The Cecil Delworth Report

Alstroemeria

The Effect of Controlled Soiltemperatures on Growth & Cropping Characteristics of Three Types

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Introduction

The interest in the production of Alstroemerias has increased with Ontario growers in the last few years. The weaker demand for locally grown chrysanthemums in combination with excellent market opportunities for greenhouse Alstroemerias are the main reasons for this.

With the completion of new greenhouses at H.R.I.O. it was decided, with the support of the Cecil Delworth Foundation, to examine the effect of soil heating/cooling on several Alstroemeria breeding lines. Most research so far has been focused on the effect of soil cooling on the 'Regina' type (Lin and Molnar, 1983; Lin 1984; Healy and Wilkins, 1982) while little or no information has been published on some of the other breeding lines (such as 'Orchid', 'Carmen' or the 'Butterfly' types). The main objective of the study was to determine whether year round control of the soil temperature at about 16°C has a beneficial effect compared to a comparison house where the soil temperature was not controlled. The study was initiated in the fall of 1984 and expected to last until fall 1986. This report contains a description of the experimental design and includes a summary of the results after one-half year.

Materials and Methods

Four different cultivars are being used for this comparison from three different sources. They are Red Sunset (source: van Staaveren, 'Carmen' type), Rosita (source: van Staaveren, 'Carmen' type), Rosario (source: Van Zanten, 'Butterfly' type), and Rio (source: Konst-Farrace, 'orchid' type). All varieties were obtained through a plant lease-license agreement with these plant breeder/propagators. The rhizomes of 'Rio' and 'Rosario' were received bare root and potted in 15 cm pots on September 20, 1984. These plants remained in a greenhouse where a minimum heating temperature of 19/17°C (D/N) was maintained until the middle of November. The other two cultivars were propagated in the U.S. and were received on November 7, 1984 in 10 cm square pots. The latter plants were well rooted. Planting took place in two glass greenhouses (each about 50m² in size) on November 20, 1984. New topsoil was amended with aged manure and the soil was steam pasteurized. Planting took place so that each bed of 6m² had only one variety. Each bed was planted with 36 plants with a final plant-spacing of 2.9 plants per m² of greenhouse surface area. Rhizomes were planted approximately 15 cm deep. A total of five support nets (15 cm square) per bed were used to provide plant support. Each variety was planted in an identically

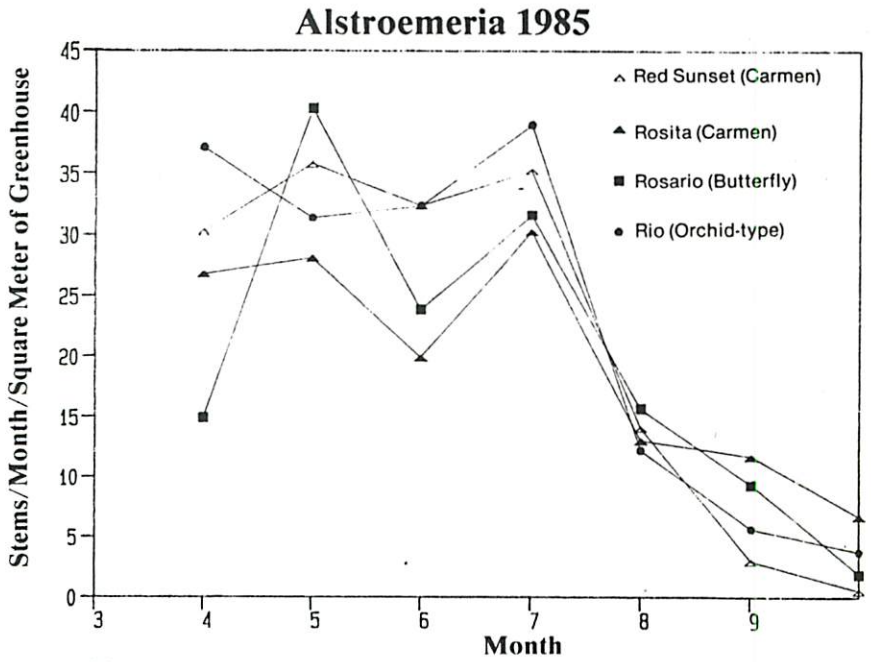

Figure 1.

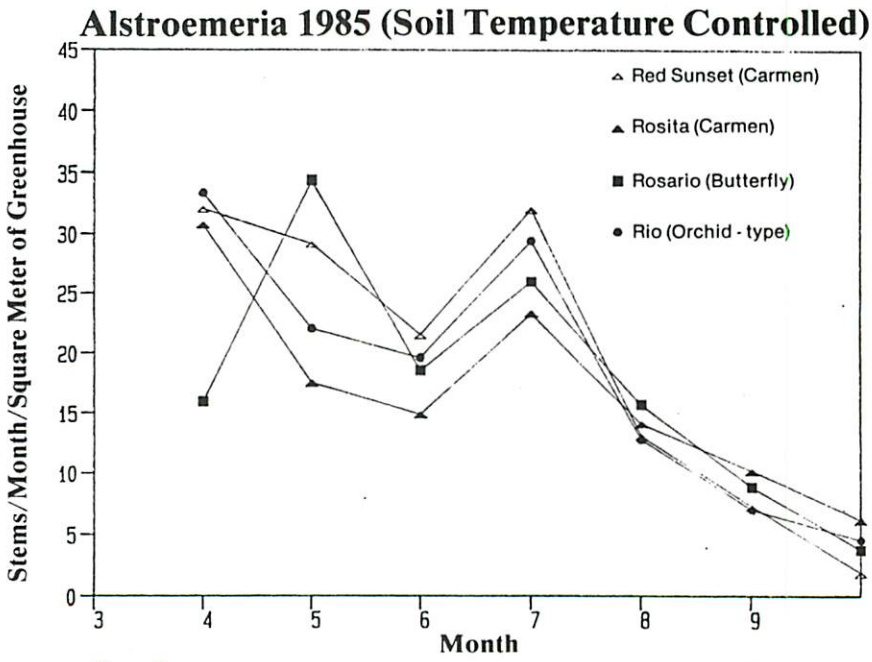

Figure 2.

located bed of the two adjacent greenhouses, which were oriented N/S. The greenhouse air temperature was maintained at 16°C minimum for the first six weeks after which the temperature was decreased to 12/10°C *(D/N)* with ventilation at 20°C. The heating temperature was maintained throughout the spring and summer except the ventilation temperature was reduced to 15°C on February 28 and later to 13°C to prevent any early heat buildup during the warmer seasons. Liquid carbon dioxide was supplemented starting on February 13, 1985.

Polybutylene lines (19 mm) had been buried in the soil at 50 cm depth and 45 cm apart. Soil cooling or heating is provided by allowing cold water (from chilled water unit) or warm water (from boiler), respectively to pass through the lines. Soil heating was started on February 8, 1985 using manual control. Soil cooling was initiated on April 26, 1985 and has run continuously. Insulation of the greenhouse floor surface was provided in three stages: thin layer (2cm) of polystyrene on May 9; then on June 12 straw in the pathways (6 cm) with 1 cm of beads on the beds and on July 26 another 2 cm of polystyrene beads on the beds. Soil temperature was recorded at different depths (8, 15 and 22 cm) at four different locations in each house by means of a datalogger. Although an automatic shading curtain was employed, a layer of whitewash was applied on the roof on May 24. Supplemental lighting was applied between December 20 and May to obtain a total daylength of 16 hrs. by means of incandescent lights at 8 W/m² installed capacity. Watering and fertilization was done through the use of two growhoses per 1.20 m wide bed. From October - February there was one watering per 7-10 days. Between April and July the crop was watered on the average every four days. The irrigation rate was generous at about 30 mm per watering. Fertilization took place based on regular soil reports but during the summer the plants were fed 130 ppm N using 20-5-30 on a continuous basis. Regular applications of phosphoric acid were applied to reduce the pH.

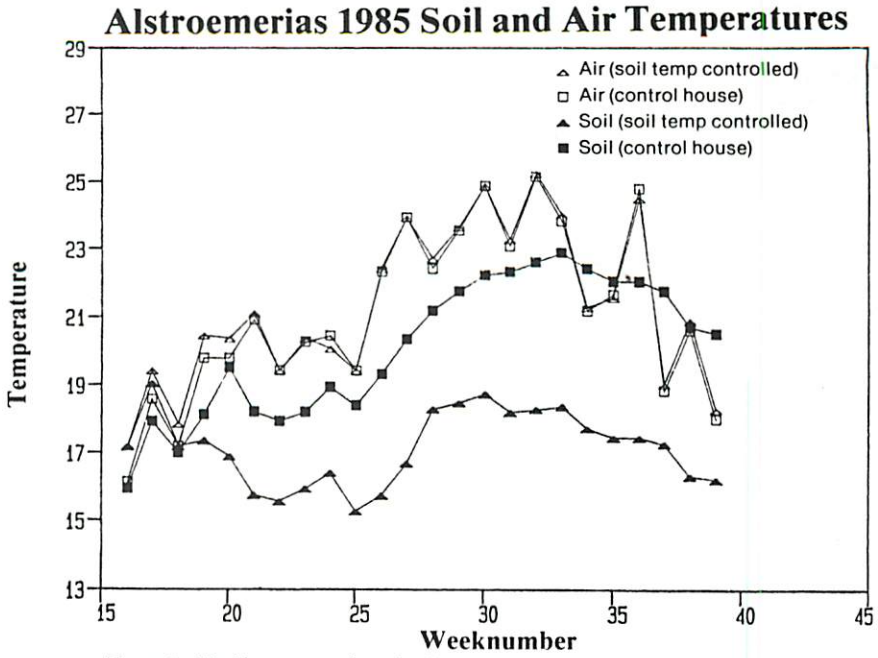

Figure 3. Weekly average air and soil temperatures for two houses.

So far only three applications of snail bait and two applications of an aphicide have been applied to control pests.

Results

The first flowers of Red Sunset and Rio were harvested on March 26. Rosita produced the first blooms 10 days later, while Rosario was 20 days later than Rio. Harvesting took place three times per week by pulling the stems which were then graded according to their quality. Three grades were used:
Grade I: stemlength 80 cm and over with four or more pedicels per cyme, with each pedicel having at least two flowers.
Grade II: stemlength 80 cm and over but with 2-4 pedicels per cyme.
Grade III: other than I or II.

There was generally no problem in attaining the 80 cm length except for Rosario which were only marginally short. Therefore, the length requirement for grade I and II was changed to 60 cm for Rosario only. Rio, on the other hand, was extremely tall (2.5 m) during the first flush. Red Sunset and Rosita reached a height of 1.20 m in the beds. The production of the first year until October is given in Figures 1 and 2.

There are two interesting observations to make at this point:

1. The control house had an overall higher production (16%) for all varieties (no exceptions!) compared to the soil

temperature controlled house. This is interesting, as the soil-cooled house showed a similar production for the month of April and all the differences were shown during May-July, while the cooling did not have any effect on soil temperature until week 18 (Figure 2). All varieties appear to have had two distinct flushes by the end of July, and have diminishing production from August to October.

2. The highest percentages for grade #1 were obtained by Rio and Rosita. Red Sunset and Rosario had many grade #2 due to the lack of sufficient pedicels on the cyme (usually 3) or a lack of secondary or tertiary flowerbuds. No difference was found on the quality patterns among the two houses for the cultivars. This may indicate that the quality of the Alstroemeria is not influenced by the soil temperature but more by the environment above the soil level. During the month of July there were many shoots predominately on Rio, which had some of the primary flower buds aborted (dried up). However, it is rare that all flower buds are aborted on each pedicel. In July, many blind shoots developed on the variety Red Sunset. The stems of all varieties were very brittle during July with Red Sunset showing the worst.

The results of the soil temperature management is shown in Figure 3 (no soil temperature recording before week 16). Although the soil temperature was measured at three different depths (8, 15 and 22 cm) it was considered that the 15 cm depth was the most representative of the rhizome and therefore used in Figure 3 (average of two locations). In the control house the soil temperature was closely related to the 24 hour average air temperature until week 18. After week 20 the difference became about 1.5-2.0°C in favour of the daily air temperature. It should be kept in mind that the insulation was applied to both houses. The soil temperature in the soil cooled houses was about 2.5-4.0°C lower than in the control house despite the fact that the soil cooling system was running continuously with 7-8°C supply and return water. The soil temperature in the soil cooled house increased to 18°C during the month of July, rather than the 16°C it was aimed for, indicating the need for additional cooling lines in the house. In the soil cooled house the average daily soil temperature at 7 cm was about 0.6°C higher and at 22 cm it was about 0.6°C lower than at 15 cm depth during July. there was little temperature stratification in the house without soil cooling.

Summary

The excellent vase life combined with low energy requirements during the winter make the production of Alstroemeria very interesting. The results with the Alstroemerias look very promising with excellent overall growth to date. It is too early to tell whether the control of the soil temperature will be beneficial to Alstroemeria in the long term. □

Julia Brown Joins Horticulture Crops Unit

Julia Brown has been appointed Market Economist in the Horticulture Unit of Commodity Markets Analysis Division of Agriculture Canada.

Julia Brown graduated from the University of Guelph with an Agricultural Economics Degree in 1983. Since then she has worked with Agriculture Canada with the Market Development Directorate where she was Program Coordinator for the Canadian Agricultural Market Development Fund (CAMDF) Program. In that position, she worked closely with industry to develop projects whose principal objectives were to stimulate the increased use of Canadian agricultural products and aid in the development of effective marketing systems.

Julia grew up on a dairy farm thirty miles west of Ottawa. She obtained some experience with the Horticultural Industry while working as an Assistant to Ontario Provincial Extension Horticulturists John Warner (Smithfield) and John Gardner (London) during the summers of '80 and '81 respectively. At that time she had the opportunity to work directly with producers and industry representatives on production related issues. □

Julia Brown, Market Economist, Agriculture Canada, Horticulture Unit, Commodity Markets Analysis Div.

Keith's Directory Update

It has been brought to our attention that we missed a few listings in our Keith's Buyers' guide Directory. The most embarassing example is omitting to list *"Ribbon"* in our category index. Our apologies to the industry's ribbon manufacturers and distributors.

Another *"goof"* was failing to list *'Niagrow Greenhouse Mechanical Systems* under four product categories which are very important to their business. If you are looking for any of the following, include *Niagrow Systems Inc.* in your inquiries...

Heating Systems - Air
Heating Systems - Bench
Heating Systems - Hot Water
Heating Systems - Steam

Our apologies to Jack Keon and his sales staff.

Editor. □

Downham Nursery Announcement

Frank G. Kearny, President of Downham Nursery Inc., is pleased to announce the appointment of Paul R. Gagnon as the Company's chain store sales representative and liaison with its sales force of 5 other salesmen. Paul Gagnon replaces Walter Bowley who retired August 31, 1985.

Paul has extensive experience in the nursery industry, having worked for Bos Nurseries Limited in Trenton, Ontario for many years. While with Bos Nurseries, Paul was involved in both landscaping and the retailing aspects of the business and hence is familiar with the plant and technical requirements of both the garden centre manager and landscape contractor.

Paul has a diploma from Loyalist College of Applied Arts & Technology where he studied business administration and chemical technology. He also received a diploma in Environmental Horticulture from the Durham College of Applied Arts & Technology.

Downham Nursery Inc. is one of Canada's oldest and largest growers of nursery stock, growing over 500 varieties of shrubs, trees, vines, rose bushes, fruit trees, perennials, evergreens and small fruits. The Company farms approximately 700 acres of land and employs between 70 and 150 employees. Downham Nursery Inc. is unique in the Canadian nursery industry as it has a full time, professional sales staff of 6 people, supported by a head office staff of 3 people. It is also the only company in Canada to utilize a full time quality control inspection staff to independently maintain a high quality standard. □