

# Labor savings from new technologies

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**L**abor is the human element in citrus production and includes tractor operators, citrus harvesters and grove managers. Equipment operators and fruit harvesters carry out defined jobs, while grove managers combine all the relevant pieces of information to make decisions on how to manage the trees and achieve the organization's production and financial objectives. To stay competitive, Florida citrus growers need to reduce operating costs, especially the cost of labor. In this article, the focus will be on current and future technology and how technology changes the way labor is managed in citrus groves.

Technology, or more precisely the evolution of technology, has three possible effects on labor efficiency. First, technology can be "labor-saving." Second, new inventions can enhance the value of work performed by field workers. Third, new technology can bring new and beneficial information into the operation, thereby enhancing managerial effectiveness.

Labor-saving technology is readily apparent in many agricultural operations. Tractors, speed sprayers, computer automated irrigation systems, and other such technologies can either reduce the number of workers required to handle a fixed area of grove, or allow the same number of workers to mow, fertilize, spray and irrigate more acreage. From either perspective, these technologies increase worker efficiency if the technology is not overly expensive.

Increasing worker productivity has two beneficial economic impacts. First, higher worker productivity translates into lower unit cost of production. Second, higher worker productivity affords the operation to pay its workers a higher hourly wage rate.

## HARVESTING

Harvesting remains the biggest frontier within the citrus industry that



*A tractor equipped with a variable rate controller, guidance system and other equipment can potentially increase the productivity of the operator.*

labor saving technology has yet to tame. The standard of citrus harvesting in Florida requires a human hand to touch every piece of fruit, at least once. Hand pickers of processed oranges in above-average grove conditions harvest an average of 10 boxes (90-lbs/box) per hour.

Mechanical harvesting systems are available today with significant improvements in harvest labor productivity. Trunk or canopy harvesting systems that remove and catch the fruit can increase harvest labor productivity by at least tenfold, or 100 boxes per labor hour.

On the horizon — perhaps in the not-too-distant future — are robotic harvesting systems. These systems are being designed to drive down a row-middle under automated guidance. With GPS and wireless communication, the vision of a single person directing multiple robotic harvesting units from an air-conditioned grove office is easy to imagine.

New technology can increase labor productivity and enhance the value of each hour worked through automation. Automation basically consists of information processing and mechanization. The goal of automation is to create human-like capabilities in a machine to replace labor. Traditionally, what is known about mechanization is a situation where machines either replace human muscle or assist people to perform a task.

## SMART MACHINES

The invention of fast and low-cost microprocessors and sensors and other technologies such as GPS and GIS has resulted in a new generation of smart machines. These machines take a new role in assisting the human brain and make the machine operation even easier, which in turn, increases the machine operator's productivity and enables the operator to work longer hours.

Take, for example, a tractor operator distributing dry fertilizer. Traveling at a given speed through the grove, the operator will require a certain amount of time to complete the operation. Now, exchange the old technology of a fixed-rate fertilizer spreader with a new spreader that allows for a variable-rate fertilizer application. The new technology does not increase the operator's productivity in terms of acres per hour, but now the operator's time is being more effectively utilized by applying a prescribed amount of nutrients to each tree. At the very least, fertilizer is being used more judiciously, saving the grove operation on input costs. At the very best, overall yield per tree is optimized for resource use.

## MANAGING RESETS

Let's take another example that deals with the new challenges of managing canker, greening (HLB), and the high cost of energy. Today, better management of reset trees and the use

of multiple chemical applications throughout the growing season is more important than ever. One way of doing multiple extra applications for reset trees is to go through every tree row in a grove, stop next to a reset tree and apply chemicals.

The alternative is to use a sprayer equipped with a new variable rate controller and an accurate GPS receiver that has the map of reset trees in the memory of its computer. The display unit can show the operator the exact location of a reset tree and the shortest path to it while the controller can automatically turn the sprayer nozzle on and off without having to slow down or stop the equipment.

Definitely, the second approach could save time, which means a sprayer unit can cover more ground with less cost. These types of technology are now available for row-crops and, with small modifications, they can be easily adapted to citrus production.

### **SCOUTING FOR GREENING**

Another example is scouting for greening (HLB), which is a new costly and labor intensive operation. Since

this is a unique operation for citrus, there is no machine available that can replace human scouting at this point. However, there are a few technologies that can potentially assist in detecting suspected infected trees, probably even before the symptoms are visually detectable. Investing in and developing such a machine can potentially be very beneficial to growers.

The ability to utilize smart machines such as a variable-rate fertilizer spreader or chemical applicator depends on other technology that amasses new information on which a grove manager can change how specific grove operations are being performed. These machines, in addition to applying the input, can automatically log information on what type of chemical is applied at what location. They can create what is known as an "applied map." These types of maps and the data used to create them can be extremely useful for the citrus production manager. They can assist the manager by automatically producing some of the documentation and paperwork that is needed and required by law. Plus, it is possible to extract ma-

chinery management related information from these data. For example, one can calculate cost of operation, field efficiency, machine downtime, efficiency of the operator and accuracy of application or even select the right size of equipment for a given operation. In some legal cases, having good documented application data has proved beneficial to the grower or applicator. New trends in marketing and the issue with traceability show that there is a value in collecting these types of data.

In conclusion, new technology can increase overall labor productivity, enhance the marginal value of labor, and/or increase the level of knowledge about the grove operations so that all resources, including labor, can be more efficiently utilized. In a global marketplace for orange juice and other citrus products, technological advances can enhance Florida growers' competitive position.

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