

# Advantages from registration of an abscission product

By Fritz Roka, Jackie Burns, Jim Syvertsen and Robert Ebel

**T**he Florida Department of Citrus (FDOC) and AgroSource Inc. continue their progress toward submitting a technical package to the United States Environmental Protection Agency (EPA) for the registration of CMNP (5-chloro-3-methyl-4-nitro-1H-pyrazole) as a citrus abscission agent. CMNP causes mature citrus fruit to easily detach from the stem, thus reducing the shaking force required to remove fruit from a tree.

The use of CMNP is expected to boost the operational efficiency of existing citrus mechanical harvesting systems in numerous ways:

First and foremost, CMNP will extend the time frame to mechanically harvest late-season Valencia acreage.

Second, CMNP should allow a mechanical system to increase its harvesting speed and increase its daily capacity by harvesting more boxes per hour.

Third, CMNP should improve overall fruit recovery percentages — that is, increase the percentage of the total fruit that is harvested and delivered directly to a bulk trailer.

A fourth benefit of an abscission agent application is the reduction in tree injury from mechanical harvesting systems since fruit loosening will allow mechanical harvesters to operate with lower impact. Fewer tree injuries should lessen grower concerns about long-term tree health, and thereby increase adoption of mechanical harvesting systems.

This article elaborates on the anticipated benefits of CMNP and discusses how the costs of mechanical harvesting should decrease with CMNP application.

## LATE-SEASON VALENCIA HARVEST

The “late season” period of Valencia harvesting occurs after a majority of young fruitlets (next year’s crop) reach 1-inch diameter. Unless normal bloom is delayed, this diameter is reached by mid-May in most years. Commercial mechanical harvesting ceases because of concerns about reducing next year’s yield. Previous IFAS research indicates that mechanical harvesting after Valencia fruitlets reach the 1-inch diameter size will reduce next year’s yields between 25 and 50 percent. CMNP can alleviate this “late season” mechanical harvesting problem by selectively loosening this year’s mature Valencia oranges, but not next year’s fruitlets. Thus, less mechanical energy is required to achieve high percentages of mature fruit removal while minimizing the inadvertent removal of next year’s crop.

Application of CMNP should extend the mechanical harvesting of Valencia oranges by an additional four to six weeks. This will increase the seasonal capacity (total boxes harvested) of harvesting equipment. Since the ownership costs of a mechanical system are spread over a greater number of harvested boxes, harvest costs per box decrease. Lower unit harvesting costs (i.e. \$/box) should accrue, not only for the late-season Valencia acreage, but also in harvesting early and mid-season varieties as well, whether or not those acres are treated with CMNP.

## HARVEST SPEED

In citrus blocks where trees have been skirted and pruned, continuous canopy shakers can travel between 0.50

and 1.25 miles per hour down a row and remove up to 95 percent of the mature crop. Trunk shakers require between 5 and 10 seconds per tree to achieve a 95 percent removal rate. By loosening fruit with CMNP application, canopy or trunk shakers could harvest individual trees faster, and thereby increase the number of harvested boxes per hour. Initial field trials in Southwest Florida have shown that canopy shakers can increase harvest speeds to 2 miles per hour, and shake duration of trunk shakers can be reduced to 2 seconds while still removing 95 percent of the fruit.

The economic value of a faster harvest speed is contingent upon a sufficient allocation of bulk trailers by a processing plant to the harvest site. Faster harvest speeds require more trailers per day. Simply filling the same number of trailers in less time will not change the cost structure of a harvesting system.

## RECOVERY PERCENTAGE

Fruit recovery is the percentage of fruit that is harvested from the tree and delivered to the bulk trailer through the mechanical system. Field data collected between 2000 and 2004 indicates that trunk and canopy shakers harvesting in “prepared” trees with catch frames, and without the aid of CMNP, recover from 88 to 92 percent of the available fruit. On average, 5 percent of the non-recovered fruit remains in the tree and the other 3 percent to 6 percent of the fruit is removed but lands outside of the catch frame. With improvements in catch frame design or equipment operation, CMNP application should facilitate a higher recovery percentage by increasing the percentage of fruit that is removed from the tree and increasing the percentage of fruit that lands on the catch frame. If overall fruit recovery could be increased from 3 percent to 6 percent, operational capacity of the machines would be increased and fewer boxes, if any, would need to be gleaned by expensive hand crews.

## REDUCING TREE DAMAGE

Even though previous IFAS research has shown that trunk or canopy shaking does not adversely affect tree health or yield, many growers are not completely convinced. They see visible cosmetic damage that mechanical systems sometimes inflict to trees and make the assumption that crop yield or long-term tree health will be impaired. Reducing visible tree damage should alleviate grower concerns about mechanical harvesting impacts on tree health.

Since CMNP reduces the required pull-force to mechanically harvest fruit, the need to operate equipment at high shake force intensities is reduced. Less aggressive mechanical shaking should reduce cosmetic tree damage and help alleviate grower fears. In addition, there is preliminary evidence that abscission agent application reduces the leaf and twig litter being loaded into bulk trailers for handling at processing plants.

## ABSCISSION AGENT OF CHOICE

CMNP is an abscission agent that is highly selective, does not defoliate the tree, and does not affect next year’s production when used at recommended rates and proce-

dures. Although CMNP may cosmetically scar the bottom or stem-end of the peel, the internal juice qualities of a fruit are not affected.

The registration of CMNP currently is progressing through EPA-required testing protocols. The FDOC plans to submit a formal registration package to the EPA early this year and expects to be granted an experimental use permit (EUP) for the 2010-11 season. In the meantime, University of Florida/IFAS is conducting research on up to 10 acres per year (current acreage limit by the EPA) to develop optimum

management strategies for CMNP application and machine operation. The results of these field trials should allow harvesters to effectively apply CMNP and to make the most of the benefits from abscission agent application.

For more details about citrus mechanical harvesting, visit the following Web site: <http://citrusMH.ifas.ufl.edu>.

*Fritz Roka and Robert Ebel are associate professors; Jackie Burns and Jim Syvertsen are professors — all with the University of Florida-IFAS.*