Propagation of Hybrid Lilacs Using Stock Plant Etiolation[1]

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Abstract

Outdoor grown stock plants of French hybrid lilacs, (*Syringa vulgaris*), were allowed to leaf out under dense shade. The resulting etiolated shoots were banded at the base with black tape to retain their etiolated condition, after which time shade was removed and the tops were allowed to green up. Cuttings from shoots treated this way rooted significantly better over a longer period of time than did the controls. Localized blanching of the shoots with black tape without prior shade treatment also had a favorable effect on rooting. Cuttings taken from stock plants forced during the winter in a greenhouse rooted as well as the best etiolation treatment outdoors. Shading or IBA treatment did not improve the rooting of these greenhouse grown plants. Only localized banding with black tape increased rooting significantly in the greenhouse grown cuttings.

Index words: *Syringa vulgaris*, rooting, softwood cuttings, shading, forcing

Introduction

In a strict sense, etiolation refers to the development of a plant or plant part totally in the absence of light, resulting in such characteristics as small, unexpanded leaves, elongated shoots, and lack of chlorophyll (6). However, in the literature of etiolation and its effect on adventitious root development, the term is used also to refer to the development of a stock plant at reduced light intensity and of the subsequent exclusion of light from initially light grown tissue, more properly called blanching. Etiolation in all these forms has been shown to promote adventitious rooting in a wide range of plants (2, 3, 5, 7, 8, 11, 12).

The purpose of this study was to apply a variety of stock plant etiolation pretreatments to French hybrid lilacs which would then be propagated by softwood cuttings. Using con-

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ventional propagation procedures, many hybrid lilac cultivars are difficult to root from cuttings so that grafting and division are more commonly used. To achieve any success, cuttings must be collected over a limited period of time when the wood is very soft, as rooting percentages decline rapidly as the shoots mature (1, 4). Initial trials suggest that stock plant etiolation can improve rooting of lilac cuttings (3, 11), but the results have been inconsistent. This study was undertaken to establish broad parameters of the etiolation technique.

Materials and Methods

To obtain two sets of data in one year, etiolation experiments were performed both on lilacs forced in the greenhouse during the winter and those grown outside in the spring. In January 1984, 100 plants 60–92 cm (2–3 ft) tall of two lilac cultivars, *Syringa vulgaris* 'Charles X' and *S. vulgaris* 'Michel Buchner,' were removed from cold storage and potted in a mixture of soil, peat and perlite (1:1:1 by volume) in 11.4 l (#3) plastic containers. Throughout the testing period they received a weekly liquid fertilization of 200 ppm N and K from potassium and calcium nitrate.

After potting, the lilacs were moved to a 21°C (70°F)/day–16°C (61°F)/night greenhouse equipped with supplemental incandescent lighting to provide 16-hr daylengths. The dormant lilacs remained in the greenhouse under full light conditions until the buds just began to swell, at which time they were placed under various levels of shade (0, 52, 92 and 100%). 100% shade was provided by a covering of black polyethylene, while black and green saran cloth provided 92% shade and 52% shade, resp. The plants were left under these shaded conditions to make their initial 7–12 cm (3–5 in) growth, which was accomplished in about 2 weeks.

Immediately upon uncovering, randomly selected shoots from each treatment were banded with 2 cm (0.75 in) black electrical tape at their bases. To prevent damage to soft new shoots, the shade was removed gradually over 1 week. The plants grew in the light for a minimum of 1 week before cuttings were collected. Cuttings were also taken 2, 3, 5, 8 and, in some cases, 12 weeks after the removal of shading and application of banding. Basal cuttings 7–12 cm (3–5 in) long were taken. Each cutting was stripped of all but the 2 most distal leaves, and those that were banded had their tapes removed. Before being placed under mist into a rooting medium of peat and perlite (1:1 by volume), the cuttings were treated with a basal application of talc containing either no active ingredient or 0.1% IBA. Bottom heat of 24°C ± (75°F) was provided. After 5 weeks in the cutting bench, rooting was assessed as % rooted. The sample size for each combination of treatments was 15 cuttings.

For the outdoor trial, 4 other cultivars, *S. vulgaris* 'Madame Lemoine,' 'Belle de Nancy,' 'Charles Joly,' and 'President Grevy,' were tested along with 'Charles X' and 'Michel Buchner.' Ten dormant plants of each cultivar were put outside and divided between treatments in April 1984. The same basic procedures were followed as with the greenhouse trial, but instead of continuing work on a range of initial shade levels, the outdoor plants were only subjected to either near darkness (about 99% shade) or full sunlight. The shade treatment consisted of two wooden cold frames stacked on top of one another covered by a sheet of black polyethylene slit in a few places to provide ventilation and low light. Other variations in the outdoor trial were that all cuttings were treated with 0.1% IBA in talc and were taken 2, 5, 8 and 12 weeks after the removal of shading and/or application of banding. Ten cuttings were collected per treatment.

Results and Discussion

Results of the Outdoor Trials will be presented first because lilac cuttings are normally taken from outdoor grown stock plants, and discussion of the Greenhouse Trials will be more meaningful in comparison with standard practices.

Outdoor Trials. With 4 out of the 6 lilac cultivars tested, initial shading of outdoor grown stock plants followed by continued localized etiolation of shoot bases with black tape (+shade, +band) significantly increased subsequent rooting of cuttings (Figs. 1 and 2). At the 5 week collection date, when the greatest differences were seen, fully pretreated 'Charles X' and 'Michel Buchner' cuttings rooted 80% compared to 10% with the controls. Also at this time, there was a 60% improvement in rooting of fully pretreated (+shade, +band) 'Belle de Nancy' cuttings, and a 65% improvement with 'Charles Joly.' Full treatment increased rooting of 'President Grevy' cuttings by about 20% over the control. Although this is not a significant difference, it does suggest a trend of increased rooting with etiolation. The only cultivar which did not show this trend was 'Madame Lemoine.' Up to the 8 week collection time, rooting of fully pretreated shoots of this cultivar was more or less equal to that of the control. In both cases, rooting remained at the 50% level or below. Rooting of fully pretreated cuttings which were collected at 12 weeks, however, increased to 80%. Because there were not enough shoots to take 12

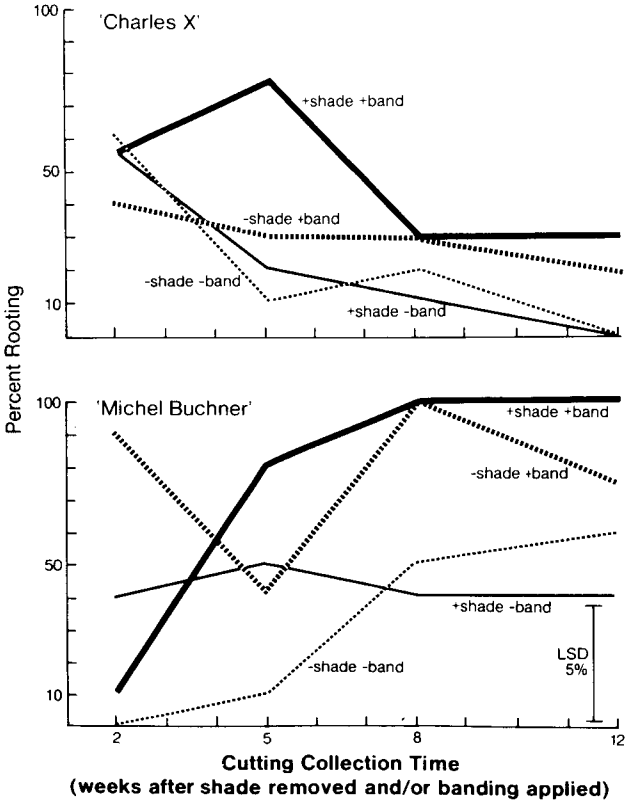

Fig. 1. Rooting of 2 hybrid lilac cultivars as affected by stock plant pre-treatment and time of cutting collection. (Plants treated outdoors, N = 10.)

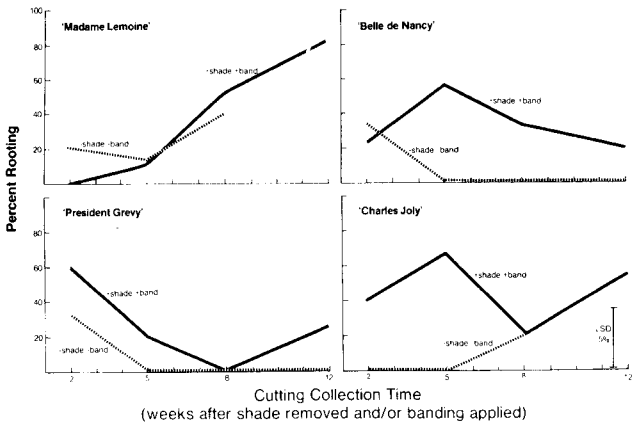

Fig. 2. Rooting of 4 hybrid lilac cultivars as affected by etiolation of the stock plant and time of cutting collection. (Plants treated outdoors, N = 10).

week control cuttings, it is uncertain whether this represents a significant improvement in rooting as a result of the etiolation pretreatment. Chances are, however, that it does, as several reports of trials with 'Madame Lemoine' indicate rooting success rates well under 50% when conventional propagation methods are used (1, 11).

The outdoor results also indicate that the period of time over which lilac cuttings can be taken with acceptable rooting is extended by etiolation of the stockplants. Considering 60% rooting as a minimum acceptable to nurserymen, the results show that with initial shading followed by black tape banding, 'Charles X' could potentially be rooted successfully from the 2 week collection date through to the 5th week, and perhaps longer. The control cuttings rooted at this level only at the 2 week mark. Etiolated 'Michel Buchner' cuttings could potentially be rooted successfully over an even longer period of time—from at least the 5 week collection time through to 12 weeks compared to control cuttings that rooted acceptably only at the last collection date. With 'Madame Lemoine' there was potentially a 4 week period (between 8 and 12 weeks) when etiolated cuttings rooted over 60%. Rooting of non-etiolated cuttings never reached this level. Unacceptable rooting throughout the testing period was also seen with control cuttings of 'President Grevy,' 'Belle de Nancy,' and 'Charles Joly.' In all these cases, etiolation pretreatment resulted in successful rooting of cuttings at least at one of the collection dates.

Localized blanching of initially light-grown tissue, by banding the shoot bases with black tape (− shade, + band), also enhanced rooting of lilac cuttings, but generally with greater variability than the full treatment (Fig. 1). Any beneficial effect of initial shading without a follow up of tape banding (+ shade, − band) was minimal. Any increase in rooting attributed to this treatment was apparent only when cuttings were collected shortly after the shading was removed.

Greenhouse Trials. Rooting of greenhouse grown lilacs, regardless of treatment, was generally as high or higher than rooting of the best treatment outdoors (Fig. 3). Also, greenhouse grown lilacs did not experience the large fluctuations in rootability seen in the outdoor trial. Rather, they showed more consistent rooting throughout the 12 week collection period with only a slight decrease in rooting as unbanded shoots matured (Table 1). Banded shoots taken over all

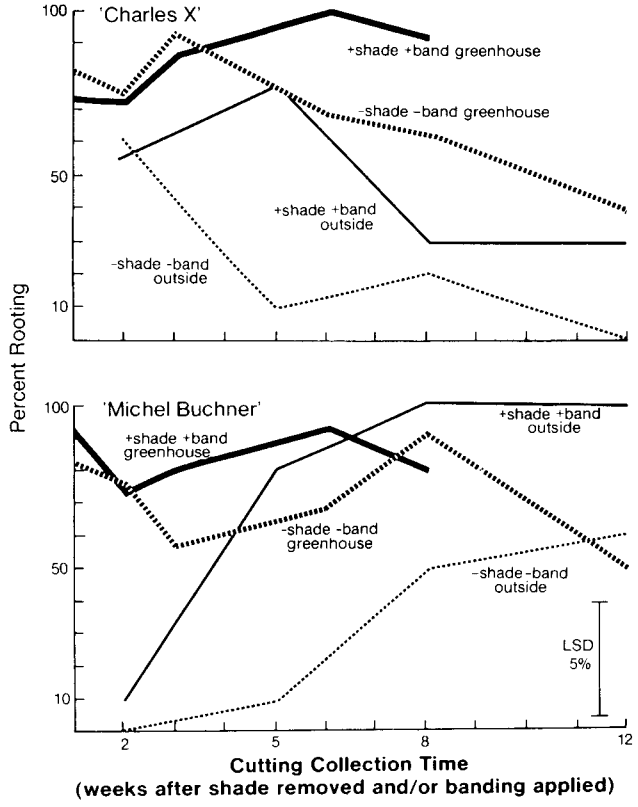

Fig. 3. Rooting of 2 hybrid lilac cultivars as affected by greenhouse or outdoor-grown stock plants and cutting collection time.

collection times and IBA levels rooted significantly better than unbanded shoots, the greatest differences appearing as the shoots matured. The addition of IBA at 0.1% made no difference in rooting percentage. Different levels of shade also had little effect on the rooting of these two cultivars under greenhouse conditions (Table 2). A slight but significant decrease in rooting under the 100% shade treatment

Table 1. Effect of IBA, banding and collection time on % rooting of 2 greenhouse grown hybrid lilac cultivars.

Banding	IBA %	Cutting collection time, weeks[z]					
		'Charles X'					
		1	2	3	6	8	12
		Rooting %					
+	0.0	80.3[y]	81.9	77.5	80.3	78.2	—
	0.1	77.1	81.8	80.2	93.5	79.5	—
−	0.0	75.0	60.6	64.5	70.8	59.3	35.0
	0.1	60.3	62.1	73.5	60.5	65.6	40.0
		'Michel Buchner'					
+	0.0	74.3	80.3	69.0	70.1	78.9	—
	0.1	84.1	80.1	76.4	70.3	83.2	—
−	0.0	73.2	65.2	51.7	47.2	52.5	47.5
	0.1	73.7	72.0	55.8	51.7	59.4	55.0

LSD 5% = 22.6%

[z]Expressed as weeks after removal of shading and/or application of bands.
[y]Rooting percentages represent the average of all 6 shade levels—total number of cuttings = 60.

Table 2. Effect of 4 initial shading treatments on % rooting of 2 greenhouse grown lilac cultivars.

Cultivar	% Shade			
	0	52	92	100
'Charles X'	83.2[z]	76.0	66.8	67.7
'Michel Buchner'	79.0	73.3	72.5	57.3
	LSD = 11.9%			

[z]Rooting percentages are averages for 5 collection dates: 1, 2, 3, 6, and 8 weeks—total number of cuttings = 150.

may be attributed to scorching of the shoots while they were being weaned from under the shade.

There are several possible explanations for this more favorable rooting response of forced shoots in the greenhouse. Plants greening up in the greenhouse in full light during February, March, and April received only about 44% of the total solar radiation that the outdoor plants received in May, June, and July (based on total solar radiation statistics provided by Cornell University Department of Meteorology and assuming a maximum 80% transmittance through greenhouse glass). So in effect, the greenhouse plants growing on in full light during the winter were under a 66% shaded condition compared to the outdoor plants in the spring and summer. This lower level of light experienced by the greenhouse plants could be at least partially responsible for the increased rooting observed in greenhouse grown control plants.

There was also a difference in light quality experienced by the greenhouse versus the outdoor plants that could have contributed to the poorer rooting response of outdoor grown plants. Greenhouse plants were not subjected to ultraviolet radiation which was filtered out by the greenhouse glass. It has been reported that exposure to U.V. light can lessen the sensitivity of plant tissues to auxin, destroy auxin cofactors or auxin itself (10).

Temperature differences between the indoor and outdoor plants may also be a factor. The plants in the greenhouse were grown in consistently warm conditions, with only a 5°C (9°F) difference between the day and night temperatures which has been reported to contribute to increased rooting percentages in other woody plants (8, 9). Outdoors, the plants were subjected to greater temperature fluctuations.

Significance to the Nursery Industry

Etiolation of outdoor grown stock plants, consisting of initial shading followed by black tape banding of shoot bases, can be used to substantially increase the rooting of some hybrid lilac cultivars. Alternately, by taking cuttings from lilacs forced during the winter in a greenhouse, rooting can also be improved. Furthermore, both practices extend the period of time over which lilac cuttings can be collected and rooted successfully. These practices give the nurseryman alternatives to the standard practices of grafting and division potentially resulting in increased productivity, freedom from root transmitted diseases and pests, no grafting costs or graft incompatibility problems. Further work is underway to make this technique commercially viable.

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