RESEARCH RESULTS

for

NURSERYMEN

No. 3

June, 1962

Department of Horticulture

Agricultural Experiment Station
Auburn University
E. V. Smith, Director
Auburn, Alabama

RESEARCH RESULTS for NURSERYMEN [1]

FOLIAR FEEDING CONTAINER GROWN ORNAMENTALS

Tok Furuta and W. C. Martin

Experiments reported in past years have shown that foliar feeding can be used successfully to fertilize woody ornamental plants grown in containers. There are many advantages such as flexibility of the fertilizer program, reduction of fertilization and production costs, and combination of insecticides and fungicides with fertilizer applications. Foliar feeding will not completely replace soil applications for maximum growth. Therefore, a combination of soil and foliar applications is needed. During 1961, experiments were continued to study the use of foliar feeding on container-grown plants.

I. Comparison of different fertilizers. This experiment showed that several different fertilizers are equally effective when used separately to foliar feed woody ornamentals. Plant growth and quality were the same when similar amounts of actual nutrient element from the different fertilizers were applied.

Small plants of *Ilex cornuta rotunda*, Banks Rose, Green Pittosporum and *Camellia japonica* were grown to compare the effectiveness of three different fertilizers for foliar feeding.

As a check, a soil application treatment that had given satisfactory results was selected.[2] Each time the check plants were irrigated, a 20-20-20 fertilizer solution containing .013 oz. of actual nitrogen per gallon of water was applied. This solution did not wet the foliage. Foliar treatments were urea (46-0-0), a 23-21-17 and a 21-21-21 complete fertilizer applied separately to different plants. The concentration of the fertilizer in the foliar spray was adjusted so that the spray solution contained .2 ounce of actual nitrogen per gallon of water. When only nitrogen (urea) was applied to the foliage, soil applications of phosphorus and potassium were made.

After 5 months, the plants were cut and weighed. All fertilizers tested for use as foliar feeding material were equally effective in maintaining excellent plant growth. When compared with the check treatment, all foliar treatments resulted in larger plants of Banks Rose and *Camellia japonica*.

II. Use of a spreader-sticker. Two types of spreader-sticker, were tested on four species of ornamental plants with urea. The use of spreader-sticker did not result in greater plant growth.

III. Nitrogen incorporation and foliar feeding. Since past studies had shown that nitrogen incorporations at potting time were needed to obtain maximum plant size, [3] studies were continued in 1961 to determine the effective amount of urea-formaldehyde (UF) nitrogen to incorporate in the potting mixture before planting. Seven species of woody ornamentals were grown, using No. 10 food cans and a soil

1/ Compiled by Tok Furuta
2/ Research Results for Nurserymen, No. 2, 1961.
3/ Op. cit.

mixture of one-half peat moss, one-half bank sand. Liners of Camellia sasanqua 'Cleopatra', Roundleaf Japanese Holly, India Privet, and Southern Magnolia were planted in March, 1961. Hardwood cuttings of Shrubalthea, Crape myrtle and Lilac Chastetree were inserted directly into the soil mixture in the containers in April.

Four pre-plant and 2 post-plant fertilizer treatments were used in all combinations. Pre-plant fertilizer treatment consisted of incorporating in the potting mixture the same amount of superphosphate and dolomitic limestone for all plants and incorporating UF nitrogen at the rate of 0, 2½, 5, or 10 pounds per cubic yard of soil.

Following planting, for each rate of UF incorporation 2 subtreatments were made, (1) foliar and (2) soil applications. The foliar application was urea applied weekly using a spray concentration of 2 ounces per gallon of water (.9 ounces of actual nitrogen) with potassium and phosphorus being applied to the soil at monthly intervals. The soil applications consisted of .20 ounces of UF nitrogen (1 teaspoonful) plus .20 ounces of 0-8-8 (1 teaspoonful) per container each month. This treatment was selected since prior studies during 1959 indicated its superiority over the use of an 8-0-8 plus superphosphate at monthly intervals. [4/]

The results show that, when UF nitrogen was incorporated into the potting mixture, the growth of plants that were foliar fed with nitrogen was equal to growth obtained when UF nitrogen was applied to the soil. For maximum growth, a higher rate of UF incorporation was necessary when the plants were foliar fed compared with monthly soil applications.

In general, incorporation of 2½ pounds of UF was sufficient for maximum plant growth when soil applications were made. Plants were smaller at lower and higher rates of UF incorporation. When foliar feeding was used, incorporation of 5 to 10 pounds of UF resulted in larger plants. UF incorporation of 10 pounds per cubic yard of soil mixture did not supply sufficient plant food for one season under Auburn conditions. [5/]

Hardwood cuttings of the deciduous ornamentals rooted well in all treatments. The percentage of rooting was not influenced by the rate of UF incorporation.

An observation in the fall indicated there was less weed growth in the cans that had been foliar fed as compared with soil applications.

During the winter of 1961-62, the plants were exposed to full sun and were not given special protection. All Camellia sasanqua plants were killed. Of the other plant species, 66 per cent of the Southern Magnolia plants, 53 per cent of the India privet plants, and 34 per cent of the Roundleaf Japanese Holly plants survived. Fertilizer treatments apparently influenced the number of plants surviving the winter. Fewer plants survived the cold when 10 pounds of UF had been incorporated than when lower rates of UF had been used. More foliar-fed plants than soil-fed plants survived the winter.

4/ Research Results for Nurserymen, No. 1, 1960.
5/ Op. cit.

LEAF ANALYSIS of WOODY ORNAMENTALS

Henry Orr, Fred Perry, Tok Furuta

The use of foliar analysis as a tool is determining fertilizer requirements of ornamental plants must await accumulation of research information on such matters as sampling technique, plant parts that reflect fertilizer requirements most precisely, and the proper time of sampling. There are many factors other than the amount of fertilizer applied that influences the concentration of a nutrient element in a given part of the plant. Some of these are the influence of the position or location of the leaf in regard to height from the ground, compass direction, and position on the shoot. Analysis of the leaves of the Southern Magnolia gathered from trees during the summer of 1961 showed that these leaf location factors, singly and in combination, influenced the amount of nitrogen, phosphorus, potassium, calcium and magnesium present in the foliage.

CULTURE OF LYONIA LUCIDA, FETTERBUSH LYONIA

Henry Orr

Lyonia lucida, Fetterbush Lyonia, is a native evergreen shrub of Alabama's coastal plain. It was found growing in sandy, organic, moist but well drained hummocks in bogs and swamps of that area. It has desirable characteristics as an ornamental shrub because of its landscape value and foliage for floral decorations.

Lyonia was easily propagated by seed and cuttings. The seed are very fine and should be germinated on a finely shredded medium, such as sphagnum moss. Germination was excellent under glass cover and under intermittent mist. Cuttings made in June and July and in early fall rooted well.

Results of fertilizer requirement studies showed that the most outstanding plants were grown in a one-half sand, one-half peat medium fertilized with a 5-10-10 at the rate of 2000 pounds per acre per year. Better growth resulted from split applications of the fertilizer than a single application in the spring.

Plants grew better under 25 to 75 per cent shade as compared with those in full sun. Saran shade was more effective than lath shade.

PACKAGING WOODY ORNAMENTALS

Tok Furuta and Fred Perry

I. Coating material and moisture loss. Wax has been used for a number of years to retard the loss of moisture from stems of deciduous ornamentals while they are in storage or on display for sale. Cracking and chipping of the wax frequently occurs during handling, which reduces its effectiveness.

An emulsified polyethylene was used and its effectiveness in preventing moisture loss was compared with wax. Uniform stem pieces were dipped in the materials and kept at room temperature. Moisture loss was determined by weighing the stems.

Wax effectively reduced moisture loss. On the other hand, moisture loss from plastic-coated stem sections was as great as that of uncoated sections.

The wax hardened soon after dipping the stems which permitted rapid handling. Drying of the plastic was slow, requiring an hour before the sections were dry enough to handle.

II. Packaging materials. Influences of the medium around the roots and use of a stem coating on keeping quality of packaged deciduous ornamentals were studied. Plants of five deciduous ornamentals were packaged. Two media, a peat-perlite mixture and sawdust, were used around the roots. This was overwrapped with plastic. Stem coatings of wax and an emulsified polyethylene were used separately and compared with uncoated plants. All possible combinations of stem coating and medium around the roots were used.

The packaged plants were kept in a room in which the temperature ranged from 50 to 70° F. and the relative humidity varied from 48 to 85 per cent. At weekly intervals, representative plants from each treatment were planted in the garden.

The medium placed around the roots did not influence moisture loss of the plant during storage, plant survival in the garden , or subsequent growth.

The stem dip material influenced moisture loss during storage. Waxing retarded moisture loss whereas the emulsified polyethylene did not. While growth of the plants after planting was not influenced by coating the stem, approximately twice as many uncoated plants failed to survive as compared with all coated plants.

Sprouting or growth of buds during the storage period was influenced by coating the stem with wax and by the medium. Plants of Lilac Chastetree and Shrubalthea did not sprout during storage. Plants of Flowering Quince and Rugosa Rose sprouted earlier when peat-perlite was used around the root. Peat-perlite mixture held more water than the sawdust. Waxing the canes of Rugosa Rose resulted in earlier sprouting.

AVAILABLE SOIL MOISTURE FOR PLANT GROWTH

Tok Furuta

I. Moisture-holding capacity of soil mixtures. The soil mixture used by growers will influence the amount of water that is available for plant growth. Measurements of available moisture in three typical soil mixtures were as follows:

Soil mixture	Available moisture per No. 10 can
½ peat, ½ perlite	0.96 pints
½ sand, ½ peat	0.37 pints
1/3 field soil, 1/3 sand, 1/3 peat moss	0.45 pints

Loss of soil moisture (evapotranspiration) is the sum of soil surface evaporation loss and plant transpiration loss. For large plants in containers, transpiration accounts for the greatest amount of moisture loss.

Soil mixture does not influence the amount of transpiration provided moisture is not deficient. Thus plants utilize the same amount of moisture each day, even though they are grown in different soil mixtures. One can see that soils with lower moisture capacity therefore would dry out faster, necessitating more frequent irrigations.

The moisture-holding capacity also regulates the duration of an irrigation period since smaller capacity means that less water must be applied to bring soil to field capacity.

II. Determination of irrigation needs. For efficient use of irrigation, reliable guides are needed to determine the amount of evapotranspiration or moisture use by a crop. The amount of evapotranspiration determines the crop need for irrigation. The problem of developing reliable guides to determine the amount of evapotranspiration was studied under greenhouse conditions.

The results show that the two different measures studied indicate the amount of evapotranspiration. These are: 1. the difference in evaporation through black and white Livingston atmometers and, 2. measurements of solar energy.

Further preliminary experiments have shown that excellent plant growth resulted when irrigation frequency was determined by measuring solar energy. Instrumentation has been simple and inexpensive.

FLOWERING of CAMELLIA JAPONICA

Tok Furuta

I. Influence of Gibberellin on time of flowering. Repeated spraying during the fall with potassium gibberellate resulted in earlier than usual flowering of plants of *Camellia japonica*. Flower size and color were not affected.

Plants of the varieties Cheerful, Yuki-Botan, Jarvis Red, Alba Plena, and Pink Perfection were used. All plants were grown in the garden in full sun. Treatment began in late September.

Spraying with an 1,000-ppm solution using an emulsified form of potassium gibberellate resulted in damage and death of the flower buds of all varieties. The cause of this damage was traced to the emulsifier.

All concentrations of potassium gibberellate induced growth of vegetative buds in the treated area. These shoots were killed by cold weather.

Earlier flowering (36 days after start of treatment) resulted when the concentration of potassium gibberellate was 500 and 1,000 ppm, but not when a concentration of 100 ppm was used. Repeated applications at weekly intervals were required.

CHEMICAL CONTROL of GROWTH

Tok Furuta

I. CCC and azalea flowering. Azalea plants were grown in pots under 50 per cent saran shade and sheared in early July. An application (soil drench) of 2 grams per 6 inch pot of CCC (2-chloroethyl trimethylammonium chloride) in early September resulted in more uniform forced flowering of plants of Coral Bell Azaleas during December. Treatment of plants in August resulted in poor flowering. Both cold storage and gibberellic acid treatments were effective in overcoming dormancy of the flower buds.

PROPAGATION STUDIES

Tok Furuta, Henry Orr, and W. C. Martin

I. Location of propagation and container. The use of peat pots for propagation and growth of woody plant cuttings was studied and compared with cuttings rooted in flats and later potted in peat pots. Rooting was done in a saran shade house (approximately 50 per cent light reduction) and in a greenhouse using a medium of one-half peat moss, one-half perlite. Test plants were 'Coral Bells' Azalea, Pink Perfection Camellia, Lyonia, American Osmanthus, Roundleaf Japanese Holly, and Cryptomeria. Cuttings were made in late June-early July. Intermittent mist was used in both locations.

Neither location nor container influenced the rooting response of the test cuttings.

II. Chemicals on Rooting of Osmanthus americanus. Cuttings were made in July and treated with various commercially available rooting powders. Six powders were used.

The only chemical treatment increasing the rooting response of American Osmanthus was Rootone 'F'. Approximately 88 per cent of the cuttings rooted when treated with this material as compared with about 75 per cent of the untreated cuttings, and lower percentages from other treatments.