

production system and enable us to produce high quality plants.

METHODS USED TO APPLY FERTILIZER TO CONTAINERS AT TOM DODD NURSERIES

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The objective of our fertilization program is to provide the proper nutrients at the proper levels in the least expensive manner. There are several problems with containers that make it necessary to modify standard fertilization methods. One major problem is the soil medium itself. We normally use two parts milled pine bark and one part German peat moss for the majority of our ericacious plants and add sand for other container ornamentals. The nutrients available initially in the peat and bark medium are not adequate for optimum plant growth. We, therefore, must add nutrients as required. The other major problem is leaching. With containerized stock, irrigation practices are different because more water is used to wet this self-contained environment properly, and we observe considerable leaching. Thus, we have a loss of many nutrients and depression of soil pH.

In attempting to overcome these problems economically, we divide our program into three basic methods: 1. Premix the medium and the nutrients. 2. Side dress. 3. Apply by injector.

Let us look first at our pre-mix procedure: Initially, the two (or three) medium components are mixed by a front-end loader. As they are mixed the second time, dolomite, nutrients, and trace elements are added. We sometimes also add chlordan at this stage. The mixture is then turned at least five more times before it is delivered to the potting machines or to the potting wagons for use. There are certain drawbacks to this procedure that will be pointed out later. All of our soil medium is mixed with dolomite at a rate of 6 pounds per cubic yard. For most of the azaleas we add either Osmocote 18-6-12 at 10 pounds per cubic yard, or Osmocote 18-5-11 at 12 pounds per cubic yard, and one ounce of Peters FTE 503. For *Ilex* and other ornamentals we add Scotts 24-9-9 Premix plus minors at a rate of 3.5 pounds per cubic yard to the two-bark, one-peat, and one-sand mixture. For *Ilex* liners we lessen the rate to 2 pounds per cubic yard. For our azalea liners and some of our native species, we add only dolomite to a one-bark, one-peat mixture and add food by top dressing or with the injector system.

Our second method of feeding is top dressing. We must side dress many of our containers as the months pass because the leaching we have precludes availability of nutrients for a full year, or until the container is sold or repotted with nutrient enriched medium. With the medium containing Osmocote we can expect six to eight months of adequate nutrient availability. Our high temperatures plus heavy rain and irrigation require us to add more Osmocote, or Stagreen 13-4-6 Nursery Special, or McMillan and Harrison 12-4-6 Nursery Special. We also foliar feed with Peters Soluble Trace Element Mix (STEM) and/or 20-20-20 when needed. With the Scotts Premix medium, we can expect only three to four months of good activity and therefore, we also side dress on a regular basis during the warmer months. Since side dressing is the most expensive method of nutrient application, it is done only when a solubridge reading indicates that it is needed.

Our third method of applying fertilizer is with an H.E. Anderson injector system. As we pot our azalea liners, we place them in beds that are irrigated initially with only water. Later, as they recover from transplant shock, we start feeding them daily as we irrigate. We mix our liquid concentrate as follows: 125 pounds of Peters 20-20-20, 10 ounces of STEM, and 100 gallons of water. This concentrate is placed in the main tank and is metered into the irrigation system at a rate of 300 ppm total food. We have found the 20-20-20 quite economical when purchased in large quantities, and it gives no trouble in the equipment.

There are many advantages to an injector system. We can vary the ratios of the various macro- and micronutrients, we can vary the levels of these nutrients, we can add pesticides, and we can be reasonably sure that all the plants receive the same amount of nutrients. We have all these advantages with the use of two valves. Since we have had good results with our injector, we have purchased another one for use in a new area. We will be able to control it with a small microprocessor interfaced with conductivity probes. In addition we will be able to control all the irrigation, heat, and light in the new area.

There are drawbacks to the pre-mix procedure. Even though the medium is turned by the front-end loader five or more times, a check at different locations in the pile with a solubridge will give readings that can sometimes vary as much as 50 percent from the desired norm. We are currently investigating several methods that will mix our various media better and faster. Another drawback is that we must use our medium soon after it is mixed. Otherwise we not only lose some nutrients but also experience more salt accumulation each time it rains.

For further information, I suggest that you read Dr. George McVey's article (2) published in the 1977 IPPS Proceedings (Volume 27) and the article (1), *Nutrition And Its Role In Plant Production*, by Dr. Ernest L. Bergman in the October 1, 1978, issue of "American Nurseryman." There are also numerous articles on the same subject that have been published in the Proceedings of the last few Southern Nurseryman's Association Research Conferences.

LITERATURE CITED

1. Bergman, Ernest L. 1978. Nutrition and its role in plant production. *American Nurseryman*. 148, No. 7 and 8.
2. McVey, George R. 1977. How soil chemistry can work for you. *Proc. Inter. Plant. Prop. Soc.* 27:277-284.

METHODS OF FERTILIZING CONTAINERS AT GREENLEAF NURSERY

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The nursery industry is continually faced with maintaining a balanced fertilization program for optimum plant growth and low production costs. The nurseryman must compare the maximum beneficial effects of fertilizers with the cost of application of the fertilizer. After making this comparison then one can consider which method of application is most suited for a particular operation. Let us consider the options for applying fertilizers to container-grown stock: 1) balanced fertilizer added to the soil medium prior to the canning of stock; 2) granular or slow-release bulk fertilizer applied as top-dressing; 3) liquid-feed (fertigation), generally provided to the plant material at continuous levels. All of these methods have their distinct advantages and disadvantages. However, the nurseryman must decide which mode of application or combination of applications is best suited for the individual operation.

Greenleaf Nursery has adopted a modified combination of top-dress application and a liquid-feed program. The programs are modified in the sense that neither one singly provides adequate nutrition for optimum plant growth, but in combination both provide a balanced and productive fertilizer program at minimal costs.

Top-dress application. As a rule of thumb, 2 to 3 weeks after canning, or once the liner has established itself after transplanting, we top-dress a new crop with fertilizer. With our