

Labor savings from new technologies

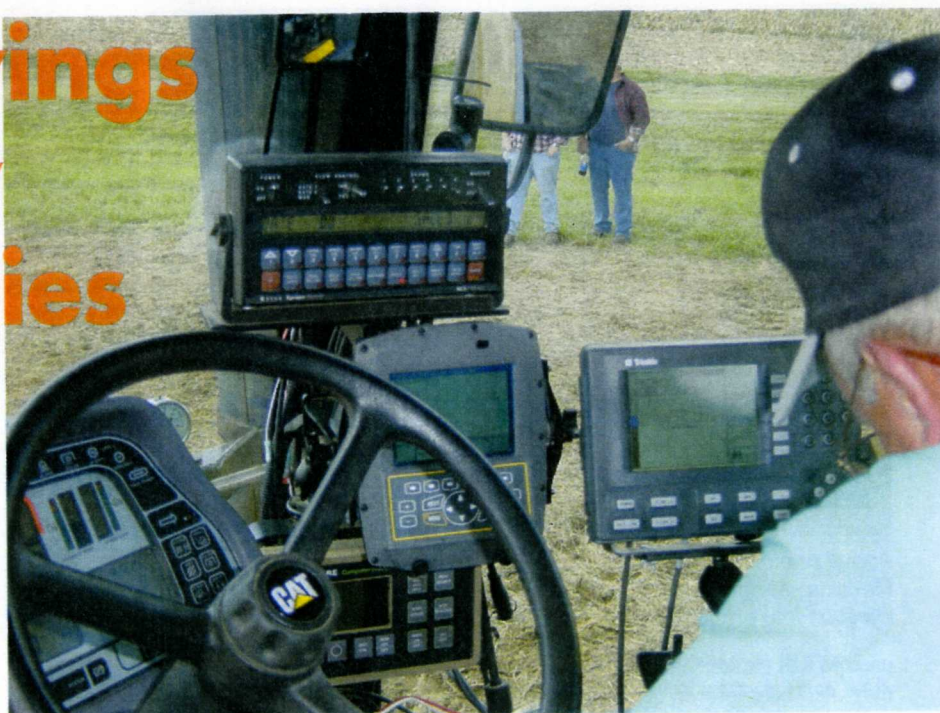
By Fritz Roka and Reza Ehsani

Labor 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.



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

HARVESTING

Harvesting remains the biggest frontier within the citrus industry that 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 mechaniza-

tion 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 man-

