Costs of Packing Fresh Grapes

study shows reductions in costs of marketing table grapes are possible by improving operating methods

L. L. Sammet and B. C. French

The following article is one of a series of reports of studies on Efficiency in Fruit Marketing *made co-operatively by the University of California, Giannini Foundation of Agricultural Economics, and the Agricultural Marketing Service, U. S. Department of Agriculture, under the authority of the Research and Marketing Act. Detailed reports are available by addressing the Giannini Foundation, 207 Giannini Hall, University of California, Berkeley 4, California.*

Total shipments of California fresh grapes for table use have averaged—over the past five years—more than 27,500 carlots; equivalent to an annual average of more than 30 million standard display lugs. On this volume, the local marketing costs—the costs of picking and hauling, packing, precooling, and loading—were roughly 31 million dollars annually.

About 83% of the total volume of California grapes sold for table use moves in interstate shipments. Recent studies indicate that returns from wholesale market sales—on this major portion of the total shipments—were divided about equally among transportation and selling agencies, packers, and producers. Thus, California packers and producers each received about one third of the wholesale market receipts. These shares amount to about 25% when considered in relation to receipts at retail prices.

The proportionate share of the retail dollar received by growers of California table grapes is low in comparison with that of agriculture as a whole in the United States. For example, gross returns to all agricultural producers in the United States were estimated in 1953 as about 45% of consumer expenditures for food. If only fruits and vegetables are considered, the producer's share is 38%. This is in contrast with a 25% share for the producers of California table grapes. To a large extent, the lower proportionate return to California grape producers results from the perishable nature of the product, which requires expensive packaging and handling and the high costs of long-distance, refrigerated shipments. Over 90% of the table grapes shipped by rail from California, for example, are to destinations east of the Mississippi River.

Because of the nature of agricultural marketing operations, it is generally true that high marketing costs and low percentage returns to growers are not the result of inordinate profits by middlemen but reflect the use of many essential materials and services in the marketing process. This fact justifies intensive and continuous effort to reduce costs and increase efficiency in agricultural marketing. Both producers and consumers can be expected to share the benefits of increased efficiency. In the short run, reductions in the costs of marketing result in increased returns to growers. Eventually they may bring about increased volume of shipments and lower prices for consumers.

Costs and Efficiency

The high cost of local marketing operations and their control by California shippers have encouraged studies to determine the relative costs and efficiency of performing the local marketing functions with different work methods and equipment and with different kinds of organization and scale of operation.

The level of costs and variations in costs among California grape packing plants is indicated in the graph on this page. The costs given pertain only to the packing of table grapes in centralized packing houses and are based on analyses of account record data from 21 different packing firms. Costs per packed standard display lug—or its weight equivalent in other types of packages—are presented for the packing of three different varieties of grapes—Emperor, Tokay, and summer grapes, mainly Thompson, with minor quantities of Ribier and Red Malaga. In some instances, the allocations to various categories are only approximate but they are believed to be sufficiently accurate to give good indications of costs in the different categories.

Cost Calculation Standardized

The basis of cost calculation was standardized to focus on the efficiency of internal plant organization. Costs in each plant were computed on the basis of a full, or nearly full, output rate per plant hour. This rate was established for each plant as the average output per plant hour for the three days of highest daily average output in a sample of output records for the season.

For all job categories except packers,

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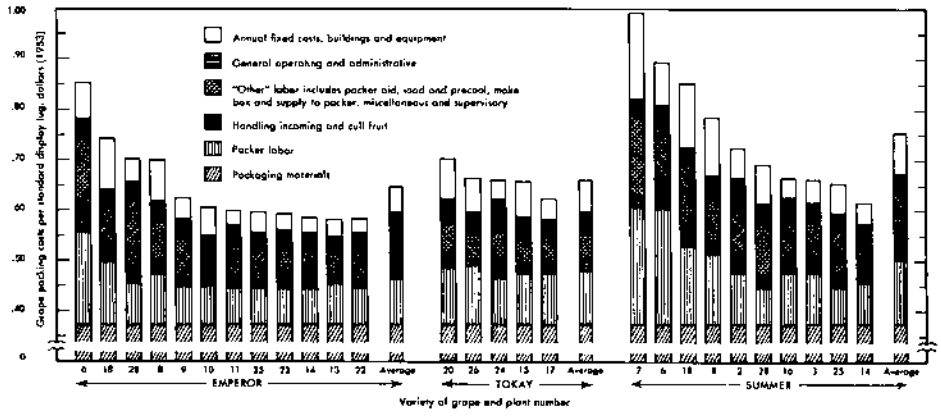

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TOXICITY

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The smaller two column table on page 13 shows the chlorine content in the leaves, trunk, and roots. The upper—not fully mature—leaves from cultures No. 3 and No. 4 contain the least chloride, and these two cultures have made the best growth.

Preliminary tests were made as to whether there is a relation between the nature of the rootstock variety and its ability to absorb chloride. Three-gallon capacity soil cultures provided with drainage were used in the glasshouse with a nutrient solution consisting of distilled water containing in ppm: potassium, 276; magnesium, 81; calcium, 239; nitrate, 1078; phosphate, 158; together with the previously used minor elements. To this solution was added calcium chloride solution as to give 50, 100, 150, and 200 ppm chloride.

Avocado seedlings of several varieties of the Mexican and Guatemalan races were used, one seedling being planted in each culture. The seedlings all were planted on October 15, 1952—except Zutano—Mexican—planted January 27, 1953. The seedlings were grown until August 10, 1953. The largest table on page 13 gives the average percentages—closely agreeing duplicates—of chlorine in the dry matter of the leaves and rootlets, and the results indicate that when grown under similar conditions of chloride concentration, the dry matter of the leaves and rootlets of the Mexican avocado varieties of seedlings contain higher percentages of chlorine than is the case for the Guatemalan varieties.

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GRAPES

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a uniform schedule of wages—typical for plants that packed Emperor and summer grapes but about 20% lower than in the Tokay plants—was used throughout the calculations. The costs of direct packer labor, however, were computed from the packer wage plan used in the individual plant and at the average rate of output per packer when the plant was at its full-output rate. Packaging materials costs were made uniform.

Fixed costs for buildings and equipment were based on estimated replacement costs. Uniform methods of calculating fixed costs were used for all plants, although the costs were adjusted to reflect the basic types of building and equipment used in the individual plant. Unit fixed costs were based on the annual volume that would have resulted in each plant if the indicated rate of output were maintained for 250 hours per season. Physical data used in the analyses are based on accounting records for the 1951 season, but the costs of labor, materials, equipment, and other items were calculated at the 1953 price level.

There was a substantial variation between plants in the total cost per standard display lug. With Emperor grapes, total costs—based on the standardized conditions—ranged from 58¢ to 85¢ per lug and averaged 65¢; with Tokay grapes the range was 62¢ to 70¢ per lug and the average was 66¢; and with summer grapes the total costs ranged from 61¢ to 99¢ and averaged 75¢ per lug.

The major components of total cost are labor—which for all plants taken together averaged 31% of the total cost—and packaging materials, which averaged 56% of the total cost. Since packaging materials costs were taken as uniform for all plants, the principal source of variation in unit total costs between plants is in the costs of direct labor. The largest single labor item, and the principal source of variation between plants, is the direct packing labor. For Emperor grapes, packer labor costs ranged from 7¢ to 18¢ per lug and averaged 9¢; for Tokays, the range was 9¢ to 12¢ and the average was 10¢ per lug; and for summer grapes, the range was 7¢ to 23¢ and the average was 12¢ per lug.

The second largest item of labor cost was the category, handling incoming fruit and culls. For all plants, the range in costs for this item was 1.7¢ to 6.0¢ per packed display lug, and the average for all plants was 2.7¢ per lug. Regarding the remaining labor categories, costs per lug are relatively small, although the percentage variation between plants is high.

Fixed costs for buildings and equipment range from 2.9¢ to 17.2¢ per lug, and for all plants, averaged 6.0¢ per lug.

Season Average Unit Costs

With computation of costs on a standardized basis, relative costs with different methods of plant operation can be illustrated. For a particular plant, however, such a cost estimate may differ considerably from the actual season average cost, primarily because the costs represented in the graph are based on a full output rate of plant operation and a standardized wage schedule. If these costs were based on the season average rather than the full output rate, an increase ranging from 1% to 30% of the total unit cost would result in individual plants. Taking all plants together, adjustment to reflect a season average—rather than a full output rate—increases the level of labor costs about 15%. If total costs, including packaging materials are considered, the average increase for all plants is about 7%.

Similarly, adjustments which reflect the actual wage schedule used in the individual plant rather than the standardized schedule used in computations for the graph would vary with each plant. Both the direction and the amount of such adjustments would depend on the actual wage level in a given plant in relation to the standardized wage schedule.

Cost Reduction

Sizable cost reductions could be achieved in many grape packing plants. As a rule, such savings are effected through the introduction of numerous relatively small improvements in individual operations and by improved plant and industry organization. More sweeping changes—in the nature of innovations which would affect the level of costs in all plants—are desirable, especially if they could be easily adopted. The potential rewards for such developments are greatest in the major cost categories. In packing grapes for table use, these are direct packing labor and packing materials. Judging from recent changes in the packing of some other commodities—for example, citrus fruits and western head lettuce—the development of a more economical package seems a likely possibility.

Improvements in local packing and shipping operations which would yield significant savings in the annual marketing bill for California table grapes can apparently be achieved.

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B. C. French was Co-operative Agent of University of California Agricultural Experiment Station and Agricultural Marketing Service, U.S.D.A., at the time the above study was made.

Improvements in fruit packing house operations will be reported in an article to be published in a future issue of California Agriculture.

VARIETIES

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Where large trees are topworked, as at Riverside, only a few years are required to determine the important characteristics of a variety. Fruit quality, yield, and hardiness are the main characteristics used to determine a variety's value for commercial planting.

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