Looking at Controlled Environments with a Focus on Europe©

Vince Wylaars
Jorna's Nursery Ltd, 301 Radcliffe Road, Belfast, Christchurch, New Zealand

INTRODUCTION

Our experience with controlled environments started 7 to 8 years ago. The essence of it was that we wanted to remove the hassle of remembering and forgetting to open the vents as the temperature changed through the day. We installed an environment-control computer in one of our series of tunnel houses and also installed weather stations outdoors to record information on rain, wind, light, humidity, and indoors for light, carbon dioxide, temperature, and humidity. The computer controlled the heating, lighting, fogging, and ventilation equipment.

Since then we have traveled extensively to get ideas about new technology. We saw the sophistication of environmental control systems that both European and American growers were using and believed that they had a place within our company. This technology has been developed due to several factors. I believe it has arisen from the need to grow higher quality products to service a more demanding market. Secondly mechanical transplanting technology requires a better quality seedling and finally the more advanced seed cultivars need more precise conditions to generate optimum returns.

USE OF ENVIRONMENT CONTROL

We now control the environment though the entire growing process. The temperature and humidity of the seed vault and the seeding room are controlled to help reduce the occurrence of seed sticking together and also the seeding machinery requires less calibration when the temperature is held constant.

The germination chambers operate under high levels of environment control. Each chamber has grow lights, under-floor heating, humidity control, and air conditioning. These are all managed and monitored by the computer.

In the plug growing stage there are eight different zones where we can control the humidity and temperature. Heating is supplied through the burning of waste oil and humidity is managed by a fog system for moisture and cooling.

Our new glasshouses, providing for the finishing stage, have incorporated other new technology including a proprietary environment-control program. Burning of liquefied petroleum gas (LPG) provides heating, both under-floor and overhead fins with fog for cooling. An ebb-flow, also known as a flood-floor system, has been installed. This system recycles water and is used for feeding with automatic CF and pH monitoring. CF is a measure of electrical conductivity (EC) where 25 CF = 2.5 EC. The 5-m-high vented glasshouse ensures even ventilation.

OPTIMISATION OF USE

To ensure that we gain optimal returns from this new technology we have had to run trials with various combinations of media and watering programmes. Alarm systems are a valuable way of managing risks when the nursery is not attended.

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©

Brian Frost
Rainbow Park Nurseries, P.O. Box 415, Drury, South Auckland, New Zealand

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-m^2 steel frame greenhouse was constructed with the following features:

- Glass for improved light transmission.
- HID supplementary lighting at 60 watts$\cdot m^{-2}$ for 20 h per day.
- Automated shade screen, for up to 50% shading.