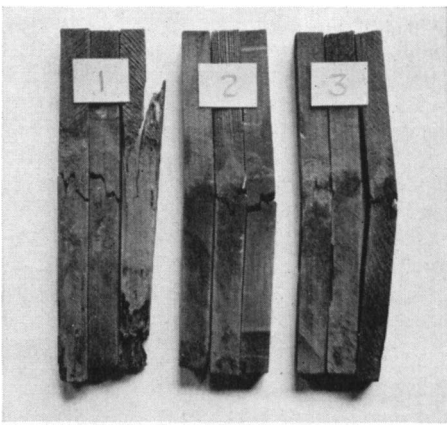


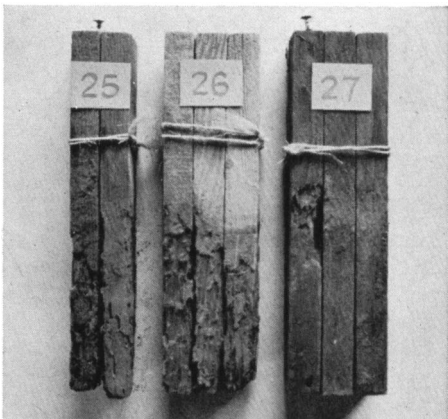
Treated Wood Stakes

exposed Douglas fir and eucalyptus stakes require treatment for long life

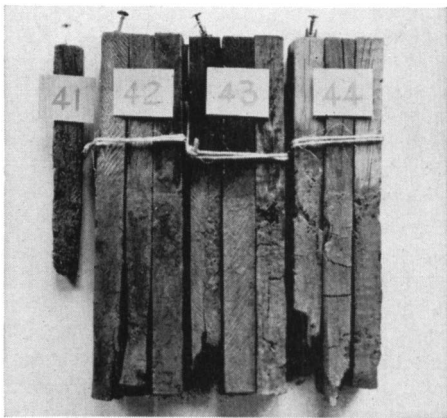
L. W. Neubauer



Redwood stakes, after being broken in the testing machine. No. 1, Untreated, showed some termite action, but retained most of their strength. No. 2, Creosote bath, remained in good condition, with little loss of strength. No. 3, Creosote, one brush coat, also remained in fine condition for 12 years.



Douglas fir stakes, removed from ground after 12 years. No. 25, Zinc chloride bath, with many termites, suffered severely from exposure. No. 26, Selenium-tellurium bath, also suffered from termites, but retained more strength. No. 27, Crankcase oil bath, showed but small termite action, and tested the highest of all in this experiment.



Eucalyptus stakes, after 12-year exposure. No. 41, Untreated, were badly rotted, and most had failed. No. 42, Creosote bath, showed some decay, but retained good strength. No. 43, Columbia bath, had some decay and termites, but also retained good strength. No. 44, Zinc chloride bath, suffered more decay and termites, with a very poor ultimate strength.

Simple and convenient methods for preservative treatment of redwood, Douglas fir and eucalyptus wood were tested with a total of seven different oils and chemicals in a 12-year study at Davis.

Stakes of 1"×1"×12" were sawed from a stock redwood fence post, from No. 1 grade Dimension Douglas fir and Oregon pine, and from partially cured trunks of locally grown trees of eucalyptus and willow.

Some of the treatments are well known, while others are relatively new. Certain preservatives were applied in different ways, to secure various penetrations and absorptions, resulting in thirteen different types of treatment. No commercial pressure treatments were used.

All bath treatments were two hours hot and two hours cold. Steeping treatments were applied cold.

The stakes were set with six inches in the ground—a fine sandy loam—so that the remaining six inches protruded above ground level.

The tests were accelerated by sprinkling the stakes occasionally with water for the first three years, to increase the action of fungi and termites.

Flexural Strength of Stakes

After a period of two years in the ground, some of the stakes were removed and tested in comparison with similar stakes which had been kept in dry storage. This comparison of maximum fiber stress showed just what decrease in strength resulted from the two-year exposure.

From the results on the check specimens it is evident that Douglas fir stakes are strongest, and that redwood stakes are weakest, before being subjected to exposure to weather or to fungi or termites in the soil.

After exposure of only two years, many stakes suffered considerable weakening. This was particularly true of the untreated specimens. Most of the treated pieces retained their strengths better, although this was not always true, as the Columbia bath treatment of redwood maintained the flexural strength at exactly the same level—7,200 pounds per square inch.

During the 12-year test, the earliest failures occurred in the fourth year, when

some of the Douglas fir and Oregon pine stakes were removed. In the sixth year, failures also developed among the eucalyptus and willow specimens. One row had failed completely within eight years. Among the redwood stakes, not one had failed during the full twelve years.

At the conclusion of the test period, all stakes remaining were removed from the ground and were subjected to ultimate flexural strength tests, to determine their final relative strengths. They were rated according to appearance and the conditions of each at its top, middle, and bottom portion. Where all stakes in a row had failed, the final strength was zero. Some of the redwoods, and others having high-grade preservative treatments, showed a final strength almost as high as the original.

Preservative Treatments

A relatively small variation occurred in the strength of redwood stakes. The natural lumber is very durable, and various treatments showed but small influence.

Douglas fir stakes, on the other hand, showed a much wider variation—from zero to the maximum of all tested—because of the low natural decay resistance of this wood.

Eucalyptus stake tests were less numerous than the others, but showed considerable variation.

The Influence of Time

A natural decrease in all cases was apparent over the 12-year period. This was not severe for redwood, because of its natural decay resistance, and all specimens remained in fair condition at the conclusion of the test. The weakening of redwood, though slight, was relatively uniform. The untreated specimens showed to better advantage than certain preservative treated groups.

Douglas fir and eucalyptus followed similar time-strength patterns, both being stronger originally than redwood, but were affected rapidly by termites and decay, and many were of no value at the end of 12 years. The greatest weakening occurred apparently during the first two or three years, under the accelerated

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IRRIGATION

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The top layers of soil are filled to field capacity before water moves downward to the dry soil beneath.

The depth of penetration depends largely upon the amount of water, whether by rain or irrigation and upon the texture of the soil. A light rain wets the soil to a shallower depth than a heavy one. Furthermore, a given amount of water wets a loam soil to a shallower depth than a sand. For example, in a loam soil an inch of rain may penetrate five or six inches, while in a sand it may penetrate a foot or more. Conversely, the readily available moisture from a given depth will ordinarily be exhausted more rapidly from a sand than from a loam.

After walnut trees come into leaf, moisture begins to leave the soil. Most of the water moves out through the leaves by the process of transpiration, but some is lost by direct evaporation from the soil.

The movement of water out from the soil is somewhat different than the movement into the soil from rain as the roots extract it more or less uniformly. This gradual, fairly regular reduction of soil moisture may be used in judging when the available supply will be exhausted and when the first irrigation will be necessary.

The permanent wilting percentage is a characteristic of the soil. All plants seem to have the ability to reduce the soil moisture to the same extent.

If weeds in a walnut orchard show signs of wilting, it may be assumed that the trees are close to that condition also. Weeds, being shallower rooted than trees, wilt first.

Trees reduce the soil moisture in a given orchard to the same moisture content year after year. The permanent wilting percentage is a soil moisture constant that does not change with the passing years. Drouth resistance in trees is not due to their ability to extract more water from the soil than other plants; but to their ability to withstand long periods of dry soil conditions without dying.

Under conditions at Davis about three irrigations—wetting the soil to a depth of seven or eight feet—are adequate. The first two irrigations are applied before harvest and the third one as soon as possible after the crop is gathered. If the soil is wetted to a shallower depth, or is coarser in texture than the loam soil at Davis, more frequent irrigations may be necessary. As a rule all of the moisture from the last irrigation is not used before leaf fall, and the remainder, together with the rainfall, is sufficient to provide enough water to start the trees with a reservoir that is full or nearly so.

The irrigation schedule should be

planned so as to interfere as little as possible with other orchard operations. Where spraying is necessary, irrigation water should be applied either sufficiently in advance of the spraying to allow the surface to dry before it is necessary to take the spray equipment into the orchard, or should be postponed until after the spray job is done. Likewise, the irrigation schedule should be so planned with regard to the harvest date that the nuts can be picked up from dry soil.

After harvest many growers feel that no more water is necessary. It should be pointed out that the leaves are still on the trees, and certain food manufacturing processes are still going on. While the leaves are on the trees, they use water whether there is a crop on the trees or not.

The last irrigation need not be as heavy as the early ones, but the exact amount may depend on the grower's ability to predict correctly the onset of winter rain. In most cases water not used during the fall months is not wasted, but is moved down by the winter rains and forms a part of the supply for the next season.

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.

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STAKES

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weathering. All treatments appeared to be of some benefit to these woods. In some cases, Douglas fir showed superiority to eucalyptus.

The creosote oil treatments maintained their reputations of being superior. The crankcase oil bath cannot be considered significant, because of its unreliability, as indicated by variable results. Another weakness of such treatments lies in the wide variation in chemical composition of different samples of crankcase oil. Zinc chloride home treatments are apparently ineffective, according to these tests.

A study was made to check the relation between the amount of preservative absorbed and stake strength after 12 years. There seemed to be no conclusive relation between these two variables, but when the various points were plotted, a few observations could be made. Under a heavy retention of the treatment, good durability always resulted. Under light treatments there was considerable variation. Many of the brush treatments were surprisingly effective. Crankcase oil treatments varied widely, apparently being not dependable.

Only a few methods were consistently

satisfactory. The creosote and Columbia baths were most consistent, followed by conservo, crankcase oil, selenium-tellurium, cold treater dust, and zinc chloride, in varying order for the three different kinds of wood.

Treatments listed in order of their values as preservatives considering average rank, dependability, and effect upon nondurable woods, are: creosote, Columbia, crankcase oil, conservo, selenium-tellurium, cold treater dust, zinc chloride.

Recommended methods of application are listed in the order of their effectiveness: pressure, hot and cold bath, hot bath, two brush, one brush, cold bath—steep.

L. W. Neubauer is Assistant Professor of Agricultural Engineering and Associate Agricultural Engineer in the Experiment Station, Davis.

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INSECTS

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amounts of residue were present on the washed tomatoes and in the juice extracted from these tomatoes.

Considerably higher concentrations of residues were present in the pomace or residue from juice extraction, particularly with the new organic insecticides.

Arsenic was reduced to about the same level as the other insecticides after washing, but did not show as marked an increase in concentration in the pomace as did DDT, DDD and toxaphene.

It appears that there is no serious residue hazard involved with canning tomatoes where DDD, DDT or the DDT-toxaphene combination are used for the control of caterpillars attacking tomato. This is particularly true if these insecticides are not used at a concentration higher than recommended here.

In all cases in the samples from the commercial blocks, there were 0.05 ppm—parts per million—or less of residue in the juice and from 0.5 to 1.77 ppm in the pomace.

Because of the relatively higher residue in the tomato pomace, it probably should not be fed to livestock, particularly dairy cattle.

A. E. Michelbacher is Assistant Professor of Entomology and Assistant Entomologist in the Experiment Station, Berkeley.

W. W. Middlekauff is Assistant Professor of Entomology and Assistant Entomologist in the Experiment Station, Berkeley.

N. B. Akesson is Instructor in Agricultural Engineering and Junior Agricultural Engineer in the Experiment Station, Davis.

Frank Lamb is Chief Chemist, National Canners Association, Western Branch Laboratories.

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