TISSUE CULTURE PROPAGATION OF FRENCH HYBRID LILACS

STEVE McCULLOCH

Briggs Nursery, Inc.
4407 Henderson Blvd.
Olympia, Washington 98501

Lilacs have been propagated and grown by nurserymen in the United States and other countries for several centuries. They are truly an old fashioned shrub noted in particular for their spring blossom color and fragrance. Many lilacs in the nursery trade have been labeled as "French hybrids." This is somewhat a misnomer. Although several hundred excellent lilacs were hybridized and introduced by the Lemoine Nursery of Nancy, France, other fine lilacs have been developed by several Frenchmen, other Europeans, and other sources—including individuals in the United States.

Lilacs may be propagated several different ways. The methods used include: 1. seed (2); 2. layering (simple, stool) (2); 3. root suckers (2, 11); 4. softwood cuttings (2, 3, 4, 11); 5. Grafting and budding (2, 11); and 6. tissue culture.

There are several reports on tissue culture of lilacs (1,2,5,6,8,10). At Briggs Nursery, we have been micropropagating *Syringa* since 1982. We have propagated many hundreds of thousands of 20 or more cultivars of lilacs (Table 1). There are good reasons for tissue culturing lilacs. They include:

1. Microcuttings of lilacs are easy to root.
2. The plant is on its own root (suckering is true-to-type).
3. Production of large numbers of new or rare cultivars is possible
4. Tissue-cultured lilacs branch readily and can be grown into a high quality product.
5. Propagation is very reliable.
6. Cost-effective method of propagation.

Table 1. Lilac cultivars micropropagated by Briggs Nursery since 1982

Adelaide Dunbar	Ludwig Spaeth
Agincourt Beauty	*Madame Lemoine*
Annabel	Maiden's Blush
Belle de Nancy	Marie Finon
Capitaine Baltet	Michel Buchner
Charles Joly	Monge
Charm	Oliver de Serres
Clyde Heard	Paul Thirion
Congo	President Grevy
De Mirabel	President Lincoln
Edward J Gardner	Primrose
Hulda	Sensation
Katherine Havemeyer	Vestale
Krasavitsa Moskvy	Victor Lemoine
Lucie Baltet	*Syringa patula*

The remainder of this paper summarizes our experience in producing tissue-cultured lilacs.

Lilacs can be initiated from actively growing shoots, dormant buds, or meristems. We use any of these explants depending upon the condition of the stock plant or source of material. Actively growing shoots are carefully defoliated and washed in running water for up to 30 min. Next, 5 to 10 twigs are placed in glass jars filled with a detergent (Tween-20) and 0.5% sodium hypochlorite and agitated for 15 to 40 minutes. The explants are then transferred to 0.05% sodium hypochlorite. The shoots are then either trimmed into smaller nodal sections or the vegetative buds are dissected to remove the meristem.

Dormant buds may also be used. These dormant shoots are first washed and then disinfected in 0.5% sodium hypochlorite for 30 minutes or longer. They are then brought into a laminar flow hood and transferred to 0.05% sodium hypochlorite. Using sharp, sterile instruments, the bud scales are pulled and trimmed to expose the meristem and primordial leaves. The meristem may be cut, or a larger bud piece cut and placed on a shoot initiation medium. Generally contamination is very low, but it is a slow and tedious

Cultures are grown using cool-white fluorescent light (50 to 70 μ mol $S^{-1}m^{-2}$) with a 16 hr. light photoperiod. The culture room temperature is approximately 23 °C. Lilac shoots are grown in glass test tubes (25x150mm) or glass baby food jars (250ml). Lilacs can be grown and multiplied on a wide variety of media (1,5,10). We use the inorganic nutrients of Murashige and Skoog (MS) (9) supplemented with 0.4 mg/l thiamine-HC1, 100 mg/l myoinositol, 30 g/l sucrose and solidified with agar. The pH is adjusted with 10% KOH to 5.6.

As indicated previously by Pierik (10) and Einset (1) lilacs have been found to respond to a broad range of cytokinins. They include: N6-isopentenyladenine (2iP), N6-benzyladenine (BA), zeatin, zeatin riboside, kinetin, and thidiazuron. In our work, we have found the first three cytokinins mentioned of most benefit. We routinely use these cytokinins in combination or individually in range of 2 to 30 μ M. An excellent medium we have used for several lilacs is MS with 8 μ M BA and 8 μ M 2iP.

Shoot cultures are transferred to fresh media every 6 to 8 weeks. Multiplication rates vary with each cultivar but a 3x increase is common. Depending upon the cultivar, multiplication may be by either nodal (1,10) or axillary branching (5,6).

There are reports of curled leaves occurring on lilacs *in vitro* (10). We are not of the opinion that this is purely a response to cytokinin. Perhaps it may be due to varietal differences, nutrient or water

uptake, or the tightness of the seal on the culture vessel. We have not experienced any problem with acclimation or rooting of these curled leaved shoots. Once rooting occurs the new growth shows no leaf distortion.

Lilacs can be rooted in the laboratory or in the greenhouse. Initially we rooted our lilacs *in vitro*. Nodal cuttings were placed on ½ strength MS supplemented with naphthaleneacetic acid (NAA). Rooting occurred within two to four weeks and was best at a concentration of 0.15 μ M NAA.

Table 2. Effect of naphthaleneactic acid (NAA) concentration on the rooting of *Syringa* cvs *in vitro*[1]

NAA Concentration (μ M)	Percent rooted shoots of 'Victor Lemoine'	Percent rooted shoots of 'President Grevy'	Percent rooted shoots of 'Charles Joly'
0 05	52 4	81 3	62 5
0 15	95 8	100.0	93 8
0 25	66 7	68 0	75 0
0 5	78 1	68 8	56 3

[1] 24 microcuttings per treatment

Currently we root all our lilacs in the greenhouse. Sixteen nodal cuttings are stuck into a 10 cm square pot filled with 70% perlite and 30% peatmoss. The microcuttings are misted and placed into plastic covered mist tents with bottom heat to root. We root lilacs year 'round. In order to do this we use high pressure sodium vapor lights to supplement and extend the photoperiod. The juvenile lilac microcuttings root quickly—within 2 weeks. We expect 90 to 95% rooting. After 6 to 8 weeks the roots will reach the bottom of the 10 cm pot. Once this occurs, top growth is rapid, perhaps 2 to 3 cm per week.

Variation in rooting can be attributed to: the quality and size of the microcutting, timing and weather, a water or humidity problem, or poor soil aeration. When the plants are large enough they are potted and grow on into liners. As a liner, they grow continuously and respond well to shearing.

We have had our challenges with lilacs since 1982. Probably the most important observation is that lilac cultivars should be reinitiated periodically. This is especially true when growing chimeras like 'Sensation.' All white forms of 'Sensation' can be found growing on the same bush with the normal flowers of 'Sensation.' So care must be exercised in initiating true-to-type material.

LITERATURE CITED

1. Einset, J. W. and J H Alexander 1984. Multiplication of *Syringa* species and cultivars in tissue culture *Proc Inter Plant Prop. Soc.* 34.628-636.

2 Fiala, J L. 1988. Lilacs, the genus *Syringa*. Timber Press, Portland, OR.

3 Halward, L. 1976. Lilac propagation. *Proc. Inter Plant Prop Soc.* 26:259-260.

4. Hand, N. 1978 Propagation of lilacs *Proc Inter Plant Prop. Soc.* 28:348-350.

5. Hildebrandt, V. and P. M. Harney. 1983. *In vitro* propagation of *Syringa vulgaris* 'Vesper.' *HortScience* 18(4).432-434.

6. Hildebrandt, V 1986. Lilac propagation by tissue culture; academic to commercial. *Proc. Inter. Lilac Soc.* 15(1).25-34.

7 Lima, H and R Ticknor 1986. The effect of propagation method on forced potted plants and on pathogen resistance in *Syringa vulgaris. Proc. Inter. Plant Prop. Soc.* 36.126-131

8. Minocha, S. 1979. Lilacs in test tubes: potential for cloning of lilacs by cell and tissue culture *Proc. Inter Lilac Soc* 8:12-19.

9. Murashige, T. and F. Skoog 1962. A revised medium for rapid growth and bio-assays with tobacco cultures. *Physiol. Plant* 15.473-497

10 Pierik, R. L M., H H M. Steegmans, A A. Elias, O. T. J. Stiekema and A. J. van der Velde. 1988. Vegetative propagation of *Syringa vulgaris* L. *in vitro Acta Horticulturae* 226.195-201

11. Wedge, D 1977 Propagation of hybrid lilacs. *Proc. Inter. Plant Prop. Soc.* 27:432-436.