Rooting Cuttings Under Mist

leafy softwood cuttings of paradox walnut hybrids rooted successfully in mist propagation tests during summer of 1956

Curtis Lynn and H. T. Hartmann

The paradox walnut hybrid—*Juglans hindsii* × *J. regia*—is very much in demand by California walnut growers as a rootstock for English walnut varieties due to its vigor and its resistance to crown rot—*Phytophthora cactorum*—tolerance of excess water, and apparent potential resistance to root lesion nematodes—*Pratylenchus vulnus*. Such hybrid seedlings are ordinarily obtained from nuts taken from Northern California black walnut—*J. hindsii*—trees growing in the vicinity of English walnut—*J. regia*—trees. Since the individual seedlings vary considerably in their vigor and in their resistance to various diseases and nematodes, it would be very desirable to be able to propagate such rootstock trees vegetatively from outstanding selected hybrid parent trees. However, cuttings of these hybrids have been extremely difficult to root and at present vegetative propagation is limited almost entirely to trench layering.

Tests in 1956

Tests conducted during the summer of 1956 show that leafy softwood cuttings of paradox walnut hybrids can be rooted in fairly high percentages in mist propagation beds. Difficulty is experienced, however, in inducing these rooted cuttings to continue top growth, and further tests of methods of bringing the cuttings out of the mist are needed.

Beginning in June, 1956, and continuing at intervals throughout the summer, softwood cuttings were taken from two-year-old and five-year-old paradox hybrids grafted on *J. hindsii* seedlings at Davis. Terminal cuttings 9″–12″ long taken from various clones were used. The basal one half to two thirds of the foliage was removed. Then the cuttings were dipped for five seconds in indolebutyric acid solutions of various concentrations before inserting in the rooting medium, which was a mixture of one half Spong-Rok and one half No. 2 grade vermiculite. The rooting tests were conducted in intermittent mist propagation beds either outdoors in full sun or in a lath house, except those made in October, which were conducted in the greenhouse. During daylight hours a mist cycle of 30 seconds on and 30 seconds off was used. The mist was off entirely at night. Cuttings taken from several clones were included in each test. The table on this page gives the rooting obtained with the Bowman-Kuhn clone, which is typical of the results found with the other clones.

The cuttings were checked for rooting after 30 days and at 10-day intervals thereafter, until it was evident no more rooting would take place. Usually the cuttings were dug, checked for rooting, then replaced in the rooting medium and returned to the mist. This later proved to be a poor practice, as the cuttings that rooted early dropped their leaves or rotted due to excess water when returned to the mist. All of the cuttings that rooted late dropped their leaves and died. Any disturbance of the roots seemed to be detrimental.

Treatment Necessary

In all cases indolebutyric acid was essential for rooting. There was not a single instance of an untreated cutting initiating roots. Cuttings taken in June and July from actively growing shoots and treated with 6,000 or 8,000 ppm —parts per million—of indolebutyric acid rooted quite rapidly and in fairly high percentages. Lower concentrations rooted more slowly and in lower percentages. Some injury at the base of the cuttings was noted at the greater concentrations, which were as high as 12,000 ppm. Cuttings taken from two-year-old trees rooted better than those from five-year-old trees. This may have been due to the difference in wood maturity. Shoots on the two-year-old trees were in much more active growth, especially late in the season, probably accounting for the better rooting obtained with wood from the two-year-old trees on the October 2 collection date. There was little difference in rooting between the various clones tried, with the exception of the Jasper clone, where no rooting was obtained; this was included only in the October test, however.

Rooting of Paradox Walnut Leafy Softwood Cuttings in an Intermittent Mist Propagating Bed

Date cuttings were taken	Age of stock trees	Per cent of cuttings rooted and average number of roots per rooted cutting at various concentrations of indolebutyric acid						
		0 ppm	2,000 ppm	4,000 ppm	6,000 ppm	8,000 ppm	10,000 ppm	12,000 ppm
June 16	5 yrs.	0	13 (2.5)	23 (5.0)	53 (8.3)	60 (7.3)	..	..
June 30	5 yrs.	.	3 .	40 .	..	..	..	..
July 14	2 yrs.	0	27 .	60 .	67 .	73 .	..	..
Aug. 7	2 yrs.	.	.. .	..	47 (4.3)	40 (6.1)	33 (7.4)	43 (8.8)
Sept. 10	2 yrs.	.	.. .	..	..	..	37 .	37 .
Oct. 2	5 yrs.	0	0	0	0	0	0	0
Oct. 2	2 yrs.	0	9 (3.4)	22 (6.5)	22 (9.9)	36 (10.2)	34 (9.9)	20 (10.7)

Survival After Rooting

In obtaining survival after rooting, it is important to withhold the mist as soon as possible after rooting has taken place. A satisfactory method of doing this is to gradually increase the Off periods of the mist and decrease the On periods until the rooted cuttings will survive without mist. Shade should be provided during this period to prevent sunburn. It is also very important to avoid removing the rooted cuttings from the medium or disturbing the roots. Two possible methods can be used to accomplish this. One is to use a raised propagating bed consisting of approximately 12″ of coarse sand topped with 4″ of the rooting medium. The roots can continue growth down into the sand. It is essential that such a bed be well drained to provide for ready removal of excess water. Another method is to use flats with removable perforated metal bottoms. After rooting and upon removal from the mist bed, the flats can be placed over soil, the bottoms removed and the roots allowed to continue growth into the soil. In both of these methods the cuttings would then be transplanted later during the dormant season. Application of liquid fertilizers shortly after rooting would probably be helpful in stimulating continued growth.

An approximate 8,000 ppm solution of indolebutyric acid can be prepared by dissolving a level one half teaspoon of the pure crystals in three and one third fluid ounces of 50% alcohol. Rubbing

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mined by local economic conditions reflecting the relationship between price of hogs and price of feeds including garbage. The results in all trials indicate the palatability and suitability of cooked residential garbage as a swine feed.

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Rancher C. J. Lyons of Saugus cooperated in the swine feeding trials

LETTUCE APHID

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deeply and allowed to dry thoroughly before being replanted to lettuce. Often lettuce can produce a satisfactory crop—even with a heavy infestation of aphids—if it can be made to grow rapidly. Even, adequate irrigation and the elimination of cracks through which winged aphids can enter the soil often assist in averting damage.

Some varietal differences in susceptibility to the lettuce root aphid have been observed. Imperial strain E-4—currently not an acceptable commercial variety—is the most resistant variety found to date, and attempts are being made to incorporate that resistance in the commercial variety Great Lakes.

Based on the results of the investigations in 1956, it is possible to control the European lettuce root aphid by a preplanting soil treatment with parathion at five pounds of actual chemical per acre. However, parathion is a highly toxic organic phosphate insecticide and all precautions and rules on the label should be followed and permits from the County Agricultural Commissioner are required before it can be purchased or used. Parathion should only be used for summer and fall harvested acreages and ordinarily only where there is a history of aphid attacks. Protection will probably last for only a single crop.

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The analyses for the presence of parathion were made by Professor W. M. Hoskins and the Insect Toxicology Laboratory, University of California, Berkeley.

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alcohol can be used satisfactorily. This solution will keep indefinitely without losing its effectiveness, but should be tightly sealed and stored in the dark.

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California Agriculture, *May 1956, page 7, published a description of mist equipment.*

STRAWBERRY

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rooting habit of the strawberry, because most of its feeder roots are rather shallow. When the strawberry beds were formed the top soil—which had a good potassium content—was piled together. Therefore, most of the strawberry roots were in soil with an adequate potassium supplying potential. This contrasts with the apricot trees, which had no roots in the cultivated surface and were unable to obtain adequate supplies from the deeper layers of soil. The fact that the apricot requires large amounts of potassium as shown by leaf analyses may also be pertinent.

The reason for the failure of the strawberry plants to absorb potassium from the added fertilizer is not so clear. The large amount applied to the beds should have encouraged luxury consumption.

This trial does not provide any basis for considering the use of a complete fertilizer for strawberries under similar conditions. Further trials are in progress in other districts to determine what may be expected on other soil types and under different climatic conditions.

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WALNUT

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maturity. Thorough application is most essential, and special care must be exercised when trees are in full leaf.

Although OMPA is the most effective aphicide for the control of the walnut aphid, it can not be used commercially because it has not been nationally registered by the United States Department of Agriculture for use on walnuts, nor has a tolerance been established by the Food and Drug Administration as authorized by the Miller Amendment.

However, satisfactory control can be expected where Systox is applied twice at a dosage of 0.25–0.37 pound—1–1½ pints of two pounds per gallon emulsion—per acre for each treatment if applications are made with an air carrier sprayer. The first application should be made in the spring and the second in July or August, when the aphid population begins to increase. To avoid injury from Systox it should not be applied until after the leaves are fully expanded. Further, applications should not exceed a total of 0.75 pound—three pints—in a single treatment or during a season, and no treatment should be made closer than three weeks before harvest.

An effective treatment is to use BHC or nicotine in the first treatment, followed by a 0.25–0.37 pound application of Systox when needed in June or July.

Walnut Aphid Control Treatments

Where air carrier sprayers are used, the aphicides listed below have given adequate aphid control when incorporated with the codling moth spray. If used alone, the aphicide should be applied in from 50–150 gallons of water per acre, depending on the air capacity of the sprayer.

Aphicide	Amount per acre
Parathion, 25% wettable powder	1.0–1.5 lbs.
or	
Malathion, 25% wettable powder	3–4 lbs.
or	
TEPP, 40%	¾–1 pt.
or	
Nicotine, 25% dry concentrate	5–6 lbs.
or	
BHC—12% gamma isomer	3.75–4.00 lbs.
or	
Systox	0.25–0.37 lb.

Where conventional sprayers were used, the aphicides gave good control when applied as full coverage sprays. The amounts used per 100 gallons of spray were:

Aphicide	Amounts per 100 gallons
Parathion, 25% wettable powder	3 oz.
or	
Malathion, 25% wettable powder	8 oz.
or	
Nicotine, 25% dry concentrate	10 oz.
or	
BHC—12% gamma isomer	8 oz.
or	
Systox—two pounds per gallon concentrate	¼ pt.

Because of the danger of BHC imparting an off-flavor to the harvested nuts, it should not be used more than once in a season, or later than May, and never at a concentration greater than that recommended by the manufacturer.

In areas where the walnut aphid is resistant to phosphate aphicides, other treatments than parathion, malathion or TEPP should be utilized.

Control of the walnut aphid can be obtained with dusts, where they are thoroughly applied. A 4% malathion dust or a 1% TEPP dust or a 2% nicotine dust applied at the rate of 40–60 pounds per acre have resulted in satisfactory control.

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