INDUCTION OF JUVENILITY AND ROOTING OF SOME WOODY ORNAMENTALS

GABOR SCHMIDT[1]

University of Horticulture and Food Industry
Budapest, Villányi út 35-43
H-1118, Hungary

Abstract. In experiments between 1978 and 1989, ornamental members of the Cupressaceae family and *Tilia tomentosa* displayed more or less clearly distinguishable histological and morphological marks in their juvenile and adult (sometimes also in transitional) stages of development, the juvenile always being the better rooters. Adult specimens of the above mentioned plants could be reverted to the very juvenile stage by vegetative propagation, shading, etiolation, changing the position of shoot, or other treatments. The first new leaves, however, retained their adult shape and only the further, entirely newly initiated ones began to display transitional or juvenile characters.

INTRODUCTION

Juvenility is a key factor during the propagation by cuttings of hard-to-root woody plants. Much research has been done to overcome the problem by using originally juvenile material (young seedlings), (7), or by rejuvenating old mother plants using different cultural methods (1, 2, 3), often called "preconditioning" or "pre-treatment" (4). The aim of the present paper is to contribute to the complex question of preconditioning, juvenility, and rooting by reporting on some experimental results.

MATERIALS AND METHODS

The experiments were carried out between 1978 and 89, with 12 cultivars and species, using different methods of preconditioning. All the cuttings were rooted in an unheated plastic house in sharp sand, under polythene sheeting. Before insertion, they were treated with a 0.1 or 0.2% alcoholic solution of IBA (5 sec. dip).

RESULTS AND DISCUSSION

Rejuvenation through vegetative propagation and experiments with members of the Cupressaceae family:

Between 1987 and 89, the rooting of 10 cultivars, either as cuttings taken from field-grown, 5 to 11 year old plants, or cuttings taken from young plants propagated in the previous year and pot-grown for one growing season under 50% shade, was compared.

As seen in Table 1, the higher rooting ability of young plants was always accompanied by presence of juvenile foliage.

---

[1] Associate Professor

Table 1. Effect of the age of vegetatively propagated stock on the juvenile character and subsequent rooting. (1987-89, averaged from three experiments)

Species or Cultivar	Age, (years)	Percent of cuttings with some juvenile foliage before rooting	Percent of cuttings with some juvenile foliage after rooting	Rooting, percent
Chamaecyparis lawsoniana 'Globus'	6-8	0%	37%	13%
	1	65	85	42
Juniperus chinensis 'Pfitzerana Aurea'	6-8	20	65	39
	1	100	100	60
J horizontalis 'Plumosa'	6-8	44	86	62
	1	100	100	80
J sabina 'Mas'	6-8	23	89	73
	1	100	100	80
J virginiana 'Grey Owl'	4-6	15	78	40
	1	87	100	58
J virginiana 'Skyrocket'	9-11	5	72	49
	1	78	87	60
Thuja occidentalis 'Hoveyi'	6-8	40	81	78
	1	64	78	74
T occidentalis 'Wagneri'	6-8	5	76	69
	1	53	78	73
Platycladus orientalis 'Compactus'	4-6	0	15	3
	1	36	44	26
× *Cupressocyparis leylandii*	9-11	0	5	0
	1	100	100	69

The biggest contrast in performance between the two cutting sources was obtained with × *Cupressocyparis leylandii* 'Stapehill'. In Western Europe, it is mainly propagated by cuttings, but in Hungary it is extremely hard and slow to root. The mother plants for this experiment were imported from southern England in July, 1978, as unrooted cuttings taken from an unpruned hedge. In the first year they rooted quickly and with full success (94%). But after three years of growing in the nursery, these plants produced non-rooting cuttings, which would stay for 1 to 2 years in the propagation bed and callus heavily, before the first roots appeared.

When shoots appeared, they looked more like a young *Cupressus* seedling than a Leyland cypress; they had soft awl-shaped leaves with long internodes and these produced cuttings that rooted well again. When potted up and grown in a lathhouse, these plants continued to produce juvenile shoots for 3 to 4 months but they returned to the "normal" leaf form.

Rejuvenation by full or partial etiolation (shading):

In experiments with *Tilia tomentosa* between 1978 and 1982, etiolation of stock plants, either by earthing-up the shoot bases or by "forcing" the stock plants under black polythene tunnels, stems showed juvenile histological structure (higher percentage of

increased markedly the subsequent rooting of cuttings. Etiolated stems showed juvenile histological (cell and tissue) structure (higher percentage of parenchymatic and meristematic tissues and a lower degree of sclerification) which was retained for 4 to 6 weeks afterwards. When earthing up, formation of juvenile stolons was also observed (5, 6).

Later experiments showed that etiolation can be partially substituted by a heavy shading, which is considered as a partial etiolation.

Table 2 illustrates the effect of shading on some *Juniperus* cultivars. The results are most prominent with *J. virginiana* 'Tripartita', an old bush growing under a tree for 6 years and having entirely juvenile branches on the shady side and adult ones on the sunny side.

Table 2. Effect of shading of the stock plants on juvenile characters and subsequent rooting (1987-1989; average of three experiments)

	Percent of shoots with some juvenile foliage		Rooting, percent	
Cultivar	Full sun	Shade*	Full sun	Shade*
Juniperus communis 'Hornibrookii'	0%	34%	64%	87%
J communis var *saxatilis*	0	22	52	75
J horizontalis 'Glauca'	16	48	74	88
J. virgiana 'Tripartita'	24	100	68	98

* Note. *J. virginiana* 'Tripartita' had been growing for 6 years under a tree, the others were provided 50% shading (dark plastic net) for 1 to 3 years.

LITERATURE CITED

1. Clark, J R. 1981. Juvenility and plant propagation. *Proc. Inter. Plant Prop. Soc.* 31:449-452.

2. Hackett, W P 1985 Juvenility, maturation and rejuvenation in woody plants. *Hort Review* 7·109-155

3 Hess, C E 1967 Root initiation and juvenility—a possible implication of terpene compounds *Proc. XVII Inter Hort. Cong.* III.443-451

4. Howard, B H 1977 Plant propagation. *Rpt E Malling Res. Sta. for 1976.*

5 Schmidt, G. 1982. Jarulekos gyokerkepzodes indukalas az ezusthars (*Tilia toemtosa* Moench) klonok elszaporitasanal *Kert. Egy Kozl.*, XLVI (14).109-114.

6 Schmidt, G 1986. Effect of etiolation on the histological structure of the *Tilia tomentosa* Moench stem Part I and II, *Folia Dendr.*, 13/86·217-262

7 Spethmann, W 1986 Stecklingsvermehrung bei Waldbaumen *Deutsche Baumschule* 4/86.148-153.