

Over the next few years we will also be developing models of the growing patterns of the plants we grow. We are collecting data on the dates and conditions when lines are sown, transplanted, and are "ready for sale". From this we look forward to being able to plan backwards from the sell date.

CONCLUSION

Controlled environments are a fundamental part of our operation. They are an accurate and effective control of the growing environment. They reduce human error and minimise risk. Further enhancements will come from combining controlled environments with modeling growing patterns and working with the knowledge of good growers.

Environment Harmony: The Greenhouse Environment as it Affects Pot Roses and Other Indoor Ornamentals®

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THE BEGINNING

Several years ago Rainbow Park Nurseries decided to grow indoor potted roses. The challenge was to produce a living bouquet of flowers. We began in our existing fiberglass clad greenhouse, equipped with gull-wing ridge vents. These provided only 15% of the floor area as venting. The house had fixed shading and an external spray-on coating to take the heat out of summer. Heating was provided by gas-fired hot air and supplementary high intensity discharge (HID) lighting was available as needed. Benching was fixed with capillary matting, but mainly overhead hand watering and liquid feeding was required. The house also had low gutter and roof height.

The Result. The crop we achieved in 10-cm pots was readily saleable, but nowhere near the European quality standard we aimed for. This was due to:

- Inadequate venting, which led to high growing temperatures during the day in summer.
- Insufficient light in winter with the aging fiberglass covering.

Other problems included poor plant shelf life arising from a combination of less than ideal greenhouse conditions. There were frequent problems with powdery mildew, which was contributed by overhead watering and feeding. It became obvious that these problems had to be tackled if high quality pot roses were to be achieved.

A FRESH START

Following a study tour to European potted rose nurseries it was realized that we needed to build a new greenhouse to achieve premium quality pot rose production. A new greenhouse was required, with the aim of improved control of light, day length, temperature, humidity, and irrigation. A 2000-m² steel frame greenhouse was constructed with the following features:

- Glass for improved light transmission.
- HID supplementary lighting at 60 watts·m⁻² for 20 h per day.
- Automated shade screen, for up to 50% shading.

- Thermal screen over a 4-m stud height to provide an even temperature and consistent humidity provided by the large internal air mass.
- Large vents opening to the equivalent of a third of the floor area.
- Automated circulating fans and ducted hot air from gas-fired heater.
- Sulfur burners to assist control of powdery mildew.
- Rolling benches to maximize growing space with approximately 26% gain in production area over fixed benching.

Irrigation was originally a combination of ebb and flood, capillary mats, and automated irrigation emitters, but now we are moving completely to ebb and flood and increasing our supplementary HID. lighting to 120 watts·m².

The greenhouse is controlled by an environmental computer, which allows a high level of environmental management every day, 365 days a year. The graphic output enables us to measure and monitor all functions. If necessary the computer can be dialed into from home or the beach, and in return you can be contacted by telephone alarm, should equipment fail.

WHAT HAVE WE ACHIEVED AND NEW CHALLENGES?

Since cropping began in the new greenhouse we have enjoyed superior growth and quality across a range of species. Due to changing consumer demand, emphasis has shifted from roses to crops including Reiger begonia, anthurium, and New Guinea impatiens.

The Pot Environment. Roses require high air porosity in the growing medium, hence it is important to consider growing media and pot design when using capillary mat or ebb and flood watering systems. Consideration should be given to:

- The shape of the pot base and area of drainage holes.
- The stability of the growing medium and maintenance of long-term high air-filled porosity.
- A suitable mix additive to aid rewetting.

The Human Factor. Despite all the technology, observant well-trained staff remains essential. The whole environment is living and constantly changing and staff need to be kept interested and trained for the right direction.

IN CONCLUSION

Success calls for harmony of these three elements:

- Controlling the growing environment.
- Choice of quality cultivars.
- Skilled staff.