

oneb, and metalaxyl + furmecyclox significantly increased plant stands. All treatments containing furmecyclox or chloroneb provided excellent disease control, suggesting that *Rhizoctonia* was the primary pathogen in this trial.

1983 Ventura County trial

Procedures were the same in the 1983 Ventura County trial as in the 1982 trial, except that 'Fordhook' lima beans were planted in fields with a known history of rhizoctonia disease. Plot 1 was planted on May 25, and plot 2 on June 16. A plant stand count and disease rating were made on plot 1 on June 23, and a disease rating on plot 2 on July 20. In this trial, *Trichoderma*, a fungus that inhibits growth and activity of the pathogen, was also tested as a biological control seed treatment (provided by Arthur McCain, Extension Plant Pathologist, UC Berkeley).

Metalaxyl + furmecyclox significantly increased the number of plants when compared with no treatment and also provided the best disease control (table 2). The biological treatment significantly reduced the number of plants when compared with no treatment; control of the disease was not significantly different from no treatment.

1984 Ventura County trial

In seven plots planted in Ventura County during the 1984 season, procedures were the same as in the 1983 trials. Lima beans were planted in plot 1 on May 29, plots 2 and 3 on May 30, and plot 4 on June 8. The other three plots were planted during the same period but were discarded because they did not produce enough disease for evaluation. Ten bean plants were dug per replicate on July 2, 10, and 17 and disease incidence rated on a scale of 0 to 3 as before.

Metalaxyl + furmecyclox provided significantly better disease control than the standard captan + chloroneb chemical control (table 3). Only two of the four captan + chloroneb treatments were significantly better than no treatment.

Conclusions

Three years of data show that metalaxyl + furmecyclox (Apron + Epic) could serve as an excellent alternative or replacement for captan + chloroneb for controlling rhizoctonia seedling disease in southern California bean fields. Apron is registered in California for use on beans, but Epic has not received federal registration and is not available for use at present.

Albert O. Paulus is Cooperative Extension Plant Pathologist, and Jerry Nelson is Extension Staff Research Associate, both at the University of California, Riverside; Robert A. Brendler is Farm Advisor, Ventura County; and Harold W. Otto is Farm Advisor, Orange County.

The fragmented California farm labor market

Philip L. Martin □ Suzanne Vaupel □ William Amaya
Cheryl Fish □ Ricardo Amon

Not all commodities would respond in the same way to farm labor reforms

Wages are the largest production expense of California farmers, totaling \$2.2 billion in 1982 and accounting for 29 percent of farm production expenses, according to the 1982 Census of Agriculture. Wage expenses are spread unevenly across commodities. Livestock and poultry, for example, accounted for 35 percent of California farm sales but only 13 percent of total wages, while crops generated 65 percent of sales and accounted for 87 percent of wages.

Fruits, vegetables, and specialty commodities such as mushrooms and flowers accounted for 70 percent of crop sales and 81 percent of crop wages in 1982. Wages were the largest expense for most fruit and vegetable growers, accounting for 30 to 60 percent of total production expenses. The labor markets for these crops are diverse: jobs are year-round in some and only seasonal in others; growers of some crops depend on illegal or undocumented workers and others do not; and some are on the verge of mechanizing labor-intensive tasks.

We have examined three crops that illustrate how a variety of economic, labor, and technological trends are fragmenting California's farm labor market. Year-round mushroom jobs pay \$5 to \$7 hourly and \$15,000 annually to workers in unionized facilities, owned mainly by large corporations, in the Monterey area. Some Napa vineyards rely on single male undocumented workers for part of the harvest work force despite high wages, because seasonal farmworker families cannot afford housing in the area. Most of Stockton's fresh tomato harvesters are legal immigrants from Mexico who earn \$5 to \$8 hourly picking tomatoes; undocumented workers are only a supplemental work force.

The case studies summarized in this article were conducted by a variety of methods. They analyze the factors that make each commodity and its labor market unique. An important conclusion is that a statewide policy change designed to affect the labor market would not affect all commodities equally. For example, an increase in the minimum wage would have few effects on mushroom wages, but an immigration reform might affect 30 to 50 percent of the work force. Farmers, workers, and policymakers must be sensitive to this labor market fragmentation when evaluating changing labor market conditions.

Mushrooms

California is the leading producer and consumer of fresh mushrooms in the United States. In 1984, the state's 40 mushroom farms, on only 425 acres of farmland, produced 100 million pounds with a farm value of \$100 million, making mushrooms a higher valued commodity than avocados. The Monterey area produces about 40 percent of the state's mushrooms.

Four companies — Castle and Cooke, Amfac, Campbell's Soup, and Ralston Purina — produce 70 to 80 percent of the state's mushrooms. Mushroom production is a labor-intensive process of year-round planting and harvesting in darkened facilities. Monterey-area producers employ about 1,000 year-round workers to hand-pick mushrooms, which are sorted mechanically. A mechanical picker has been developed but is not now in use.

Mushroom workers are settled or local Mexicans and Mexican-Americans, a change from a mostly white work force in the early 1970s. Pickers are 30 to 40 percent of a facility's work force, and most

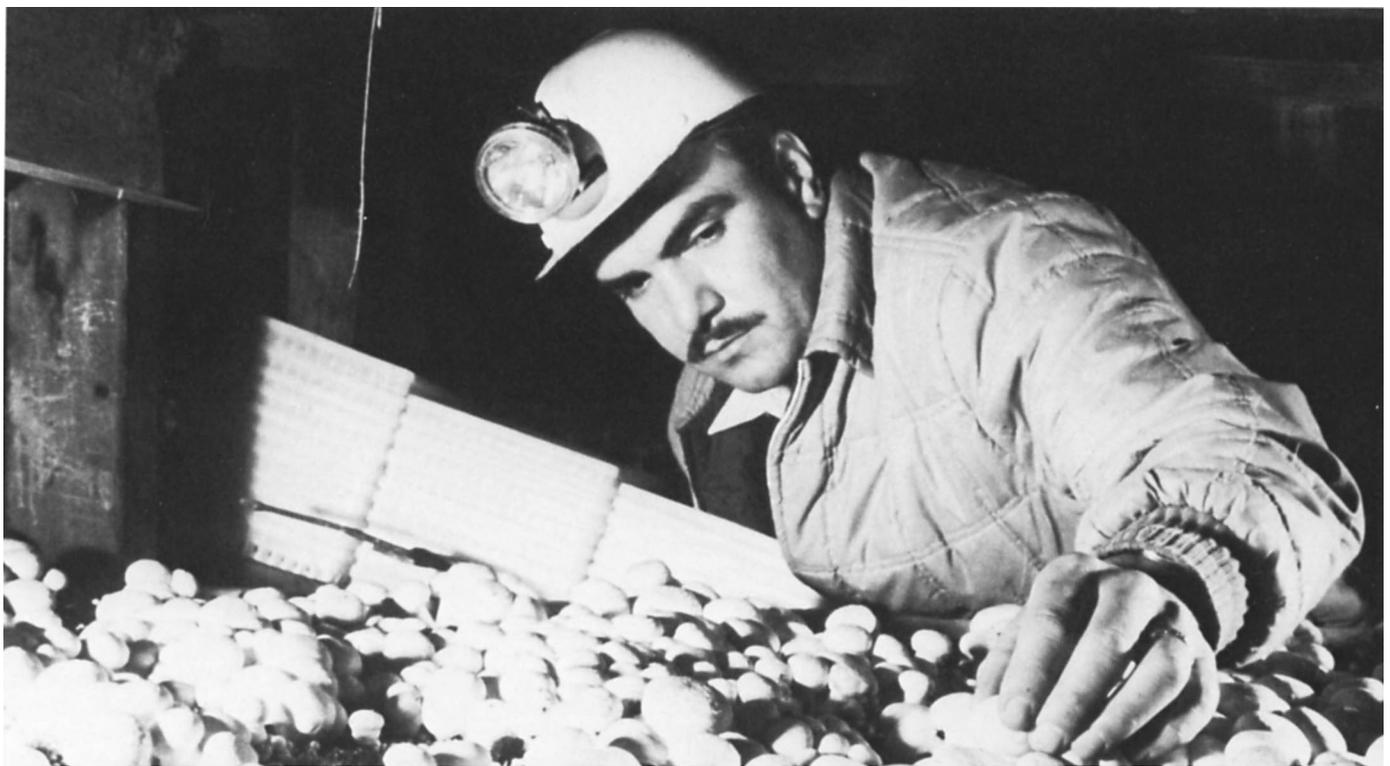


Photo courtesy Castle & Cooke

California's 40 mushroom farms produced a hundred million pounds of mushrooms in 1984 with a farm value of \$100 million. Mushroom harvesting jobs are seldom advertised, but are filled from direct contact with current workers.

pickers are men between the ages of 20 and 30. New workers are recruited by Mexican-American foremen and current workers; mushroom job vacancies are seldom advertised. Even with year-round work at hourly wages of \$5 to \$7, 30 to 50 percent of the mushroom work force consists of illegal aliens. One explanation might be that, with recruitment for vacant jobs geared to the friends and relatives of current workers, an illegal work force tends to replace itself.

Labor costs, of which the largest are for picking, are 55 percent of mushroom production expenses. Mushroom pickers are paid piece-rate wages of 15 to 16 cents per pound; most workers pick 350 to 400 pounds in eight hours for daily wages of \$52 to \$64. Since pickers can work six days a week year-round, annual earnings can be \$12,000 to \$18,000.

Mushroom pickers on corporate farms are represented by the United Farm Workers (UFW) and are guaranteed at least \$6.20 an hour. Wages have risen with the rise of corporate farms and unionization; pickers' wages were near the minimum wage in the early 1970s. The UFW represents about 55 percent of the Monterey-area mushroom workers, and some form of the union package of health insurance, paid holidays, and other fringe benefits are also found at the nonunion facilities.

If immigration reforms reduced the availability of Mexican workers, the mushroom industry could bid legal workers away from lower paying field jobs. Over time, the industry would probably mechanize harvesting, a change that might favor the established corporate

farm with capital and modern production facilities.

Wine grapes

California produces 90 percent of the nation's grapes with 750,000 acres of wine, raisin, and table grape varieties (100,000 acres of grapes are nonbearing). Grapes are grown in 43 California counties, but four Central Valley counties — Fresno, Kern, Madera, and Tulare — have two-thirds of the state's acreage.

The 300 Napa Valley growers have only 27,000 acres of wine grapes — less than 8 percent of the state's wine grape acreage. However, Napa wines are considered to be premium quality, and vine-

yard prices in the valley remain at \$25,000 to \$30,000 per acre. Napa wine grapes sold for a weighted average of \$812 per ton in 1984, much higher than the statewide average of \$196.

Vineyards employ both year-round and seasonal workers. Year-round workers typically earn \$5 to \$10 hourly for preharvest work and equipment operation. Seasonal workers are hired for the two most labor-intensive tasks: pruning and harvesting. During the 8- to 10-week harvest, each worker picks about a ton of grapes per day, so four workers are required to harvest an acre of grapes with the normal 4-ton yield. At the prevailing piece-rate wage of \$60 to \$100 per ton, the average

Summary of wages and status of unionization and mechanization in three case studies

	Mushrooms: Monterey area	Wine grapes: Napa Valley	Fresh tomatoes: San Joaquin County
Harvest workers			
Method of pay	Piece rate	Piece rate	Piece rate
Average pay	\$52-\$60 daily	\$60-\$100 daily	\$5-\$10 hourly
Average hours per day, days per week	8,6	8-10,6-7	5-6,6
Average length of employment per year	Year-round	60 days	3-5 months
Average yearly earnings	\$12,000-\$18,000	\$3,600-\$6,000	\$4,000-\$6,000
Year-round workers			
Method of pay	Hourly	Hourly	—*
Average pay	\$5-\$7	\$5-\$10	—
Average hours per day, days per week	9,6	8,6	—
Average yearly earnings	\$12,000-\$18,000	Up to \$12,000	—
Peak labor requirement	1,000	1,800	2,100
Union contracts	5 farms, about 55% workers	5 of largest wineries	None
Mechanization	Picker has been developed that could displace 25% of work force, not currently used	About 25% harvested mechanically; up to 75% could be harvested mechanically	Harvester developed for mature greens, some growers use as standard practice

*Information not available.

Source: Surveys of growers and workers in February-March 1985.

worker earns \$60 to \$100 daily. Most vineyards offer health insurance benefits to seasonal workers, but few Napa harvesters work enough hours to qualify for benefits.

Most Napa vineyard workers are Mexican-born immigrants, some of whom are undocumented. The grape harvesters, usually men aged 25 to 35 whose families remain in Mexico, typically arrive in Napa from Mexico or other areas of California. The Napa work force of single males is a sharp contrast to the family workers who often harvest grapes in the San Joaquin Valley, a labor force difference traceable to the lack of inexpensive housing and year-round work in other crops in Napa.

Five of the largest Napa wineries have United Farm Worker contracts. The union-negotiated hourly wages of \$6.19 to \$6.50 (1982) tend to be the standard for the Napa Valley.

About 25 percent of Napa's wine grapes were harvested mechanically in 1984. The \$125,000 harvest machines slap or shake grapes from the vine and convey them into a tank gondola. Machines can harvest about 1 acre or 4 to 5 tons per hour, compared with 1 to 2 tons per day for a hand-harvester. Machines also permit night harvesting, which reduces heat stress on the grapes.

An estimated 75 percent of Napa's wine grapes could be machine-harvested without modifying trellises, but the use of machines will depend on wages and worker availability, the cost and improvements in machinery, and vineyard funds available for machine investment. An immigration reform would probably accelerate mechanization, since most growers indicate they would rather invest in machinery than in housing for temporary workers.

Fresh market tomatoes

Tomatoes are the most valuable vegetable grown in California, with a farm value of \$600 million in 1984. The 240,000 acres of processing tomatoes yielded 6.6 million tons worth \$350 million, and the 29,000 acres of fresh market tomatoes yielded 7,100 hundredweight worth \$250 million.

Fresh market tomatoes can be ripened on the vine or harvested when green and then ripened. The labor-intensive vine-ripened tomato crop usually requires that each plant be staked and harvested four or five times; mature green tomatoes are picked only twice from bush plants. Two-thirds of California's fresh tomatoes are mature greens, and the state's growers have shifted half of the total production into the early summer harvest period, when there is the least competition from Florida and Mexico.

Labor is the largest single production expense in growing tomatoes, amounting to 33 percent of preharvest costs. Harvest and packing wages are another 33 percent of production costs, making the cost of seasonal farmworkers the largest single expense of tomato growers.

San Joaquin County produces about one-fourth of the state's fresh tomatoes, and the demand for tomato harvesters peaks at 2,100 workers in September. Most pickers are Mexican or Mexican-American men, and most live in Stockton and nearby communities. Most are U.S. citizens or legal immigrants; only about 20 percent are illegal aliens.

Tomato pickers are paid piece-rate at 40 cents for each 25-pound bucket, and most workers pick fast enough to average \$5 to \$10 hourly, and \$4,000 to \$6,000 for the three- to five-month season. Few employers provide voluntary fringe benefits such as off-the-job health insurance, but most harvesters obtain unemployment insurance benefits off-season.

Many tomato picking crews are assembled by Stockton-area labor contractors, and during peak harvest periods the largest contractors may each have 400 to 500 workers on farms. However, these contractors are threatened by mechanization and immigration reforms. The processing tomato harvester has been modified to pick mature green tomatoes, and two-thirds of the state's tomatoes could eventually be harvested mechanically. Even though most tomato harvest workers today are U.S. citizens and legal residents, the new workers who replace "retiring" 30- to 40-year-old pickers are often illegal aliens. If immigration reforms substituted legal guestworkers for illegal aliens, labor contractors would find it hard to assemble crews, since only a farmer with a crop to be harvested would be legally allowed to import guestworkers.

Conclusion

Each of the three labor markets studied is unique and would be affected differently by any modification in the labor market. In the mushroom industry of the Monterey area, relatively high wages, good benefits, and year-round employment engender loyalty and job satisfaction among workers. Most workers reside in the area, and the older ones maintain employment by being shifted to jobs less demanding than picking. In the Napa Valley wine grape industry, however, workers have little loyalty to seasonal jobs because of a relatively short harvest season and the lack of inexpensive local housing. If they can earn as much or more in other crops, grape workers may not migrate. Napa growers dependent on this migrant work force sometimes find it difficult to

secure an adequate labor supply. Wages for harvesting fresh tomatoes in San Joaquin County, though lower than in the other labor markets studied, are relatively high for the region. The local labor supply has increased with many workers settling in the area.

An increase in the minimum wage would probably not directly affect the three labor markets studied, since each pays above minimum wage. However, a wage increase in a competitive industry such as food processing or construction could greatly affect the Napa wine grape industry, since workers might be drawn away. The Monterey mushroom industry would probably suffer little with increased wages in competitive industries, since it offers relatively high wages and year-round employment. The large local labor supply for other commodities in San Joaquin County would keep fresh tomato harvest jobs filled, even if wages in other crops increased.

Immigration reform would have very different results in each of the markets. Although half of the work force may be undocumented in the Monterey mushroom industry, immigration reform would probably not have a great effect, since legal workers could be attracted to these jobs from less stable and lower wage jobs. The Napa wine grape industry could suffer a severe labor shortage with immigration reform, since a large percentage of harvest workers are undocumented and there is no local labor supply to draw on. However, Napa growers would probably accelerate harvest mechanization. Immigration reform would have relatively little effect on the fresh tomato harvest of San Joaquin County, since most of the workers are permanent residents and the local labor supply is adequate.

A high percentage of the harvest work in each crop studied could be mechanized with present technology, which would probably be adopted quickly if the labor supply diminished. If the harvest were mechanized in Napa wine grapes, many small growers and those with untrellised vines would be at a cost disadvantage.

These case studies indicate that relatively high wages and benefits, a long harvest season, and a local labor supply contribute to labor market stability, while inadequate housing or a short season can make a commodity vulnerable to labor shortages. Nevertheless, most of the hand jobs in these commodities could be mechanized if there were insufficient workers and if growers had adequate capital.

Philip L. Martin is Professor; Suzanne Vaupel is Visiting Assistant Agricultural Economist; William Amaya, Cheryl Fish, and Ricardo Amon are students. All are with the Department of Agricultural Economics, University of California, Davis.