# RESEARCH RESULTS FOR NURSERYMEN

No. 2

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# STUDIES ON METHODS OF APPLYING NITROGEN TO CONTAINER PLANTS

Studies were continued during 1960 on methods of maintaining adequate levels of nitrogen for optimum growth of woody ornamentals in containers. Soil incorporation of urea-formaldehyde nitrogen before planting and soil and foliar application methods and materials were studied in combination.

Plant species studied were Juniperus chinensis 'Pfitzer', Juniperus conferti, Juniperus horizontalis 'Waukegan', and Ilex crenata 'Roundleaf'. A soil mixture of ½ sand, ½ German peat moss was used with sufficient amounts of dolomitic limestone incorporated to bring the initial pH to 6.5. All plants were grown outdoors at Auburn, Alabama.

The most significant findings of this study may be listed as follows:

1. The incorporation of moderate amounts of nitrogen into the potting soil prior to potting was necessary to obtain maximum growth and plant size by Oct. 1. However, incorporation of urea-formaldehyde nitrogen could be overdone. At the rate of 20 pounds per cubic yard, plant injury in the form of reduced growth or plant death resulted. In addition to the incorporation of nitrogen, supplemental nitrogen was needed during the season for optimum growth for all plants tested except Roundleaf Japanese Holly.

2. Equally good and highly desirable plants were produced by several of the fertilizations methods and materials used. These were: Foliar 'feeding' using urea at a concentration of 2 ounces per gallon of water (potash and phosphorus applied to the soil), or a complete 23-21-17 fertilizer at a concentration of 4 ounces per gallon of water at weekly intervals; 'constant feeding' (watering with a dilute fertilizer solution) using a concentration of 1 ounce of a 20-20-20 fertilizer in 15 gallons of water; and dry applications of urea-formaldehyde nitrogen at the rate of 1 tsp. per gallon can at monthly intervals (potash and phosphorus added to the soil). It seems therefore, that economic considerations

such as cost of production and profits should be most important in determining the proper methods for each situation.

The following considerations should influence the grower in determining the proper method for his situation:

1. Foliar 'feeding' methods would be moderate in equipment cost (actually may not require any more equipment than is on hand at present for pest control programs) and would be adaptable to some automation. Labor requirements should be very low. Considerable research on other crops such as apple trees show that this practice may be combined into a pest control program.

2. Dry fertilization methods are economical in materials used and the equipment necessary for distribution. However, labor requirements are high and the labor may require close supervision to insure correct dosages to all containers.

3. 'Constant feeding' procedures can be easily automated and the equipment cost can be moderate. Distribution of the fertilizer solution through overhead or subirrigation methods would be low in labor requirements, but would be wasteful of the fertilizer material.

## STUDIES ON THE INFLUENCE OF THE SOIL MIXTURE ON THE MOST DESIRABLE CONCENTRATION OF THE FERTILIZER SOLUTION FOR 'CONSTANT FEEDING'

Studies were conducted during 1960 to determine the influence of the soil mixture and 'constant feeding' on plant growth. Constant feeding refers to the procedure of applying a dilute fertilizer solution each time water is applied to the plants. Soil mixtures used were: $\frac{1}{2}$ sand, $\frac{1}{2}$ peat; $\frac{1}{2}$ perlite, $\frac{1}{2}$ peat; and $\frac{1}{2}$ clay loam, $\frac{1}{2}$ peat. Several species of plants were used in these studies conducted in a greenhouse.

The results may be summarized as follows:

1. There was little influence of soil mixture on growth, either by itself, or by altering the optimum concentration of fertilizer for 'constant feeding.'

2. The optimum concentration of the 'constant feed' fertilizer solution for maximum growth was 1 ounce of a 20-20-20 fertilizer in 15 gallons of water for all the soil mixtures tested.

3. Better plants resulted from the optimum 'constant feeding' solution than from fertilizing the plants with a dry 8-8-8 at monthly intervals, using the rate of 1 tsp. to each 1 gallon container.

The grower should consider the following factors in evaluating 'constant feeding' as part of his fertilizer program.

1. Accurate, fairly inexpensive metering devices are now available that eliminate the problem of maintaining desired fertilizer concentrations in the irrigation water.

2. Applying the fertilizer solutions through overhead or subirrigation methods could be easily automated, but would result in considerable wastage of material. However, labor requirements would be at a minimum.

3. Wastage of materials may be prevented by using hand 'watering' methods, but this would be very expensive in labor requirements.

4. Applying fertilizers through the overhead irrigation system may aggravate the problem of controlling weeds in and near the growing areas.

## SITE PREPARATION FOR CONTAINER GROWING

Studies were continued during 1960 on the influence of site preparation on the growth of container stock. In addition to the surfaces that were previously tested and reported, (sawdust, concrete, asphalt, and gravel) bare sandy soil, soil concrete, and black plastic film were added. Liners of representative plants were canned in February, and immediately placed on the surfaces.

The results may be summarized as follows:

1. The surfacing influenced the numbers of plants that died from February to May and numbers were as follows:

| Surfacing | No. of plants out of 26 that died |
|---|---|
| Bare sandy soil | 2.0 |
| Sawdust | 5.0 |
| Concrete | 3.5 |
| Asphalt | 4.0 |
| Gravel | 6.0 |
| Soil concrete | 2.5 |
| Black plastic film | 1.0 |
| Least significant difference | 2.7 |

2. Summer temperatures measured 12 inches above the surface in the group of plants varied little between the surfaces and did not appear to be a contributing factor in the growth of the plants observed.

## DAYLENGTH AND GROWTH OF WOODY PLANTS

Studies were continued from 1958 to 1960 on the influence of increasing the natural daylength with low intensity electric light on the growth of woody plants.

1. Many plant species and varieties respond with greater vegetative growth when the natural daylength is lengthened. Among those studied at Auburn, the following plants responded. Roundleaf Japanese Holly, Convexleaf Japanese Holly, Camellia sasanqua and Camellia japonica.

2. White light was very effective, as was red in stimulating growth. However, blue light did not stimulate growth (in cases it seemed to suppress growth).

3. A 4-hour light break in the middle of the night was as effective as lighting from sundown.

4. Stimulation of growth due to daylength was additive to other factors such as larger container size that also stimulated growth.

5. The influence was more noticable during the naturally shorter daylengths of fall and spring, than during the naturally longer lengths of day of early and mid summer.

6. Lengthening the daylength appears to be practical in the commercial production of container growth stock.

## PROPAGATION OF ROSA BANKSIAE

After 2 months under mist in a greenhouse, cuttings taken in August from the tip, middle, or basal portion of a cane and treated with Hormodin #3 rooted as follows: Tip cuttings - 83.5%, Middle - 94.5%, Basal - 91.5%.

## STUDIES ON ROOT WRAPPING DECIDUOUS ORNAMENTAL SHRUBS

Studies were continued in 1960 on the use of sawdust, peat and perlite mixture and sphagnum to root-wrap deciduous ornamentals for consumer size packages. The results were as follows:

1. With plants stored outdoors from January 29 to March 14, little influence of the packing material on subsequent plant performance was demonstrated.

2. With plants stored at room temperature inside a building from March 17 to April 22, the best plants, based on appearance and subsequent survival, resulted from the use of a peat-perlite mixture around the roots, compared with sawdust or sphagnum moss. This was due to greater moisture retention.

3. Addition of moisture to the packing material on plants held outdoors (no added moisture to those held indoors) account for much of the difference of performance between the two groups.

4. In studies of the effect of plastic root wrap cover film where these were removed when these plants were planted, it was shown that the plant roots did not penetrate unbroken 1½ mil film. Complete removal of the film is desirable before planting.

## STUDIES ON GRADING CONTAINER PLANTS

A 'photometer' was tested to determine its usability in grading plants grown in containers. Highly significant correlations were found between measurements of quality of container grown Roundleaf Japanese Holly and So. Magnolia plants and the 'photometer' reading. Significant correlations between grades and photometer readings were also obtained.