by the percentage of annual turnover of invested capital. In 1965, the rate was 55.67 percent, while in 1971 it was 76.47 percent. Similar to most other agricultural commodities, ornamental nursery plants can be produced in many alternative ways. Each way is apt to utilize a different combination of labor and machinery and equipment. For a given number of the same plants produced, a production process that uses relatively less capital (machinery and equipment) and relatively more labor will have a higher percentage of annual turnover. However, it may not necessarily be more profitable.

The real acid test of a nursery operation, or any other business for that matter, is the level of profit generated. The productivity factors discussed above will not give an indication of how much profit is being made. They will, however, provide some clues as to the potential problem areas if a nursery is not making adequate profit. In addition, they point out the importance of effectively using the three major productive resources employed in ornamental nurseries.

The level of profit obtained per dollar of sales is an excellent indicator of the effectiveness with which the nursery operation is utilizing all of its resources. In making this calculation, the business analysis program gives credit to the nursery for any increase (or decrease) in the inventory value of plants. This results in a more accurate measurement of the productivity of those items represented by the total costs incurred by the nursery. In 1965, the 13 nurseries on the business analysis program averaged 5.39 percent profit. In 1971, this same figure had increased to 10.06 percent. Despite the onslaught of rising costs, the 13 program nurseries nearly managed to double their profit as a percent of sales. That is rather remarkable. In terms of dollars, the average profit of these same nurseries increased from $4,906 in 1965 to $18,183 in 1971. That is an increase of nearly 271 percent.

Summary

The nursery business analysis program has developed some useful measurement factors to judge the efficiency of resource use in ornamental nurseries. A few of the most important factors have been discussed in this paper. It should be pointed out that most factors come in two forms: one calculated with sales adjusted for changes in plant inventory and the other without this adjustment. In the sake of brevity, only one of each form was presented here.

There is nothing magical about the business analysis program nor is there anything magical about being on the program. The growth in sales and profits reported here were made solely by the nurserymen involved. The role of the business analysis program was to make them aware of some economic management factors that could lead to higher profit.

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THE INFLUENCE OF A-REST UPON GROWTH AND FLOWERING OF *IXORA COCCINEA* C.V. 'NORA GRANT'

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Abstract. **Eighty gallon sized plants of the Ixora cultivar Nora Grant were treated with various rates and combinations of rates of the chemical growth retardant ancymidol (A-Rest)[1]. Two applications of material were made 2 weeks apart beginning March 12, 1973. At each application, rates included the following: 0 mg, 1 mg, 3 mg and 6 mg per pot. Five plants were treated with each rate and rate combination. Measurements of shoot elongation and observations of inflorescence development were taken on May 15. Inflorescence development was rated on a scale where 0 = vegetative, up to 4 = inflorescence greater than 1.5 cm across.**

[1]The author wishes to thank Eli Lilly Co. for supplying the A-Rest, and the Behrens Nursery Corporation, Ft. Lauderdale, for the plants used in this experiment.

As the rate of A-Rest increased, shoot elongation decreased and flower initiation increased. The least amount of A-Rest required to produce a significant effect on both shoot elongation and flowering was a total dose near 6 mg per pot.

Ixora coccinea L. c.v. 'Nora Grant' produces large clusters of very attractive, showy pink flowers as a medium sized shrub, but as a "gallon"-sized plant blooming is sporadic. By the time such plants begin to bloom well, they are often too large for their containers and require moving up to a larger container. A means of shortening internodes to produce a more compact flowering plant would be desirable. The growth retardant A-Rest appeared to offer a reasonable hope for success in this aspect, hence an experiment was conducted to determine its effects on this cultivar.

Materials and Methods

Eighty "gallon"-sized plants approximately 30 cm tall were divided into 4 blocks of 20 each, with 4 rows of 5 plants per block. At the first application, each block of 20 plants received either 0, 1, 3 or 6 mg/pot of material as a drench of 100 ml. Two weeks later, each row of 5 plants in each block was given a 100 ml drench coresponding to the overall initial treatment plan. Thus the first row in each block was drenched with water only; the second with 1 mg/pot; the third with 3 mg/pot; and the fourth with 6 mg/pot. This resulted in the production of 5 plants which had received no A-Rest at either time, through all combinations of treatments to a group of 5 plants which received 6 mg/pot initially and 6 mg/pot on the second application.

Plants were grown under 50% wood lath shade and watered with overhead irrigation. The plants had been recently fertilized with a complete fertilizer plus micronutrients at the nursery and were not fertilized during the test. The soil was a mixture of 1/3 perlite and 2/3 muck and had been steam sterilized.

Two or 3 rooted cuttings were in each "gallon" container and composed "a plant" Each terminal shoot was marked with a spot of water soluble white latex paint on the leaf of the uppermost pair of newly expanded leaves on the day of the first drench. Subsequent measurements of internodal elongation were made from the axil of that leaf to the shoot apex. Transition of the shoot apex to flowering was rated on a 0-4 scale, with 0 being completely vegetative; 1 being a swollen apex containing an inflorescence covered by a pair of leaves; 2 being a clearly visible inflorescence less than 5 mm across; 3, less than 1.5 cm across; and 4, greater than 1.5 cm across. The data thus obtained were tabulated as the average from 5 plants, each plant consisting of 2 to 3 separate measurements. The experiment was begun on March 12, 1973 and evaluated on May 14, 1973.

Results and Discussion

It can be clearly seen in the accompanying table that as the total dose of A-Rest increased, shoot elongation was reduced, while at the same time, flowering was being promoted. The 3+3 mg rate appears to be close to the treatment which would result in desirable significant effects with the least amount of material, which is an important factor, since A-Rest is a rather expensive compound. However, for overall consistency in response, the 6+1 treatment was the best. At the price schedule currently in effect as of the time of this presentation, the cost per plant for a 3+3 mg treatment would be around 70¢. There were no phytoxic effects observed at any of the rates used in this test. Treated plants were a somewhat darker shade of green than those receiving only water, a response noted with some of the other plant growth retardants, (3). The effects of A-Rest can be nullified by applications of Gibberellic Acid (GA), (personal communication from Dr. H. M. Cathey), which would suggest that this compound either interferes with the production of GA or with the plants' utilization of its endogenous supply (3). Flowering in citrus and in several other species of woody perennials has been shown to be inhibited by GA (1), which would suggest that some of the other GA-inhibiting growth retardants might have a similar effect on flowering in this cultivar of Ixora as A-Rest.

Freehand sections of root samples obtained from 6+6 plants were compared microscopically to those obtained from 0+0 plants, as direct viewing of the whole root system of each plant revealed that the A-Rest treatments resulted in roots larger in diameter and more stubby than those from 0+0 plants. It appeared that the major factor in the increased diameter of treated roots was the result of about 2.5 times as many cortical cells which were also larger in diameter than those of the untreated roots. Such enlarged, fleshy roots could store fairly substantial water reserves and thus be partially responsible for the decreased frequency of irrigation required by treated plants

The effect of A-Rest upon shoot growth and flowering in *Ixora coccinea* L. c. v. 'Nora Grant'.

		BLOCK I	0 mg +	
	0 mg	1 mg	3 mg	6 mg
Growth(cm)	9.1 ab[z]	7.3 abc	9.6 a	4.5 cde
Flowers[y]	0 f	0 f	.1 f	.4 ef
		BLOCK II	1 mg +	
	0 mg	1 mg	3 mg	6 mg
Growth(cm)	8.5 ab	7.5 abc	6.1 bcd	4.9 cde
Flowers	0 f	.5 def	.9 bcdef	1.7 ab
		BLOCK III	3 mg +	
	0 mg	1 mg	3 mg	6 mg
Growth(cm)	5.3 cde	7.7 abc	3.6 de	3.1 de
Flowers	0 f	.6 cdef	1.3 abcde	2.0 a
		BLOCK IV	6 mg +	
	0 mg	1 mg	3 mg	6 mg
Growth(cm)	5.9 bcd	3.1 de	2.4 e	2.3 e
Flowers	1.4 abcde	1.7 ab	1.5 abcd	1.6 abcd

[z]Numbers followed by the same letter are not significantly different at the 5% level as determined by Duncan's multiple range test.

[y]Transition to flowering: 0 = vegetative; 1 = swollen apex containing very small inflorescence covered by 2 leaves; 2 = clearly visible inflorescence less than 5 mm across; 3 = less than 1.5 cm across; and 4 = greater than 1.5 mm across.

(pers. comm., Eli Lilly Co.). Additionally, the fact that root anatomy and morphology was somewhat altered by A-Rest would be suggestive of the possibility of some changes in GA production and/or export by the roots to the shoots, as it has been shown that gibberellins or gibberellin-like compounds are produced in the roots of some species of higher plants (2,4).

In conclusion, A-Rest was quite effective in reducing internodal elongation and in promoting flower bud initiation in this particular Ixora cultivar. Other possible applications of this material need to be investigated, especially on viny species. The potential for this chemical in ornamental horticulture is tremendous.

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COLLETOTRICHUM NEEDLE NECROSIS OF NORFOLK ISLAND PINE

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Abstract. **A needle necrosis of Norfolk Island pine (Araucaria heterophylla), commonly known in the nursery trade as A. excelsa, is reported for the first time. Seedlings inoculated with a conidial suspension of the fungus Colletotrichum showed necrotic areas only on the needles at the branch tips after 10 to 14 days. Conidia from acervuli on infected needles measured 14.5 x 4.0 μ, and conidia produced on setae in the acervuli measured 12.7 x 3.5 μ. This species of Colletotrichum coincides with the description for C. derridis. Chemical control was obtained with Dithane M-45, Benlate, Daconil, and Kocide 101.**

Norfolk Island pine, *Araucaria heterophylla* (Salisb.) Franco, commonly known in the nursery trade as *Araucaria excelsa* R. Br., is a popular dark green, pyramidal, evergreen tree grown in lower central Florida and southward (3). Relatively few diseases of Norfolk Island pine have been reported. Fungi attacking this host include *Phytophthora parasitica* Dastur (2), *Cryptospora longispora* Servazzi (7), and *Coniothyrium palidofuscum* Sacc. (8). Recently, the fungus *Colletotrichum* has been found associated with an unreported disease of the needles of seedlings and young trees in Florida nurseries. This paper reports the identification, pathogenicity, and control of this fungus.

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Materials and Methods

The isolate of *Colletotrichum* used in this study was derived from naturally infected needles of a young tree of *A. heterophylla.* Isolations on potato dextrose agar (PDA) were made either by picking conidia from the spore masses on the infected needles or by plating on PDA pieces of necrotic needle tissue following surface sterilization with 0.1% sodium hypochlorite for 2 min and rinsing in sterile distilled water.

Conidia were produced abundantly on PDA in glass petri plates by maintaining cultures under alternating 12 hrs dark and 12 hrs of fluorescent light at room temperature (ca 22-25 C) for 7-10 days. Inoculum was prepared by making a conidial suspension from culture, filtering through double-layered cheesecloth, and diluting the conidia with sterile tap water to 5-10 x 10^5 conidia/ml as measured with the hemacytometer. The inoculum was atomized on the branches of young trees ca 2 ft tall. The plants were then covered with a plastic bag and placed in a mist chamber.

Fungicides tested for control of needle necrosis were Benlate (½ lb/100 gal), Dithane M-45 (1 ½ lb/100 gal), Daconil (1 ½ lb/100 gal), and Kocide 101 (1 ½ lb/100 gal). The fungicides were applied at 7-day and 1-day intervals prior to inoculation of the branches and needles. Plyac (0.2 ml/liter) was added to the fungicide preparations.

Results

Pathogenicity Tests

Inoculated branches developed necrotic spots and complete necrosis of the needles at the tips of