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# **Economic Benefits and Risks for Harvest Platform Adoption for NY Fruit Farms**

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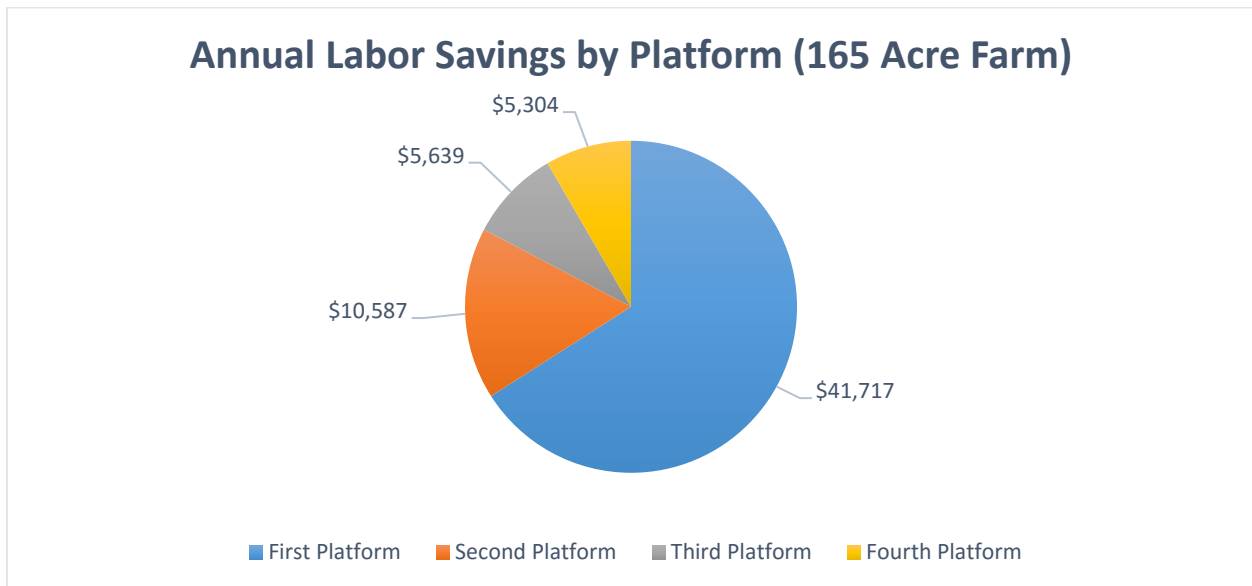
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### Economic Benefits and Risks for Harvest Platform Adoption for NY Fruit Farms

Harvest platform adoption is one way that fruit farms can adapt to the ongoing farm labor shortages and plan for future labor market shocks. In a recent New York Fruit Quarterly article, we reported the findings of time trials for harvest platforms for New York apple farms and summarized the findings of the economic analysis that was conducted as a part of this study. In this bulletin, we provide more details from the economic analysis and an extended discussion of various considerations for the platform investment decision. Overall we find that apple harvest platform adoption may currently have mixed appeal, but should have positive returns across a variety of operations if overall wage levels respond to the increasing minimum wage.

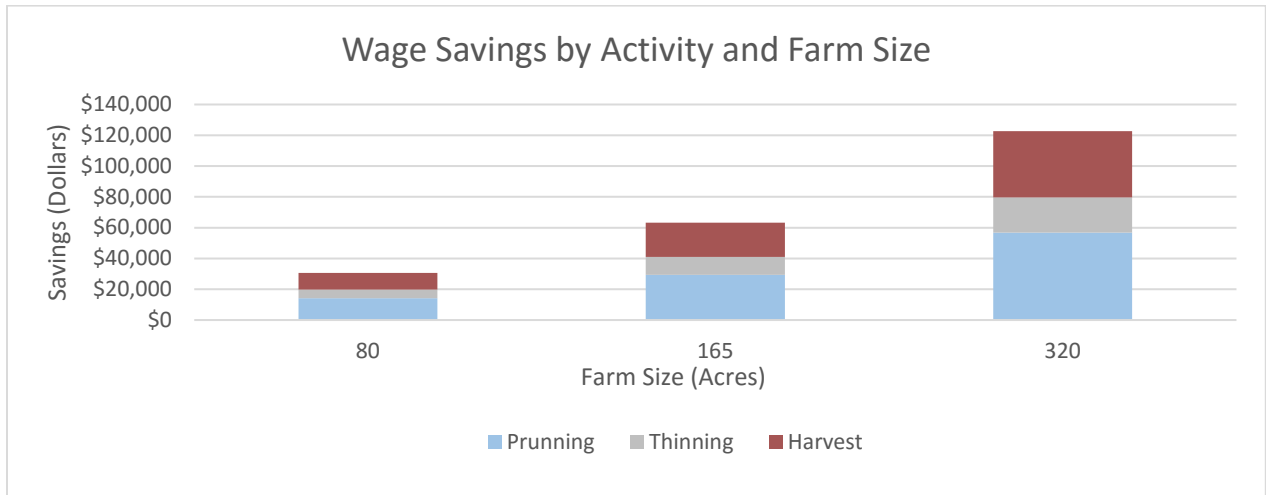
*Assumptions.* For this report, our examples focus on a 165-acre apple farm. However, our findings will apply to any farm that can fully use at least one platform. We do not assume any economies of scale that would change these results. Key assumptions include a 13% increase in harvesting labor efficiency, a 30% increase in hand thinning efficiency (only required for 20% of a farm’s total acres) and a 40% increase in pruning efficiency. We assume 8 available weeks for thinning, 16 available weeks for pruning, and 8.5 available weeks for harvest. Calculations also assume 40 man-hours to prune an acre, 60 man-hours to thin an acre, and 70 man-hours to harvest an acre. Unless otherwise specified, our findings assume a wage rate of \$14.80 per hour, including employer taxes. The efficiency of the platform is based on trials in which the orchards were picked one time. Multiple picks (spot picking) would have resulted in higher productivity or efficiency gains.



**Figure 1. Labor savings are much smaller after adoption of first platform.**

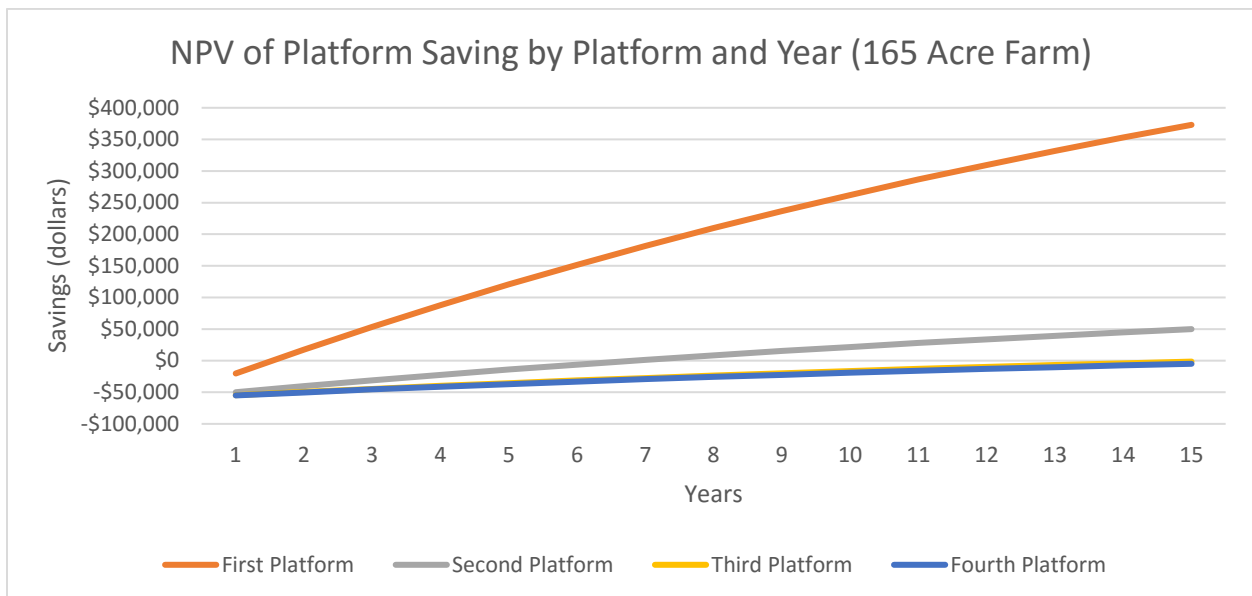
This figure reports annual labor savings for each additional platform purchased. The first and second platforms purchased can be used for hand thinning and pruning, where labor savings are substantial. If the farm wishes to use platforms to meet all of harvest needs, two additional purchased platforms are

necessary. The annual labor savings for these third and fourth platforms only come during harvest time and thus are each less than \$6,000, compared to over \$50,000 in labor savings for the first two platforms.



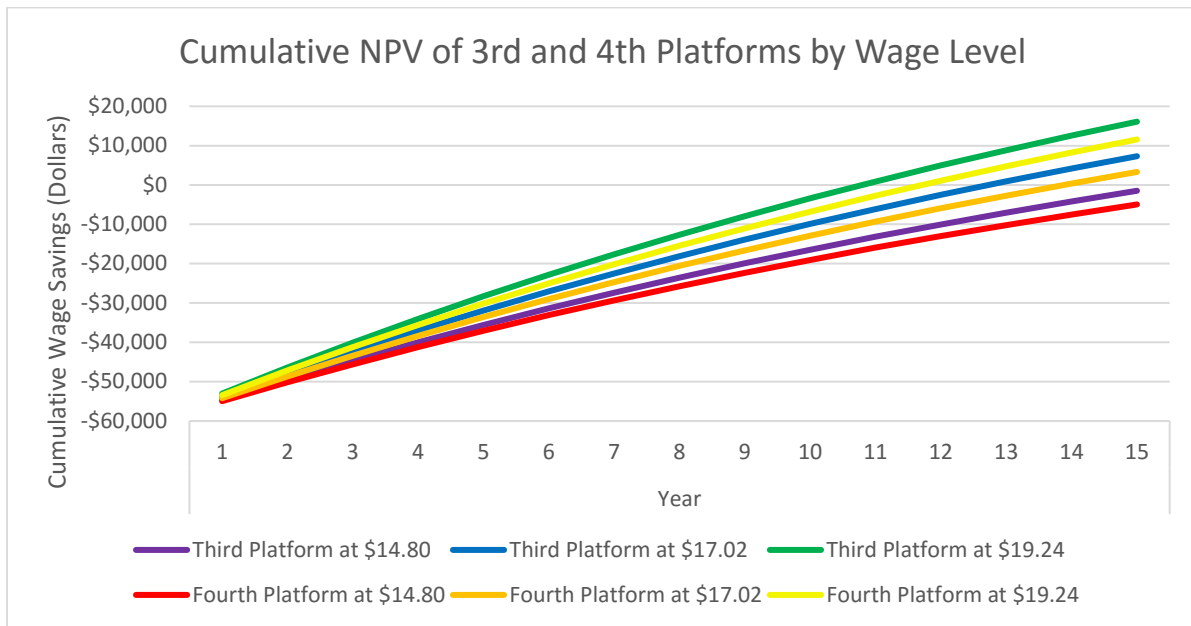
**Figure 2. Efficiency savings from harvest make up about 1/3 of labor savings from platform adoption**

This chart further illustrates the importance of pruning and thinning to labor savings gains from platform adoption. For farms that purchase enough platforms to cover all of their harvest needs, only about 1/3 of wage savings will come from harvest. Further, the pruning and thinning needs can be fully covered by 2 platforms, for a 165 acre farm, but an additional 2 platforms are necessary to meet harvest needs under the assumptions outlined above. For the rest of this bulletin, we will focus on the returns by number of platforms purchased.



**Figure 3. At current wage levels, wage savings will not cover the purchase cost of additional platforms**

In this figure, we extend annual savings calculations to the entire estimated working life of a platform, 15 years. The savings include the initial cost of the platform. We assume a standard discount rate of 5%. For an illustration of the sensitivity of NPV calculations to discount rate levels, see Appendix Table. 1. In this chart, we see large lifetime savings accrue to the first platform purchased, due to high returns to hand thinning and pruning. The second platform purchased has some use for hand thinning and pruning as well, and hence has more modest but still positive returns. The third and fourth platforms can only be used for harvest activities, and hence do not accrue positive returns over fifteen years, when taking into account current wage levels and benefits from a single picking only.



**Figure 4. If wages increase, harvest platforms may become universally profitable**

In this figure, we consider the “lifetime” returns to harvest platforms. The useable life of a platform is considered to be 15 years. Considering labor savings for a single picking only, the purchase of additional platforms for harvest will not yield positive returns, or cumulative net present value, after 15 years. However, with incremental wage increases, returns over platform life become positive. Given that New York’s minimum wage is expected to increase to \$12.50 by 2021 and that this will likely increase overall farm labor wages, such increases in wage levels are feasible. While harvest platform adoption may currently be profitable if additional benefits are realized, such as spot picking or night picking, under the assumption of increased wage levels and no increases in platform cost, broad harvest platform adoption across the industry may make financial sense.

**Debt levels.** The current financial position of farms affects ability to invest in new equipment. The average farm in the Cornell Fruit Farm Business Summary carried debt of \$3,167 per acre in 2015. Purchase of four harvest platforms for a 165 acre farm will lead to an additional debt load of nearly \$1,500 per acre, if they

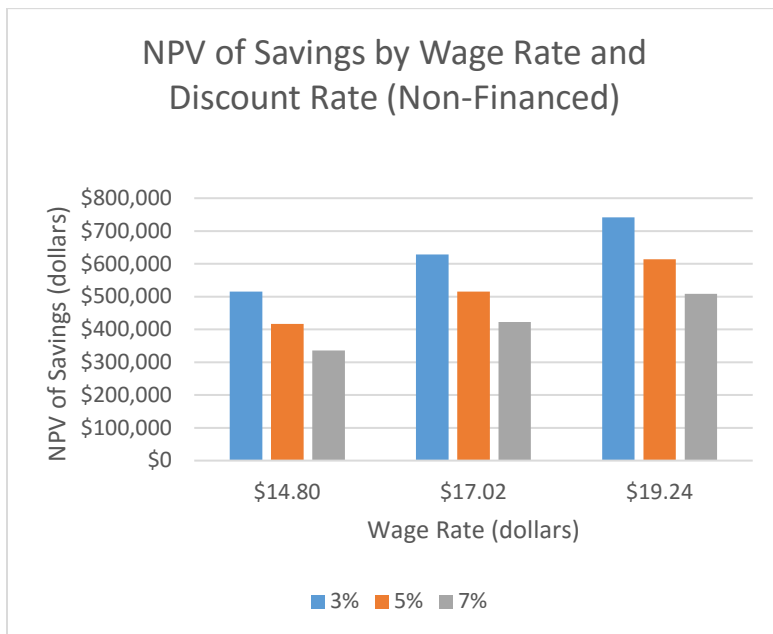
are purchased with 100% debt financing. This would increase the debt of the average farm by 47%. This may be an unacceptable level of debt increase for farms that are facing lower apple prices, investing in expansion, or undergoing a management transition. The level of debt that a farm takes on depends on their current equity position and both their tolerance for risk as well as their lender’s tolerance for risk.

**Additional considerations.** As discussed in our recent New York Fruit Quarterly Article, the purchase of platforms can be justified by hand thinning and pruning gains only. Current wage savings from harvest efficiency gains alone may not justify use of harvest platforms. However, even under current wage levels, there may be several other benefits. These include lower injury rates and higher worker satisfaction and retention. One study by Pennsylvania State University found that the reduction in routine injuries and ladder falls may contribute up to an additional one percentage point increase in labor efficiency<sup>1</sup>. This efficiency gain is in addition to potential benefits from farm liability reduction as well as the very real benefits from a more satisfied and healthy workforce. The use of platforms is less strenuous than ladder-picking, and this may widen the pool of potential employees and allow for the hiring of women or, more generally, workers with a wider range of fitness levels. Furthermore, spot picking or night picking for a “second shift” could make harvest platforms more attractive investments.

As wage levels rise under New York’s minimum wage law and considering generally tightening labor markets, returns to labor efficiency gains for harvest platforms are likely to increase and become positive even for the basic scenario considered in this study. Harvest platforms are a relevant option for apple farms considering different approaches to adapting to higher wage levels.

**Appendix**

Table A1 – Sensitivity of NPV calculations to the discount rate



<sup>1</sup> Heinemann, Paul H. and Zhang, Zhao. *Economic Analysis of a Low Cost Apple Harvest Assist Unit*. Department of Agricultural and Biological Engineering, The Pennsylvania State University

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