
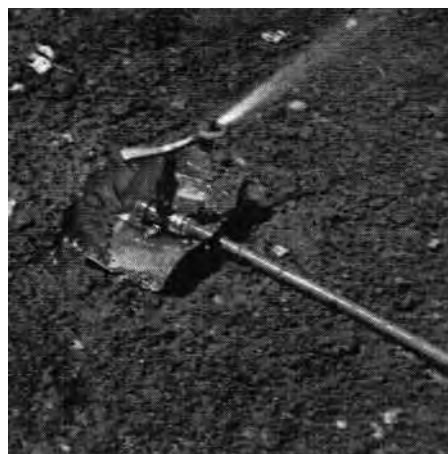


NEW SPRINKLER SAVE

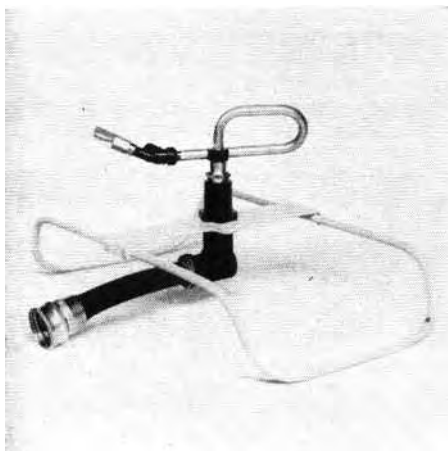
RICHARD O. SCHADE



Automatic controller used with overhead sprinklers seen in background reduces labor to a minimum. Used in conjunction with water sensing devices, the irrigation system would be completely automatic.



Two of the many new types of sprinklers developed to operate at low volumes with hose-pull systems are shown above, and below.



SPRINKLER IRRIGATION for tree crops in the San Joaquin Valley has increased rapidly during the past ten years, particularly in areas planted to citrus. While no exact figures are obtainable, it is estimated that more than 20,000 of the 100,000 acres in citrus are now irrigated by sprinklers. Large acreages of walnuts, olives, and deciduous fruit are also being irrigated by sprinklers. Nearly all of this increase in sprinkler irrigation involves systems using the new hose-pull or overhead methods, as described in this study.

Irrigator shortage

One of several reasons for the rapid increase in the use of sprinklers in this area is that trained irrigators are becoming increasingly difficult to find. Higher paying positions in industry and other phases of agriculture have drastically curtailed the number of these important farm workers available. However, growers have found that unskilled workers can pull hoses and operate sprinkler equipment.

In citrus, one-half hour per day is required to move each 10 acres of sprinklers. Even less time is required when powered carts are used to transport workers who pull the hoses. Many of the soils on the east side of the San Joaquin Valley have very low infiltration rates. Water must be held in furrows as long as 72 to 84 hours for an application of three

inches of water per acre. A 24-hour sprinkler setting will apply this amount of water.

Rolling topography

Much of the new land being brought into production is located in foothill areas with rolling topography, and sprinklers are the only practical method of irrigation. Water savings are usually possible using sprinklers where the land being brought into production is located in water-deficient areas. Because the land is located in rolling topography, the cost of land leveling is greatly reduced when sprinklers are installed. However, initial costs for sprinkler systems are high. Hose-pull systems used in citrus cost about \$250 per acre and the solid-set, overhead systems start at about \$500 per acre.

Low volume

Most of the sprinklers installed in citrus are the low-volume, hose-pull systems. These systems operate at pressures of from 20 to 30 lbs per square inch and each sprinkler discharges from .5 to 1.5 gallons per minute. On a 24- x 24-ft tree spacing, this rate of application amounts to less than .1 inch per hour up to .25 inch per hour. Applying such small amounts of water requires precise engineering. Each lateral must be engineered, and the system operated within the toler-

SYSTEMS

IRRIGATION LABOR COSTS

... a study of hose-pull and overhead systems in Tulare County



Two barrel-type filters mounted side by side. One is left in operation while the other is being cleaned.

ance of its design—with most of the engineering and installation done by commercial companies.

Working with low volumes of water has required the development of better filtration systems because any small foreign body can easily plug the small orifices. The barrel-type screen filter is the most common type in use and normally consists of two filters installed side by side to allow one to be in operation while the other is being cleaned. Self-cleaning

screens can also be used—with or without filters to remove trash.

Supply lines

The main supply lines are pipes of asbestos cement or polyvinyl chloride (PVC) up to 4 inches in diameter. Lateral lines are PVC and both mains and laterals are buried. The risers from the laterals are usually flexible to prevent damage by equipment. The plastic hoses are $\frac{1}{2}$ inch in diameter, and normally three sprinklers are attached to each hose. The sprinklers are left for 24 hours at a set. Each hose line will irrigate both sides of a tree row and nine trees on each side of a lateral. However, the number of trees each line irrigates will often vary and, in some cases, a hose line is located in each tree row. The faster an orchard is to be irrigated, the higher will be the initial cost of the system.

The low-volume, hose-pull system has recently seen widespread acceptance in many other deciduous crops and olives. In walnuts, the system is somewhat modified and only one sprinkler per hose may be used. Here again, the design of the system will be different for each orchard and depends on the tree spacing and the time required to complete an irrigation.

Overhead sprinkler systems (as shown in photos) have long been used in California citrus, but availability of new

equipment has renewed interest in this method of irrigation. The initial cost of an overhead system is more than twice the cost of a low-volume, hose-pull system. The main advantage of the overhead system is that it can be automated and requires much less labor. High quality water must be used when overhead systems are used, however, because sodium or chloride over two milliequivalents per liter will cause leaf burn under dry, windy conditions.

Richard O. Schade is Farm Advisor, Agricultural Extension Service, University of California, Tulare County.

Part circle overhead sprinkler used on edge of orchard.

