DATE HA

Research started in 1961 by agricultural engineers of USDA and University of California has led to commercial acceptance of mechanical harvesting methods with resulting labor and cost savings for California date growers. About 65% of the 1965–66 date crop is expected to be harvested with the aid of various mechanical systems that can reduce labor requirements from 50 to 80%, as compared with conventional hand picking.

NEARLY ALL of the U. S. production of dates is grown in the Coachella Valley of California. Harvesting this date crop has historically involved selective hand picking of individual mature fruits from the bunch in which they grow. The usual practice was to harvest the fruit in two hand pickings, and clean up the remaining fruit during pruning operations, following the main harvest. Time studies, in 1961, indicated that about two hours

ing of dates by USDA and U.C. agricultural engineers in 1962. Towers are mounted on a wide trailer with shaker-bin equipment behind for delivery of dates. The hydraulic booms will take the platforms and the pickers up to 50 ft above the ground. Bottom photo (also cover) shows one of nine mechanical date harvesters developed by a growers' cooperative and an equipment manufacturer for commercial harvesting. Pickers can harvest four palms and place date bunches in cages for delivery to shaker and bins at bottom of photo.

Conventional hand picking of dates invo
60-ft ladders so that pickers can get to t
palms to hook up a bosun's chair, as show
of dates are then lowered to the ground o

RVEST MECHANIZATION

R. M. PERKINS · G. K. BROWN

were required to hand pick all the fruit on each of the tall palms. A picker could accomplish the first two picks in about 50 minutes each. The Mexican bracero was the main type of labor used in picking as well as for most other work connected with date production. Harvest costs represented 45% of total production costs.

Hand harvesting was accomplished by climbing into the tall palms by means of a 48- to 60-ft extension ladder, then picking the fruit from a bosun's chair supported by chains hooked on the palm fronds. The dates were picked into buckets which were then lowered to the ground with ropes. Picked fruit was hauled to the packing house in wooden boxes holding about 30 lbs each. Several years ago, attempts were made to replace the ladder with various platforms or towers which would support the man in his picking position and move him from palm to palm. The use of this type of equipment did not prove practical because it did not decrease harvesting costs or labor.

There are some 100 varieties of dates grown in the Coachella Valley. The Deglet Noor variety accounts for about 92% of the total production. Because the remaining varieties are grown only for the exclusive gift shop trade, Deglet Noor was the only variety considered for mechanization.

An early study of the feasibility of mechanical harvesting by bunches, rather than individual mature fruits showed that by delaying, and then completing the picking in two properly spaced "bunch harvests," the difference in grade between hand-picked and bunch-harvested fruit was not significant.

A study of methods for rapidly separating all of the fruits from the bunch indicated that this could be accomplished best by shaking the bunch vertically with a mechanical shaker. The shaker developed for this purpose delivers a 3¼-inch stroke at about 700 cycles per minute. No fruit damage was encountered and all of the fruit was separated in one to two seconds.

Tests indicated that mechanically harvested fruit could be handled and stored in bulk bins to a depth of 18 inches. This depth was a compromise between storage and handling requirements. While fruit could be handled from field to plant at greater depths without damage, prolonged storage—sometimes as long as nine months—could not be accomplished at greater depths.

Field tests of mechanical harvesting systems were begun in 1962. The system found most practical, and which has been adopted by the industry, uses towers to position men at the palms where they can cut mature bunches rapidly and immediately place them in containers. During the move from one palm to another, the cut bunches are transferred to a shaker operator who is at the base of the tower or on a separate vehicle following the tower. Each bunch is next shaken with the mechanical shaker at which time the fruit goes directly into 47- by 47-inch bins, 20 inches deep. Forklifts are used to pick

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Grower-developed mechanical harvester shown below, left, has a shaker mounted over bulk bins and conveyors mounted on each side of the trailer to deliver cut bunches to the shaker operator. Pickers climb into the palms from ladders (which may also be carried on the trailer unit), and cut bunches of dates are lowered with ropes to the conveyors. Close-up of the date bunch-shaker used with all the mechanical harvesting equipment, showing delivery of dates into bins below, right.

up the full bins in the field and load them on trucks for transport to the packing house.

During the 1962–63 harvest, about 4% of the crop was harvested mechanically on an experimental basis. This was followed by commercial harvesting of 10% of the crop during 1963–64, and 30% during 1964–65, with equipment especially designed or modified for this purpose. It is estimated that 65% of the 1965–66 crop will be harvested mechanically.

From time studies of harvest operations and evaluation of harvest records, it has been found that labor requirements of mechanical harvesting systems now in use are 20 to 50% of conventional hand picking requirements per 1,000 lbs of fruit havested. Since the equipment is expensive, and requires many acres to justify its use, some smaller growers who want to harvest their own fruit have developed systems of mechanical harvesting which still employ the ladder. In these systems the picker uses a ladder to enter the palm. Once he is in the palm he cuts the bunch and lowers it by rope to a shaker trailer where the fruits are removed from the bunch. This saves about 50% in labor and total harvesting costs.

The total harvest costs, including machines and necessary labor, have been reduced to about half the conventional costs. Exact labor requirements depend upon the harvest system being used, conditions in the date garden, type of labor, and amount of acreage covered with harvest systems capable of high capacities. Since the harvest season has been shortened (by delaying the start of harvest and then harvesting by bunches), a given acreage must now be harvested in a shorter period and peak labor requirements for the industry may be slightly higher than previously mentioned figures suggest.

Improvements will no doubt be made as more acreage is adjusted to the equipment, but the mechanical harvesting of dates is now a commercial reality. One of three areas in which gains may be made is in the improvement of existing equipment. This will be the smallest gain, however, since most of the mechanical advantages have already been realized. The second area of improvement involves the conversion of more acreage to mechanical harvesting with necessary changes in cultural practices, such as irrigation, tillage, and row length. Third, an increase in the annual use of each machine can be made so that a maximum acreage is harvested—either on a contract basis or by combining the small acreage holdings of a group of growers—to justify the purchase of the most efficient mechanical harvesting equipment.

Remaining problems in date production include the mechanization of the pollination operation so that commercially acceptable yields can be obtained without the accompanying high labor requirements. All palms must now be hand pollinated and the timing is most critical. Research is now underway to develop new pollination methods.

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PICLORAM

. . . a promising new herbicide for control of woody plants

J. R. GOODIN · L. R. GREEN · V. W. BROWN

In more than 20 years of research on the chemical control of plant growth, many hundreds of compounds with herbicidal activity have been tested on woody plants and then fallen into obscurity. The standard of comparison for all new chemicals has been and remains 2,4-dichlorophenoxyacetic acid and related chemicals. Their physiological activity, although less than desired, is superior to any other compounds screened.

The latest, and among the most promising herbicides to challenge 2,4-D and 2,4,5-T in control of woody plants is Picloram (4-amino-3,5,6-trichloropicolinic acid). Picloram is a systemic herbicide readily absorbed by both leaves and roots that injures or kills most woody species, as well as herbaceous broadleaved plants. Established grasses are generally tolerant, and growth responses following applications of Picloram resemble responses following treatments with the phenoxy herbicides.

This article is a progress report of experimental use of Picloram as a rangeland herbicide. This material has not yet been registered for rangeland use and is not recommended at this time by the University of California.

Four groups of experiments have been conducted under various site and climatic conditions in southern California to test the relative merits of Picloram in the control of chaparral. Foliar sprays were applied to representative sprouting shrubs on the 1962 Glendora Ridge burn above Glendora in the Angeles National Forest; on the hand-cleared Oak Grove fuel-break and other locations in San Diego County; and on a hand-cleared site on the North Mountain experimental area adjoining the San Bernardino National Forest near Banning. Dry pellets were applied to old, established brush on two San Diego County locations.

Glendora Ridge

The Morris fire of 1962 had removed mature brush from Glendora Ridge. Sprouting was rapid, and by spring, 1963, regrowth was 1 to 2 ft high. Picloram was applied at rates of ½, 1, and 2 lbs per 100 gal of emulsion; and