

The days of the ladder and pick sack are probably numbered in Florida's processed citrus groves. If the harvesting labor supply shrinks and mechanical harvesting progresses as some in the know expect, more than half of all juice groves will be harvested mechanically within the next five to seven years. Sometime after 2010, hand harvesters with ladders and pick sacks may only be found in fresh fruit groves.

Those are not the projections of pie-in-the-sky, think-tank gurus. They're the opinions of Florida Department of Citrus (DOC) Harvesting Program Administrator Galen Brown, citrus manager-turned-mechanical harvesting manager Will Elliott, and grower Joe L. Davis, Jr. Elliott and Davis are chair and co-chair, respectively, of the DOC's Citrus Harvesting Research Advisory Council.

Since 1995, the council has recommended financial support for inventors and entrepreneurs developing mechanical harvesting systems.

Based on council recommendations, the Florida Citrus Commission has provided several million dollars in seed money to help make large-scale mechanical harvesting a reality. Brown, a retired U.S. Department of Agriculture harvesting researcher and administrator, has closely supervised and evaluated the development efforts.

All DOC mechanical harvesting efforts have been directed at fruit bound for processing plants. The industry consensus is that fresh fruit must continue to be harvested by hand, at least into the foreseeable future, to avoid damaging it.

Many recognize, however, that processed citrus must be mechanically harvested to reduce harvesting costs and increase the productivity of available workers. Florida's harvesting costs are estimated to be more than three times as large as Brazil's, and many fear Florida won't always have enough laborers to hand-pick the entire crop.

We asked Brown, Davis and Elliott to evaluate the DOC harvesting program, describe the current state of mechanical harvesting and predict where it's headed. Following are their answers to some broad questions.

How has the DOC mechanical harvesting program performed, and where are we?

Davis described the DOC program as an "incubator approach" to encouraging mechanical harvesting, and said it has worked well. Without it, he said, some systems that are harvesting citrus commercially or that expect to harvest commercially "would never have happened."

"I think we've been successful," Elliott added. "We have viable systems that are working in the field."

Those systems harvested about 6,500 acres in the 1999-2000 season, mostly in southwest Florida. Brown and Elliott think that number will roughly double to about 13,000 acres this season.

One system aided by the DOC – an area canopy shaker developed by Mongoose, Inc. – is harvesting commercially. Other DOC-aided systems not yet operating

commercially include continuous travel canopy shake and catch systems owned by Korvan Industries and OXBO International Corp.; Compton Enterprises' trunk shake and catch system; and

Crunkelton Enterprises' selective harvester. Brown said Korvan, OXBO and Compton are committed to having their systems operating commercially by the 2001-02 season.

Two trunk shake and catch harvesting systems reached the commercial harvesting stage without DOC funding. One was developed by FHI, the other is owned by Coe-

Collier Citrus Harvesting, L.L.P. Elliott, formerly citrus manager at Silver Strand Groves in southwest Florida, this spring became general manager of Coe-Collier Citrus Harvesting L.L.P., which leases the mechanical harvesting systems. Coe-Collier is owned by Barron Collier Co. and Coe Orchard Equipment.

Another promising trunk shake and catch system being developed by Stackhouse Bros. Harvesting has not received DOC funding, but may this season for a mechanical fruit pickup system.

What are the most promising mechanical harvesting methods?

Brown, Davis and Elliott agree that continuous travel canopy shake and catch systems have the greatest long-term potential for cutting harvesting costs and reducing labor needs – in some groves. To operate most effectively, continuous travel systems – being developed by Korvan and OXBO – require uniform, densely-planted groves that present a continuous wall of fruit. Many such groves were planted during the 1980s and 1990s throughout southwest Florida.

Elliott, who leases trunk shake and catch systems to growers, said the continuous travel system will ultimately excel in the right type of grove "because of the speed it possesses."

Indeed, the potential speed of that system is awesome. Brown estimates a continuous travel system may eventually harvest almost 2,000 acres a year, if it operates for only on shift a day. By contrast, he said a trunk shake system may harvest 500 acres a year; at the Mongoose canopy shaker 400 acres a year.

What's most effective right now?

While the continuous travel canopy shakers have the greatest long-term potential, they're not yet commercially available. So, what's the most effective system now?

"Of course, I'm going say the trunk shake and catch

Mechanical harvesting update

Good-bye, ladder; hello, shaker!

By Ernie Neff



Brown



Davis



Elliott

system," said Elliott, who leases those systems. Brown agrees.

"I think trunk shakers are right up there short term, and actually will be the system which mechanically harvests most of the fruit in the short and interim term," Davis added. He said there's also a role for the Mongoose area

canopy shaker, which can be used on trees in any type of grove, without tree preparation. He envisions the Mongoose being used in non-uniform groves throughout central Florida.

Even long term, there likely will be a place for all of the various harvesting systems. "It may be that we always have 50 percent of the groves being unsuitable for the continuous travel system," Davis said.

"You can't envision one system that's going to be suitable and economical for all groves," Brown added.

"There's a spot for all of them," Elliott said.

What will the per box harvesting costs be with mechanical systems?

The industry has a pretty good idea what it costs to harvest fruit with trunk shake and catch systems, which have been operating in Florida about

seven years.

"If you lease the Coe-Collier system for a season and operate it, you're probably looking at \$1.10 per box,"

Elliott said. That's the cost of getting the fruit harvested and into a roadside trailer. It's a considerable saving over the approximately \$1.70 industry average

for getting fruit harvested and into a roadside trailer using manual labor.

Elliott knows the trunk shake and catch system's costs well. He used the system for several years as citrus manager at Silver Strand. As general manager of Coe-Collier, he'll be leasing 15 sets of the system to growers this season. He expects the growers who use the Coe-Collier system to harvest 5,500 to 6,000 acres.

Brown estimated that a grower who owns a trunk shake and catch system could harvest fruit for less than \$1 a box. Hiring a contractor to harvest the fruit with the same system may cost \$1.25 a box, he said.

Although Brown didn't have per-box harvesting costs for the Mongoose, he said that system should be able to save growers money compared to manual harvesting.

Giant savings will occur when continuous travel canopy shake and

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One grower's costs: "Half production and half harvesting."

Grower Joe L. Davis, Jr. knows exactly how much harvesting costs him, and he wants to do something about it. His break-even cost on processed oranges, after paying Department of Citrus assessments and ad valorem taxes, is a cost-efficient 66 cents per pound of solids. Of that 66 cents, 33 cents is spent on growing the fruit and 33 cents is spent on harvesting it. "Half production and half harvesting," he says. "Harvesting is equal to all other costs." Because he runs his own harvesting operation, his harvesting costs are less than those of most growers.

"We're (Florida) one of the world's highest cost producers," Davis declares. "Harvesting is where we're at the greatest cost disadvantage internationally." Indeed, Floridians spend about three times as much to harvest a box of juice oranges as Brazilians do. The main reason: Harvesting labor is much more expensive in Florida.

Davis sees a silver lining to this cloudy situation. The silver lining is mechanical harvesting, which has the potential to cut Florida's harvesting costs by from a third to a half (see main story). "Ultimately, it's going to save us lots of money," he declares.

He was encouraged to see almost 200 attend a tour of various mechanical harvesting systems in southwest Florida in April. "I think that more and more growers are focusing on harvesting as our biggest long-term threat in a competitive, international citrus situation," he says.

Davis applauds Galen Brown, who has overseen the Department of Citrus' effort to spur development of a variety of harvesting systems. "Galen has done a great job and has done a great service to the industry," he says.

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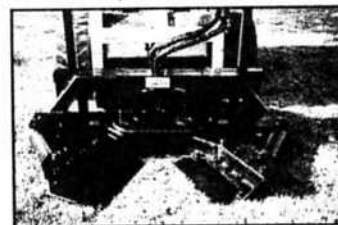


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catch systems are operating commercially in suitable groves. Brown, Davis and Elliott agree. "We could be at 50-60 cents (per box) roadside on groves ideally prepared and designed for the continuous travel canopy shaker in 10 years," Davis said. Fifty cents would be close to the per box harvesting cost in Brazil, making Florida much more price-competitive.

When will 51 percent of all processed fruit be harvested mechanically?

"Whoah!" Brown said when asked that question. But he quickly grinned, pulled out a pen and started making calculations.

"We're hoping for 13,000 acres (mechanically harvested) this year," he said. "And we might need to double that every year."

If annual doubling occurs, the Florida industry will be mechanically harvesting 416,000 acres in five seasons (2005-06). That would be well more than half of the state's processed acreage. "I hope we'll be there, because the labor supply and hand harvesting costs may be dismal by then," Brown said.

"I've been thinking we've got five to seven years" to harvest most processed fruit mechanically, Davis said.

"Probably five to seven years," Elliott added. "It just depends on the labor situation. If the labor situation gets shorter than it has been, it will increase demand for mechanical harvesting."

When will all processed fruit be harvested mechanically?

Brown said all other fruit and nut industries that started using mechanical harvesting eventually harvested all their production mechanically. "Those growers who aren't doing it can't be competitive," he explained.

He said Florida citrus also will harvest all processed fruit with mechanical systems, "but I can't tell you when that will be."

"It will be at least a decade to get it to that point," Elliott said.

Will mechanical harvesting drastically reduce our need for manual harvesters?

Yes. Brown said the continuous travel canopy shake and catch system can be 25-30 times as productive as hand labor. But remember that this system can't be used in all groves. Mix in trunk shakers, the Mongoose and other systems, and per-worker harvesting productivity will probably increase two to 25 times for processed fruit, Brown said.

Bottom line, according to Brown: Our labor supply is decreasing, but if we harvest all processed fruit mechanically and pick all fresh fruit manually, Florida may be able to operate with only 25 percent of its current harvesting labor force.

What is the DOC program doing this year?

The DOC harvesting program budget peaked at \$2.5 million last season. Its budget this season is \$1.5 million. The Citrus Commission believes most necessary research and development work on harvesting systems has already been done, witnessed by the number of systems operating commercially or on the verge of doing so.

This season, the program will help fund further development of the Korvan and OXBO continuous travel canopy shake and catch systems and the Crunkelton selective harvester.

It also will fund development of four mechanical pickup systems that will be able to quickly collect fruit from the ground. "There are a lot of systems that will get fruit to the ground," Davis explained. The Mongoose and at least one trunk shaker, for example, shake fruit off the tree but have no catch systems. Development of pickup systems should allow cost-effective completion of harvesting for those systems without catch frames.


The program also will continue funding abscission chemical research and development, mostly by University of Florida scientists at Lake Alfred. Abscission chemicals loosen fruit and make mechanical harvesting easier and less costly; none is commercially available.

Don't hold your breath waiting for an abscission chemical. "It would take us a minimum of five years to get an abscission chemical to the grower if we knew what the material was today," Brown said. That amount of time would be required to adequately test the material and receive Environmental Protection Agency approval to use it, among other things. And researchers haven't yet identified the material they think is the right one. "When we have the right one, the savings will be huge," Brown said.

Will the DOC harvesting program eventually go out of business?

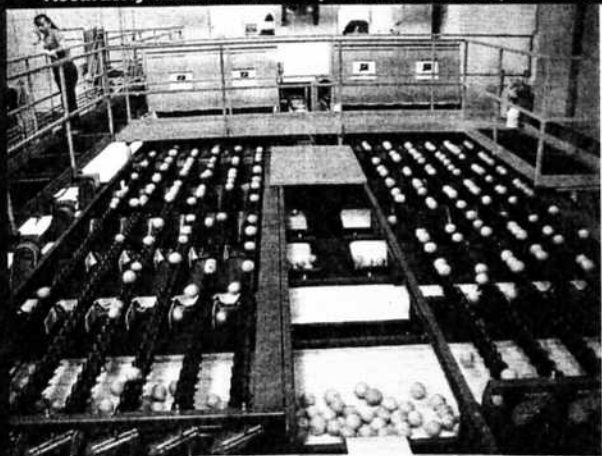
"Yes, that's the goal - when the commission thinks they have enough harvesting techniques to get most of the processed fruit," Brown said. He hopes to have the DOC harvesting program closed within five years.

"We want this council to go out




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