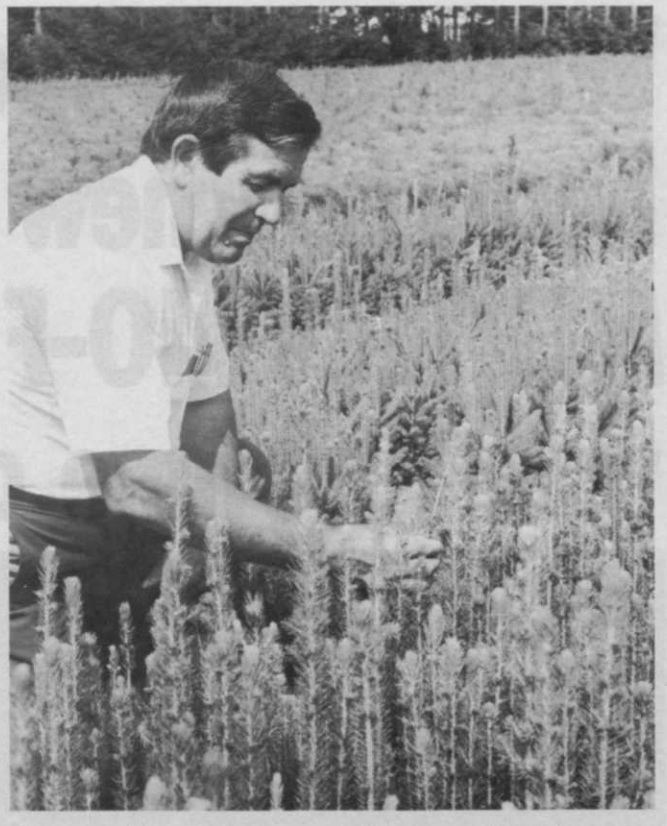
WINTER-HARDY ORNAMENTALS

The Key Is Year-Round Fertility



Two-year-old white spruce seedlings are checked by Dr. Robert J. Schramm, Jr. at Pachaug State Forest Nursery, Voluntown, Conn. More budding and branching was found in plots under year-round fertility tests.

THERE'S a new outlook for ornamentals and forward-looking nurserymen through a new concept for producing nursery stock, says Dr. Robert J. Schramm, Jr., extension nurseryman and associate professor of ornamental horticulture at the University of Connecticut in Storrs, Connecticut.

Through this new concept called "Year-Round Fertility", Dr. Schramm reports that many nurseries have the potential for improving plant growth and quality of stock over a shorter period of time. With some species, three years of normal growth can be realized in just two seasons. An added benefit is an improvement in winter hardiness. It all adds up to increased opportunities for nursery profits.

Basically, the concept calls for 1) building up all plant nutrients in the soil to "optimum" levels based on soil analyses (these levels are below the toxic level, but high enough to overcome the "Law of the Minimum"); and 2) maintaining nutrients at these levels through regular soil sampling and periodic application of the required nutrients, especially nitrogen, phosphorus, and potassium. with this approach, no essential nutrient is believed to function under the "Law of the Minimum".

In essence, the idea for Year-Round Fertility has been taking shape for some time. Three years of research in Connecticut have established the benefits in the Northeast and have also confirmed earlier studies by Dr. Schramm in North Carolina In this earlier work on azaleas and rhododendrons it was found that under a year-round program more flowers were produced per plant and also these flowers opened sooner in the spring and stayed open longer with better color than when plants were grown under a conventional fertilizer program. With a conventional program, fertilizer is applied only during the active growing period (May through August).

In Connecticut, many of the traditional ideas and recommendations for growing nursery stock were based on practices used by tobacco and potato farmers. Frequently, the nurseryman simply applied whatever fertilizer the local dealer had on hand. And so crop recommendations, passed from father to son, became the accepted way to fertilize nursery stock.

Dr. Schramm has now initiated a new approach. He has been working to help nurserymen and others grow marketable, high quality plants in the shortest period of time to realize maximum profits. Workers in many other states have also been looking at ways to push stock for maximum production, but results in many instances involved injury to plants. Fertilizer burn or freeze damage often stemmed from improper timing and improper rates of fertilizer.

Early in Dr. Schramm's studies came a decision to look at the complete analysis of the soil in which a plant would be grown. The first question he felt a nurseryman should answer is, "What does the soil test show?" Without knowing the nature of the soil, it is impossible to treat and fertilize growing stock properly. Here is where the "Law of the Minimum" comes into play. Soil analysis may show prescribed levels of nearly all elements essential for proper growth but a low level of just one element will prevent the plant from reaching its maximum potential. It's like the old adage — a chain is no stronger than its weakest link. A complete soil analysis will usually tell you what is lacking.

The value of fall fertilization has recently been demonstrated by Dr. Harold B. Tukey, Jr., of Cornell University. He found that when the tops of plants become dormant in the late fall or early winter, the roots

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will continue to grow, taking up nutrients and moisture from the soil. These are translocated through the plant and the following spring, properly fertilized plants make better growth than other plants fertilized the conventional way.

Of all the elements involved in Year-Round Fertility, nitrogen seems to be the key. Many plants absorb most of their nitrogen in the form of nitrates. Even when ammonium fertilizers are applied to agricultural soils, much of the absorption of nitrogen by plant occurs in the form of nitrates. Generally, the fertilizer carrier is not important, as long as the proper amount of nitrates is present when the plant needs nitrogen.

So. Dr. Schramm undertook research to compare ammonium nitrate and Uramite ureaform fertilizers for differences in nitrogen availability. He found (Figure 1) that foliage color, density of foliage, number of flowers, and time of flower opening on azalea test plants were significantly improved from the use of Uramite, as compared with plants treated with ammonium nitrate. The slower release of nitrogen

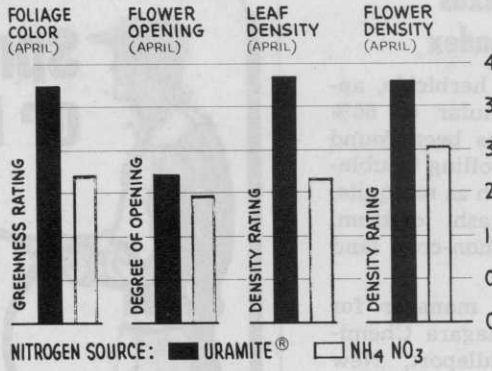

Figure 1. A comparison of the growth and development of Azalea var. Hinodegiri plants treated with Uramite ureaform and ammonium nitrate sources of nitrogen.

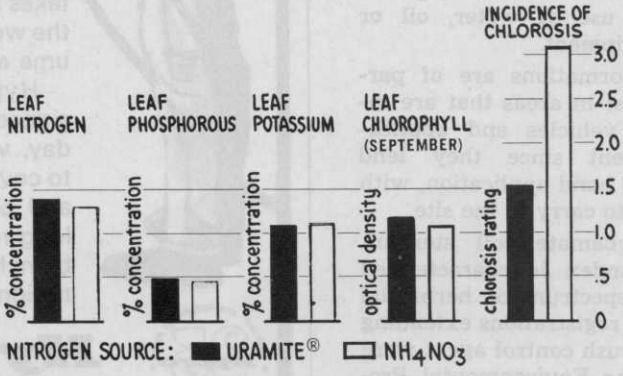

Figure 2. A comparison of the tissue analysis of Azalea var. Hinodegiri plants treated with Uramite ureaform and ammonium nitrate sources of nitrogen.

by Uramite allows nitrogen to be taken up over an extended period of time by the plant.

Other measures of plant performance also demonstrated that Uramite improved the general appearance of various plants. For this ureaform nitrogen source produces a significantly higher level of leaf nitrogen and leaf calcium, without any observable chlorosis (Figure 2). No differences were observed in leaf potassium and magnesium; but with continued use of ureaform nitrogen there is a striking increase in late season greenness as shown by leaf chlorophyl content.

Another aspect of a Year-Round Fertility program involves frequency of application. The use of Uramite reduces the number of nitrogen applications necessary in the nursery and this helps to reduce labor requirements. Ammonium nitrate, for example, to produce comparable growth must be applied at frequent intervals to supply the necessary nitrogen. On the other hand, Uramite need be applied only once or twice a year.

Organic materials containing nitrogen were also compared with these two sources of commercial nitrogen. In all cases, the organic materials released the nitrogen too slowly to maintain maximum plant growth.

Scheduling for Year-Round Fertility is indicated by a program started in 1970 at Johnson's Nursery in Fairfield, Conn. Here Kenneth Johnson first adjusted nutrient levels based on an initial soil test. He then planned applications of Uramite ureaform fertilizer on a semi-annual schedule. His program for the first full year was as follows:

Feb.	Apply combination of	
	(a) Dolomitic limestone	2000#A
	(b) Uramite	395#/A
	(c) Superphosphate	1000#/A
	(d) Potassium Sulphate	400#/A
	(e) Complete minor elements	120#/A
Mar.	Apply 10-10-10	480#/A
June	Apply 10-10-10	480#/A
Sept.	Apply 10-10-10	480#/A
Oct.	Apply Uramite	395#/A
Dec.	Apply 10-10-10	480#/A

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Lateral branching on Canadian Hemlock is measured by nurseryman Kenneth Johnson in Fairfield, Conn. nursery. Graceful pendulous branch is characteristic of this tree which has benefited from two annual treatments with Uramite under Year-Round Fertility tests.

Feb. Take soil test and adjust nutrient levels if necessary.

The Johnson program was repeated in 1971, and it is now being carried into its third year. Enthusiasm for the program was noted in a September, 1971 field day at the Johnson nursery in Fairfield when Connecticut nurserymen viewed plants which had been under the program for two years. Nurserymen were impressed with the uniformity and quality of nearly all species being grown. This included rhododendrons, azaleas, maple, birch, dogwood, mountain andromeda, juniper, hemlock, pines and numerous other shrubs and trees.

A year earlier the Johnsons had reported "we have been careful to make all applications on schedule. We find foliage looks better, the stock looks better and we had outstanding growth in a number of species."

Now at the 1971 field day the Johnsons said improved plant growth increased the market value of the plants and more than justified the added cost of the Year-Round Fertility program.

A poll of the nurserymen confirmed the Johnson analysis and by this spring a total of six nurseries will be on the program in Connecticut.

Much of the early Connecticut field test work for this Year-Round Fertility program was carried on at the Pachaug State Forest Nursery in Voluntown in cooperation with nurseryman, Clarence "Pete" Merrill. Here, Dr. Schramm confirmed winter hardiness of plants. Comparisons were made between the conventional application of fertilizers and the Year-Round Fertility program.

The tests included such species as white pine, white spruce, Norway spruce, Black Hills spruce, Canadian Hemlock, Douglas Fir and European Larch. Fig. 3 shows results of Year-Round fertilization after only one season's testing on three year old (3-0) forest tree seedlings.

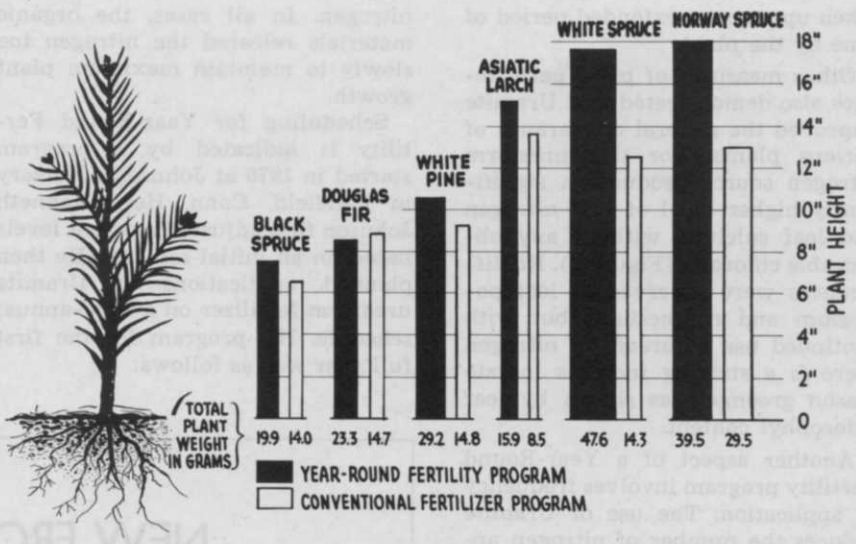

Figure 3. Growth of 3-O year forest tree seedlings under Year-Round and conventional fertilizer programs. Averages of 60 plants per species.

One small problem that has been observed is the increase in the number of weeds in the nursery. *(See "Chemical Weed Control Cuts Labor Costs In Half," WTT, March 1972)* Dr. Schramm's fertility concept really makes everything grow. Growers must plan to take care of this problem when they decide to adopt the Year-Round Fertility concept.

The question of economics is often raised about a program such as this. The Johnsons report that with close plantings and narrow rows and multiple applications the cost of fertilizer applications, extra labor for weed control, and other related expenses can average up to $500 per acre. Other nurseries expect lower costs. Despite the added cost, however, the increased value of the stock is realized through a reduction in winter damage, increased growth, and the improvement in quality.

What's the next step in Year-Round Fertility? Dr. Schramm believes more northeastern nurserymen will be switching to this new concept. He also sees builders, developers, and others following the lead of the first Connecticut nurseries. Top quality ornamentals are therefore in prospect and down the road is the hope that added study will establish the point that healthy plants offer greater resistance to disease and to insects, as well as to air pollution. There is much to be done to take advantage of Dr. Schramm's pioneering work. Progressive nurserymen can be expected to be beating a path to his door as they step up their efforts to improve profitability without increasing nursery acreage or the number of plants being maintained.

Fertility contrast is seen in two-year-old white pine seedlings at Pachaug State Forest Nursery, Voluntown, Conn. Larger seedlings in foreground (dark area) have been under Year-Round Fertility; lighter colored, smaller seedlings in rear have received conventional fertilizer treatments.

Two-year-old white pine seedlings are examined by Dr. Robert J Schramm, Jr. and Clarence "Pete" Merrill at Pachaug State Forest Nursery, Voluntown, Conn. They are looking for second growth lateral bud break in these seedlings, studied under Year-Round Fertility tests.