RESPONSE *IN VITRO* OF EXPLANTS CHEMICALLY TREATED VIA FORCING SOLUTIONS

PAUL E. READ AND GUOCHEN YANG

Department of Horticulture
University of Nebraska-Lincoln
377 Plant Science
Lincoln, Nebraska 68583-0724, U.S.A.

Abstract. Stems of deciduous trees and shrubs were effectively forced into growth by immersing the basal ends of cut stems in a solution of 200 ppm 8-hydroxyquinoline citrate (8-HQC) and 2% sucrose. The new growth is an excellent source of explant material for micropropagation. Growth regulating chemicals placed in the forcing solution both influenced the forcing rate and the *in vitro* performance of explants produced in this fashion. In addition, a pre-forcing NaOCl soak accelerated bud break and size and number of shoots available for propagation.

INTRODUCTION

Commercial florists have for many years used solutions containing an energy source (sucrose) and an anti-microbial agent (8-HQC or other chemicals) to increase the longevity of cut flowers such as roses, carnations, and gladiolus (2,3,5). In addition, forcing cut stems of flowering shrubs has been a common practice to obtain winter color in an inexpensive fashion (6). The system we use combines these technologies to obtain softwood tissue for *in vitro* studies.

MATERIALS AND METHODS

The system employed for this research is as described above and in our recent publication (4). Cut stems were disinfested by soaking for 15 minutes in bleach (0.78% NaOCl) plus 6 drops/liter of a wetting agent (Tween-20). A comparison was made between such bleach treatments and no treatment. Data were taken on days to bud break, percent bud break, and length of forced shoots. The basal parts were then freshly cut and immersed in a solution containing 200 ppm 8-HQC and 2% sucrose. For growth regulator studies, 0, 1, 10, or 50 ppm GA_3 or 0, 1, or 10 ppm benzyladenine (BA) were placed in the forcing solution. Influence on shoot elongation from the forced buds was noted and effects on subsequent *in vitro* culture were recorded. The *in vitro* system was as described by Garton, et al. (1) for *Alnus glutinosa*. Vanhoutte's spiraea, privet (*Ligustrum vulgare*) and lilac (*Syringa vulgaris*) stems cut from established landscape plants were the plant materials employed.

RESULTS AND DISCUSSION

Bleach treatment increased percent bud break and shoot length while reducing days to bud break for lilac and privet (Tables 1, 2, 3). In contrast, the opposite effects were observed for spiraea, pos-

sibly because of tissue damage from the bleach due to the thinner bud scales of spiraea. It seems clear that a bleach treatment can enhance the production of potential explant material, but tests will have to be conducted to determine appropriate rates and timing for various species.

Low rates (1 or 10 ppm) of GA_3 in the forcing solution caused elongation of shoots two to three times that of non-treated stems (data not shown). Higher rates of GA_3 (10 or 50 ppm) caused a reduction of *in vitro* performance, however. When BA was included in the forcing solution, an increased number of explants produced shoots *in vitro* and a greater number of shoots were produced per explant (Table 4). Although these data are somewhat preliminary, we have found responses to be similar for several other plant species. Further study of use of the forcing solution to influence *in vitro* performance of explants taken from forced woody stems is therefore warranted.

Table 1. Effect of a pre-forcing bleach wash on percent bud break of woody stems forced for 10 to 14 days in a solution containing 200 ppm 8-HQC and 2% sucrose.

Plant Species	Percent bud break		Difference (%)
	Bleach Wash	No Wash	
Lilac	90.1	82.9	+ 8.2
Privet	32.0 a	12.0 b	+20.0
Spiraea	77.5	81.2	− 3.7

Table 2. Effect of a pre-forcing bleach wash on shoot elongation from woody stems forced for 10 to 14 days in a solution containing 200 ppm 8-HQC plus 2% sucrose.

Plant Species	Shoot Length (cm)		Significant at
	Bleach Wash	No Wash	
Lilac	2.15 a	1.85 b	0.10
Privet	1.73 a	0.86 b	0.01
Spiraea	0.79 a	0.61 b	0.05

Table 3. Effect of a pre-forcing bleach wash on days to bud break of forced woody stems held in a solution containing 200 ppm 8-HQC plus 2% sucrose.

Plant species	Days needed to bud break		Difference (day)
	Bleach wash	No wash	
Lilac	3.5 b	5.9 a	+ 2.4
Privet	5.6 b	7.7 a	+ 2.1
Spiraea	4.8 a	3.5 b	− 1.3

Table 4. Effect of BA in the forcing solution on shoot initiation and elongation of Vanhoutte's spiraea explants cultural *in vitro*.

BA (ppm)	Percent of explants producing shoots	Number of shoots/explant
10	54.2 a	2.46 a
1	37.2 b	1.24 b

LITERATURE CITED

1. Garton, S., M. A. Hosier, P. E. Read and R. S. Farnham. 1981. *In vitro* propagation of *Alnus glutinosa*. *HortScience* 16:758–759.
2. Larsen, F. E. and J. F. Scholes. 1966. Effects of 8-hydroxyquinoline citrate, N-dimethyl amino succinamic acid and sucrose on vase-life and spike characteristic of cut snapdragons. *Proc. Amer. Soc. Hort. Sci.* 89:694–701.
3. Marousky, F. J. 1968. Physiological role of 8-hydroxyquinoline citrate and sucrose in extending vase life and improving quality of cut gladiolus. *Proc. Fla. State Hort. Soc.* 81:409–414.
4. Read, P. E. and Yang Qiguang. 1987. Novel plant growth regulator delivery systems for *in vitro* culture of horticultural plants. *Acta Hort.* 212:55–59.
5. Rogers, M. N. 1973. An historical and critical review of post-harvest physiology research on cut flowers. *HortScience* 8:189–194.
6. Schwarze, D. 1988. Forcing flowering branches. *Nebguide* G88–868.