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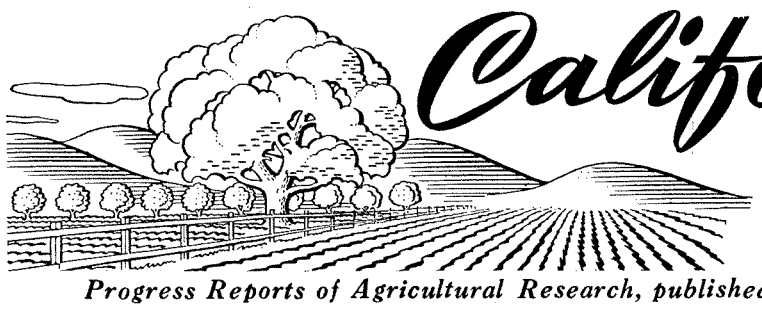

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Control of Peach Twig Borer Under Continuing Study

Stanley F. Bailey

In the past year or two many new chemicals have entered the field of insecticides but the majority of them are not useful in the control of the peach twig borer.

Laboratory experiments show that the larvae of the peach twig borer will be paralyzed by crawling across bark and leaves sprayed with DDT, and therefore, caterpillars do not need to feed on poison-sprayed leaves to be killed.

Some growers have used the wettable DDT spray powders—usually 50 per cent strength—at the rate of one pound of actual DDT per 100 gallons of water, as well as a five per cent dust, to control this insect on canning peaches and report excellent results.

In experiments in the orchard on almonds, DDT was compared with the basic lead arsenate spray, and found to be slightly superior in controlling the peach twig borer.

DDT Residue

Preliminary tests with canning peaches have shown that the amount of DDT residue on the fruit at picking time has been far below seven parts of DDT to one million parts of the fruit, which is the amount permissible on apples and pears.

Small scale tests in which the fruit was lye peeled, showed that all the DDT was removed by that process. It is still unknown whether the DDT residue in the lye tank will accumulate sufficiently under average cannery conditions to contaminate the commercial pack without frequent changings.

(Continued on page 2)

Extra Irrigation Is Extra Expense In Prune Production

A. H. Hendrickson and F. J. Veihmeyer

There exists a general idea, that if maintaining moisture in an orchard readily available to the trees at all times is good, the addition of more water to keep the soil moisture relatively high is better.

Experiments with prune trees over a 13-year period do not support that idea.

Experimental irrigation plots of eight French prune trees were replicated three times for two of the test treatments and four times for the third. All plots in each treatment received the same irrigation.

Test Treatments

Whenever the plots were irrigated, the soil was moistened to a depth of six feet, so the trees either did or did not have moisture to the depth occupied by most of the roots. Light irrigations, wetting the soil to a shallow depth were not used.

Treatment **A** was kept at a relatively high moisture content. Treatment **B** was allowed to exhaust the moisture to the permanent wilting percentage before replenishing one supply. Treatment **C** was irrigated during the early part of the season only, the average date of the final irrigation being July 20.

The irrigations were under the direction of the same man throughout the 13 years. The average application was very close to 7.5 acre inches.

The soil moisture records for these treatments indicate that in general, the **A** treatments had readily avail-

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DDT Dust With Sulfur Is Treatment Recommended For Summer Control Of Greenhouse Thrips On Avocados

Walter Ebeling

During the past few years the greenhouse thrips, **Heliothrips haemorrhoidalis,** has become the most serious of the avocado pests, especially in the areas of greatest concentration of the avocado industry, in San Diego County.

The greenhouse thrips is 1/24 of an inch in length, dark brown to black, and very sluggish in its movements. The adults seldom, if ever fly.

As a result of successful preliminary trials with DDT sprays and dusts, made by the University of California College of Agriculture in cooperation with the San Diego County Agricultural Commissioner's Office, many growers used a DDT sulfur dust to control greenhouse thrips during the past season.

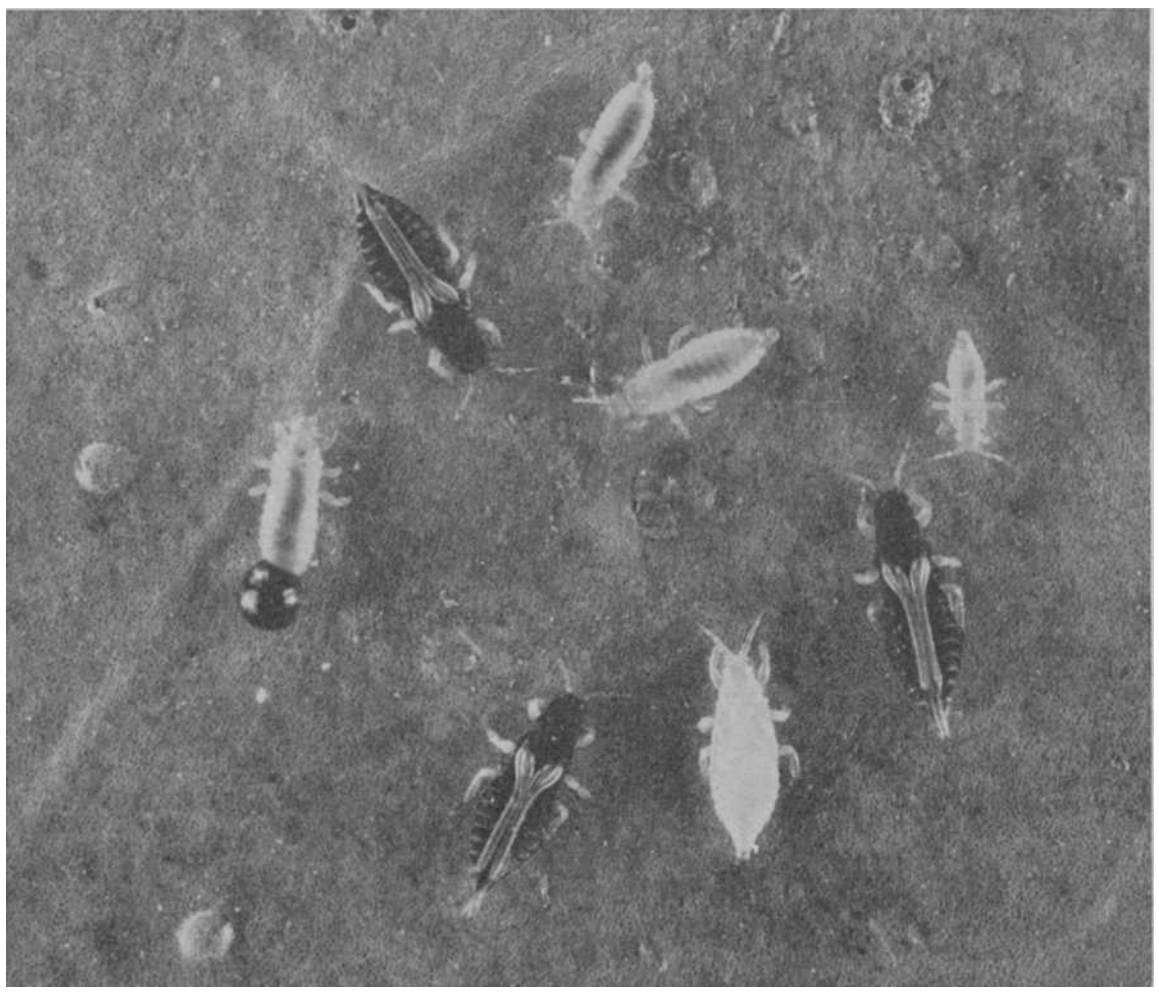
The dust consisted of 5 per cent DDT and from 50 to 85 per cent sulfur, the latter for the control of avocado brown mite, **Paratetranycchus coiti.** From one-half to one pound of dust was applied per tree by means of a small wheelbarrow-type duster pulled by one man and pushed and operated by another.

Good results were obtained by use of this rapid and relatively inexpensive method of treatment.

stances that the second application is not necessary. The present year will be the "on year," however, in the alternate bearing cycle, and no chances should be taken with greenhouse thrips.

With good control this year, it is possible that next year—the "off year"—no treatment may be necessary.

DDT may also be applied as a spray, using one-half pound of actual DDT to 100 gallons of spray, to which two pounds of wettable sulfur may be added for brown mite control.



Larvae, prepupa, and adults of the greenhouse thrips on a carissa leaf. Note also egg mounds, some with exit hole made by emerging egg parasites. (Photograph is greatly enlarged)

Often all stages of this insect—the two larval stages, the pupal stages, and the adult—may be found together on an avocado leaf or fruit, frequently tending to congregate in small colonies. With the aid of a hand magnifying lens, small, corky pimple-like protuberances may be seen on the leaf or fruit, indicating where the tiny, kidney-shaped eggs have been inserted beneath the cuticle.

Injury Caused by Greenhouse Thrips

The injury consists of whitish discoloration of the infested areas of the leaves and fruit, followed by a brownish appearance and leathery consistency of the epidermis. In case of the fruits, this may be accompanied by cracking. Premature dropping of infested leaves and fruit may also ocur. The fruit is degraded or culled, depending on the severity of the injury.

Control

Within recent years, good control has been obtained by spraying with light medium oil and pyrethrum extract, but often spraying is not a practicable method of treatment in avocado orchards, besides being quite expensive.

Recommendations

The thrips begin to attack the fruits when the latter are about the size of a hen's egg. If the trees are dusted before the fruit has a chance to become infested, injury to the fruit may be entirely avoided. After the fruit becomes infested, it is difficult, by means of dusting, to kill the thrips which occur on the lower surfaces of the fruits.

It is recommended that in the control of greenhouse thrips attacking avocados, a 5 per cent DDT dust, containing sulfur, should be applied between June 15 and July 30, followed in five to seven weeks by a second application.

From an inspection of the orchard it may be concluded in some in-

Effect of DDT on Other Pests

Not enough experience has yet been obtained to predict the long term effects of the DDT on the other pests of avocado, which might increase in numbers because of the effects of the treatments on parasites and predators.

The long-tailed mealy bug populations, however, were decreased by DDT applications made last year.

DDT Residue

Analyses of 23 samples of fruit, taken from commercially treated orchards and experimentally treated plots, showed in all cases that the residue of DDT was considerably less than the provisional tolerance of 7 parts per million allowed by the Federal Food and Drug Administration for certain crops.

Walter Ebeling is Lecturer in Entomology and Associate Entomologist in the Experiment Station, Los Angeles.

New Method For Disposal of Liquid Waste By Wineries

G. L. Marsh

Pilot scale field tests during the past vintage season proved it is possible to eliminate the odor nuisance and the mosquito menace from land disposal of winery liquid wastes, or stillage.

Methods of stillage disposal commonly in use can no longer be considered satisfactory in those areas where recent population growth has put wineries close to or in residential developments. The odors arising from the disposal ponds or lagoons, as a result of the decomposition of the organic material in the stillage, give cause for justifiable complaint.

The wine industry, through its agency, the Wine Institute, The Coast Laboratories, Inc., and the University of California cooperated during the past vintage season in carrying out successful field tests in developing a new method of land disposal of winery liquid wastes.

Intermittent Irrigation System of Disposal

The chief difference between the new method and some of the older systems, is the manner in which the liquid is applied to the land. The size, shape and area of the disposal basins or settling tanks have important places in the success of the system.

As the name implies, the liquid is added intermittently to the land set aside for the purpose, rather than continuously. This is accomplished by dividing the area of land into shallow basins—similar to irrigation checks—of a size capable of holding the daily stillage output to a depth

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Precision Planter For Row Crop Seeds Proved Successful

Roy Bainer

Precision planting of small seed row crops is now possible by the use of a metered planter which drops the seed at a pre-selected, uniform spacing in the furrow.

The development of the precision planter followed the introduction of processed sugar beet seed in 1942. The widespread adoption of the processed seed created a demand from growers for improved planting equipment.

Planters then in use failed to give the uniform distribution desired when processed seed, containing a high percentage of single-germ units, was planted at six to 12 seed units per foot—from three to six pounds per acre.

Uniform Seed Size Required

Early in the planter development program, uniform close grading of processed seed was found necessary to avoid the possibility of having more than one seed at a time in the seed wells or cells of the seed plate.

Seed processed by segmentation—the shearing of the seed ball into its parts—gave the best results when graded to within a range of 2/64-inch in size.

Seed processed by decortication or burr reduction—rubbed into parts between the mill-like wheels of a machine—may vary as much as 3/64-inch in size without causing excessive filling of the seed plate cells.

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Irrigation Engineering Applied To Winery Waste Disposal, Stops Odor Nuisance, Mosquito Menace

(Continued from page 1)

of not more than six inches and preferably not over four inches.

Use of Disposal Basins

A sufficient number of basins should be provided so that cycling or rotated use of each check occurs at not less than seven day intervals. If plenty of land is available, ten day intervals are recommended. Pomace stillage requires a somewhat longer cycling period because of its higher suspended solid content.

period which produces the curled pieces of dried residue.

Dried Layer Rich in Protein

The pieces of curled residue will float when the next application of stillage is made. In the pilot scale testing, better than twenty applications were made to a basin without a serious reduction in the rate of percolation of the liquid into the soil but the dried cake accumulated to a considerable thickness.

The waste solids remain as a thin layer on the floor of the disposal basin after the liquid disappears. As the layer dries, it cracks and curls exposing the surface openings of the soil to the air.

Four to six inches of stillage placed upon a basin usually will be absorbed within 48 hours by soils classed as sands and loams. This is an important feature of the method as it enables aerobic bacterial decompositions to reduce the organic content to a very considerable degree.

Shallow Basins Important

An important feature of the intermittent irrigation method of disposal and the one which accounts in a large measure for its success, is the change occurring at the soil surface.

The solids and the colloidal material which the stillage contains will seal the pores of the soil surface under continued application and reduce percolation to the minimum.

In the ponds or lagoons of the older method of land disposal the soil surface becomes so tightly sealed that percolation almost ceases and the odor nuisance develops.

In the shallow basins with not more than four to six inches of liquid at any time the rate of percolation is not reduced to any great extent. The liquid disappears in 48 hours and the surface of the basin begins to dry.

Odors and Mosquitoes Avoided

A thin layer of waste solids remains on the floor of the basin after the liquid disappears. Because of the nature of the solids the upper surface of the layer dries faster than the under surface. The layer cracks and breaks into pieces which curl upward. The combined action of the breaking and curling re-exposes the surface openings of the soil to the air, allowing it to dry before the next application of stillage.

Odors and mosquito breeding waters are eliminated by the drying

At periodic intervals the dried layer should be scraped and collected. Most, if not all, of it should be removed before the rainy season begins.

Because the dried cake is approximately 35 per cent protein, it has a potential value as a concentrated fertilizer.

Operational Recommendations

The intermittent irrigation system of disposal has important features intended, primarily, to reduce the amount of liquid waste going to the stillage basins.

Separation of the clean, uncontaminated waters, from condensers and cooling coils, will reduce materially the volume of liquid from as much as a conservative 25 per cent to as high as 75 per cent in some cases.

Increasing the strength—the alcohol concentration—of the distilling material will decrease the volume in direct proportion as the strength is increased. Certain changes in distilling material production may be necessitated but should be undertaken by the wineries.

A competent and trained man should be placed in charge of the operation of the disposal system. Careless handling of the basins can quickly result in standing pools of putrid waste waters. Intelligent handling can keep the basins operating at capacity during the entire vintage —including the cloudy, wet weather at the tail-end of the season.

G. L. Marsh is Assistant Professor of Food Technology and Assistant Chemist in the Experiment Station.

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sate for the extra irrigations involved.

On the other hand treatment **C** obviously suffered from insufficient irrigation. The total crop was smaller than either **A** or **B** and the average percentage of large sizes was also smaller.

The results indicate that refilling the soil reservoir when empty or nearly so is the most economical irrigation practice. In commercial operation irrigation must be started somewhat before the lower limit is reached in order to cover the entire acreage before the last trees are allowed to suffer very long.

The results of these experiments show that soil moisture is readily available throughout the range between the field capacity and the permanent wilting percentage.

The results also indicate that trees in soil at the permanent wilting percentages for comparatively short periods are apparently not injured, but that reduction in growth and crops results when they are allowed to suffer for water for long periods.

Except for a small increase in cross-section area, there is nothing in these results to indicate a marked benefit from using more water than necessary. Conversely, there was no harm to the trees.

A. H. Hendrickson is Pomologist in the Experiment Station, Davis.

F. J. Veihmeyer is Professor of Irrigation and Irrigation Engineer in the Experiment Station, Davis.

Rootstocks For Marsh Grapefruit Investigated

L. D. Batchelor and W. P. Bitters

Two experimental plantings of Marsh grapefruit on several different rootstocks were made in 1928.

One parent tree of the Marsh grapefruit supplied the buds used on seedling rootstocks from a selected parent tree of each variety of rootstock.

One orchard, at Brawley, is on Holtville silty loam. The other orchard, at Riverside, is on Ramona loam.

The average annual yields were recorded in pounds of fruit per tree and the size of each tree indicated by the square centimeters of a trunk cross section.

Effect of Rootstocks on Tree Size

One of the most noticeable effects of the rootstocks on the orchard trees is their influence upon the sizes of the trees.

Trees on Sampson tangelo rootstocks are larger than those on sweet orange rootstocks. Trees on Rough lemon, sour orange, and Cleopatra mandarin stocks are about the same size and all are smaller than trees on sweet orange stock. Trees on Trifoliate rootstock are the smallest.

In general, the yields are in proportion to the size of the trees.

Trees on sweet orange rootstock have produced somewhat more than those on sour orange, primarily because they are slightly larger trees.

Rootstocks and Fruit Quality

Certain citrange rootstocks have improved the fruit quality.

The Rough lemon and the Palestine sweet lime rootstocks have invariably lowered the quality. Total sugars, soluble solids and total acids in fruit produced by trees on these rootstocks are lower than those on other rootstocks.

These two rootstocks are the exceptions to the general absence of any striking effect upon the quality of the fruit by either sweet orange or sour orange rootstocks.

Tree Hardiness

Rootstocks affect the hardiness of the trees. Trees on sour orange rootstock in an experimental orchard in Imperial Valley were only about one quarter defoliated by a minimum temperature of 17° F., in 1937. At the same time, trees on Rough lemon were more severely injured, and lost nearly three quarters of their foliage.

The experimental plots were duplicated several times in the orchard and these differences in defoliation were consistent throughout.

The orange tree quick decline prevalent among Washington Navel and Valencia orange trees on sour orange rootstock has not yet been found among grapefruit trees.

The Cleopatra Mandarin Rootstock

Among the uncommonly used rootstocks the Cleopatra mandarin has produced as good as the sweet orange rootstock in the Riverside orchard, and nearly as good as the sour orange rootstock in Brawley.

It is more resistant to gummosis than sweet orange rootstock.

The quality of fruit from the Cleopatra mandarin has been almost exactly the same as the average quality for all the rootstocks studied.

The Cleopatra mandarin and the Savage citrange are clearly superior to other tested varieties in their respective groups.

The Savage Citrange

The Savage citrange, another uncommonly used stock, has made a good showing in both orchards.

It has produced fruit of outstandingly good quality and more of it, in proportion to the size of the trees, than other rootstocks.

The seed for this rootstock is not generally available now but could soon be produced by topworking mature trees for seed production purposes.

The Sampson Tangelo

The production from trees growing on Sampson tangelo rootstock has been somewhat lower than would be expected from the size of the trees. Both of these orchards have had only a moderate amount of fertilizer, and possibly it has been insufficient for such large trees.

(Continued on page 4)

Successful Precision Planting Of Small Seed Row Crops Now Possible With Improved Planter

(Continued from page 1)

Graded whole seed and pelleted seed give little trouble with over-filling or multiple-filling, when sized within a 3/64-inch limit, because of the spherical or ball shape of the seed.

Plate-type Planters

Planters employing vertical, horizontal, or inclined plates are capable of uniform metering of seed.

Certain problems are common to all plate-type planters. It is essential that the cells in the plates fit the seed. There must be sufficient opportunity for the seeds to enter the cells of the plate. Positive unloading of the cell is necessary for regularity of drop. The tube carrying the seed from the plate to the furrow must be smooth to offer only the least restriction to the seed.

Laboratory Tests

Special laboratory equipment was set up for testing the metering units before making field tests with them.

The equipment consisted of a stand, adjustable in height, for mounting the units under test. A power driven endless conveyor was provided for carrying grease-coated boards under the planting device. The grease caught and held the seeds in place as they fell from the planter.

This method of studying the seed distribution of each planter was useful in determining the effect of modifications in design on the performance.

Field Tests

Following pilot field tests, a commercial planting of sugar beets was made on 80 acres near Davis, last season.

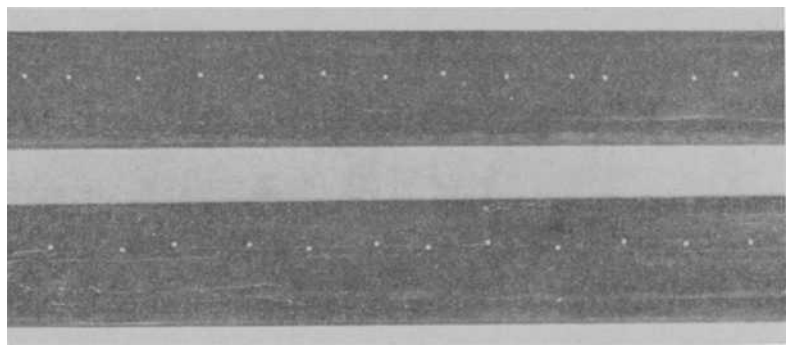
Thinning of the field was combined with the first hoeing for weeds.

The uniformity of the seedling stand was emphasized by the fact that an average final stand of 119 beets—85 per cent singles—per 100 feet of row was obtained.

The final yield amounted to slightly less than 20 tons per acre.

For Seeds Other Than Beets

The precision planter was developed for sugar beets but has been adapted to handle peas, beans, grain sorghums, spinach, pelleted tomato, onion and lettuce seeds.



In the above illustration the white spots are seeds on boards coated with heavy grease to hold the seeds in place. In the laboratory tests these greased boards were used to catch the seed as it was dropped by the planter and to hold them where they fell so the accuracy of the mechanism could be studied.

In a field test near Davis, pelleted onion seed was planted at the rate of nine pellets per foot and produced a final stand of six plants per foot.

Last year, 20 acres near Davis were planted to tomatoes, using commercially pelleted seed. Two rows, six feet apart, were planted at one time. Seed was dropped every three inches and thinned, by hand, to one plant every 24 to 30 inches.

No transplanting was necessary and for that reason tobacco mosaic was reduced to a minimum.

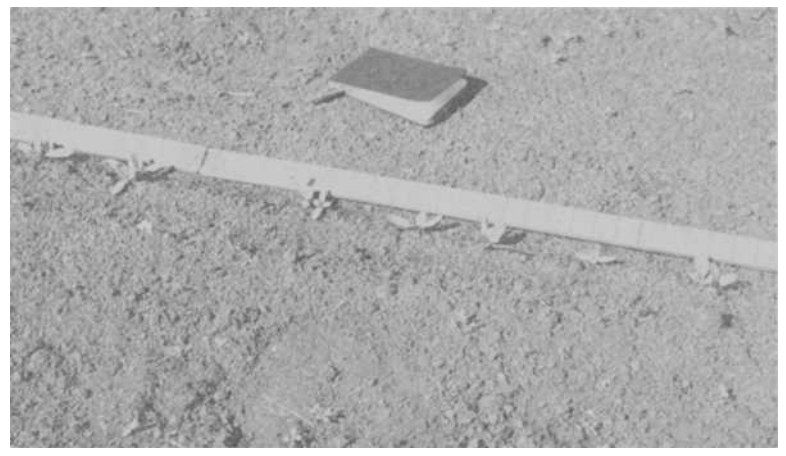
This year, 300 acres were planted to tomatoes as a result of last season's test planting of 20 acres.

Precision Planting—Precision Practices

Precision planting requires precision seed and precision farming practices if the greatest gains are to be realized.

Planters available today are capable of better performance than the seed and farming practices used justify.

New developments in seed process-



Field test followed laboratory experiments to prove the practicability of precision planting. Note the pencil and pocket notebook for comparative sizes in judging the regularity and spacing of the plants seeded by precision planting, rate of less than three pounds of seed per acre.

Decorticated seed having a laboratory germination of 95.6 per cent, with 1.75 seedlings per each seed unit capable of growing, was used at the rate of 3.03 pounds per acre—3.82 seeds per foot.

Planting was done on beds to a depth of 1½-inches with the planter operating at three miles per hour. The field was irrigated following planting to insure germination.

Stand counts showed 17.85 uniformly spaced inches per 100 inches, with a total of 24.75 plants. Of the 17.85 inches with plants, 64 per cent contained singles. Under the field germination—49.6 per cent—of this trial, seed showing approximately 25 per cent singles in the laboratory, produced a stand in which 64 per cent of the inches with plants contained singles.

ing indicate the possibility of producing seed with a higher germination, a greater factor of safety and improved shape for use in a precision planting program.

Roy Bainer is Professor of Agricultural Engineering and Agricultural Engineer in the Experiment Station, Davis.

Many soils cannot be used in adobe construction unless they are improved by adding other materials to the building mixture. In fact, some soils, such as the clay known commonly as "adobe," are not at all desirable building material.

The use of oils as general contact herbicides for pre-emergence spraying in row crops is being investigated.