FRIDAY AFTERNOON SESSION

December 9, 1966

The session convened at 1:15 p.m. in the Colonial Room Viking Hotel. Mr. Hugh Steavenson was moderator of the speaker-exhibitor symposium.

STU NELSON: Our moderator this afternoon is Hugh Steavenson.

HUGH STEAVENSON: It gives me a great deal of pleasure to introduce Mr. John McGuire.

EFFECT OF TERMINAL APPLICATIONS OF IBA ON ROOTING OF WOODY ORNAMENTAL PLANTS[1]

JOHN J. MCGUIRE AND DAVID C. SORENSEN[2]

It has long been a practice to apply auxins in either a talc or an alcoholic base to the basal portion of cuttings to stimulate root initiation and growth. This has been effective, provided optimum levels of auxin were applied. If concentrations were too high, inhibition of root elongation occurred. If concentrations were too low, poor rooting resulted. There are a few reports of auxin application to the foliage of terminal portions of cuttings either before (4) or after removal from the plant (1) (3), but significantly improved rooting was not obtained.

Terminal applications could be advantageous if they improved rooting without injury to the plant, or if they could be applied as a spray to cuttings in the propagation bench. Theoretically, it is feasible to apply auxins to the terminals of cuttings. It has been established by Went and White (5), and more recently by Leopold and Guernsey (2), that when IBA was applied to the distal (terminal) end of a coleus cutting some auxin was transported to the proximal (basal) end. It is not thought to be in the form of IBA after it is transported.

The purpose of this work was to determine the effect of terminal applications of IBA when applied to woody ornamental cuttings. Preliminary work, done in 1963, with cuttings of *Ilex crenata convexa* Mak., provided information which was used in establishing treatments and procedures used for this experiment. A 1% solution of IBA in a 40-50% solution of ethanol or polyethylene glycol, was satisfactory as a terminal application either as a dip of the terminal bud and next two nodes together with leaves, or as a spray applied to the entire leaf area of the cutting.

Applications of IBA, IAA and NAA separately or in

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combination with each other indicated that NAA could be used effectively at much lower concentrations than IBA or IAA, especially when in combination with one of the other two. The preliminary work also indicated that to be effective terminal treatments must be approximately five times as strong as basal treatments.

In the summer of 1965 comparisons of terminal and basal applications of IBA with NAA were made on a large number of species commonly propagated from softwood or semi-hardwood cuttings. The number of cuttings of each species varied, but there were at least 15 cuttings in each of three replications in each of three treatments in a randomized complete block. The size of cuttings also varied with species, but each cutting had a terminal bud and four nodes. The following three treatments were used:

1. A terminal dip to a depth of two nodes with leaves in a mixture of 1% IBA and 500 ppm NAA in 40% polyethylene glycol (Carbowax 400) for 10 seconds. Cuttings were immediately blotted to remove all excess.
2. A basal dip to a depth of one inch of defoliated stem in a mixture of 0.2% IBA and 500 ppm NAA in the same solvent mentioned above.
3. A basal dust to a depth of one inch of defoliated stem in a commercially prepared talc containing 0.3% IBA.

Cuttings were placed in flats containing sterile medium of equal parts horticultural grade perlite and sphagnum peat moss. Flats were placed under intermittent mist in a greenhouse equipped with fan-pad cooling. Temperatures were maintained at a maximum of 85°F during the day and a minimum of 68°F at night. Cuttings were examined periodically and those of each species were removed when cuttings in one of the treatments were found to be well rooted. Upon removal all media was washed from the roots and the number and length of each root was recorded. For analysis, the data were given a numerical value according to the following system. Roots less than ¼″ long were given a value of 1; roots ¼″ to ½″ long were given a value of 2; roots ½″ to 1″ long, a value of 3; 1 to 2″ = 4; and roots over 2″ were given a value of 5. Thus, a cutting with 1 root ⅜″ long, 3 roots 1½″ long, and 5 roots over 2″ long was given a value of 39. Rhododendrons were evaluated differently because the root system of this species makes counting and measuring individual roots impractical. The following scale was used. Cuttings with 20 or less roots were given a value of 1, cuttings with more than 20 roots in a ball up to ¼″ in diameter were given a value of 2, a root ball ¼″ to ½″ = 3, ½″ to 1″ = 4, and a root ball more than 1″ in diameter a value of 5.

Terminal application resulted in significantly greater root development than basal application for 3 species: *Rhododendron 'Dr. Dresselhuys', Viburnum carlesi compactum,* and *Viburnum wrighti.* Terminal application did not result in

significantly less root development than one of the basal treatments for 5 species: *Euonymus, alatus compactus, Juniperus chinensis ketleeri, Juniperus horizontalis douglasi, Pachysandra terminalis*, and *Rhododendron catawbiense grandiflorum*. Results for other species were either inconclusive due to poor rooting or there were no differences between treatments.

The terminal treatment was noticeably ineffective on *Acer palmatum disectum* (Japanese red maple). This may have been due to the heavy waxy bloom on that species. Terminal treatments resulted in minor chlorosis on *Rhododendrons* species. No chlorosis was observed on any basal treatment. Chlorosis was one of the side effects noted in preliminary work when NAA was used as a terminal treatment. It should be noted that the low values for many of the basal treatments do not indicate lack of roots but rather lack of root elongation. This may have been the result of inhibitory levels of auxin in tissue at the site of root initiation. This phenonemon was not observed in terminal treatments in these experiments.

It is apparent that terminal treatments are feasible and perhaps could be used on a practical basis provided optimum concentrations were determined. It may be found that different concentrations are required for each species. Terminal applications have resulted in modified root orientation on some species, notably on *Ilex* where the greatest number of experiments have been carried out. There have been no lasting inhibitory effects on terminal or axillary buds from terminal treatments. The application of auxin to terminal buds and leaves may be a useful tool in studying auxin movement in relation to the environment. It may also have a practical application in treating scions during grafting to facilitate more rapid union of the scion to the stock.

EFFECT OF METHOD OF APPLICATION OF GROWTH REGULATORS ON CODED ROOT LENGTH OF CUTTINGS OF WOODY ORNAMENTAL PLANTS

Species	Terminal Dip 1% IBA + 500 ppm NAA	Basal Dip 0 2% IBA + 500 ppm NAA	Basal Dust 0 3% (Talc)
Acer palmatum disectum	7.0 NA	29.5 NA	7.0 NA
Euonymus alatus compactus	517.0 A	505.0 A	158.6 B
Juniperus chinensis Ketleeri	42.0 A	11.0 B	55.6 A
Juniperus horizontalis couglasi	88.6 A	73.7 A	75.3 A

Junipurous hoirzontalis plumosa	115.0 A	45.0 B	123.0 A
Pachysandra terminalis	239.3 A	260.0 A	121.3 B
Picea glauca conica	64.6 NA	20.6 NA	20.6 NA
Rhododendron 'Dr. Dresselhuys'	218.3 A	26.6 B	23.3 B
Rhododendron catawbiense grandiflorum	52.8 A	54.0 A	36.2 B
Viburum carlesi compactum	149.0 A	203.6 B	40.2 C
Viburnum plicatum tomantosum	20.0 A*	20.0 A*	20.0 A*
Virburnum wrighti	385.3 A	260.6 B	159.3 C

NA = no analysis made due to the small number of cuttings which rooted
Numbers with the same letter on the same line are not significantly different from each other (P 05)

* In this species only root numbers are listed, not coded values

LITERATURE CITED

1 Hildreth, A C and Mitchell, J W 1939 Spraying is a new method of applying root promoting substances Flor Rev p 14

2 Leopold, A C and Guernsey, E S 1953 Auxin polarity in the coleus plant. Bot. Caz 115 147-154

3 Mitchell, J W and Marth, P. C 1947 Growth Regulators for garden, field and orchard University of Chicago Press

4 Stoutemeyer, V T and O Rourke F. L 1945 Rooting cuttings from plants sprayed with growth regulating substances Proc Amer Soc Hort Sci 46 407-411

5 Went, F W and White, R 1939 Experiments on the transport of auxin Bot Caz. 100. 465-484.

HUGH STEAVENSON: Our next speaker is one of our very loyal members, Al Lowenfels.

VARIOUS TYPES AND STRENGTHS OF HORMONES FROM U. S. A., ENGLAND AND HOLLAND

ALBERT LOWENFELS
White Plains, New York

I planned to bring containers of Hormones that are sold commercially and say a few words about my experiences with them. But then I felt that few words on the whole subject of root promoting substances would be of interest.

Hormones for plant growth are comparatively new. Baileys Nursery Manual, 22nd adition—a wonderful book in