Studies With Ilex Coruta Burfordi

By A. E. EINERT and J. W. MURPHY*

EFFECTS OF THE RELATIVE POSITION OF THE BASAL CUT ON THE ROOTING RESPONSE of ILEX CORNUTA BURFORDI

Evergreen hollies, primarily plants of the Chinese variety, **Cornuta** are being used widely for decorations as pot plants, cut sprays and in seasonal floral arrangement. Landscape work in the South, specifically in Northeast Arkansas, has greatly increased the commercial production and sale of holly. Evergreen hollies are becoming the most widely used broadleaf evergreen in landscape plantings.

The berried types, which are of the most ornamental value, cannot be selected from seedlings until the plants are several years old. Among seedlings there is usually much variation in leaves, berries and plant size. For these reasons, vegetative propagation is used almost exclusively by commercial growers. Semi-hardwood stem cuttings are usually treated with synthetic growth regulators and require three to four months to develop a high percentage of roots.

If a method of making the cuttings could be determined to promote faster rooting it would have considerable value in propagation work. Particularly, if the relative position of the basal cut was found to influence rooting response, it might be possible to consistantly increase the size of the root system and produce salable holly plants in a shorter time.

According to Hume (6), in regard to camellias, the position of the basal cut is of no concern when preparing a cutting. He maintains that the basal cut is determined only by the length of the cutting desired. Edmond, Musser and Andrews (4) mention the findings of Gardner (5) who stated that there is no preference regarding the position of the basal cut for **Deutzia, Sherry, Eleagnus, Forsythia** or Winterberry. In preparing hardwood cuttings, Malstede and Haber (9) reported that the basal cut position is of little consequence, although in commercial practice, usually a 45° slant is made about one half inch below a node.

Although the position of the basal cut seems to be of no importance for many plants, work has shown that a definite correlation exists between the location of the basal cut and rooting response of a large number of ornamentals. Malstede and Haber (9), in reference to softwood stem cuttings, state that the position of the basal cut is determined by the reaction of the exposed tissue to the rooting media and the anatomical make up of the shoot.

Chadwick (1) reported that if preformed root initials are present in a particular species, they will usually be distributed around the node. Corlson (3) supported Chadwick's findings in her work with willow. She found that roots arise on stem cuttings of **Salix Cordata** from definite places at or near the nodes. She attributes this to her previous findings that nodal roots develop from primordia which are present in the stems before removal from the tree. The primordia are formed progressively upward in the nodes of growing branches. After maximum development they remain dormant unless the branches are removed and placed in conditions favoring the growth of root primordia.

Commercially, most plants propagated by stem cuttings, are taken with the basal cut just below a node. Chadwick (1) working with decidious soft wood cuttings, concluded that the basal cut should be one half inch below a node because of greater carbohydrate accumulation at the node. Childers and Snyder (2) working with American holly, showed however, that no consistant relationship exists between carbohydrate content and rooting response of this holly. Kains and McQuesten (7) stated that in their opinion, although many propagators believe a large per cent of cuttings will "strike root" if the basal cut is just below a node, the viewpoint has not been sustained by experimental evidence.

Several investigators have determined that some plants respond better to root formation if the basal cut is through the internode or above the node, deviating from the usual practice. Malstede and Haber (9) explain that with **Weigela** and **Philadelphus** the basal cut is made between nodes to prevent excessive callus. Gardner (5) reported the basal cut above the node produces the best response from California privet. European privet and pink weigela.

Zimmerman and Hitchcock (11) found that the rooting response of holly is determined by a combination of factors such as time of year cuttings are taken, presence or absence of foilage and type of rooting media. Kirkpatrich (8) showed that removal of the basal buds of American holly caused an increase in number of roots induced by "hormone" treatment. He also noted a definite increase in roots formed as a result of basal wounding.

* A Report prepared for the Honors Committee of Arkansas State College. Senior Horticulture student and Assistant Professor of Horticulture, respectively, Arkansas State College.

Childers and Synder (2) also working with American holly found that treatment with synthetic growth regulators did not consistently result in increased rooting.

Basal wounding and use of growth regulators are usually commercial practices in propagation of holly by stem cuttings. Kains and McQuesten (7) contend that when growth substances are used, it is unnecessary to make the basal cut at a slant or close to a node.

There seems to be quite some difference of opinion among authors regarding the preparation of stem cuttings. The position of the basal cut seems to exert no influence on root formation of some plant species. However, definite effects have been found on other species, although no recommendations for evergreen hollies have been set forth in the cited literature. In view of the limited literature and in the absence of data on hollies this study was undertaken to determine whether the relative position of the basal cut has a significant effect on the rooting response of evergreen holly species.

MATERIALS AND METHODS

In the fall of 1962 an experiment was initiated to study the influence of the position of the basal cut on the rooting response of evergreen holly stem cuttings. The Burford holly, **Ilex cornuta burfordi,** was selected for this study.

Semi-hardwood cuttings were obtained from asexually propagated plants in containers in a lath house at the college nursery. The stock plants were approximately two years old. All cuttings used in the experiment were terminal cuttings about 6 inches long, obtained from the current year's growth. The cuttings, each having 6 leaves were taken on November 23, and placed in a rooting bench in the Arkansas State College greenhouse.

Three treatments were made in respect to the position of the basal cut. On the first group, designated group A the basal cut was made immediately above a node. The second group, designated B, was made with the basal cut an equal distance between 2 nodes or at the median of the internode. On the third group, C, the basal cut was made immediately below a node. Each treatment was replicated 15 times.

The basal cut on all treatments was made at a 45° angle and additional wounding was done. A growth regulator containing 0.8% indolebutric acid was used.

Pure sand was used as the rooting medium. Water was applied when needed, as determined by visual indications. A mist system, using standard nozzles, was employed. The air temperature was controlled at an average temperature of between 70° and 75° F. No bottom heat was applied to the rooting bench.

The cuttings remained in the rooting medium for a period of four months. During this time no nutrients were supplied to the cuttings. On March 23, 1963, all cuttings were removed and evaluated according to the method set forth by Malstede and Lana (10).

Plants from each treatment were ranked according to amount and size of roots formed as having: high rooting response, medium response, low response and no response, as determined by visual observation.

The three groups were also ranked by comparison to each other. Immediately after ranking, the roots were exised and weighed. The roots were then air dried for 48 hours and dry weights recorded for comparison.

RESULTS AND DISCUSSION

The data in table I show the effect of the position of the basal cut on the rooting response. The basal cut immediately below a node (group C) produced the greatest number of roots by weight. It should also be noted that where the cut was below the node, all the cuttings formed roots, which was not the case in the other treatments.

The weights of the root material of group A and B showed little variation. When the basal cut was above a node (group A), 13.34% of the cuttings failed to form sufficient roots to be of commercial value and 20% did not root when the basal cut was at the center of the internode (group B).

Table 1.—Rooting response of Burford holly stem cuttings, in relation to the position of the basal cuts.

Group	Number of cuttings	Total rooted (percent)	Weight—total roots (group) Green	Dry (group)
A	15	86.60	5.70	1.17
B	15	80.00	4.16	2.33
C	16	100.00	10.76	2.33

SUMMARY AND CONCLUSIONS

The effects of the relative positions of the basal cut on the rooting response of stem cuttings of Burfordi holly, **Ilex cornuta burfordi,** were studied at Arkansas State College, during 1962-1963. The Burfordi holly was used because of its popularity as an evergreen ornamental.

The effects of the positions of the basal cut as measured by the number, size and weight of roots produced, showed that when the cut was immediately below the node, a greater number of roots formed. It also resulted in a higher percentage of cuttings that formed sufficient roots to be of commercial value. No appreciable differences were found in regard to the number of cuttings which rooted and the amount of roots produced per cutting, when the basal cut was made above a node or at the center of an internode. In no case did callus tissue fail to form.

Because of the limited study conducted, no definite conclusions can be made. The results

indicate however, that when the basal cut on stem cuttings of Burfordi holly is immediately below a node, the greatest number of well rooted plants would be obtained.

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NACTA JOURNAL
Box 28 Tech Station
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