Nursery Seedlings

improved methods of production possible with control of damping-off disease

Kenneth F. Baker

New mechanized production techniques are being developed and adopted in the growing of seedlings because the damping-off disease now can be practically eliminated in commercial nurseries.

The proper treatment of the soil, and of seed in some cases, coupled with reasonably careful handling to avoid recontamination, is becoming an integral part of production of vegetable seedlings for farm planting, and of bedding stock for sale in flats.

To free the soil of pathogens, it should be uniformly steamed to 180° F for 30 minutes, preferably in the flats to be used. Seeds which carry organisms that cause either damping-off or diseases of mature plants should be treated to kill the parasites.

Careful utilization of these basic procedures has made possible striking improvements in mechanization of pepper seedling production in a southern California nursery and some of the methods developed should be applicable to other types of crops.

Methods of Handling Soil

The soil mixture consists of: 1. A light sandy loam as free as possible of fine clay; 2. Canadian peat, and 3. commercial fertilizer, blood or fish meal.

Natural manures or leaf mold usually are not used. Such a simple mixture is dependable, can be duplicated, does not break down under steaming, is practically free of excess soluble salts and has desirable characteristics of drainage, aeration, and breaking away from the roots on pulling.

The soil components are conveyed from the various storage piles by a moving belt, are blended in a large concrete mixer and brought to the proper moisture level before being dumped into a mechanical flat filler. The filled flats are placed on wooden pallets and transported to the soil pasteurizer and through the various steps by a fork-lift truck.

Methods of Seed Treatment

Although the Rhizoctonia fungus is carried internally in pepper seeds, it can be killed by a simple hot-water treatment without reduced germination. The seed is placed in cheesecloth bags which should not be more than half full, and is then immersed in a deep sink or tub containing at least 30 gallons of water held at 125° F.

The temperature is most easily maintained by allowing hot water—140° F–150° from a water heater—to trickle in during treatment, with frequent thorough stirring for uniformity. The bags should be kneaded early in the treatment to get rid of air bubbles. After 30 minutes they should be removed, quickly submerged in cold water until cool, and then drained.

The seed is spread out in thin layers on screens to dry either outdoors in warm weather or in a heated room with fans, but drying must be completed within 12 to 20 hours.

Planting and Germination

Because the number of plants is not reduced by disease, seed is sown in place in the flats by a patented vacuum-plate planting machine. For the same reason, it is possible to maintain the flats at a high moisture level during germination.

Immediately after the seed is planted in the flat and covered, first with thin tissue paper and then sterile sand, it is rather heavily watered. All of these processes are handled by machines at the rate of 150 flats per hour. These flats then are stacked and moved into a closed room held at fairly constant temperature and high humidity. Under these moist conditions the seeds germinate uniformly and shed the seed coats without the sticking or binding common under dry conditions.

The flats are removed from the germination room and placed on greenhouse benches just after emergence, but before the seedlings elongate.

Greater uniformity and percentage of germination is thus obtained while avoiding the laborious watering required for seed flats. The greenhouse benches are not used during the seven- to 14-germination period, and are available for plants which require light. This method of germinating seed flats under conditions free of pathogens is now successfully used by several nurserymen and seedsmen in California and the mid-West. It has been found useful when a single variety is sowed in numerous flats but not when several varieties are involved, because of differences in germination rate. This

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Olive Yields

studies underway to determine causes and correction of irregular bearing

H. T. Hartmann

Reduced yields of oil olives the year following the season when the fruit is harvested late—in January and February—were indicated by studies made in Tulare County several years ago.

To expand the studies, an experimental plot was established in 1947, in Butte County.

Trees were harvested October 21, 1947, and January 2 and February 23, 1948.

Oil content determinations were made of fruit samples harvested on these different dates. It was found that as the harvest was delayed the oil content increased.

These same trees will be harvested at approximately the same dates for several years and yield records and oil determinations will be obtained. This should show the extent to which late harvest depresses yields.

The first visible cause of a poor crop—nonbearing, irregular bearing, or alternate bearing—is the excessive production of staminate or male flowers which do not develop into fruit but drop soon after bloom. Two approaches are being tried at this time to overcome this trouble.

One is girdling branches in December; the other is applying hormone sprays in early spring. When the plots are harvested this season, the value of girdling and hormone sprays in olives will be known and a complete report will be made.

Variety Studies

A variety collection has been established for variety studies and in contemplation of an olive breeding program.

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OLIVES

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With the importation in 1947 and 1948 of about 20 new varieties from France, Italy, Greece, Turkey, Palestine, Egypt, Algeria and Australia, this is now probably one of the most complete collections of table olive varieties in the world.

In connection with this work on varieties, a study has been made of the tree and fruit characteristics of all the available bearing olive varieties in California.

Rootstocks

To supply some information as to the value of own-rooted olive trees in comparison with grafted trees, a rootstock planting will be set out next spring at the Wolkskill Experimental Orchard. A planting of 10 acres will be made with about five acres used for the rootstock tests. Trees will be grown on a number of different rootstocks, including several different *Olea* species, for comparison with the trees started from cuttings.

In preparing trees for this proposed olive planting, tests were made with various hormone root-forming substances to determine their value in rooting softwood olive cuttings.

It was found that indole-butyric acid at about 50 parts per million gave very good results in inducing root formation.

Last spring a similar test was made using hardwood olive cuttings. The results of this test will be known at the end of the current growing season.

Fruit Measurement

During the 1946–47 and 1947–48 seasons, growth studies were made of developing olive fruits. Measurements of fruit size—volume, diameter, fresh weight, and dry weight—moisture content, and oil content were taken. Two years' results have been obtained using the Mission and Manzanillo varieties and a complete report of this work will be published soon.

Pruning

Two pruning plots have been established—one in Tehama County and one in Butte County—to give information on how severely bearing olives should be pruned.

Two years' results, while insufficient for drawing conclusions, have been in agreement that the trees receiving the least pruning have been the most profitable.

Fertilization

To determine whether the time at which nitrogen fertilizers are applied to olives has any effect on fruit set, experimental plots have been established in Tehama and Tulare counties in which different trees are fertilized at about two-month intervals throughout the year. Results must be obtained for several years before valid conclusions can be drawn.

Nontillage

Another phase of current olive research concerns the practice of nontillage in olive orchards—the control of weeds by oil sprays. A number of experimental plots have been set up by the Agricultural Extension Service in the several olive producing counties to examine the feasibility of such practices.

An experimental plot also has been established by the University in Glenn County where trees are grown under clean cultivation, sod culture, and weed control by oil sprays.

Individual tree-yield records were obtained for the 1947–48 season. The maintenance of such plots for a number of years will compare the value of these different types of soil management.

Specialized Studies

A number of other projects are underway, such as nutrition studies, including minor elements, physiological effects of spray materials, collections of desirable variety strains, blossom-thinning sprays, fruit-bud differentiation, irrigation studies and temperature in relation to fruitfulness.

Many of these projects must be carried on for a number of years before definite results can be expected.

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GRUBS

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rotenone-sulfur formula seems superior.

Recent work conducted at the University of California has demonstrated that the northern grub is more resistant to treatment than is the common grub; however, control of either species is often incomplete.

The main value of the present program of area-wide treatment lies in the fact that a single season of community-wide spray treatment in a grubby area will reduce the number of grubs so much that relatively little trouble will be experienced the following year.

There is the immediate advantage of ridding the animals of those grubs currently sapping the vitality and reducing the market value of the stock.

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SEEDS

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Scarification may frequently be harmful, especially with beans because growing points of some seeds are injured by the rough treatment. If not carefully done, too much coat is scratched off causing a rapid decline in viability, and allowing a ready entrance for fungi.

Another practice is to keep the beans and possibly other legumes in a storage of the proper humidity and temperature so that the moisture in the seeds is maintained high enough so there are few or no hard seeds, yet the moisture is not so high as to cause loss of viability.

From the experimental results obtained at Davis, and from the work reported by research workers in Connecticut and in Puerto Rico it seems that at storage temperatures around 70° F, a relative humidity of 50% or a little higher is dry enough to prevent all but a few hard seeds in even the most susceptible varieties.

For long storages of over a year, a lower humidity or a lower temperature is advisable. The seed could then be stored at the higher humidity or temperature for a month or six weeks before expected shipment.

The long time approach is to make selections or breed out of each variety the tendency for hard seed development at normal storage humidities.

Thus, if bean seeds are stored in the proper humidities, hard seeds can be reduced greatly or avoided. If the seed companies and experimental stations test for hard seeds in their breeding and selection programs the strains with genetic tendencies toward hard seeds may be eliminated.

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FIRE

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is important also to consider cost and difficulty of replacement as well as use and occupancy in the case of destruction by fire of homes, farm buildings, fences and other improvements.

Increased costs for materials and wages and marked scarcity of many critical items may make quick replacement of burned facilities virtually impossible without undue delay.

A farm home, barn, milk house or other equipment may be quite as vital in the carrying on of farm operations to the owner as is a factory, mill or office building to a business corporation. The hidden losses must include the cost of replacement and the inconvenience of doing without such destroyed facilities.

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