CUTTING PROPAGATION OF *CUPRESSUS* AND × *CUPRESSOCYPARIS*

GENE BLYTHE

Monrovia Nursery Company
P. O. Box Q
Azusa, California 91702

Abstract. The rooting of selected cultivars of *Cupressus* and × *Cupressocyparis leylandii* was evaluated utilizing various cutting treatments. Cuttings of *Cupressus glabra* rooted best with the use of an 8,000 ppm IBA dip and a 6,000 ppm IBA + 6,000 ppm NAA dip; 6,000 ppm IBA was the optimal treatment for *Cupressus macrocarpa* 'Donard Gold'. *Cupressus sempervirens* 'Glauca' produced the highest rooting percentages when cuttings were treated with 8,000 ppm IBA, 6,000 ppm IBA was optimal for rooting cuttings of × *Cupressocyparis leylandii* Clone 121 tended to root the most readily of the three clones tested.

INTRODUCTION

Cupressus and × *Cupressocyparis* are two genera of evergreen conifers widely used in the landscape and produced in the nursery trade in California and the U.S. Southwest. There are some twenty species of *Cupressus*, primarily trees, originating in North America, the Mediterranean, the Himalayas, and eastern Asia. Their appearance may add a bold, yet graceful effect to the landscape, or they may provide a strongly rigid and formal effect. × *Cupressocyparis leylandii*, a bigeneric hybrid between *Cupressus macrocarpa* and *Chamaecyparis nootkatensis*, is valued in the landscape for its rapid growth and graceful form (2).

Selected cultivars of *Cupressus* and × *Cupressocyparis* are propagated vegetatively to avoid the variation found in seedling plants. As with many other conifers, some *Cupressus* and × *Cupressocyparis* cultivars root readily from cuttings, while many offer a challenge to the commercial propagator.

Dirr and Heuser (1) indicate that rooting of *Cupressus glabra* is dependent upon juvenility, while clonal rootability is a factor with *Cupressus macrocarpa* cultivars. They also mention the advantage of an IBA treatment for the rooting of *Cupressus sempervirens*. With cuttings of × *Cupressocyparis*, Whalley (4) emphasized the importance of selecting easier-to-root clones, while Howard (3) notes that a basal wound is of advantage.

MATERIALS AND METHODS

Experiments centered on the effects of selected types and on concentrations of rooting hormones and other cutting treatments on the rooting of *Cupressus glabra* 'Blue Pyramid', *Cupressus macrocarpa* 'Donald Gold', *Cupressus sempervirens* 'Glauca', and × *Cupressocyparis leylandii*.

The rooting hormones utilized were the auxins, indole-3-butyric acid (IBA), naphthaleneacetic acid (NAA), and combinations of IBA and NAA. The auxin were generally prepared as solutions containing 55% methanol and 45% water. Some treatments involved the use of the potassium salt of IBA (designated as KIB) or the use of the methylated salt of IBA in a dry talc powder (designated as IBA powder)

Propagation material was collected from vigorous stock plants (approximately five to ten-years-old) during the early winter. Cuttings were prepared approximately 4 to 5 in. in length, such that the outer tissue on the main stem of the cutting was brown at the base and green above. Side branchlets on the cuttings were trimmed as needed so that all cuttings were of an overall uniform size.

Prepared cuttings were washed and disinfected by immersing them for five seconds in a water bath containing 15 ppm chlorine followed by five seconds in 200 ppm Physan disinfectant. Cuttings then received a quick basal dip in their respective hormone treatments and were stuck into pasteurized flats of a rooting medium consisting of 90% coarse perlite and 10% peat moss. Cutting flats were placed on outdoor heated concrete rooting beds in full sun with an average bottom heat temperature of 62 °F. Intermittent mist was provided during the daytime for 10 sec. every 12 to 30 min., depending on weather conditions.

In addition to the standard treatment described above for general rooting hormone experimentation, other specialized cutting treatments were examined. Some cuttings were soaked for 24 hours in a 5% sucrose solution prior to the standard washing and hormone treatment in an attempt to stimulate additional rooting by increasing the carbohydrate content of the cutting tissue. Other cuttings received a quick-dip in acetone prior to a dip in a hormone powder, the theory behind this treatment being that a portion of the IBA in the powder will be redissolved to provide a quick effect on the cutting, while some IBA will remain undissolved in the powder for subsequent effect. Another treatment involved the inclusion of 200 ppm (a.i.) Captan in the IBA solution. Some cuttings of × *Cupressocyparis leylandii* received a basal wound such that a ½ in. slice of bark was removed from one side of the cutting base. One experiment with × *Cupressocyparis* involved the use of a heavier rooting medium (70% fine perlite and 30% peat moss) in an effort to reduce heavy callusing by reducing the air space (and available oxygen) in the rooting medium. Finally, three clones of × *Cupressocyparis leylandii* (one from Monrovia Nursery and two obtained from the Glasshouse Crops Research Institute in England) were tested with 6,000 ppm IBA to compare their rootability.

After a rooting period of four to five months, bottom heat was discontinued and the mist frequency was gradually reduced during a two-week period to harden-off the rooted cutting flats. The cuttings were then removed from the flats and the number of rooted cuttings and the rooting percentages determined.

RESULTS

The treatments given and results obtained are given in tables 1 through 9.

Table 1. Effects of selected treatments on the rooting of *Cupressus glabra* 'Blue Pyramid' (Experiment 1)

Treatment	Average No Rooted Per Flat ± Std. Error[1]	Percent Rooted
3,000 ppm IBA	82.0± 3.2a[2]	41.0%
6,000 ppm IBA	108.0±15.8ab	54 0
8,000 ppm IBA	122.8± 3 3b	61.4
16,000 ppm IBA powder	99.8± 7.7ab	49.9
45,000 ppm IBA powder	83 0± 9.5a	41.5
6,000 ppm NAA	101.3±17 3ab	50.6
6,000 ppm IBA + 5% sucrose soak	121 3± 9 3b	60.3

[1] 200 cuttings per flat. Four flats per treatment.

[2] Means followed by the same letter or letters are not significantly different at the 5% level (Duncan's Multiple Range Test)

Table 2. Effects of selected treatments on the rooting of *Cupressus glabra* 'Blue Pyramid' (Experiment 2).

Treatment	Average No. Rooted Per Flat± Std. Error[1]	Percent Rooted
8,000 ppm IBA	50.7±5.4a	25.4%
8,000 ppm IBA ± 200 ppm Captan	62.3±6.7ab	31.2
3,000 ppm IBA ± 3,000 ppm NAA	43.7±9.7a	21.8
6,000 ppm IBA ± 6,000 ppm NAA	88.7±9.2b	44 4
5% sucrose soak, 8,000 ppm IBA	76 3±3.8ab	38.2
5% sucrose soak, 8,000 ppm IBA ± 200 ppm Captan	78.7±9.8ab	39 4

[1] 200 cuttings per flat. Three flats per treatment.

Table 3. Effects of selected treatments on the rooting of *Cupressus macrocarpa* 'Donard Gold' (Experiment 1).

Treatment	Average No. Rooted Per Flat ± Std. Error[1]	Percent Rooted
3,000 ppm IBA	58.4±6.5ab	22 9%
6,000 ppm IBA	72.5±5.6a	28.4
8,000 ppm IBA	25.0±1.6cd	9 8
16,000 ppm IBA powder	36.5±1.2bcd	14.3
45,000 ppm IBA powder	21 8±2.7cd	8.5
6,000 ppm NAA	37.8±4.4bcd	14 8
6,000 ppm IBA ± 6,000 ppm NAA	7.3±1.3d	2.8

[1] 225 cuttings per flat. Four flats per treatment

Table 4. Effects of selected treatments on the rooting of *Cupressus macrocarpa* 'Donard Gold' (Experiment 2)

Treatment	Average No Rooted Per Flat ± Std. Error[1]	Percent Rooted
6,000 ppm IBA	101.5±16 6ab	39.8%
acetone ± 3,000 ppm IBA powder	111.0± 10 7a	43 5
acetone ± 6,000 ppm IBA powder	94 8±10 7b	37 2

[1] 255 cuttings per flat Four flats per treatment

Table 5. Effects of selected treatments on the rooting of *Cupressus sempervirens* 'Glauca'.

Treatment	Average No Rooted Per Flat ± Std Error[1]	Percent Rooted
3,000 ppm IBA	176 6± 12.3a	78 5%
6,000 ppm IBA	186.0 ± 10 3ab	82 6
8,000 ppm IBA	202 6 ± 6.0c	90.0
16,000 ppm IBA powder	145 2 ±11.2	64 5
acetone ± 3,000 ppm IBA powder	195 6±10.3bc	86.9
acetone ± 6,000 ppm IBA powder	158.6±20 9	70.5

[1] 225 cuttings per flat Five flats per treatment

Table 6. Effects of selected treatments on the rooting of × *Cupressocyparis leylandii* (Experiment 1)

Treatment	Average No Rooted Per Flat ± Std Error[1]	Percent Rooted
6,000 ppm IBA	141 8±12 9abc	56 7%
6,000 ppm IBA ± 200 ppm Captan	177 3±9.7a	70 9
6,000 ppm KIB	173 3±10.3a	69 3
12,000 ppm KIB	160 3±11 6ab	64 1
16,000 ppm KIB	162 8±11.4ab	65 1
3,000 ppm NAA	146 8±4.9abc	58 7
3,000 ppm IBA ± 3,000 ppm NAA	160 0±8 1ab	64 1
6,000 ppm IBA ± 6,000 ppm NAA	116 5±10 4c	44 4
5% sucrose soak, 8,000 ppm IBA	129 5±10 1bc	51 8

[1] 250 cuttings per flat Four flats per treatment

Table 7. Effects of selected treatments on the rooting of × *Cupressocyparis leylandii.* (Experiment 2).

Treatment	Average No Rooted Per Flat ± Std Error[1]	Percent Rooted
6,000 ppm IBA	109.6±6 8a	54 8%
6,000 ppm IBA ± 200 ppm Captan	98 2±5 6a	49.1
3,000 ppm IBA ± 3,000 ppm NAA	96.4±7 0a	43.2

[1] 200 cuttings per flat Fifty two flats per treatment

Table 8. Effects of selected treatments on the rooting of × *Cupressocyparis leylandii* (Experiment 3)

Treatment	Average No Rooted Per Flat ± Std Error[1]	Percent Rooted
6,000 ppm IBA, standard medium	108 2±6.6a	54 1%
6,000 ppm IBA, heavier medium	93 0±8 0ab	46 5
16,000 ppm IBA powder; heavier medium	57 2±6 6c	28 6
acetone ± 3,000 ppm IBA powder; standard medium	76 2±8 6bc	38 1
acetone ± 3,000 ppm IBA powder, heavier medium	68 2±5 7bc	34 1
acetone ± 6,000 ppm IBA powder, standard medium	61 8±11 0c	30.9

Table 8. *Continued*

acetone ± 6,000 ppm IBA powder, heavier medium	74.3±12.8bc	37.2
basal wound 6,000 ppm IBA powder; standard medium	72 7±6.5bc	36.4
basal wound 6,000 ppm IBA powder, heavier medium	61 2±9.0c	30.6

[1] 200 cuttings per flat Six flats per treatment.

Table 9. Rooting percentages of selected clones of × *Cupressocyparis leylandii.*

Clone	Year	No Rooted/No Stuck	Percent Rooted
MN Clone	1987	804/2,000	40.2%
Clone 21	1987	45/70	64.3
Clone 121	1987	54/65	83.1
MN Clone	1988	738/2,000	36.9
Clone 21	1988	86/170	50.6
Clone 121	1988	112/170	65 9

DISCUSSION

The initial experiment with *Cupressus glabra* 'Blue Pyramid' showed 8,000 ppm IBA to be the optimal hormone treatment, but with the sucrose soak showing some promise. A subsequent experiment with this cultivar showed 6,000 ppm IBA + 6,000 ppm NAA to be a preferable hormone treatment over 8,000 ppm IBA, with the sucrose soak continuing to show promise.

In a comparison of hormone treatments on *Cupressus macrocarpa* 'Donard Gold', 6,000 ppm IBA resulted as the optimal hormone treatment. Treatment with acetone and IBA powder was not shown to be of benefit.

Cuttings of *Cupressus sempervirens* 'Glauca' produced the highest rooting percentages when cuttings were treated with 8,000 ppm IBA.

× *Cupressocyparis leylandii* cuttings rooted best when treated with 6,000 ppm IBA in the standard rooting medium. Clone 121 tended to root the most readily of the three clones tested.

LITERATURE CITED

1. Dirr, Michael A. and Charles W Heuser, Jr , 1987. The Reference Manual of Woody Plant Propagation Varsity Press, Inc., Athens, Georgia.

2. Everett, Thomas H. 1981. The New York Botanical Garden Illustrated Encyclopedia of Horticulture Garland Publishing, Inc New York.

3. Howard, B.H. 1973. A measure of the consistency of the response of cuttings to propagation treatments as a guide to the value of experiments on nurseries. *Proc. Inter. Plant Prop. Soc.* 23.203-211.

4. Whalley, D.N. 1979. Leyland cypress—rooting and early growth of selected clones *Proc. Inter. Plant Prop Soc.* 29 190-203

BRUCE BRIGGS: Mike Evans, a question for you. How do we manage to preserve the germplasm for the woody ornamental plant material when we have over eight times the number of kinds of plants of all the others put together? How can we preserve the germplasm and make it more useful to all?

MIKE EVANS: In the earlier talk at this meeting by Dan Parfitt on the use of tissue culture for germplasm maintenance, the principles he outlined would hold true here.

California has an extensive computer search system called the ''natural diversity data base''. This can serve to locate plant material in the state. I don't know if it exists in other states or at the federal level. The California Native Plant Society has prepared an inventory of rare and endangered native species. California has been exemplary in this area and, in many ways, could be a model for tracking the location of plant material in the U.S. and throughout the world.

VOICE: For Eugene Blythe, is light intensity much of a factor in rooting cuttings of your *Cupressus* cultivars?

EUGENE BLYTHE: The major effect of increasing light intensity is to reduce disease incidence. When we try to propagate many conifers inside the greenhouse we may have fungus problems, so we root cuttings outdoors in the full sun under mist, where we get good air circulation.

VOICE: For Ann Fisher: working inside a closed house in rooting cuttings of native plants, what mist intervals do you use?

ANN FISHER: Our mist is on about 4 sec. every 5 min. initially, then we cut it back; but it is changed quite a bit depending upon conditions, cool and rainy or windy and hot.