Advantages from registration of an abscission product

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

The Florida Department of Citrus (DOC) 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 tree, 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 one-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 one-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 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 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 re-
search has shown that trunk or canopy
shaking does not adversely affect tree
health or yield, many growers are not
completely convinced. They see vis-
ible 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 me-
chanical harvesting impacts on tree
health.

Since CMNP reduces the required
pull-force to mechanically harvest fruit,
the need to operate equipment at high
shaker 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 trail-
ers 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
crates and procedures. Although CMNP
canoretically 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 DOC 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 manage-
ment strategies for CMNP application
and machine operation. The results of
these field trials should allow harvest-
ers to effectively apply CMNP and to
make the most of the benefits from
abscission agent application.

For more details about citrus me-
chanical harvesting, visit the following

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Retailers Experience
Citrus Industry Firsthand

By Ken Keck

The cold weather in February didn’t stop retail visitors from soaking up the
Florida sunshine and absorbing information about the state’s citrus industry. FDOC
hosted merchandisers and consumer affairs representatives from leading Northeast
chains for an in-depth tour of citrus from grove to consumer.

“Our goal is to help our customers intimately understand our business,” ex-
plained Pete Palmer, director of retail communications. “We immerse participants
in the agricultural process, and show them how citrus travels from the tree to the
table. This knowledge makes them stronger advocates of Florida citrus within their
organizations.”

The tour began in a grove where participants learned about the citrus growing
cycle, how openness is determined and the effect of weather. They watched fruit
being hand-harvested and loaded for transport. At a nearby processing plant, the
group witnessed the transformation of fresh citrus into orange juice, and followed
the juice through the packaging process.

FDOC presented timely research on the health benefits of citrus, consumer atti-
itudes and behavior, and retail trends. The marketing team illustrated how FDOC
utilizes this research to create strategic initiatives centered around health and well-
ness to increase citrus consumption and drive sales.

In addition, the retail team demonstrated how FDOC provides customized mar-
et data and competitive information to help each retailer grow their citrus business.
The team also outlined the wealth of FDOC resources ranging from industry ex-
erts to proprietary market research, emerging health studies and collateral mate-
rials.

“Spending quality time with retailers is priceless,” commented Palmer. “Not
only do they develop a greater appreciation for our products, but they become en-
ergized to increase promotional activities resulting in more sales and profits.”

Building stronger partnerships with retailers is a priority for FDOC that ulti-
mately benefits the entire industry by generating greater consumer awareness of the
health and wellness benefits of Florida citrus and increased product movement in
the marketplace. We think it’s a win-win situation for all.