

BRIEFS

Short reports on current agricultural research

Decline of

REDWOOD TREES

Soil properties in old Redwood groves are being studied by sampling soils in healthy groves to ascertain the normal ranges of chemical and physical properties that accompany trees in good health. Soils in which trees have died recently or have shown signs of decline in vigor are being sampled also and their properties determined to see if any marked changes in properties have taken place. The research aims at finding some soil indicators of conditions that may result in decline of vigor or death of the trees. Such indicators could serve as warning symptoms and the corrective steps be taken to avert the loss of the old trees.—*Paul J. Zinke, School of Forestry, Berkeley.*

Chemical changes in

PROCESSED FOODS

Chemical tests for evaluating storage changes in processed foods revealed that storage temperature is one of the important factors influencing shelf life of canned tomato products. High storage temperature invariably causes rapid deterioration in quality. A storage temperature of 68°F or lower is desirable for quality retention.

Head space gases—including carbon dioxide, hydrogen, oxygen, and nitrogen—in stored canned foods are being studied by gas chromatographic methods. A sample with high hydrogen content in the head space would indicate rapid dissolving of tin and iron from the can into the food, eventually causing swelling of the can. This method is being used with other chemical tests to study storage stability of the canned cherries and apricots, pear puree, salad oil, and tomato products.—*B. S. Luh, Dept. of Food Science and Technology, Davis.*

Lygus bug damage to

TABLE BEET SEED

Lygus bugs under high population conditions cause a direct seed loss of 30%–35% to table beets grown for seed. This contrasts to a seed loss of from 50%–60% to alfalfa and umbelliferous

seed plants, when only moderate infestations are present.

High bug populations are necessary to give serious economic seed loss to table beet seed plants as the seeds appear to stick tightly and are not easily blasted. Furthermore, the weight or size of seeds does not seem to be materially reduced until large numbers of bugs are present. The most significant effect of the bugs to table beet seeds appears to be reduction of viability to about 60%.—*Elmer C. Carlson, Dept. of Entomology, Davis.*

True plant bugs on

STONE FRUITS

At least 16 species of true plant bugs—Hemiptera—occur together or successively in stone fruit orchards of California. As far as now known, three of these sucking insects—conspire stink bug, leaf-footed plant bug, box elder bug—puncture green almonds to produce a condition called dark kernel spot. Dimpling and pithy flesh of peaches are attributed to stink bugs. Lygus bugs produce pinholes and dime-spots in the skins of the same fruits. One kind of twig die-back of peach is caused by lygus bug bites, ovipunctures, or both. Other species of this general group of insects are under suspicion as being orchard pests, but the symptoms of their feeding or egg punctures have not been definitely distinguished. Complications arise when symptoms of injury produced by several species are confused. For example, Davis entomologists concerned with controlling lygus bug damage to peaches recently found that the minute pirate bug, a species widely regarded as a predator, also damages peach buds by ovipuncture and that this species may produce a large share of the terminal die-back hitherto regarded as lygus bug damage.

Current investigations on the biology and control of plant bugs affecting peaches and almonds have revealed several mixups as to identities of the bugs in relation to kinds of injury. Accordingly, this research at Davis is being extended to include studies of isolation cultures of each of the endemic species on fruits and foliage, to determine similarities of damage.—*Francis M. Summers, Dept. of Entomology, Davis.*

NEMATODES

attacking cotton

The cotton root-knot nematode is the only important nematode pest on cotton in California. Widely distributed in cotton-growing areas, it causes loss of yield mainly in cotton on sandy soils.

Preplanting applications of nematocides have proved satisfactory and economical. Yield increases following control have usually exceeded one-fourth bale of lint cotton per acre, and have been as high as one-half bale in experimental plots.

Cultural methods of control include alfalfa rotations, fallow periods, and regulation of irrigation schedules. Alfalfa rotations are effective in most areas, but their success is sometimes limited by the host plant range of the nematode population. A fallow period during the summer, particularly following grain, reduces soil populations so that a satisfactory crop of cotton can be grown the following year. However, one year of clean fallow has little or no effect upon root-knot nematode populations 2'–4' or more below the surface. Two years of clean fallow reduced the population at all depths, but did not eliminate the nematode at any depth. Significant yield increases have been obtained on some sandy soils by delaying the first irrigation, but this was not true if the soil had received a preplanting fumigation.

Resistance of all breeding lines and varieties of cotton is being investigated. So far, Acala 4-42 has been found only moderately resistant. The families comprising Acala 4-42 vary in resistance, but even in the most resistant, root-knot nematode may reduce yield by more than one-half bale per acre. If a high degree of resistance is found in any of the lines and varieties under study, they will be used as a source of resistance for Acala 4-42.—*M. W. Allen, Dept. of Plant Nematology, Davis.*

Trees required in life cycle of certain

ROOT APHIDS

Aphids of the genus *Pemphigus* are of particular interest to farmers and to entomologists because the aphids possess complicated life cycles—alternation of

sexual and asexual cycles between poplar trees and annual plants—and certain species select agricultural crops in fulfilling portions of their life histories.

One species—the lettuce root aphid—alternates between Lombardy poplar and lettuce. In the spring of the year stem mothers, hatching from overwintering eggs on poplar, start forming typical pear-shaped galls on the petioles and leaves. Winged forms later migrate to lettuce and other weed hosts. Continuous asexual cycles can occur on lettuce and certain weeds irrespective of the poplar cycle. In the fall certain winged migrants move to poplar bark and give birth to beakless sexual males and females. The females lay one egg each.

A second species—the sugar beet root aphid—is believed to be the asexual form of one of the native species forming galls on cottonwoods. The relationships of six or nine species remain to be investigated in California.

The aphids in the galls are entirely

distinct structurally from aphids of the same species occurring on the roots of annual plants and the forms on annual plants tend to exhibit very similar structural characteristics.

Control investigations have shown the value of pre-plant parathion applications in the control of the lettuce root aphid, but no adequate chemical control has been developed for the beet aphid.

Further investigations of this group of gall and soil infesting aphids may lead to developing adequate chemical or other control measures.—*W. H. Lange, Dept. of Entomology, Davis.*

Weed control in

SWEET PEA SEED CROP

at Lompoc

Two chemicals—neburon and CDEC—successfully controlled weeds in sweet pea seed fields when properly applied at

the right time. Both chemicals are low in toxicity to man and animals.

Neburon is effective against more species of germinating weed seed—including grass and broad-leaf—than CDEC, but may not control seed germinating from depths of 1" or more. CDEC is particularly effective against most germinating grass seed.

Immediately after planting, neburon and CDEC were sprayed on the soil surface of test plots. Weeds were controlled in the treated plots and seed yield increased. At regular handweeding time, weeds removed from the untreated check plot included prostrate pigweed, lamb's-quarters, shepherd's-purse, nightshade, small nettle, common knotweed, yellow mustard, wild radish, bull mallow, red brome, and foxtail. Neburon at the rate of two pounds active per acre in 100 gallons of water gave good broad-leaf weed control early in the season, but it was not so effective against grass species.—*Jack L. Bivins, Agricultural Extension.*

CITRUS

Continued from page 3

size, especially in groves which were in a state of decline. Recovery of these trees, indicated by yield, required from 4-5 years. By contrast, experimental plots with Valencia oranges in Santa Paula and lemons in Ventura—which were not in a state of decline—showed but little decrease in production and fruit quality as a result of soil fumigation, and made total, rapid recovery. The D-D used for soil fumigation is quite toxic, and it destroyed much of the root system in the area treated. However, the vigor of the trees was apparently sufficient to prevent serious decline and encourage rapid recovery.

Soil Physical Properties

In order to evaluate the effects of soil treatments in each grove, soil samples were taken from various depths at the start of the study. Soils studied included three sandy soils, with quite different percentages of sand, silt, and clay, and three loams with about the same percentage of silt, but varying widely in their clay content.

Comparisons were made between soils under the tree and soils under the furrow-irrigated areas. One factor was consistent in all the orchards—the less favor-

able physical properties of the soils in the furrowed row middle as compared with soils under the trees. This indicates that the poor soil structure is probably the result of orchard traffic and more mechanical tillage in the middles.

In the orchard at Redlands there was a marked difference in bulk density—weight of soil per unit volume—between the top soil in the areas under the trees and that in the furrow or middle area. This appeared to have little effect on how much water the soil held or the hydraulic conductivity—rate of flow divided by hydraulic gradient in saturated soil. The soil under the furrows had a smaller volume of large pores than did soil under the trees. The larger pores control the rate at which water infiltrates into and moves through the soil. The Ramona loam from Riverside also showed a much more compacted condition in the furrow area. Soil in this orchard is a good example of one that can be abused easily when subjected to the cumulative effects of normal cultivation, sprinkler irrigation, and other cultural practices which can cause a deterioration in soil tilth. The hydraulic conductivity in the furrows was at a minimum and therefore required a long period of irrigation to rewet the soil. With this type of soil, traffic and mechanical tillage contribute to a compacted soil layer and a reduction in water penetration.

The Ventura orchard was also a prob-

lem soil in so far as water infiltration was concerned. The high silt-clay ratio resulted in a poorly aggregated soil. However, this orchard seemed to be less affected by cultural practices than did any of the other five. The soils in the orchards at Santa Paula and Highlands were similar to that in Riverside. Certain cultural practices may have more of a detrimental influence on their structure than was the case with either the Redlands or Ventura soils. The surface soil in the orchard at Olive was very coarse-textured but had areas of fine material below. These caused sharp changes in suction-moisture content relationships in the soil profile.

Physical conditions of soils are related to many factors. On some soils a certain management practice may be beneficial while on others it will show no effects. Some management practices, such as mulching and less orchard traffic, could encourage the development of larger soil pores in irrigated middles. A higher percentage of these pores would increase the infiltration rate of the soil as well as its hydraulic conductivity.

O. C. Taylor is Assistant Horticulturist, University of California, Riverside.

L. H. Stolzy is Assistant Irrigation Engineer in Soils and Plant Nutrition, University of California, Riverside.

R. B. Harding is Associate Chemist in Soils and Plant Nutrition, University of California, Riverside.