In Florida Groves, Cheap Labor Means Machines

MMOKALEE, Fla. — Chugging down a row of trees, the pair of canopy shakers in Paul Meador's orange grove here seem like a cross between a bulldozer and a hairbrush, their hungry steel bristles working through the tree crowns as if untangling colossal heads of hair. In under 15 minutes, the machines shake loose 36,000 pounds of oranges from 100 trees, catch the fruit and drop it into a large storage car. "This would have taken four pickers all day long," Mr. Meador said. Canopy shakers are still an unusual sight in Florida's orange groves. Most of the crop is harvested by hand, mainly by illegal Mexican immigrants. Nylon sacks slung across their backs, perched atop 16-foot ladders, they pluck oranges at a rate of 70 to 90 cents per 90-pound box, or less than $75 a day. But as globalization creeps into the groves, it is threatening to displace the workers. Facing increased competition from Brazil and a glut of oranges on world markets, alarmed growers here have been turning to labor-saving technology as their best hope for survival. "The Florida industry has to reduce costs to stay in business," said Everett Loukonen, agribusiness manager for the Barron Collier Company, which uses shakers to harvest about half of the 40.5 million pounds of oranges reaped annually from its 10,000 acres in southwestern Florida. "Mechanical harvesting is the only available way to do that today." Global competition is pressing American farmers on many fronts. American raisins are facing competition from Chile and Turkey. For fresh tomatoes, the challenge comes from Mexico. China, whose Fuji apples have displaced Washington's Golden Delicious from most Asian markets — and whose apple juice has swamped the United States — is cutting into American farmers' markets for garlic, broccoli and a host of other crops. So even while President Bush advances a plan to invite legal guest workers into American fields, farmers for the first time in a generation are working to replace hand laborers with machines. "The rest of the world hand-picks everything, but their wage rates are a fraction of ours," said Galen Brown, who led the mechanical harvesting program at the Florida Department of Citrus until his retirement last year. Lee Simpson, a raisin grape grower in California's San Joaquin Valley, is more blunt. "The cheap labor," he said, "isn't cheap enough." Mr. Simpson and other growers have devised a system that increases yields and cuts the demand for workers during the peak harvest time by 90 percent; rather than cutting grapes by hand and laying them out to dry, the farmers let the fruit dry on the vine before it is harvested mechanically.

Some fruit-tree growers in Washington State have introduced a machine that knocks cherries off the tree onto a conveyor belt; they are trying to perfect a similar system for apples. Strawberry growers in Ventura County, Calif., developed a mobile conveyor belt to move full strawberry boxes from the fields to storage bins, cutting demand for workers by a third. And producers of leaf lettuce and spinach for bag mixes have introduced mechanical cutters. American farmers have been dragging machines into their fields at least since the mid-19th century, when labor shortages during the Civil War drove a first wave of mechanical harvesting. Mechanization grew apace for the following 100-plus years, taking over the harvesting of crops including wheat, corn, cotton and sugar cane.

But not all crops were easily adaptable to machines. Whole fruit and vegetables — the most lucrative and labor intensive crops, employing four of every five seasonal field workers — require delicate handling. Mechanization sometimes meant rearranging the fields, planting new types of vines or trees and retrofitting packing plants. About 45 vegetable and fruit crops planted
over 3.6 million acres of land, and worth about $13 billion at the farm gate, are still harvested by hand, by a labor force made up mostly of illegal immigrants. On average, farm workers earned $6.18 an hour, less than half the average wage for private, nonfarm workers, in 1998, the year of the Labor Department’s most recent survey of agricultural workers.

Florida's orange groves have reflected the broader trends. In the 1980's, a 20-year research effort into mechanical harvesting ground to a halt. With frosts upstate taking 200,000 acres out of production, orange prices soared and the demand for labor fell. But as is often the case in agriculture, farmers overreacted to the market's strength, flocking to plant groves among the vegetable patches, pastures and swamps in the southwestern part of the state. By the early 1990's, the market looked poised for a glut. With the prospect of bumper crops in Brazil, where harvesting costs are about one-third as high as in Florida, a crisis loomed — driving orange growers back into technology's embrace.

In 1995, the growers decided to plow $1 million to $1.5 million a year into research in mechanical harvesting. By the 1999-2000 harvest, the growers had achieved their technological breakthrough, with four different harvesting machines working commercially. Last year, machines harvested 17,000 acres of the state's 600,000 acres planted in juice oranges, said Fritz M. Roka, an agricultural economist at the University of Florida. “Mechanical harvesting is the biggest change in the Florida citrus industry since we switched to aluminum ladders,” said Will Elliott, general manager of Coe-Collier Citrus Harvesting, one of seven commercial contractors that are shaking trunks and brushing canopies around the state.

Mr. Brown, the retired Department of Citrus official, estimates that in five years, machines will harvest 100,000 acres of oranges here. But there are obstacles. Machines work best on the big, regularly spaced, groomed young groves in the southwest, and some do not work at all on the smaller, older, more irregular acreage in central Florida. Machines are hard to use on Valencia orange trees, because shaking them risks prematurely dislodging much of the following year's harvest. Still, the economics are in mechanization's favor. A tariff of 29 cents per pound on imports of frozen concentrated orange juice lets Florida growers resist the Brazilian onslaught — but not by much. According to Ronald Muraro and Thomas Spreen, researchers at the University of Florida, Brazil could deliver a pound of frozen concentrate in the United States for under 75 cents, versus 99 cents for a Florida grower.

Mechanical harvesting can help cut the gap. Mr. Loukonen of Barron Collier estimates that machine harvesting shaves costs by 8 to 10 cents a pound of frozen concentrate. The spread of mechanization could redraw the profile of Immokalee, which today is a rather typical American farming town. Seventy-one percent of the population of 20,000 is Latino — with much of the balance coming from Haiti — and 46 percent of the residents are foreign born, according to the 2000 census. About 40 percent of the residents live under the poverty line, and the median family income is below $23,000 — less than half that of the United States as a whole.

Philip Martin, an economist at U.C. Davis, points to the poverty as an argument in favor of labor-saving technology. He estimates that about 10 percent of immigrant farm workers leave the fields every year to seek better jobs. Rather than push more farmhands out of work, he contends, introducing machines will simply reduce the demand for new workers to replenish the labor
pool. And there are some beneficiaries among workers: those lucky enough to operate the new gear. Perched in the air-conditioned booth of Mr. Meador's canopy shaker, a jumpy ranchera tune crackling from the radio, Felix Real, a former picker, said he can make up to $120 a day driving the contraption down the rows, about twice as much as he used to make. Yet many Immokalee workers are nervous. "They are using the machines on the good groves and leaving us with the scraggly ones," said Venancio Torres, an immigrant from Mexico's coastal state of Veracruz who has been picking oranges in Florida for three years. Mr. Loukonen, the Barron Collier manager, said the farm workers were right to be anxious. "If there's no demand for labor, supply will end," he said. "They will have to find another place to work, or stay in their country."

Questions

1. According to the information in the article above, do you think the US has an absolute advantage in orange production (compared to Brazil)? Do you think the US has a comparative advantage in orange production (compared to Brazil)? What type of data would you need to support your argument? (hint: try making a table like the one below filling in the cells with hypothetical data).

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<thead>
<tr>
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<th>Labor Hours per Unit of Oranges</th>
<th>Labor Hours per Unit of Other Goods</th>
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<tr>
<td>US</td>
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2. What would be the effect(s) of technological change in the mechanical picking of oranges (like the one described in the article) on the US absolute and comparative advantages in orange production (assuming no such change in Brazil). (Hint: how would this change the productivity numbers in your table above and the resulting conclusion about the US comparative advantage?)

3. As a result of a trend toward freer international trade in agricultural goods (lower import tariffs and quotas), the US will increase its exports of some agricultural commodities (like rice, wheat, and soybeans), and the US will increase its imports of other agricultural commodities (like apple juice, orange juice, and garlic). Since we usually argue that freer international trade results in increased specialization according to comparative advantage, what seems to characterize the agricultural goods for which the US has a comparative advantage? What seems to characterize the agricultural goods for which the US does not have a comparative advantage?

4. Which comes first? high wages lead to the development and introduction of new technology? or, the development and introduction of new technology lead to high productivity and high wages? Do countries with low labor costs have less incentive to introduce new technology?