

drenched chemicals. Many plants can be affected, but not necessarily all. For instance, Benlate treatment of seeds of eight different bedding plants produced severe stunting on two, mild stunting on four, and no effect on two. The phytotoxic effect is cumulative to an undetermined degree as well. Snapdragons were more severely stunted when given two applications of fungicidal drenches (at seeding and at transplanting) as opposed to just one.

Table 2. Effects of fungicide drenches on the rooting of softwood cuttings of three *Prunus* species. Drenched at 2 weeks and 6 weeks from sticking.

Plant and Treatment	Rooting Percentages (Out of 300/Treatment)
<i>Prunus</i> 'Halle Jollivette'	
Control	62
Benlate/Truban	47
Dithane M-45	74.5
Captan	81
<i>Prunus cerasifera</i> 'Newport'	
Control	11.5
Benlate/Truban	7
Dithane M-45	3
Captan	16
<i>Prunus glandulos</i> 'Rosea'	
Control	96
Benlate/Truban	73
Dithane M-45	56.6
Captan	94

CONCLUSIONS

Fungicides can provide useful protection against diseases in propagation. However, they must be used with caution. More important controls to these diseases involve environmental manipulations that favor rapid seed germination or rooting of cuttings by reducing stress on the plant material. Further, sanitation and environmental changes that work against pathogen survival and spread are quite basic to controlling diseases in propagation.

PROPAGATION OF *KALMIA LATIFOLIA* BY CUTTINGS

ALFRED J. FORDHAM

Weston Nurseries, Inc.

Hopkinton, Massachusetts 01748

During the Question Box Session at last year's IPPS meeting, the subject of *Kalmia latifolia* (mountain laurel) propagation by cuttings was discussed. While at the Arnold Arboretum, I worked on propagation of *Kalmia* by cuttings and have prepared a table showing the outcome of that effort. It gives data

concerning 30 experiences, most of which show a high degree of success.

Many cultivars of *Kalmia latifolia* have been selected as natural variants either in the wild or from nursery rows. Oddly enough, *K. latifolia* 'Rubra', one of the first cultivars of this native American plant to appear in the records of the Arnold Arboretum, came from the English nursery firm of Veitch and Son in 1886. From native sources, the Arboretum received such *Kalmia latifolia* cultivars as 'Obtusata' (1886), 'Polypetala' (1870), and 'Myrtifolia' (1885).

Despite the fact that good garden forms were first described more than a century ago, few are carried in nursery lists. This can be explained by the fact that they were considered difficult to propagate from cuttings.

In the early 1940's, Edmund Mezitt of Weston Nurseries became interested in mountain laurel selections, particularly those with deep red buds, pink flowers, etc. Plants of similar kind were planted side by side to insure cross pollination. Seeds of these were sown and plants grown on for further selection. This program has led to some spectacular clones. I am now associated with Weston Nurseries and one of my involvements will be an effort to put these into commercial production.

POLYETHYLENE CHAMBERS

Much of the mountain laurel propagation was carried out in polyethylene chambers which have some distinct advantages. Nutrients do not leach from the cuttings as can happen under mist. The chambers are carefree and can be left for long periods of time without attention. There is little chance of loss through human or mechanical failure. Many subjects normally considered difficult can be rooted in high percentages.

The chambers were constructed on benches with side walls about 5 inches high. They were first lined with 2 mil polyethylene film. Bottom heat was provided by heating cables, so about 1 inch of medium was placed in the bench and cables were installed at that level. To disperse the heat more evenly, 1/2 inch galvanized hardware cloth was placed in contact with the cable. The bench was then filled with medium consisting of equal parts of horticultural grade Perlite and sphagnum peat moss. Welded joint wire of 2 by 4 inch mesh was shaped to form supporting frames which hold the 2 mil plastic covering about 8 or 10 inches above the rooting medium. Bottom heat was maintained at about 75°F.

CUTTING PREPARATION

Mountain laurel cuttings are made from the current year's growth and can be taken as soon as the growth ripens. The

stems are cut to a uniform length, (any leaves that would be below the rooting medium are removed) and they are wounded so they will produce well distributed root systems. This is accomplished by slicing two silvers of rind downward for a distance of 1 to 1-1/2 inches on opposite sides at the base of the cutting. This procedure removes physical barriers to root emergence and exposes more surface to the action of root inducing substances. Wounding both sides of the cutting is important to prevent a lopsided root ball. Mountain laurel roots slowly, usually taking from 4 to 6 months.

ROOT INDUCING MATERIALS

Some of the most effective treatments in our previous experiences were 5-sec dips using IBA plus NAA at various strengths or treatment with 2,4,5 TP powder formulations. Because of clonal variation, there were instances where IBA plus NAA was superior, while in other cases, 2,4,5 TP proved better. In the course of our current work at Weston Nurseries, a number of formulations are being tested. When sufficient propagating wood is available, we use as many as eight treatments.

We are grateful to the Research Department, Agricultural Chemicals Division, Amchem Products, Inc., Ambler, Pennsylvania, for providing the experimental materials being used. The "quickdip" preparations are diluted from concentrated solutions while the 2,4,5 TP formulations were in talc.

MOUNTAIN LAUREL SELECTIONS

In the Boston area, mountain laurel blooms about June 1st and its course of flowering is longer than that of most woody plants. The span between bud opening and flower drop covers about 3 weeks. Flowers of red budded forms and those with banded corollas tend to flower later and to persist for greater periods. At Weston Nurseries, there are several mountain laurel blocks from which selections are made. Those thought to have merit are moved to an areas where they can undergo further observation. In order that evaluations be uniform, only one person is involved in making judgments. During the last few years Wayne Mezitt has undertaken this responsibility.

IMPORTANCE OF CHARACTERISTICS OTHER THAN FLOWERS

In seedling populations of mountain laurel, one finds plants with widely varying characteristics. Some with special horticultural merit display bright red, yellow or orange stems which on many plants are contrasted against dark-green leaves. One particularly striking specimen is characterized by compact

growth habit, red stems and dark green leaves with red midribs. Some of these beautiful features are prominent throughout most of the year and therefore should receive special consideration when selections are being made.

PROPAGATION OF KALMIA LATIFOLIA BY CUTTINGS

Taxa	Time Taken	Number of Cuttings	Treatment	Rooting Percentage	Evaluation of Roots	Remarks
'Rubra'	3 Mar 66	10	IBA — 1% 5-second dip	100	Excellent	Plants of same clonal line forced in greenhouse — wood very firm — under polyethylene
'Rubra'	3 Mar 66	10	IBA — 2% 5-second dip	90	Excellent	Plants of same clonal line forced in greenhouse — wood very firm — under polyethylene
'Rubra'	3 Mar 66	10	IBA — NAA 500 ppm ea. 5-second dip	100	Excellent	Plants of same clonal line forced in greenhouse — wood very firm — under polyethylene
'Rubra'	3 Mar 66	10	IBA — NAA 1,000 ppm ea. powder	100	Excellent	Plants of same clonal line forced in greenhouse — wood very firm — under polyethylene
'Rubra'	3 Mar 66	10	245 TP 5,000 ppm powder	90	Excellent	Plants of same clonal line forced in greenhouse — wood very firm — under polyethylene
'Rubra'	30 Mar 67	10	245 TP 1,000 ppm powder	90	Excellent	From 1-year old rooted cuttings in greenhouse — wood starting to firm — under polyethylene
'Rubra'	30 Mar 67	10	245 TP 1,000 ppm powder	30	Fair to Good	Wood as above — placed under mist; leached badly
'Rubra'	30 Mar 67	10	IBA — NAA 1,000 ppm ea. 5-second dip	90	Excellent	Wood as above — placed under polyethylene
'Rubra'	30 Mar 67	10	IBA — NAA 1,000 ppm ea. 5-second dip	50	Fair	Wood as above — placed under mist; leached badly
'Rubra'	4 Aug 66	6	245 TP 5,000 ppm powder	83	Excellent	Cuttings from 8-year old plant in nursery row — under polyethylene
'Rubra'	23 Jan 67	22	IBA — NAA 5,000 ppm ea. 5-sec dip	91	Excellent	Cuttings from 9-year old dormant plants in cold storage unit — all same clone — under polyethylene
'Rubra'	23 Jan 67	22	245 TP 1,000 ppm powder	86	Excellent	Cuttings from 9-year old dormant plants in cold storage unit — all same clone — under polyethylene

Taxa	Time Taken	Number of Cuttings	Treatment	Rooting Percentage	Evaluation of Roots	Remarks
'Rubra'	20 Dec 67	93	245 TP 1,000 ppm powder	91	Excellent	Cuttings from 22-month old rooted cuttings in nurser row — under polyethylene
Selection	27 Aug 70	15	245 TP 1,000 ppm powder	73	Excellent	From large plant, Beverly, Massachusetts — darker than normal foliage — under polyethylene
Selection	27 Aug 70	15	IBA — NAA 2,500 ppm ea. 5-second dip	100	Excellent	From large plant, Beverly, Massachusetts — darker than normal foliage — under polyethylene
'Rubra'	4 Aug 66	6	.8% IBA — Thiram powder	50	2 Good 1 Excel.	From 7-year old plant in nursery — under polyethylene
'Rubra'	4 Aug 66	6	none — control for above	66	Excellent	As above
Compact form	29 Nov 68	6	245 TP 5,000 ppm powder	100	Excellent	From plant in nursery — under polyethylene
'Rubra'	20 Dec 67	30	245 TP 1,000 ppm powder	87	Excellent	From older plant in nursery — under polyethylene
'Rubra'	20 Dec 67	30	IBA — NAA 5,000 ppm ea. 5-second dip	84	Excellent	As above
Selection	17 Dec 74	12	.8% IBA — w/Thiram powder	100	Excellent	From older plant in nursery — under polyethylene
'Fuscata'	28 Jun 67	11	245 TP 1,000 ppm powder	82	Excellent	Under mist — later removed to under plastic because of leaching
'Fuscata'	28 Jun 67	11	245 TP 5,000 ppm ea. powder	100	Excellent	Under mist — later removed to under plastic because of leaching
'Fuscata'	28 Jun 67	11	IBA — NAA 2,500 ppm ea. 5-second dip	100	Excellent	Under mist — later removed to under plastic because of leaching
'Fuscata'	28 Jun 67	11	IBA — NAA 2,500 ppm ea. 5-second dip	82	Excellent	Under mist — later removed to under plastic because of leaching
'Polypetala'	20 Dec 67	12	non	50	Excellent	Taken from very old plant received at Arnold Arboretum 1885 — under polyethylene
'Polypetala'	20 Dec 67	12	IBA — NAA 2,500 ppm ea. 5-second dip	80	Excellent	As above
'Polypetala'	20 Dec 67	12	245 TP 1,000 ppm powder	66	Excellent	As above
'Silver Dollar'	17 Dec 74	8	.8% IBA — w/Thiram 15% powder	100	Excellent	From 2-foot grafted plant — under polyethylene