

Current Status of Postharvest Handling of Cut Flowers and Foliage in the Retail Sites of Western and North Western Provinces of Sri Lanka

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ABSTRACT

A range of tropical and temperate cut flower and foliage species are supplied to retail sites through various channels. Handling practices adopted from harvest onwards can have significant impact on end user vase life of cut ornamentals. In Sri Lanka, no study has been conducted to clearly recognize the handling chains involved in cut flower supply channels. This study was, therefore, carried out with a view to better understand the current handling practices adopted by cut flower and foliage retail sites, using a sample of 40 florists in Western and North Western provinces of Sri Lanka. Information was gathered using a structured questionnaire and interviews. Data were analyzed using STATA package. This study provides the first formal report on handling practices adopted at cut flower retail sites. It recognizes the major drawbacks in retail handling, which includes but not limited to inability to maintain cold chain, non-application of essential postharvest treatments (e.g. preservatives, flower food), poor sanitation and lack of coordination with consumers. Further research is recommended to develop affordable and effective holding solutions for retail selling and also for consumer sites. In addition, the handling chains involved in higher levels of the supply channel should be investigated.

KEYWORDS: Cut flowers, Cut foliage, Handling chain, Postharvest, Retail selling

INTRODUCTION

Floriculture is a profitable agribusiness in Sri Lanka comprising both export and domestic industries. The industry earns significant foreign exchange and generates employment, thereby, empowering rural communities (Anon, 2012). Although reliable statistics are unavailable on present status of the domestic market, there has been a gradual increase in the local consumption of cut flowers and foliage. It is partly reflected by the recent expansion and distribution of retail flower shops in many urban and suburban areas of the Island (Abayakone *et al.*, 2010). Cut flower market in Sri Lanka has not been able to create auction centers as in many other countries. Retail outlets scattered throughout the production areas (Western, North Western and Central Provinces) are the popular centers where the cut flowers are sold for local consumption (Dhanasekara, 2002).

A range of tropical and temperate cut flower and foliage species are supplied to retail sites through various channels. The reliable supply of high quality cut flowers is important in maintaining customer satisfaction. However, handling practice adopted from harvest onwards can have significant impact on end user vase life of cut ornamentals. Insufficient

quality management or improper actions at different stages of handling cause a quality loss of products (Van Doorn and Tijskens, 1991). Postharvest quality and vase life of cut ornamentals could be maintained throughout the distribution process by adopting correct handling practices, including proper postharvest treatments (Wills *et al.*, 1998). Postharvest handling chains have been well characterised and standard treatment have been adopted elsewhere in the world (Hoogerwerf *et al.*, 1994; Faragher *et al.*, 2002). In Sri Lanka, no systematic study has been conducted to clearly recognize the handling chains involved in cut flower supply channels. It is, therefore, crucial to identify for each crop the nature of its handling chain, and the main postharvest problems along with time and frequency of their occurrence (Noordegraaf, 1999). Recognition of the actual problems will enable development of successful postharvest treatments for the relevant species. It will also enable to suggest / adopt valid recommendations for quality management in handling chains. Therefore, the present study was carried out with a view to better understand the current handling practices adopted by cut flower and foliage retail sites,

using a sample of florists in Western and North Western Provinces of Sri Lanka.

MATERIALS AND METHODS

Sampling and Data Collection

The study was conducted from January to April 2013. A sample of 40 retail flower shops in Western and North Western Provinces of Sri Lanka was selected based on secondary data published in business information directories. Information was gathered using a structured questionnaire and personal interviews. The questionnaire was pre-tested with five florists. The information obtained on retail handling included: major selling products, sources and quality of supplies, mode of delivery, treatments given at retail sites, methods and conditions of retail display, sanitation, useful display life, species-specific postharvest problems, and consumer feedback. The mean temperature and humidity prevailed in the areas (Western and NWP) were 27°C and 80%, respectively (Department of Meteorology, Sri Lanka, City Forecast Statistics, 2012).

Data Analysis

Data were descriptively analyzed using STATA package (Stata Crop, United States).

RESULTS

Horticulture products are used for decorative purposes, as gifts, as arrangements, or bouquets for formal events or special occasions. They are purchased for weddings, funerals, and holidays and in times of illness in home, business and public places. Demand patterns are therefore particularly seasonal and dependent on fashions.

Product Types

Cut flowers and cut decorative foliage were the two major product types sold by retailers. While 53.51% of products were cut flowers, 46.41% comprised of cut foliages. *Astroemeria* (*Alstroemeria* spp.), white daisy (*Leucanthemum vulgare*), gerbera (*Gerbera* spp), rose (*Rosa* spp), lily (*Lilium* spp), chrysanthemum (*Chrysanthemum indium* L.) are major cut flowers and kithul (*Caryota* leather fern (*Acrostichum aureum*), ivy (*Hedera helix*) are major cut foliages that have highest demand in the market.

Nature of Supplies Received at the Retail Shops

Majority of products (86.3%) sold at retail sites came from the outside growers and only 13.7% were produced in own nurseries (Figure 1).

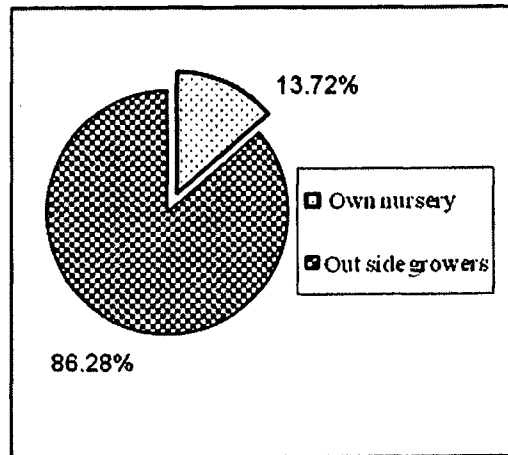


Figure 1. Sources of cut flower and foliage received at retail sites.

The general quality of supplied products was expressed as excellent (39.15%), good (59.5%), slight defects (11.97%), and poor (0%).

There were specific quality standards considered by retailers when they purchase flowers and foliage from outside growers. About 38.6% of flowers were bought when they were in half open stage. These include alstroemeria and carnation. Species such as gerbera and anthurium were purchased in fully open stage (30%). About 1% was received in tight bud stage and those include roses. About 95.5% of cut foliages types were purchased considering the stem length. The length requirement for many species was 3 fete. For kithul and cypress, one fete of ivy and leather fern. In addition, the number of leaves/stem, and the number of open flowers/stem were also considered in star Flower and gladioli.

The suppliers have not applied any pre-treatments (e.g. anti-ethylene treatments, pulsing) to cut ornamentals prior to arriving at retail sites.

About 55.7% of florists had occasional rejections of products, and 30.8% of them reject rarely while 5.9% of florists had not rejected. A majority of rejections were due to damages occurred during transport (40%). The other reasons for rejections include improper flower colors, wilting, and pests and disease incidences (Figure 2).

A majority of cut flowers (87.3%) and cut foliage (90.8%) reached retailers by normal road transport (i.e. by train/bus / Truck) in dry condition. Only 13% of products were transported using refrigerated vehicles (cool trucks). Wet transport was used by only 2% for roses and orchids.

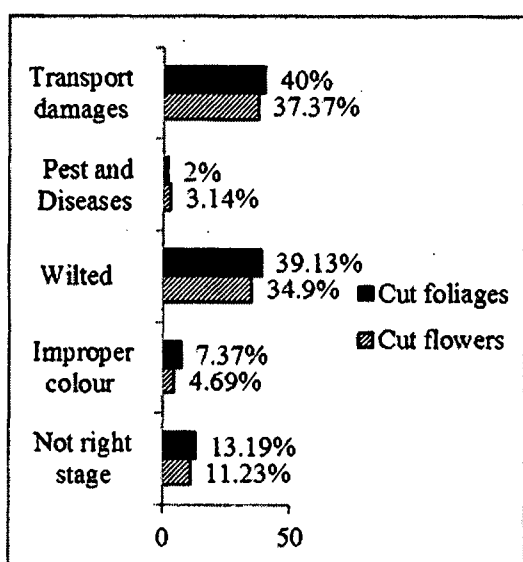


Figure 2. Reasons for rejections

The packaging material used for majority of products was card board boxes (Table 1). It took about 6-12 h for the products to reach the retailers. Most of the products arrived in the morning between 8.00 - 10.00.

Table 1. Packaging materials used to transport cut flowers and foliage to retail sites.

Packaging material	Cut flowers	Cut foliage
Fiber board boxes	11.11	13.13
Polythene sleeves	10.42	18.18
Open buckets	0.51	10.89
Card board boxes	34.35	38.65
Bamboo cages	43.14	40.52

Care and Handling at Retail Sites

A majority (80.6%) of retailers stood Cut flowers and foliage into water buckets in room temperature. Rests of retailers used cool rooms.

As the holding solution, retail shops used normal tap water (93.1%) or well water (6.9%) without any kchemical preservative or carbohydrate source. The most common routine practice done by 99% of retailers was daily changing of water in flower holding buckets and re-cutting of 2- 2.5 cm of the stem ends.

Display period in cool rooms was about one week and in room temperature it was 3-4 days. Keeping time of the products varied according to the season for both arrangements and cut stems. Retailers who used refrigerated/cool storage conditions, had

excellent products. Slight to moderate defects were present in other retail sites which did not use refrigerated/cool storage.

Table 2. Different display methods of cut flowers and foliage at the retail shops.

Display method	Percentage
In water buckets at room temperature	60.0
Only sample display and others stored in cool rooms	17.5
In cool rooms	16.1
Bunches in water buckets	4.0
Arrangements in room temperature	3.2

Although different species had different display periods, the general display period was 3 to 4 days. Major postharvest problems occurred during display period were: flower drop in in alstroemeria, petal discoloration in roses and orchids, petal drop in daisies, roses and chrysanthemum, petal wilting in lilies and daisies, failure to open buds in roses, bent necks in gerbera and alstroemeria. Leaf wilting and leaf yellowing in cypress and kithul, leaf drop and yellowing in ivy are some problems associated with cut foliage. Compared to cut foliage, damages are high in cut flowers. Damages occurred due to pest and diseases were low.

Florist who has their own nurseries did not spend largely on purchasing products. They purchased only the amount they lacked. Funeral decorators give flowers as a free service. Figure 3 show that retailers purchased alstroemeria, white daisy, orchid, roses, and gerbera in large quantities. These species had higher demand compared to others. The amounts discarded in alstroemeria, white daisy, and star flowers were relatively higher. Quantity discarded was very low in roses, orchid and gerbera because they were stored mostly in cool conditions. When compared to cut flowers, the quantity discarded in cut foliage was low.

About 82.9% of florists, cleaned flower holding buckets and utensils daily and others in two or three-days intervals. Majority of retailers (68.5%) used water alone and 31.4% used detergents (e.g. Wim and Soap) for cleaning of utensils.

Fifty percent of the retailers provide care instructions for customers, such as spray water for arrangements, recut stems prior to putting in to water, wet the forms, store in cool conditions etc.

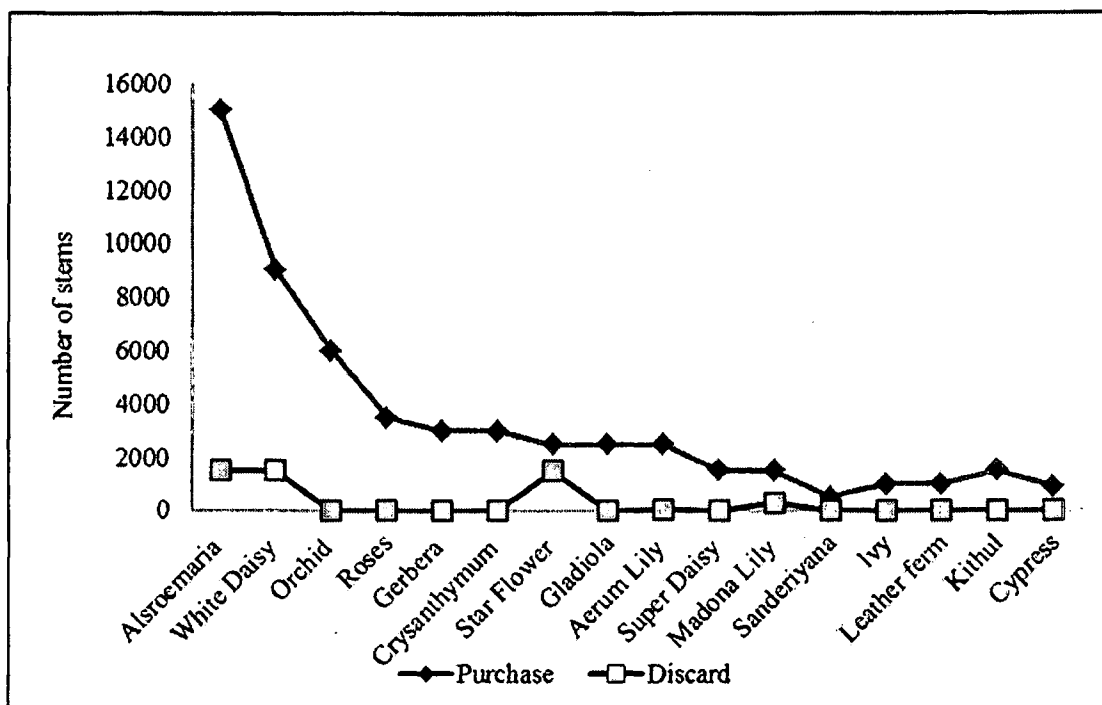


Figure 4. Usage of cut flowers and foliage in retail shop

Thirty seven percent of retailers have received complaints from customers. They were mainly on wilting of flowers, lack of flowers in arrangements, flower drop, and failure to open buds. Thirty four percent of florists had marketing problems such as competition from other retailers, competition from artificial flowers, high price for fresh flowers, transport problems, damages to cut flowers and foliage and seasonal problems.

Only 20% of florists had memberships in floriculture societies.

DISCUSSION

Cut flowers and foliage are parts of plants characteristically including the blooms or inflorescences and some attached plant materials. They are highly perishable products and can only maintain very limited life supporting processes by absorbing water and nutrients through their stems. They are thus, crucially dependent on efficient and speedy distribution channels, and excellent cold chain management systems (Faragher *et al.*, 2002).

The retail shops in Western and North Western Provinces maintain their products under hot, humid conditions. Therefore, special attention should be paid to maintain the freshness of cut stems for longer periods. Some retailers obtain products from their own nurseries located in up country areas. They maintain relatively higher product quality standards by using proper technology in transportation, display (e.g. maintaining cold

chain) and handling them carefully. Most of the retailers purchased flowers from outside growers and those were inferior in quality.

There are essential pre-treatments that should be applied to cut flowers before transport, such as anti-ethylene treatments (Faragher *et al.*, 2002). However, no such treatments have been applied prior to or after arrival at the retail sites. Moreover both ethylene sensitive and insensitive species are packed together in cartons during transport. Some of the problems observed during display period, such as flower drop, leaf yellowing, and petal discoloration could be a result of poor ethylene management. The long period of normal non-refrigerated road transport mainly by train, and the compact and inappropriate dry packing have already caused external and internal damages to cut flowers. A limited number of suppliers use fiber board boxes/ plastic boxes with flowers wrapped in polythene sleeves. Most of the suppliers use conventional bamboo cane baskets and newspapers for secondary packaging. These conditions accelerate the senescence process during display period (Faragher *et al.*, 2002).

During retail display, no chemical preservatives are added to holding solutions to prevent microbial proliferation. This causes a gradual decline in rate of water uptake by the cut stems (Durkin and Put, 1955). This eventually results in wilting and organ drops which were common during retail display and at consumer sites. Furthermore, no flower food (e.g. sucrose) is provided to facilitate opening

of buds. This could result in failure to open buds even at consumer sites (Faragher *et al.*, 2002). Only a few florists use cool rooms to store cut stems, particularly for selected species such as roses, orchids and chrysanthemums.

One possible reason for high level of customer complaints could be that only 50% of retailers provide care instructions upon purchase by the consumer. In Europe and many other countries, special attention is paid on preserving the freshness and quality of cut ornamentals sold in retail shops. This also includes providing special care instructions and preservative formulations (e.g. in the form of sachets) for the consumer (Jones, 2001).

CONCLUSIONS

Due to the rising middle class and increased use of flowers in special occasions, there is a high potential to expand the domestic cut flower industry in Sri Lanka. However, the poor postharvest quality management at different levels in handling chain does not guarantee a quality product in the hands of the consumer. This study provides the first formal report on handling practices adopted at cut flower retail sites. It recognizes the major drawbacks in retail handling, which includes but not limited to inability to maintain cold chain, non-application of essential postharvest treatments (e.g. preservatives, flower food), poor sanitation and lack of coordination with consumers. In this context, introduction of affordable and effective holding solutions for retail selling and also for consumer sites will improve the end user quality of cut ornamentals. In addition, the handling chains involved in higher levels of the supply channel should be investigated in future research.

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REFERENCES

Anon, 2012. Sri Lanka Export Development Board (SLEDB). Floriculture Industry Trade Information. Available from: <http://www.srilankabusiness.com/trade/info/srilankaproduct/foilage.htm>. Accessed 30.12.2012.

Abayakone, A. M. D. H., Krishna rajah, S. A., Wijesundara, D. S. A., Mahantheagama, P. M. M. P. K. (2010). Survey on the floriculture sector in the Gampaha District, export nurseries and flower shops. Abstract. Floriculture Research in Sri Lanka. Proceedings of the National Symposium of Floriculture Research 2010, Department of National Botanic Gardens and Sri Lanka Council for Agricultural Research Policy, Sri Lanka.

Dhanasekara, D.M.U.B.(2002).Cut flower production in Sri Lanka. FAO Corporate Document Repository, Available from: <http://www.fao.org/DOCREP/005/ac452e08.htm#fn8> (Accessed 15 January 2013).

Department of Meteorology, Sri Lanka, City Forecast Statistics, 2009.

Faragher, J., Slater, T., Joyce, D., Williamson, V. (2002). Postharvest Handling of Australian Flowers – from Australian Native Plants and Related Species: A Practical Workbook. Rural Industries Research and Development Corporation (RIRDC). Publication No. 02/021. Barton, ACT, Australia.

Hoogerwerf, A., Simons, A. E., Reinders, M. P. (1994). A system view on horticultural distribution applied to the postharvest chain of cut flowers. *Agricultural Systems*, **44**, 163-180.

Jones, R. (2001). Caring for cut flowers. Second Edition. Landlinks Press, Collingwood Press, VIC, Australia.

Kader, A.A. (1992). Postharvest Biology and Technology: An Overview- Asia and Modified Atmospheres during Transport and Storage. In: Postharvest Technology of Horticultural Crops. University of California, Division of Agriculture and Natural resources.

Noordegraaf, C.V. (1999). Problems of postharvest management in cut flowers. *Acta Horticulturae*, **482**, 53-57.

Van Doorn, W.G. and Tijskens, L.M.M. (1991). FLORES: a model on keeping quality of cut flowers. *Agricultural Systems*, **35**: 111-127.

Wills, R., McGlasson, B., Graham, D. and Joyce, D. (1998). Postharvest: An introduction to the physiology and handling of fruit, vegetables and ornamentals. UNSW Press, Australia 1-262.