WILLOW WATER AND ROOTING RHODODENDRON CUTTINGS

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Abstract. Cuttings of *Rhododendron* 'Britannia', 'Crest', 'Dr. Dresselhuys', 'Ignatius Sargent' and 'Jean Marie de Montague' were treated with auxin, or auxin + willow water extract, and rooted under mist. The extract failed to stimulate rooting or root quality in any of the cultivars.

REVIEW OF LITERATURE

Rooting cofactors, chemicals that stimulate root initiation in combination with auxin, have been studied for many years, but remain poorly understood. The working model of root stimulation in plants remains essentially that of Bouillenne and Bouillenne (1) who proposed that "rhizocaline", the stimulating substance, is composed of three components: 1) a specific factor, translocated from the leaves; 2) a nonspecific factor (auxin); and 3) a specific enzyme located in the cells of certain sensitive tissues that activates 1 and 2.

Cofactors have been extracted from various woody plant and partially characterized using the mung bean bioassay (2,3). A cofactor from willow extracts was similarly demonstrated (4,5,7), and later reported to have potent stimulatory activity in several difficult-to-root woody species (8,9). The purpose of this paper is to report the results of a study designed to test the efficacy of crude *Salix purpurea* extracts on the rooting of several rhododendron hybrids.

MATERIALS AND METHODS

Young shoot tips of Arctic willow or purple willow *(Salix purpurea)* were collected August 30, 1982, frozen at -60°C and pounded to loosen the bark from the wood. About 250 g of willow were steeped in 1.5 liter of distilled H_2O at 50°C for 2.5 hr. The bases of 50 cuttings each of *Rhododendron* 'Britannia' (Brit), 'Crest', 'Dr. Dresselhuys; (Dr. D), 'Ignatius Sargent' (IS), and 'Jean Marie de Montague' (JM) were soaked overnight (18 hr.) in the willow extract. The bases of another 50 cuttings of the same cultivars were soaked for 18 hr. in distilled H_2O. After the soak, all cuttings were dipped for 5 sec. in a 15% solution of Dip n' Grow (1500 ppm IBA, 750 ppm NAA), stuck in a medium composed of coarse quartz sand and peat (4:1), then maintained under mist. There were 5 replicates of 10 cuttings in each treatment. The rooting of the cuttings was

evaluated February 7 to 10, 1983. Cuttings were graded for the presence or absence of roots and the root system subjectively rated as good, fair, or poor.

RESULTS

The treatment of rhododendron cuttings with Arctic willow extract failed to stimulate rooting within the 5-month test period (Table 1). Neither the number of cuttings rooted, nor the quality of the rooted cuttings was significantly better in either treatment. Cvs. Brit, Crest, Dr. D, and IS are generally regarded as difficult to root, and were used for that reason. In this trial, however, Cv., IS rooted readily and developed substantial root systems in both treatments. The overall lower quality of the willow-treated Cv. IS root systems was nearly significant at the 5% level. The lower rooting percentage of willow-treated Cv. Crest cuttings was close to significance at the 10% level. A high percentage of Cv. JM rooted, but the root systems were still small and delicate on the evaluation date.

Table 1. Rooting percentage and percent rated good after treatment with water + auxin, or willow extract + auxin, of 5 rhododendron cultivars. Means were not significantly different according to analysis of variance.[1]

	Treatment			
	Water		Willow extract	
Cultivar	Percent Rooted	Percent Rated Good	Percent Rooted	Percent Rate Good
'Britannia'	14	0	10	0
'Crest'	20	2	8	4
'Dr. Dresselhuys'	34	2	38	2
'Ignatius Sargent'	100	96	100	72
'Jean Marie'	82	16	76	8

[1] Five replicates of 10 cuttings per treatment.

DISCUSSION

The published evidence of root promoting activity of willow originated with an observation that centrifugation of willow cuttings stimulated rooting (4). Data were later presented suggesting that centrifugation stimulated rooting by increasing stem ethylene concentrations (6). Applied ethylene also promoted rooting of willow. When the water that the willow cuttings were centrifuged in was tested, significant rooting cofactor activity, other than ethylene, was detected by the mung bean bioassay (4,5). Cofactor activity in the mung bean test was also reported in several other woody species (7).

Two sources suggest that willow extracts promoted rooting of several difficult-to-root woody species (8,9), but there ap-

pear to be no data describing these effects. Instead, propagators have tried to glean information from other sources and with apparently mixed results.

There was clearly no positive effect of the willow extract on the quantitative or qualitative aspects of rooting of the *Rhododendron* cultivars that we tested. These results indicate that a great deal remains to be discovered about the use of the willow rooting factor. Species, date of extraction, methods of extraction, concentration, methods of application and problems such as Kawase's statement that "impurities in the crude extract from willow cuttings from time to time completely nullified the root promoting effect" (9) are obstacles to overcome.

The existence of extractable cofactors that stimulate rooting of woody plants that auxin cannot is an attractive and important concept in plant physiology, but it has yet to be demonstrated. The willow factor is an interesting possibility and deserves further objective research.

LITERATURE CITED

1. Bouillenne, R. and M. Bouillenne-Walrand. 1955. Auxines et bouturage. *Rpt. 14th Inter. Hort. Cong.* Vol. 1, pp. 231-238.
2. Fadl, M.S. and H.T. Hartmann. 1967. Isolation, purification, and characterization of an endogenous root-promoting factor obtained from basal sections of pear hardwood cuttings. *Plant Physiol.* 42:541-549.
3. Hess, C.E. 1962. Characterization of the rooting cofactors extracted from *Hedera helix* L. and *Hibiscus rosa-sinensis* L. *Proc. 16th Inter. Hort. Cong.*, pp. 382-388.
4. Kawase, M. 1964. Centrifugation, rhizocaline, and rooting in *Salix alba* L. *Physiol. Plant.* 17:855-865.
5. Kawase, M. 1970. Root-promoting substances in *Salix alba*. *Physiol. Plant.* 23:159-170.
6. Kawase, M. 1971a. Causes of centrifugal root promotion. *Physiol. Plant.* 25:64-70.
7. Kawase, M. 1971b. Diffusible rooting substances in woody ornamentals. *J. Amer. Soc. Hort. Sci.* 96:116-119.
8. Kawase, M. 1978. Extraction and application of rooting substances obtained from *Salix fragilis*. *HortScience* 13:370.
9. Kawase, M. 1981. A "dream" chemical to aid propagation of woody plants. *Ohio Report of Res. and Devel.* 66:8-10.