

initial control of standing vegetation (amitrole is *not* as yet registered for use in walnut orchards).

No symptoms of injury were observed in trees in the tested areas with the exception of leaf symptoms appearing in late June in the Chambers plot, Butte County, on a sandy river bottom soil that had been treated in April at the rate of 4 lbs per acre. Symptoms in young trees consisted of marginal and interveinal chlorosis, recognized as characteristic of triazine symptoms in walnuts.

A method for simazine analysis was developed which gave an average 80% recovery with average deviation of $\pm 42\%$. No residue was found in the meats of walnuts from samples of 10 orchards. Samples from the same field tests were also analyzed for diuron by the E. I. du Pont de Nemours Chemical Company and found to be free of chemical residue.

Weed control program

Annual weeds in walnut orchards can be controlled under several programs, including applications of a 50:50 mixture of weed oil and water at 40 to 100 gallons per acre, depending upon the height and density of weed growth. The lower rates are sufficient for young weeds in the 1- to 2-inch stage, whereas older weeds will require closer to 100 gallons per acre. It is therefore desirable to control weeds with weed oil in the earliest stage after the maximum amount of germination. In using weed oil for annual weed control in walnut orchards, one must exercise care in using directed sprays to keep oil off the trunks, particularly of young trees, as severe damage may result from applying weed oil to the foliage or trunks of young trees.

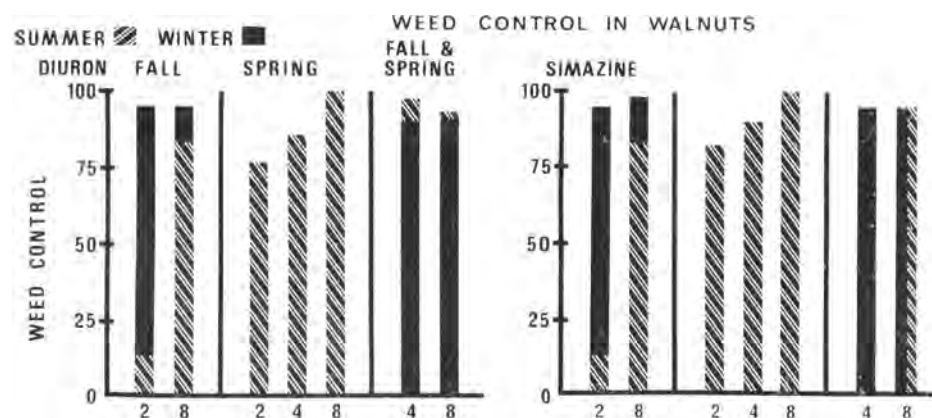
Annual weeds can also be controlled by application of 2 lbs of diuron (i.e., 2.5 lbs of Karmex) in 40 to 60 gallons of water,

applied after harvest and prior to fall rains. In areas of heavy soils and high rainfall, a second application in the spring is often desirable. Weeds can be controlled over the entire orchard floor, in strips down the tree rows, or in small areas around the base of trees. Regardless of the method used, accurate application on the basis of the area of soil sprayed must be employed. Diuron should be used only on well-established walnut trees one year or older. It should never be used in desert valleys nor on some sandy soils. Diuron can also be used in a single application after harvest and prior to weed germination at the rate of 2.4 to 4 lbs of diuron (3 to 5 lbs of Karmex) in 40 to 60 gallons of water per acre. The lower rate of 2.4 lbs has usually been adequate in light soils whereas in heavy soils with high organic matter content, 4 lbs has given better weed control, with sufficient safety, to well-established walnut trees, one year or older.

Simazine is also recommended for annual weed control in walnut orchards and should be applied at the rate of 2½ to 5 lbs of 80W simazine in 40–60 gallons of water after harvest, i.e., before annual weeds germinate in the fall. More latitude on timing can be used when under sprinkler irrigation. However, under furrow irrigation it is essential to apply both simazine and diuron prior to the annual rainfall so that these herbicides may be activated by being leached into the root zone of germinating weed seeds.

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Summary of average percentage weed control from 15 field trials where applications were made in the fall, spring, and in both spring and fall, at rates of 2, 4 and 8 lb per acre. Evaluations for weed control were made in summer and again in the winter.



H. T. HARTMANN

THE OLIVE TREE (*Olea europaea* L.) has very desirable characteristics for use as an ornamental. It has attractive, gray-green foliage, and develops a picturesque, gnarled trunk and branch system as the tree grows older. It is an evergreen with a willowy-type of shoot growth which makes a very pleasing appearance. The great disadvantage of the olive as a street, lawn, or patio tree is the production of fruits which drop over a long period of time during the winter and early spring months. These, of course, become a great nuisance, discoloring concrete walks, adhering to pedestrians' shoes, and attracting birds which consume some of the olives and further contribute to the litter.

Aware of the potential value of a fruitless olive as an ornamental, horticulturists of the University of California have long been on the lookout for an olive tree which does not produce fruits. Occasionally, it appeared that one had been located, but invariably it originated in an area having warm winters and, when grown in regions having greater amounts of winter chilling, such trees would fruit. It is known from the climatic adaptation of olives for commercial fruit production, as well as from experimental studies, that the olive tree requires a period of several months with substantial chilling temperatures (about 2000 hours below 45°F) for flower and fruit production. Trees grown in regions having little or no such chilling produce few blooms or fruit because they have received insufficient winter chilling. Unlike many deciduous tree-fruit species, the olive does not require winter chilling in order to have satisfactory vegetative growth in the spring.

Australian tree

During a sabbatic leave, in Australia in 1960–61, the author discussed the desirability of a fruitless olive tree with horticultural officers of the Victoria Department of Agriculture. They mentioned the existence of a single olive tree which had been planted approximately 30 years previously near a farm house close to the town of Swan Hill in Northern Victoria. This tree had never been known to produce fruits. Other olive trees of the same age planted around the farmhouse fruited normally. This place was visited in November, 1960, just at the time the olive trees were coming into full bloom. The "fruitless" tree was in bloom, but examination proved that the flowers were

'SWAN HILL'

*... a new
ornamental
fruitless olive
for
California*



Four-year-old 'Swan Hill' fruitless olive tree, grafted on Mission olive rootstock.

all staminate, or male. There were no perfect flowers (having both male and female parts) which, in the olive, are necessary if fruits are to be produced. The trees around the farmhouse had been planted as seedlings and apparently the "fruitless" tree carried, as a genetic characteristic, the failure of the pistil (female part of the flower) to develop normally, thus resulting essentially in a "male" tree.

Scion wood was collected from this tree and shipped airmail to California to the USDA Bureau of Entomology and Plant Quarantine in San Francisco where it was fumigated with methyl bromide to destroy any possible insect pests. Following this, the scion wood was delivered to the Department of Pomology at Davis where it was grafted onto two young Mission olive trees, started from cuttings, and growing in 8-gallon containers. A year later (1962) one of the trees was planted at the University's Wolfskill Experimental Orchard at Winters while the other was maintained in the container at Davis. Holding olive trees in containers, where the roots are confined, will usually cause them to begin fruiting earlier than trees set out in the orchard.

California trials

While these two trees bloomed at both Winters and Davis in 1964, 1965, and

1966, not a single bloom has set fruit, all flowers being the staminate type. In these areas, ample winter chilling occurs to cause olive trees of commercial varieties to produce fruit.

The foliage characteristics of this "fruitless" olive are the same as those of the commercial olive varieties grown in California, exhibiting the desirable gray coloration on the underside of the leaves. The young stems are somewhat angular in shape rather than round as in the usual commercial varieties.

Leafy cuttings of this "fruitless" olive obtained in midsummer, treated with indolebutyric acid, and placed in a rooting medium of vermiculite and perlite under intermittent mist sprays in the greenhouse failed to root. No cuttings rooted out of two separate trials with 200 cuttings each, although they did callus well and maintained good leaf retention. With most commercial California olive varieties the above treatment usually results in high rooting percentages.

Since the cuttings apparently are exceptionally difficult to root, propagation by budding or grafting onto rootstock plants will be necessary. Scions of this "fruitless" olive have been grafted on one- to three-year-old trees of other varieties, started as rooted cuttings, without difficulty. A side-tongue grafting method

was used in which the top of the rootstock was not cut back to the inserted scion until the graft union had healed and the scion buds resumed growth.

Diseases, pests

Little is known at present of the relative susceptibility of this clone to the several olive diseases and insect pests which occur in California. Leaves have been found on the trees, however, showing infection with the fungus disease, peacock spot, *Cycloconium oleaginum*, which is widespread on olives in California, especially following wet winters. This is easily controlled, however, by spraying with Bordeaux mixture or lime sulfur, applied in advance of the winter rains.

Grafting wood of this ornamental fruitless olive will be distributed in small quantities for propagating purposes to nurseries through the Foundation Plant Materials Service, Department of Viticulture and Enology, University of California, Davis, starting in the summer of 1968. The name proposed for this fruitless olive is 'Swan Hill,' after the town in Australia where it was found.

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