ROOTING OF PEAR CUTTINGS

Limited tests indicate possibilities of rooting commercial varieties

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Bartlett cuttings rooted best in recent tests to obtain own-rooted trees of commercial pear varieties, and the new USDA varieties—Magness, Moonglow and Dawn—were intermediate. Anjou rated last, with results not very successful regardless of rooting medium or environment.

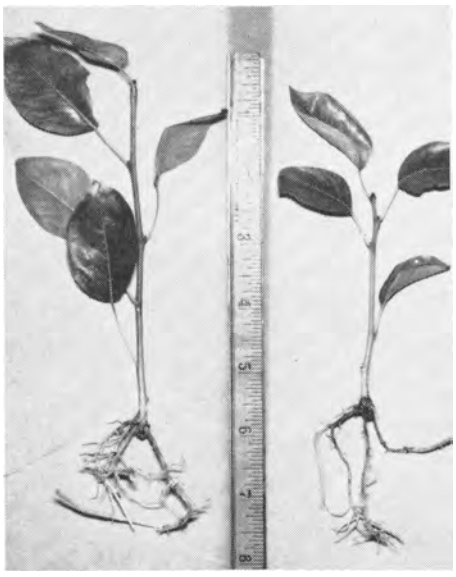
The rapid spread of pear decline and the evidence that it may be associated with a rootstock-scion relationship stimulated these studies to determine whether Bartlett and Anjou varieties could be propagated on their own roots by means of softwood or semi-hardwood leafy cuttings. Also included were three new pear varieties—Magness, Moonglow, and Dawn—recently named and registered by USDA. In addition to good fruit quality, Magness and Moonglow have a high degree of resistance to fire-blight. Rooted cuttings of these varieties would be expected to produce trees with blight-resistant roots as well as tops.

Scions of Bartlett and the three USDA varieties were grafted in February, 1961, onto evergreen pear, *Pyrus Calleryana*, in one-gallon cans on a glasshouse bench. Cuttings were available six weeks after grafting. Shoots 5 to 8 inches long, still soft at the tip, were cut into two or three cuttings each. They were divided into groups, given two different growth substance treatments, and placed under three rooting environments. The treatments were made using 0.8 per cent IBA (indolebutyric acid) powder "Hormodin 3" and IBA at 8 milligrams per milliliter (mg per ml) in 50 per cent alcohol, applied by momentary basal dip. The three rooting environments consisted of (1) a standard sash-covered propagating case shaded with cheesecloth when necessary, (2) a polyethylene case cooled by an intermittent water spray, and (3) mist applications at three-minute intervals. Vermiculite (industrial No. 1 grade) was used as the rooting medium, and it was maintained at a minimum temperature of about 72°F by means of an electric heating cable.

Bartlett cuttings

The Bartlett cuttings began to show roots in less than a month, and all of them had rooted by the end of seven weeks. A second lot of Bartlett cuttings taken from the same plants six weeks later (May 8), and treated with 0.8 per cent or 2 per cent IBA powder averaged 72 per cent rooting under mist. An equal number placed in the propagating case completely failed to root. With the same treatments, a third lot of Bartlett cuttings under mist averaged 85 per cent—the tips rooting 57 per cent, and the sub-tip and basal cuttings, 100 per cent.

Bartlett pear cuttings showing root system at end of seven weeks.



In March, 70 more Bartlett scions and 70 Anjou scions were grafted in the same way as the first set. Cuttings were taken from the Bartlett scions after five weeks. Sub-tip and basal cuttings which received the two stronger treatments (0.8 per cent and 2 per cent IBA) rooted 93 to 100 per cent under mist, and tip cuttings with the same treatments rooted 60 per cent. In the other two environments with these

ROOTING OF BARTLETT PEAR CUTTINGS

Summary of rooting under mist after treatment with indolebutyric acid—0.8 or 2 per cent powder or 8 mg per ml quick-dip solution

Date	Source of cuttings*	Per cent rooted		
		Tip cuttings	Sub-tip & basal cuttings	Short shoots
March 27	I	100	100	..
April 19	II	60	96	..
May 8	I	67	75	..
May 23	II	..	..	77
June 15	I	57	100	..

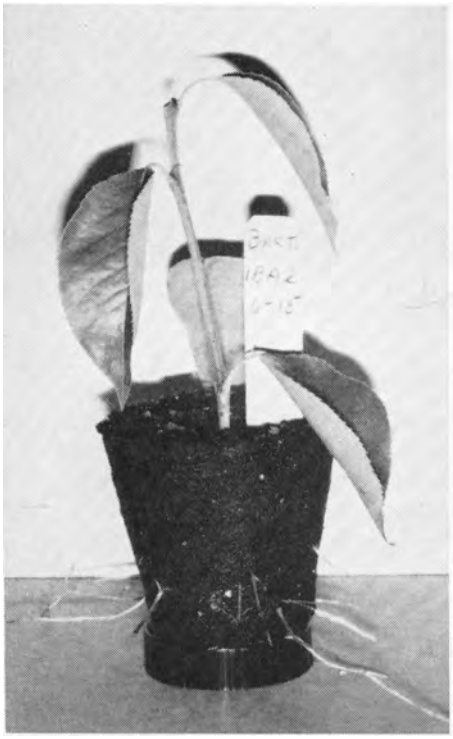
* Bartlett grafted on P. Calleryana, grown in glasshouse; I grafted February 15; II grafted March 16.

EFFECT OF THREE ENVIRONMENTS ON ROOTING OF BARTLETT CUTTINGS

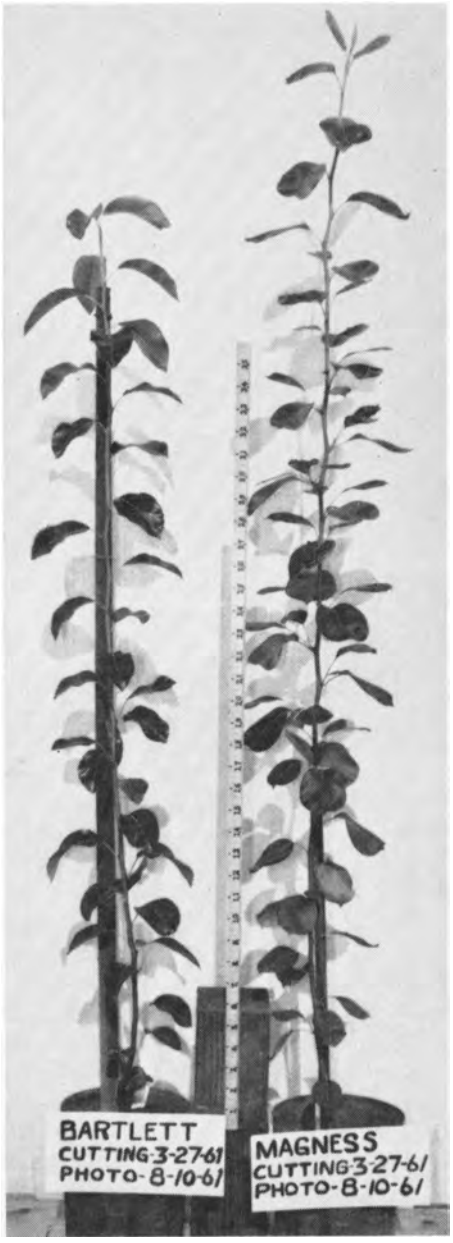
	Per cent rooted					
	Mist		Polyethylene		Case	
	IBA 0.8%	IBA 2%	IBA 0.8%	IBA 2%	IBA 0.8%	IBA 2%
Tip	60	60	60	20	40	40
Sub-tip & base	93	100	50	36	21	43

treatments, maximum rooting was 6 per cent. With 0.3 per cent IBA and no treatment, rooting was not over 6 per cent, regardless of location.

The next lot of cuttings from the second set of Bartlett scions consisted mostly of shoots not over 4 inches long. These were treated with 0.8 per cent IBA or with a 2 per cent NAA (naphthaleneacetic acid) powder, and inserted in vermiculite in 2¼-inch peat pots. The IBA-treated cuttings rooted 77 per cent under mist and 47 per cent in the closed case. For the NAA-treated cuttings the results were 35 per cent under mist and 58 per cent in the closed case.



Bartlett pear cutting showing root development through a peat pot.



Rooted cuttings of Bartlett (left) and Magness (right) 4½ months after cuttings were made.

Survival after rooting

Survival and growth after rooting has been one of the problems with producing own-rooted pear trees. In these experiments, the rooted cuttings were potted and transferred to a closed case where they were left until growth started or, when rooted in peat pots, were moved into gallon cans in a high-humidity glasshouse. In the first two lots 90 to 95 per cent of the rooted cuttings survived and most of these grew vigorously. Cuttings taken March 27 made as much as 3 to 4 feet of growth by mid-August. Growth was best on cuttings that rooted rapidly.

The Anjou scions grafted in mid-March produced shoots up to 10 inches long in less than a month. A hundred of these shoots were made into two or three cuttings each, treated, and placed in the three rooting environments. Response of the Anjou cuttings was much different than Bartlett. Total rooting in the propagating case was less than 15 per cent and results showed no apparent relationship to type of cutting or to treatment—which included concentrations up to 20 mg per ml IBA and .02 per cent 2,4,5-TP (2,4,5-trichlorophenoxyacetic acid)—as well as lower concentrations and no treatment. Other rootings were even less satisfactory, totalling 1 per cent under mist and 5 per cent under polyethylene.

Similar cuttings taken two weeks later from another group of Anjou grafts gave somewhat better results. The best rooting was again in the propagating case, where 33 per cent of the tip and 44 per cent of the sub-tip and basal cuttings rooted. Under mist the results were 17 per cent and 31 per cent respectively. Rooting was negligible under polyethylene. Treatments in this experiment were with 0.8 per cent and 2 per cent IBA.

About five weeks after the first lots of Anjou cuttings were taken, a second lot was available from each group of plants. This time rooting percentages were even lower than for the first two lots averaging only 3 to 5 per cent.

The rooting response of Magness, Dawn, and Moonglow was intermediate between Bartlett and Anjou. Cuttings of Magness taken in March and June averaged 33 per cent for tip and 64 per cent for sub-tip and basal cuttings. A small number of cuttings taken May 8 did not root as well.

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ROOT DEVELOPMENT OF SAFFLOWER

SAFFLOWER, a crop of increasing importance in California, develops the deepest root system of any annual crop yet investigated by the Department of Irrigation. Under favorable soil conditions, mature plants can completely exhaust the available soil moisture to a depth of 10 feet and can utilize most of the available moisture to a depth of 12 feet (the greatest depth sampled). There is little difference in root development in present commercial varieties.

Because of this characteristic, there is little or no yield response to irrigation during the growing season when safflower is planted on deep soils of high water-holding capacity—provided that the soil is moist to great depths at planting time and that there are no tight soil layers to retard root development. Minimizing surface irrigation during the growing season is important because safflower is highly susceptible to root-rot injury in wet soils.—*D. W. Henderson, Associate Professor of Irrigation, Dept. of Irrigation, University of California, Davis.*