companies which tend to be far more capital-intensive.

Landlessness is on the rise in Tabasco for the foreseeable future. Economic policy must take this into account, even though in many instances it will mean reduced political consideration for the farm-owning and ejidal sectors. Tabasco should aim to transform as many individuals as possible from the category of "landless rural laborer" to "skilled worker" in rural and urban areas. Due to the petroleum boom, this is starting to occur; the policy challenge is to see that the trend continues beyond the boom period.

CHAPTER 10. RESOLVING THE AGRICULTURE-PETROLEUM CONFLICT: LESSONS FROM TABASCO

The experience of Tabasco in the 1970's shows that the agriculture-petroleum conflict is not inevitable. Whether the negative effects of a petroleum boom or similar major industrial transition can be mitigated for the agricultural sector depends on a number of economic, political and social factors.

Demography and agricultural prices set the basic constraints on local response. The political strength of farmers determines the level of political activism by government to counter effects of the "boom." Finally, employment conditions and the basic structure of agriculture determine how well the agricultural economy will tolerate major economic disruption. Resilience in large part will depend on a strong smallholder or campesino sector.

Basic Development Constraints: Demography and Prices

Demographic conditions and agricultural prices critically influence the outcome of petroleum-agriculture interactions, though they are usually out of the control of policy makers.

Demographic Conditions

That the principal petroleum zone in Tabasco happened to coincide with the area of greatest population density in the state was a distinct disadvantage. Nevertheless, this kept the disruption of rural-urban migration to a minimum. Settlement patterns were such as to encourage continued residence on the farm rather than permanent residence change to the large towns.

Low traditional female participation in the Tabascan work force was a constraint on agricultural production where males chose to work in petroleum. But the principal age group of farm-related workers who did turn to petroleum was quite young, and the demographic cycle was such in this area that their absence was far less disruptive than would have been the case had chiefly older heads of household sought petroleum work.

In general, low population density areas (relative to agricultural resources) will be in a more favorable position and adjust to petroleum-related problems more easily. Should large amounts of undeveloped land be available, these could be reserved for use by affected farmers, rather than speculators.

The rate of labor participation - working age, female participation, the demographic cycle as it relates to working life and local culture - affects the kinds of changes that a petroleum economy introduces. Areas with high traditional female participation on the farm,

for example, may prove more adaptive than zones where loss of the male head of household to petroleum employment leaves behind no one trained to run the farm.

Rates of immigration have a profound effect on petroleum-agriculture conflict, by exacerbating problems with inflation, wage rates, housing and other basic goods' scarcity, if poorly managed. If a government can restrict immigration to those with obviously needed and scarce skills, more individuals from the local agricultural population will be employed in petroleum work.

Settlement patterns of immigrants and their access to adequate social infrastructure will also affect the levels of social conflict between natives and immigrants. Settlement patterns of natives in the region of petroleum development is a crucial factor as well. Employment patterns will differ substantially between a zone located far from urban areas and one where farming communities are close by. Internal migration rates and flow patterns will affect the viability of an agriculture in transition.

Agricultural Prices

The greatest single boon to the Tabascan farm sector in the latter 1970's was the highly favorable price situation for major farm products, particularly cacao, cattle and coconut. The exception proving the rule was the dismal return to maize farming. The maize sector, in fact, conformed to the classically described negative farm response to a petroleum boom.

In order to assure continued agricultural production in a petroleum economy, product prices must cover the costs of at least enough production to support the farm family, even after a decline in (presumably now more expensive) input use. This level will depend on farm budget structures and sensitivities to items whose price and availability are affected by the boom. It will probably not be the same for all producers of a particular commodity.

High commodity prices encourage production not only for the obvious reasons of increased returns to family labor and resources, but also for their psychological impact on farmers. With high prices, farmers are likely to continue farm investment despite the boom, whereas low prices may hasten the disinvestment process.

Any price interventions should be designed to stabilize production for those farm groups whose stability most affects employment and welfare conditions in the area.

All the above suggest the difficulty of a positive petroleum-agriculture interaction in zones dominated by low-priced basic grains and subsistence production.

Political Support for Farmers

One of the factors which most encourages resolution of agriculture-petroleum conflicts is - perhaps obviously - a relatively strong political bargaining position for agriculture.

In the case of Tabasco, a combination of strong producer organization for both political and economic goals, the simultaneity of interests of powerful largeholder cacaoteros with campesino interests, the importance of cacao to Tabasco, and national public sympathy for the threatened farmers combined to give the cacaoteros unusual political strength. The cacaoteros, who had long helped control the Tabascan state government, played a dominant role in designing state and federal government programs to stimulate the cacao economy and promote production advances.

Such political strength among agriculturalists is not common. Even where there is substantial local leverage, it is difficult to build a coalition sufficiently powerful to take on a giant multinational corporation or state-run monopoly.

Where political will does thus exist, the government can play a crucial role in carrying out general development policies, mitigating the inflationary impact on farmers, and encouraging petroleum company compromise.

Government Intervention

In general, government can play a leading role in managing internal terms of trade, limiting petroleum company prerogatives and providing needed services to the farming communities. Even under circumstances where the structure of agricultural production itself exacerbates the vulnerability of the farm sector, these latter factors can make an enormous difference in terms of the human cost of industrial transition. Such policies are critical in helping the farm sector weather an intense, but temporary "boom" so that agricultural production can resume older patterns successfully when the boom is past.

Governmental intervention in the agriculture-petroleum conflict should have two parts: containing the negative impacts of petroleum development and spreading the benefits of petroleum development as broadly as possible throughout the population.

In Tabasco, the state government contained many negative impacts through its inflation control programs, by supporting farmers in expropriation procedures, attempting to minimize conflicts between PEMEX activities and environmental safety, and strongly supporting agriculture to overcome farmer insecurity.

They spread the benefits chiefly through investment in widespread education and health programs, COPLAMAR, PIDER sites, tourism development in outlying areas of the state and new agricultural projects. They were under no illusions that petroleum activity per se would result in trickle-down of benefits.

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It is important to overcome the tendency to concentrate government infrastructure investments during industrial transition completely in the towns, although this is where shortages appear most obvious. Under dynamic economic conditions, processes of marginalization tend to speed up, hence decisions to postpone investments in marginal areas by even a few years (e.g., to postpone construction of farm-to-market roads in favor of urban highways) can lead to severe economic stagnation in those areas bypassed.

Solid support for community and small town development in the agricultural regions - including housing, sanitary infrastructure, schools - can reduce internal migration and encourage agriculture.

Inflation Controls

Accelerated inflation nearly always accompanies a petroleum boom. It plays havoc with the local economy, particularly those sectors not linked to the leading petroleum economy with its high wages. For farmers, increases in cost of living and production inputs are the leading causes of farm disinvestment and farmer migration to petroleum employment.

In Tabasco, inflationary pressures were by no means controlled, but they were mitigated substantially by, first of all, high farm prices which made farming relatively competitive with petroleum employment, and secondly by direct government action. The proliferation of government-sponsored rural stores, establishment of new transportation centers, opening of medical clinics, assistance to producer coops in acquiring production inputs, retail price controls, and government bus services competing with private companies were some of the methods tested to ease inflationary pressures. Their effectiveness was mixed at best, but in specific zones made a great deal of difference to farm families.

Initial analysis of any developing petroleum area should include farm budget checks for different farm types and different commodities to ascertain the inputs whose use is most sensitive to price increases. Early intervention in the farm economy could include marketing projects to offset price declines, such as cooperatives, special transport facilities, alternative sources of basic commodities. Consumer cooperative organization in farm areas may be necessary both for farm production and family consumption, to keep living costs down and thereby enable farm incomes to satisfy family needs.

Petroleum Company Flexibility

One of the greatest political coups of the Tabascan state government was the inclusion of PEMEX at state planning board meetings and federal guidelines to the organization to cooperate with the state when possible, and particularly to inform them in advance of where and

how new developments would be established. The advantages were not all with the state. By sharing information with COPRODET and the Governor, PEMEX often passed to them responsibility for coordinating public relations.

The willingness of the petroleum companies involved to compromise, consult with and consider the agricultural sector in its land use planning is of critical importance in resolving agriculture-petroleum conflicts. There is a broad range of issues on which the two sectors are by no means incompatible. Some adjustments would increase costs for the company, but would be outweighed in real economic terms by reduced losses and added production of the farming sector (not to mention reduced political conflict and litigation.)

Drainage system protection, pollution control, prior warning of changes and farmland utilization, adequate compensation for expropriated land and damages, mutually compatible road designs and location - these are items on which petroleum companies should reasonably be expected to consider agricultural interests.

Another factor dependent on the companies themselves is petroleum employment policy: transfer of personnel from other petroleum areas versus local hiring; degree of technical skill required versus training availability; use of short-term or long-term labor contracts; educational and other requirements for jobs; unionization, membership rules and job protection; determination of pay levels.

In Tabasco, one of the most destabilizing factors for the landless workers and minifundistas was their inability to get contracts for over three months, intended so the companies need not pay social security. A lot of time was lost waiting for jobs and little forward planning was possible. On the other hand, the mass transfer of personnel from other states for particular jobs in Tabasco means that after the boom many new migrants will leave again, reducing the potential problem of mass unemployment.

Attributes of Local Agriculture

The agricultural system itself determines, to a large extent, the nature of its interaction with the petroleum economy. The pattern of labor requirements for principal farm products will conflict more or less with petroleum labor demand. Labor availability - the composition of the EAP - will either mitigate or exacerbate regional labor disruptions. Finally, the economic characteristics and farm management patterns of principal farmholding groups will determine the viability of farming for those groups in the new petroleum economy.

Employment Conditions

The flexibility of employment conditions in agriculture has an extremely important effect on the potential for compatibility between

agriculture and petroleum. Agricultural labor cycles and seasonality, and the labor sensitivity of different crops are key variables.

Cacao production in Tabasco utilizes labor very abundantly but flexibly. There are few operations for which timeliness is critical, and the high labor use is spread throughout the year. Peaks occur at the height of the rainy season, which is the period when construction activities for PEMEX, the government and nearly everyone else comes to a halt. This permits an influx of multi-sector workers to cacao plantations during the most critical periods.

In general, perennial crops (such as cacao, coconut, oranges) with flexible labor requirements are the most conflict-free. Perennial crops such as avocado and sugar cane, which have definite timing requirements for inputs and extreme labor peaks, are less so. Production of some annual crops may fit easily within the periods of slack petroleum labor demand; others will directly conflict.

A final factor in determining labor demand, which is frequently overlooked, is the sensitivity of farm employment to agricultural product price. Labor requirements for a particular crop are not fixed over time; when prices are high, more labor will be required for more intensive production, and when prices are low, labor use will generally be reduced. Farms with different management objectives and constraints will respond differently to such price changes; but respond they will.

Labor Availability

Labor availability for agricultural production is dependent on a number of factors. The EAP occupied in farming and farm work is itself dependent on cultural characteristics such as the role of women and children, structural characteristics such as land tenure patterns, and demographic characteristics such as the age distribution.

Whether the EAP on farms and in rural areas will choose to work on farms depends on what their alternatives are, and on cultural work preferences. In a petroleum economy, the alternatives may be both financially and personally more rewarding. Regional unemployment levels, and a custom of off-farm employment will also affect these decisions.

Labor in Tabasco - Scarcity or Surplus?

To judge employment conditions, it is critical to look at what is happening endogenously within the agricultural sector, as well as to analyze general employment changes induced by the new petroleum (or other) investment. Failure to do this in the case of Tabasco led to mistaken interpretations of petroleum impact, and premature emphasis on employment-generating investment outside the petroleum sector (e.g., State Plan investments, intensification programs in agriculture.)

Short-term objectives of the State Agricultural Plan included generation of 15,000 permanent new jobs - an increase of over twelve per cent in the agricultural labor force, or three per cent per year (72, p.116). Most technical assistance programs relied on technology requiring heavy infusions of labor inputs. The Chontalpa Plan doubled the number of hours worked during the late 1970's.

For political reasons, this approach was quite understandable. Had the government waited until the construction phase of the petroleum boom was over in order to initiate major state projects, it is possible that federal support would not have been forthcoming to the degree possible during the petroleum boom crisis.

Nonetheless, Tabasco was not experiencing a temporary labor scarcity in the midst of a long-term tendency to labor abundance. Data which are cited to support this position ignore secondary occupations, the role of family labor in production, seasonality, and volatility of employment with agricultural price changes.[1/] In fact, Tabasco has traditionally been a labor-short area. The state experienced significant unemployment mainly in areas newly switched from agriculture to livestock production, and during periods of depressed agricultural prices.

Agriculture would probably not even have been perceived as suffering from a labor scarcity at the peak of the petroleum boom were it not for high prices in labor-intensive crops. These production incentives, combined with government incentives to utilize new, labor-intensive inputs, increased farm demand for labor markedly over the level required in the early 1970's.

Will a collapse of the boom change the countryside from labor-scarce to labor-abundant? Perhaps; the determining variable will be changing conditions within the agricultural sector itself.

Smallholder Flexibility

Had Tabasco been a region dominated by capitalist largeholders on the one hand, and a pool of landless workers on the other, the employment situation would have been vastly simplified - and vastly more devastating to agricultural production. Relative price and wages would have mandated a move out of agricultural investment and employment. They key to the farming sector's continued dynamism was the small-scale producer.

Because of the abundance of smallholders in the cacao sector, most on-farm production activities could be carried out properly by family members, even when scheduled around PEMEX jobs. As a result of this flexibility and the farm management characteristics of campesino

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[1/] An example is Allub and Michel (1980), who estimate agricultural underemployment in 1970 at 45-59 per cent, depending on whether the Agricultural or Population Census figures are used. This is almost certainly an overestimation (1, Chart 7).

farming, there was a much broader range of prices over which the campesinado could continue to produce cacao. Farm employment and rural incomes were significantly stabilized as a result.

Indeed, while high price and labor-intensity in the Tabascan cacao economy find limited duplication elsewhere, this campesino flexibility offers hope of stability during times of economic duress to many other farming areas in Mexico and throughout the world.

Role of the Peasantry in Economic Development

We have come quite a way in our thinking about the peasantry in the past thirty years. Some formerly accepted ideas have been almost completely debunked as the result of careful research: that peasant attitude is the chief reason for backwardness; that traditional peasant institutions usually serve as a brake on economic development; that peasants live in undifferentiated, egalitarian communities; that they do not base decision-making on principles of rationality.

As demonstrated in Tabasco, the peasantry can be a potentially dynamic economic sector within its own constraints. Peasant modes of production can be extremely complex; community social histories quite diverse. Production systems change over time with changing market conditions, changing role of non-agricultural income in family and community income, types of exploitation, intra-household tensions, changing means of production. These systems also change temporally within a single family over the life-cycle.

In addition, smallholders and peasants frequently play an important role in the non-farm sector, through resource transfers and particularly through urban employment, as part of complex job-related migration cycles.

But the position of the campesinado is highly contradictory. Much of its stabilizing effect within the agricultural economy actually stems from poverty and the subordinate position of campesinos within the political and economic structure.

Tabascan family farmers and minifundistas are typical in that they act in part as a reserve labor force, which raises and supports individuals in a low-cost (relative to the broader economy) environment. Their support system acts for the family as nursery, sickroom and retirement home, relieving employers outside the campesino economy from having to meet these costs in the form of higher wages or other protections. To the extent that they produce their own food and other supplies, they reduce market demand for these products, which are frequently in short supply.

Under conditions of economic stress - such as take place during petroleum development - capitalist-based agriculture is put under tremendous strain. This is not experienced in the same way by campesinos, whose decision criteria is not profit maximization and who

have limited flexibility in asset deployment - because the assets themselves are so limited. The campesinado thus has greater potential for production and employment stability, achievable at far less cost than comparable support of the capitalist sector.

Support for Peasant Farming

What would a commitment to foster peasant farming involve? First, policies to support peasant agricultural production, then policies to ensure that increased production does not come at the price of greater exploitation.

It is important to keep in mind that a re-orientation of policy which focuses on the peasantry does not in itself imply improved conditions for the peasantry, if that policy is aimed entirely toward extracting more surplus production, rather than toward community development as well.

During the recent period of high off-farm wages, when petroleum jobs were utilized to accumulate resources for the cacao farms, the relationship between the cacao farm sector and the general economy was not generally exploitative. This is in contrast to earlier periods when off-farm jobs paying wages insufficient to support a family were required to supplement earnings from poorly-paid farm products.

Support to ensure greater peasant prosperity would include not only general policies in favor of agriculture - high relative prices, low cost inputs, improved transportation - but also local level, smaller-scale interventions. These must be location-specific, decentralized and developed via continuous farmer-institution interaction and experimentation.

Direct intervention in the form of technical programs, infrastructure development, marketing organization, and so on may be an important form of support where they result in significant decreases in farm costs, increases in farm returns, or greater availability of scarce inputs. But large-scale programs involving disruption of ongoing economic patterns or significant changes in production systems should be avoided. The principal concern of policy-makers must be to maximize the stability and security of the farming sector, not to introduce still more uncertainty.

Any technical recommendations must be based on at least some minimal analysis of whole farm systems, not single crop budgets. This procedure need not entail complex computing or methodologies, but simple small-scale surveys which highlight potential conflict between input requirements for different products and reveal general farm expenditure patterns and the relative importance to farm costs and family income of the crop in question. Such analysis would, as a matter of course, incorporate information on major non-agricultural income sources, expenditures and employment priorities.

As this study illustrates, the farming population can clearly not be assumed to have homogeneous production characteristics. Policy recommendations must be oriented to specific groups of farmers, based on budget analyses of their economic conditions, capacities and special advantages.

In many societies, the peasantry will remain an integral part of the economic and social scene for the foreseeable future. The preservation of a sphere of family existence directed to subsistence is a stable form of organization in societies where instability and uncertainty are great, market circuits operate poorly, and industrial development generates little employment. The subsistence orientation is not necessarily "backward," but may be the most rational organization possible, an adaptive mode of production.

Using Rural Economy Analysis for Development Theory and Policy

Peasant economies and their role in economic development are at the center of the great theoretical issues of the field today: agrarian reformism, socialist versus capitalist paths of growth, rural underdevelopment, changing international division of labor, dualism in economic growth.

The unfolding of these debates, however, has proceeded at a rarefied level. While they help to alert the researcher or policy-maker to certain problems, they have not provided much guidance for the design of useful field research on the one hand, nor, on the other hand, the collection of key information to inform practical policy-making. To the extent that field research has even been carried out in relation to macro-theoretical issues, they are more often designed to validate rather than test or elucidate those theories.

The danger of such an approach was obvious in Tabasco. Its experience was not congruent with any of the principal paradigms of development, but research designed to collect only certain sorts of data could easily have led one to think so. (Review Chapter 4, and Appendix A of the Thesis.)

Micro-level research, by contrast, has tended to skirt the larger theoretical issues entirely, for lack of a method to link their research systematically to macro-theoretical and policy questions.

This thesis was a modest attempt to develop such a research method. It is grounded in the detail of development - for the specifics of history, ecology, demography are critically important - but they are located in a much broader context. The details of interest were chosen in order to speak to those broader issues.

The success or failure of agriculture in other petroleum regions cannot be ascertained without at least cursory review of the variables discussed in this chapter. But the result will vary - and it is this variation which needs to be described and analyzed, its heterogeneity appreciated. An emphasis on macro-level theory will otherwise result in excessive reductionism.

How Unique Was the Case of Tabasco?

Must the Mexican campesinado disappear in the face of modern industrial development and its chronic exploitation and displacement of campesinos? In Tabasco, the peasant economy appears capable of long-term resilience, as a major economic sector, despite the increased proletarianization of the minifundia and subsistence maize sectors. But since the latter forms the majority of Mexico's campesinado, Tabasco is a less optimistic example than it may first appear to be, without more generous national support for the peasantry.

In Tabasco in the 1970's, many factors which mitigate the agriculture-petroleum conflict were operating simultaneously. The negative record reviewed in Chapter 1 suggests that it is rare indeed that demographic, political, structural and marketing forces coalesce in this way.

It is important to reiterate that most of the variables responsible for Tabasco's success in resolving agriculture-petroleum conflicts were historically determined and not amenable to immediate policy intervention - regardless of the political orientation of the government. But if political action is to be taken, analysis of the above variables is the first step in determining what policies are appropriate. Tabasco's policy experience (as opposed to its historical characteristics) provide some ideas for what those policies could be, but are by no means a blueprint.

In Tabasco, powerful groups fought on behalf of the cacao producers. Will state or national governments take upon themselves this burden where target groups have little political power in their own right?

That they do will be critical in those areas of the world newly involved in petroleum development, such as the Mexican Southeast and West Africa, which are populated regions of settled agriculture dominated by smallholders. Despite the visibility of the petroleum sector in the regional economy, agriculture and non-petroleum economic activities will continue over the long term to provide the principle income and employment base and determine family income levels and distribution for the majority of people in these areas.

The potential resilience of the smallholder or peasant sector can be a critical factor in stabilizing such regions. Will these agrarian nations make the simultaneous commitment to peasant farming and large-scale industrial development necessary to reduce the inherent conflicts?

This will be their central development challenge during the coming decades. The history of the Tabascan cacao farmers in the 1970's offers some hope of success.

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NOTES

CHART 2. CHARACTERISTICS OF 1970 EAP FOR TABASCO (p.39)

a/ The statistics given in the Census do not provide a very clear picture of the working situation of individuals or groups of individuals, as data on income, branch of work, position, etc. are presented separately. This chart is my attempt to combine these variables to summarize what is known about the various groups. It is by no means exact.

b/ Note that in the agricultural sector over-all, 14.9 per cent of workers (17,208) had no income at all; 81.6 per cent (93,943) earned under $1000 per month (of whom 17.8 per cent, or 10,833 earned $500-1000); 3.5 per cent (4996 individuals) earned over $1000.

c/ The farmers, including propietarios and ejidatarios, can be differentiated as follows:

Per Cent of EAP	Number of Individuals	Type	Per Cent of All Farmers
6	12,000	Subsistence	20.7
7	34,000	Semi-commercial	58.6
2	4,000	Collective farmers	6.9
2	4,000	Medium-sized ranchers	6.9
2	4,000	Largeholders with over 50 hectares	6.9

d/ Note that 68 per cent of all construction workers earned under $1000 per month.

e/ All large-scale transformation workers and 87 per cent of small-scale transformation workers earned over $1000 per month.

f/ There was no way to differentiate income levels for service workers outside Villahermosa. Within Villahermosa, "high income" workers over $1000 per month, and "low income" workers under $1000 per month.

CHART 22. PRIMARY OCCUPATION OF POTENTIAL EAP, BY AGE (p. 99)

a/ Note that of 646 individuals aged 8-15, only 57 were working, of whom only three were not agricultural workers.

b/ Of 234 individuals aged 61-99, 77 were not working: only ten of those were not working in agriculture.

c/ The graphs in Chart 22 show that portion of the potential EAP which is in fact employed; those remaining include housewives, students, the sick and retired individuals.

CHART 24. PER HECTARE COSTS OF CACAO PRODUCTION IN TABASCO, BY FARM TYPE (p. 102)

a/ "Imputed family labor" represents the value of family labor used on the farm, had it been remunerated at the going agricultural wage rate.

b/ "Other costs" include transport and vehicle use; depreciation on tools, equipment and other items; interest on debt.

c/ Cost data on the collective does not include any depreciation on equipment or buildings, which would be substantial.

d/ The "recommended" production system is taken from the SARH, Plan de Cacao, 1979. It does not include any estimates for depreciation, transport, or interest.

TABLE 8. COSTS OF CACAO PRODUCTION ON FAMILY CACAO FARMS (p. 111)
These notes also cover TABLE 13 (p. 132) and TABLE 18 (p. 154)

a/ SARH, Comision de Grijalva, Direccion de Estudios y Proyectos, "Rendimientos y Costos de Produccion de Cultivos Tropicales," August 1979, pp. 10-16.

b/ SARH, "Plan de Incremento de la Produccion de Cacao en el Estado de Tabasco," January 1979, Villahermosa, Tabasco, Cuadro 20. This represents the supposed "typical" production system in Tabasco, before rehabilitation programs.

c/ Same source as above. This represents the production costs after farmers have instituted rehabilitative measures on their plantations (see text) suggested by the Cacao Plan.

d/ A higher estimated value for land is shown in the first figure; a lower estimate in parentheses.

e/ The original figures valued a man-day of labor at $75 (Grijalva data) and $83 (Cacao Plan data). Here we have adjusted this to $100, the minimal going rate found in Tabasco during my field study.

f/ The family man-day of labor here is valued at the typical (not minimum) going rate of $120 per day.

g/ Sr. Luna was uncertain about how much fertilizer was applied, but fertilization took place only once. The value of fertilizer applied was certainly under $1,500.

h/ These include imputed cost of family labor.

TABLE 11. FAMILY AND FARM INCOME OF HIRED-LABOR-BASED CACAO FARM HOUSEHOLDS, 1979-80 (pp. 115-117)
These notes also cover TABLE 16 (pp. 136-138) and TABLE 21 (pp. 157-158)

*Source: Author, Cacao Farm Budget Analyses, 1979-80, Tabasco, Mexico. Note that the costs, returns and labor use summarized here can be found in preceding chapter tables.

a/ The blank spaces below refer to the specific income measure used - cash, labor earnings with and without equity deduction; the figures are found in the appropriate column to the right.

b/ Cash income refers to costs and returns to the family only in cash.

c/ "Labor Earnings" (without equity deduction) is a measure of income that includes several non-cash components such as: inventory changes, family use of farm products, etc.

d/ "Labor Earnings" with equity deduction is similar to the simple labor earnings measure, but also adds the cost of tying up the family's capital in the farm enterprise. It enters, as a cost, the interest that could be paid to the family by a bank were all assets to be sold for cash and deposited, without the risks entailed in a farm enterprise. The very low rate of 7 per cent is used for our calculations.

e/ Total Income of whatever measure is the sum of farm income, off-farm agricultural income and off-farm non-agricultural income.

f/ Income per man-day is a rough measure of average labor productivity - not marginal product; including both hired and family labor use. To compute this, the wage bill is subtracted from total costs.

g/ This is the average value of a day of labor performed by family members. For this purpose, the wage bill is included in costs.

h/ This does not include the imputed value of family labor.

i/ This pig budget is probably inaccurate. If we assume net returns at $1 million (based on unreported costs); and a doubling of the very low reported labor input to 800 man-days per year, then returns per man-day are reduced to $1250.

j/ The value in parentheses represents the higher of two cost estimates for cacao production.

k/ The value in parentheses represents costs (or returns) in the form of a changed animal inventory.

l/ Sr. Prado's reported activities almost certainly underestimate the number of man-days he works. If we increase this estimate to 200 days (a change of 54 days), then the value changes to $1200 per man-day.

m/ Irregularities in the Prado budget include: a) unusual reduction in the cattle inventory this year; b) milk income estimates which seem too low; c) labor use in pig operation probably underestimated; d) no payments of principal on loans are included as costs; e) it is not certain whether the owner's son received cash income for work in the cattle operation; none is included here.

n/ Irregularities in the Ramirez budget include: a) underestimation of fungicide applications; b) no payment of principal on loans is included as costs.

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