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Propagation of *Osmanthus heterophyllus* 'Ilicifolius' and 'Rotundifolius' by Stem Cuttings[1]

Frank A. Blazich and Juan R. Acedo[2]
Department of Horticultural Science
North Carolina State University
Raleigh, NC 27695-7609

Abstract

Nontreated semihardwood and hardwood cuttings of *Osmanthus heterophyllus* 'Ilicifolius' rooted in high percentages (>80%) while comparable results for 'Rotundifolius' were only noted for hardwood cuttings. Response of both cultivars to indolebutyric acid (IBA) treatment [2500 to 10,000 ppm (0.25 to 1.0%)] was variable and often resulted in inhibition rather than stimulation of rooting.

Index words: rooting, auxin, indolebutyric acid, holly osmanthus, false holly, Oleaceae

Introduction

The genus *Osmanthus* Lour. (Oleaceae) comprises 30 to 40 species of evergreen shrubs and trees occurring primarily in eastern Asia with a few species in North America, Hawaii and New Caledonia (5). The most widely cultivated species is *Osmanthus heterophyllus* (G. Don) P.S. Green. The specific epithet *heterophyllus* is appropriate because it alludes to the variable morphology of the leaves. Leaves are opposite, simple, evergreen, coriaceous, lustrous, glabrous, dark green above, yellowish-green beneath, elliptic to ovate to elliptic-oblong to occasionally obovate, 2.5 to 6.4 cm (1 to 2.5 in) long, 2.5 to 3.8 cm (1 to 1.5 in) wide, cuneate to broad cuneate, and entire or spinose with 1 to 4 pairs of prominent spiny teeth (1).

Cutting material selected for having a predominance of one leaf type can be perpetuated by asexual propagation. Thus, rooting of stem cuttings consisting of holly-like leaves results in plants generally exhibiting this type of foliage. The same holds true for cuttings rooted from myrtle-like growth. The holly type of foliage has been reported to be juvenile and the myrtle-like foliage to be adult (1).

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[2]Professor and Research Technician, resp.

Fixation of leaf morphology by vegetative propagation was reflected in a key to cultivars of *Osmanthus heterophyllus* published in 1959 by Green and Keenan (3). Their key, based on leaf morphology and color, listed six cultivars: 'Aureus', 'Ilicifolius', [*O. ilicifolius* (Haask.) Hort. ex Carriere, *pro sp.*], 'Myrtifolius', 'Purpureus', 'Rotundifolius', and 'Variegatus'. One form of leaf is basically holly-like (i.e. 'Ilicifolius') with margins bearing spiny teeth. Another form of leaf is oval to ovate and entire with a spinescent apex (i.e. 'Myrtifolius'). A less common, third form of leaf is obovate, spineless, yet bearing blunt angled projections along the margins, remnants of locations for spiny teeth, with a rounded apex (i.e. 'Rotundifolius'). Since publication of the key, additional cultivars have been introduced (1). Landscape use of these newer cultivars has been limited similar to the six described by Green and Keenan (3).

The most often observed cultivar is 'Ilicifolius'. Although common in southern landscapes, specific propagation information is lacking. Those references available simply note that the species and related cultivars can be propagated by rooting stem cuttings and describe procedures which have proven successful (2, 4, 6). No information has been reported regarding importance of the time of year cuttings are taken (timing) or influence of auxin treatment on rooting. Rooting information for various cultivars of *Osmanthus heterophyllus* is apparently nonexistent. Therefore, the objec-

tive of this research was to determine the influence of timing and auxin treatment on rooting of two cultivars of *Osmanthus heterophyllus*, the common 'Ilicifolius' and the less common 'Rotundifolius'.

Materials and Methods

Terminal stem cuttings, each 7 cm (2.8 in) long, were taken on Feb. 24 and Sept. 24, 1987 and Feb. 22, 1988 from single plants of *Osmanthus heterophyllus* 'Ilicifolius' and 'Rotundifolius' growing on the campus of North Carolina State University. Cuttings were always taken from the same stock plants. The growth stage in February corresponded to a hardwood condition and in September the growth stage was semihardwood.

Following collection, the cuttings were trimmed from the base to 6 cm (2.4 in), leaves were removed from the lower 2 cm (0.8 in) and the following treatments employed: (A) nontreated, (B) 2500 ppm (0.25%) indolebutryic acid (IBA), (C) 5000 ppm (0.5%) IBA, (D) 7500 ppm (0.75%) IBA and (E) 10,000 ppm (1.0%) IBA. When treating cuttings with IBA, the basal 1 cm (0.4 in) was dipped into the IBA solution for 1 sec followed by 15 min of air drying before insertion into the rooting medium. IBA solutions were prepared by dissolving reagent grade IBA in 50% isopropyl alcohol. After auxin treatment, cuttings were inserted to a 2 cm (0.8 in) depth in individual 7 cm^2 (2.8 in^2) plastic rose pots containing a medium of 1 peat:1 perlite (by vol.).

Pots were placed on a single raised bench in a glass-covered greenhouse maintained at approximate day/night temperatures of 23.9 ± 5.6°/18.3° ± 2.8°C (75° ± 10°/65° ± 5°F). Intermittent mist operated 6 sec every 5 min from 7:30 a.m. to 7:00 p.m. daily. A natural photoperiod was provided daily. The experimental design was a randomized complete block using six cuttings per treatment and six replications.

Fifteen weeks after the experiment was initiated, cuttings were harvested and data recorded. Data included the number and length of primary roots greater than 1 mm (0.04 in). Any cutting having one or more roots was classified as rooted. Data were subjected to analysis of variance procedures and regression analysis.

Results and Discussion

Cuttings of 'Ilicifolius' taken on Sept. 24, 1987 and Feb. 22, 1988 rooted (Table 1) while rooting of 'Rotundifolius' was only noted for cuttings taken on Feb. 24, 1987 and Feb. 22, 1988 (Table 2). Response of both cultivars to auxin treatment was variable, and IBA often inhibited rooting.

Percent rooting of semihardwood cuttings of 'Ilicifolius' taken on Sept. 24, 1987 was unaffected by IBA treatment although greatest rooting was noted for the nontreated cuttings (Table 1). Similarly, root number was also unaffected. Auxin treatment resulted in a highly significant decrease in root length.

Hardwood cuttings of 'Ilicifolius' taken on Feb. 22, 1988 exhibited a more pronounced response to IBA but considering the nature and magnitude of the responses, the beneficial effects of such treatments are questionable. Auxin treatment caused a highly significant decrease in percent rooting whereas a highly significant increase in root number was observed with a corresponding significant decrease in root length (Table 1). Hardwood cuttings of 'Ilicifolius' were also taken for rooting on Feb. 24, 1987 but due to a malfunction of the mist system all were lost.

While only hardwood cuttings of 'Rotundifolius' could be rooted, IBA treatment was not beneficial. For both dates (Feb. 24, 1987 and Feb. 22, 1988) auxin treatment significantly decreased percent rooting. On the other hand, for either date, no significant response was observed for root number and root length.

Lack of consistent, positive benefits from IBA such as increasing the percentage of cuttings which root and increasing the number of roots per cutting suggest that further research utilizing different auxins and/or formulations may have merit. Another possibility might involve use of IBA solutions <2500 ppm (0.25%). However, data for the nontreated cuttings of both cultivars suggest satisfactory rooting can be achieved without auxin treatment provided the cuttings are in the proper growth stage.

Results herein, as well as unreported rooting trials by the authors with cuttings of 'Ilicifolius', lead us to conclude this cultivar is easily rooted provided semihardwood and hardwood cuttings are used. During propagation it may be wise to pay close attention to water relations because ex-

Table 1. Influence of timing and IBA treatments on the rooting of stem cuttings of *Osmanthus heterophyllus* 'Ilicifolius'.

Treatment	Rooting (%)[z]		Mean no. roots/cutting[y]		Mean root length (mm)[y]	
	9/24/87	2/22/88	9/24/87	2/22/88	9/24/87	2/22/88
Nontreated	91.7[x]	80.6[w]	10.2[x]	8.4[v]	75.6[u]	76.1[t]
2500 ppm IBA	77.8	86.1	9.2	7.7	61.5	73.5
5000 ppm IBA	88.9	50.0	10.8	10.1	64.2	69.4
7500 ppm IBA	77.8	69.4	10.6	12.6	58.2	58.1
10,000 ppm IBA	77.8	52.8	10.8	12.5	52.3	66.8

[z]Each value is based on 36 cuttings.

[y]Means are based on the number of cuttings which rooted for a particular treatment.

[x]Treatments nonsignificant at the 5% level.

[w]Treatments linear at the 1% level; y intercept = 82.2, slope = −0.002889.

[v]Treatments linear at the 1% level; y intercept = 7.6, slope = 0.000531.

[u]Treatments linear at the 1% level; y intercept = 72.7, slope = −0.002045.

[t]Treatments linear at the 5% level; y intercept = 76.0, slope = −0.001491.

Table 2. Influence of timing and IBA treatments on the rooting of stem cuttings of *Osmanthus heterophyllus* 'Rotundifolius'.

Treatment	Rooting (%)[z]		Mean no. roots/cutting[y]		Mean root length (mm)[y]	
	2/24/87	2/22/88	2/24/87	2/22/88	2/24/87	2/22/88
Nontreated	94.4[x]	77.8[w]	5.2[v]	4.3[v]	74.3[v]	77.8[v]
2500 ppm IBA	83.3	72.2	5.7	4.7	75.9	74.4
5000 ppm IBA	69.4	30.6	6.8	3.4	69.1	81.7
7500 ppm IBA	66.7	55.6	5.7	5.0	74.5	98.7
10,000 ppm IBA	52.8	52.8	5.2	5.1	82.4	82.4

[z]Each value is based on 36 cuttings.

[y]Means are based on the number of cuttings which rooted for a particular treatment.

[x]Treatments linear at the 1% level; y intercept = 93.3, slope = −0.004000.

[w]Treatments linear at the 1% level; y intercept = 71.1, slope = −0.002667.

[v]Treatments nonsignificant at the 5% level.

cessive moisture has been reported to cause leaf drop (2). On a few occasions we have observed such a phenomenon, but are uncertain about the actual cause.

Limited success in rooting cuttings of 'Rotundifolius' was surprising. Unexpectedly, semihardwood cuttings did not root. Because hardwood cuttings rooted, timing appears to be critical for successful propagation of this cultivar. The inability to root semihardwood cuttings may have been related to the vigor of the stock plant. The plant appeared vigorous but was the only plant from which cuttings could be taken. Perhaps a different response with semihardwood cuttings might have been noted if cuttings were taken from other plants. However, results of a nonreplicated study conducted several years previously by the senior author utilizing semihardwood cuttings from a different stock plant, support the inherent difficulty of rooting this growth stage.

Significance to the Nursery Industry

Results of this study indicate that semihardwood and hardwood cuttings of *Osmanthus heterophyllus* 'Ilicifolius' can be rooted in high percentages without IBA treatment, whereas only hardwood cuttings of 'Rotundifolius' appear capable of rooting. Nurserymen are cautioned about auxin treatment to promote rooting because IBA applied using the concentrated dip method at concentrations of 2500 to 10,000 ppm (0.25 to 1.0%) has little or no positive influence on rooting and might even prove inhibitory.

(*Ed. note*: This paper reports the results of research only, and does not imply registration of a pesticide under amended FIFRA. Before using any of the products mentioned in this research paper, be certain of their registration by appropriate state and/or federal authorities.)

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