Acclimatization of Selected Tropical Foliage Plants for Simulated Shipping Conditions

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Introduction

After removal from production sites, intact ornamental plants are typically exposed to substantially altered environmental conditions. These conditions may extend to after final placement of the plants *viz.* interior environments. The ability of these plants to withstand adverse postharvest conditions is affected by a wide cross-section of factors such as preharvest conditions, species and cultivar. Acclimatization of tropical foliage plants has been aimed at converting sun grown plants to shade plants adapted to low light levels found in interior situations (Conover and Poole, 1975). Therefore, well-adapted plants for interior environments are essential in maintaining quality during postharvest period. Studies on the physiological changes occur in the plants need to be undertaken as the information obtained will be of importance in determining suitable postharvest treatment and utilization of such plants in Malaysia's horticulture industry. During this adaptive phase, ornamental plants have been shown to exhibit changes in their morphology and physiology. These changes can be utilized to serve as guidelines for efficient crop management.

Although most of these areas had been defined in various studies (Conover and Poole, 1975, 1977 & 1979, Conover *et. al*, 1981, Conover *et. al*, 1982), this information is still lacking for plant species and conditions found in Malaysia. So, studies using plants found locally is appropriate.

Since there is demand for the country's foliage plants by oversea importers (such as Brunei, Hong Kong, Singapore, USA and Netherland) where in 1990, our export value was RM 8.8 millions but increased to 20 millions in 1995 (FAMA, personal comm.). Potted foliage plants are mostly shipped by ship and rarely by plane due to their relatively high weight that resulted in high costs of transportation. However, long transportation periods are disadvantageous for the quality of plants, often causing droppings of leaves, excessive elongation of shoots, discolouration of leaves, infection of plants with gray mold and chilling injuries. Therefore, factors governing the deterioration of quality of foliages plants under transit need to be addressed which will be studied in this proposed project.

Materials and Methods

Dracaena sanderiana, Codieum variegatum and Dracaena reflexa are tropical foliage plants used for this study. The plants were obtained from a commercial exporter in Layang-Layang, Johor and mass propagated before being used as experimental plants. The plants were initially acclimatized using various techniques *viz. viz.* different levels and durations of shade, application of cytokinin and manipulation of watering frequency as prescribed in the experiments proposed. During acclimatization, physiological and physical quality characteristics of the plants were evaluated.

Results and Discussion

Dracaena reflexa (Song of India) is known as one of the tropical foliage plants that is prone to loosing its quality in the container during sea shipping (per.comm.). Our study showed that plants acclimatized for six weeks in 57% shade is probably the optimum conditions for quality retention during shipment in the adverse conditions. The simulated shipping conditions were 16-18°C with 47-57% relative humidity maintained for 28 days. To prevent excessive evaporation from the growing media, coconut coir is used to cover the surface. The acclimatized plants could be restored to their original quality quite substantially within one week after removal from the container. The level of shade and duration requirement determined in this study could be made as general guideline for acclimatization of this species destined for export market.

The results on the study of the effect of different durations and levels of shade on the quality retention of *Dracaena sanderiana* during simulation for 4 weeks indicated that plants acclimatized under 85% shade for 6 weeks showed better quality retention. This shows that even plants of the same genus, their shade requirement differ with species. Therefore, general requirement can only be made as guideline with specific study been carried out for individual species.

Treating of *Dracaena sanderiana* with 300 mgL^{-1} benzyladenine resulted in better physiological and physical quality. However, in combination with frequency of waterings, plants sprayed with 225 mgL^{-1} benzyladenine and water every 4 days performed better. Six weeks of shading is still the requirement for better quality retention during simulated shipping

conditions. As expected, application of cytokinin can improve the indoor quality of a plant since this hormone can reduce chlorophyll breakdown as well as enhance its synthesis. Reduced watering is required in order to accustom the plants for condition where the plants are impossible to be watered in the container during long transportation.
With *Codiaeum variegatum*, plants sprayed with benzyladenine at 75 mgL^{-1} had better quality. Similar to *Dracaena sanderiana*, plants watered every 4 days are of improved quality but at higher concentration of benzyladenine. However, shorter shading duration (4 weeks) managed to retain quality better during simulation.

Conclusions

Dracaena reflexa grown under 57% shade for six weeks are able to withstand better the adverse conditions during simulation for sea shipment. The plants were able to recover after 1 week post-shipment.

However, *Dracaena sanderiana* requires heavier shade (85%) during acclimatization for 6 weeks and application of benzyladenine at 300 mgL^{-1} for obtaining better quality plants. But, in combination with watering every 4 days, the optimum concentration of benzyladenine needed is reduced to 225 mgL^{-1}.

Codiaeum variegatum needed shorter duration under the shade of 85% for the plants to be acclimatized. In combination with 225 mgL^{-1} benzyladenine, the plants were able to retain their quality better.

Benefits from the study

Acclimatization techniques can be advised for use in acclimatizing the three species of tropical foliage plants for shipping conditions.

Patent(s), if applicable:

Nil

Stage of Commercialization, if applicable :

Nil

Project Publications in Refereed Journals:

Nil

Project Publications in Conference Proceedings

1. Misril Fuadi, **Mahmud, T.M.M.,** Awang, Y. and Ramlan, M.F. Effect of different concentrations of benzylaminopurine (BAP) on *Dracaena sanderiana*. In: Proceeding of Malaysian Society of Plant Physiology (MSPP) - Conference 2002 (Agro-Forestry), 10-12 September 2002, Melaka.

2. **Mahmud, T.M.M.,** Misril Fuadi, Yahya, A., Ramlan, M.F. Simulation study of *Dracaena sanderiana* during sea transportation. In: Faculty of Agriculture Exhibition on Inventions and Research 2002 (22-23 August 2002).

Graduate Research

Name of Graduate	Research Topic	Field of Expertise	Degree Awarded	Graduation Year
Misril Fuadi	Acclimatization of *Dracaena sanderiana* and *Codiaeum variegatum* for Simulated Sea Transportation.	Postharvest	M.S.	2003
Salman Idris	Pengaruh paras dan jangkamasa di bawah lindungan terhadap kualiti tanaman hiasan berdaun *Dracaena sanderiana* semasa simulasi pengangkutan laut.	Pascatuai	B.S.	2002

Faridah Haryati Mohamad Yusof	Penyesuaian *Dracaena reflexa* 'Song of India' untuk keadaan gelap semasa pengangkutan laut.	Pascatuai	B.S.	2003

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