Fall Fertilization of Nursery Crops

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INTRODUCTION

Fall fertilization should play an important role in nursery production programs. Knowledge of the leaf tissue N level in plants prior to dormancy is essential for maximizing spring growth. A desirable level of leaf tissue N can be attained by following the proper procedures for fall fertilization.

WHY FALL FERTILIZATION

Although the attainment of proper nutrient levels in woody plant tissue in the fall is an important aspect of production, it is usually necessary to curtail fertilizer application to most container-grown woody plants by early fall in order to avoid a late flush of growth, which may not have sufficient time for cold acclimation before the onset of freezing temperatures. Shoot elongation ceases for many woody plants by late summer but shoot dry weight accumulation often continues well into the fall months. In Virginia, *Ilex crenata* 'Convexa' has been observed to accumulate over 40% of its seasonal shoot dry weight between mid-September and mid-November (Walden, unpublished data). This continued increase in shoot dry weight, coupled with decreased fertilizer application, can dilute leaf tissue N levels to well below the 2.0% to 2.5% considered optimum for the growth of most woody plants. Since it has been firmly established that the level of N in dormant woody plants strongly influences the time of bud break and magnitude of the first growth flush in the spring (Wright and Gilliam, 1977a, 1977b; Meyer and Splittstoesser, 1969; Meyer and Tukey, 1965), the benefit of restoring nutrient levels in the plant prior to winter storage is apparent.

TIMING AND RATES OF NUTRIENT APPLICATION

Nutrient absorption in woody plants is influenced by both temperature and the concentration of applied nutrients (Wright and Blazich, 1983; Wright et al., 1983). Procedures have been developed for reapplication of fertilizer to the container in the fall when air temperatures are low enough to preclude the initiation of a late growth flush in response to N fertilization (Wright and Blazich, 1983). When maximum daily air temperatures no longer exceed 18C (65F), application of a complete fertilizer for 4 to 6 weeks will allow adequate time for sufficient nutrient accumulation. A concentration of 30 to 50 ppm N should be maintained in the container substrate solution. This is most easily accomplished through liquid fertigation, usually at one-half the rate required for vigorous growth during the growing season. If a slow-release fertilizer is utilized, it should be one which will release the major portion of its nutrients over this time period at temperatures below 18C (65F).

LEAF TISSUE N LEVEL

Leaf tissue analysis is an important aspect of fall fertilization. Some slow-release fertilizers or fertigation at low concentration may provide adequate nutrition during late summer/early fall to maintain sufficient N levels in the plant without stimulating a late growth flush. An initial sampling of the uppermost mature leaves should be taken for nutrient analysis in early fall to determine the need for fall fertilization. A second sampling should be taken 4 weeks after the start of fall fertilization to determine if the desired level of leaf tissue N has been attained.

This raises the question "what level of dormant leaf tissue N resulting from fall fertilization will maximize spring growth of woody plants?" Limited research indicates that woody plants may respond to dormant tissue N levels which are higher than those normally recommended for vigorous growth. Walden and Epelman (1992) found the critical leaf tissue N level in dormant *I. crenata* 'Convexa' which resulted in maximum spring growth was 3.4% N—higher than the critical leaf N level of 1.8% to 2.4% N reported for other *I. crenata* cultivars during the growing season (Gilliam and Wright, 1977c). Walden and Epelman also found that the number of buds breaking in the spring was greater at 3.4% N than at 2.6 % N. Leaf drop, however, increased in response to increasing N in dormant leaf tissue. No leaf drop was evident when tissue N ranged from 1.6% to 2.6 %, while plants with 4.3% N lost more than half their leaves. In light of the leaf drop associated with high levels of dormant leaf tissue N, I would recommend 2.5% to 3.0% N as a desirable range in dormant plants for maximizing spring growth.

SPRING FERTILIZATION

In the same study, for *I. crenata* 'Convexa' with 1.6% N in the leaves of dormant plants, spring growth was increased by early spring fertilization (6 weeks prior to bud break), in comparison to the growth which resulted when fertilizer applications were delayed until just prior to bud break (Walden and Epelman, 1992). The timing of spring fertilization had no effect on spring growth when leaf tissue in the dormant plant was 2.6% N. Thus, the level of dormant leaf tissue N should influence a grower's decision regarding when to initiate spring fertilizer applications. This result implies that the timing of initial fertilizer applications in the spring is less critical when dormant leaf tissue N levels are sufficient due to fertilization the previous fall. For growers who use surface-applied granular fertilizers, spring applications to small blocks of containers can be spread out over time with no loss of spring growth. Such a practice would help to minimize nutrient runoff from container production areas.

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Application of Israeli Low-Volume Irrigation Technology

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INTRODUCTION

Two years ago Gilbert's Nursery faced a dilemma. We were rapidly increasing the number of taxa we were producing as well as increasing overall production. We were operating mist systems in our six propagation houses off a well capable of delivering 26 liters (7 gal) of water a minute. Four pressurized tanks were used to increase our water volume, but this was not enough to comfortably supply our 1394 m^2 (15,000 ft^2) of propagation houses with sufficient pressure to operate our misting sprinklers. We were solely using the Olson 0-4000 sprinkler. We liked this type of misting device because it also allowed us the capability of watering in liners after they rooted. However, it delivers 6 liters (1.5 gal) per min. This was putting an incredible strain on our pump which also supplies our propagation room, break room, bathrooms, and offices with water. We also had twelve other propagation structures totaling 1498 m^2 (16,128 ft^2) which we were misting with recycled pond water. In an effort to cut back on potential for disease, we also had a goal of supplying this area with well water.

OBJECTIVES

Therefore, we had three objectives: (1) to make our area currently being misted with well water more effective and reliable, (2) to increase this area to twice its original size, and (3) to accomplish the first two objectives without increasing the amount of water available to us.

OPTIONS

The evolution began with a phone call to Mark Lurey of M.L. Irrigation, in Laurens, South Carolina. Mark made several visits to our nursery to educate us about our options. After a great deal of study on the part of James Gilbert and Bob Smart, we selected the Ein Dor 809 Mister. It can be fitted with a number of nozzle sizes ranging from 0.8 to 2.2 mm. Each nozzle size is color coded for convenience. We are predominantly using the green nozzle which is 1.3 mm. The low water volume generated is ideal for rooting conifers like *Cryptomeria japonica* which are sensitive to excess soil moisture in the pre-callus stage. Its spray pattern, however, provides