



**Co-author Roka
checks out
harvesting
systems.**

UF-IFAS photo

Can we mechanically harvest citrus the entire season?

By Richard S. Buker III, Jackie Burns and Fritz Roka

It is the time of year when you should start planning when, where and by which method you will harvest your fruit. Mechanical harvesting is a method that has proved to quickly remove fruit with few people involved at competitive costs. The canopy or trunk shaker systems will provide the greatest benefit to the industry when they are able to harvest at the beginning of the harvesting season and work through the entire Valencia season.

Trunk and canopy shakers provide growers with a viable option to harvest early and mid-season fruit for the processed market. What about the Valencia crop? Can Valencia be mechanically harvested late in the season?

Mechanical harvesting of Valencia fruit is complicated by the presence of two simultaneous crops – this year's mature fruit and next year's young green immature fruit. To successfully harvest Valencia mechanically, the harvest must be selective. A selective harvest efficiently removes mature fruit without having a sig-

nificant impact on future yields.

Valencia ready for harvest before the mid-February to mid-March peak bloom period can be selectively harvested. Growers have concerns about mechanically harvesting trees during peak bloom because some flowers are removed by the shaking mechanism; however, it's not clear if bloom removal results in yield loss. Only a very small percentage of bloom actually produces the next season's fruit crop. Research is underway to determine if there is a measurable effect on yield when trunk or canopy shaking occurs during bloom. In an abundance of caution, many harvesters and growers briefly halt mechanical harvesting during peak bloom. Mechanical harvesting is resumed after the peak bloom period.

Both University of Florida research and commercial practice demonstrate that Valencia can be selectively mechanically harvested well after bloom and until the immature green fruit reach approximately 0.25 inches in diameter (late April to early May) with-

out reducing future yield. As mechanical harvesting extends past early May and into June, increasing numbers of immature green fruit are removed due to their increased size. Alarmed to see green fruit being harvested, growers understandably worry that removing green fruit reduces the next year's yield. Ongoing research is determining the extent of yield loss as a result of immature Valencia removal by mechanical harvesting.

We are currently exploring two methods of selectively harvesting late season fruit: Reducing the 'aggressiveness' of mechanical harvesting, and incorporating the use of experimental abscission agent chemicals along with reduced mechanical harvesting aggressiveness. Aggressiveness is a combination of the force of shaking and how long each tree is shaken.

In theory, reducing the aggressiveness during mechanical harvesting would reduce immature

fruit loss, and, thus, decrease the potential for future yield loss. In practice, however, scaling back mechanical harvesting aggressiveness alone is not sufficient to achieve selectivity. Combining less aggressive harvesting with an abscission agent has shown real potential to achieve the selectivity needed for late season Valencia harvesting. Selective abscission agents loosen only mature fruit, and allow mechanical harvesters to operate on less aggressive settings. The net effect is that mature fruit are removed with high efficiency while green fruit removal is low because less force is required to remove mature fruit.

Although less green fruit were removed, will next year's yield be reduced? We do not know yet. Logic tells us that even a small amount of green fruit loss will ultimately reduce yield, yet it is possible that the tree will adjust to a lower immature fruit load and either drop less fruit throughout the season or increase solids in the

remaining fruit, resulting in no net loss of yield. If yield loss occurs, the individual must determine if mechanical harvesting costs are competitive enough to result in an overall positive economic decision.

Evaluation of results from last season's harvest with and without abscission agent will reveal if late season Valencia yields can be maintained with a combination of less aggressive mechanical harvesting and abscission agents. Our future work will focus on refining these methods to selectively harvest Valencia until the end of the season. When an abscission material becomes commercially available, then it will be possible to mechanically harvest the entire processed crop!

Additional information on mechanical harvesting can be found at:
<http://www.lal.ufl.edu/harvesting.htm>
<http://www.lal.ufl.edu/CRE-CHOME/FDOCHarvesting.htm>



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