POST HARVEST ABILITY OF SOME NEW CUT FLOWERS

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Abstract

One of the most important abilities for a new cut flower is a good keeping quality. Therefore, one of the first crucial tests the new generas meet is the vase life test, which at our institute is standardized.

As a good vase life we suggest two weeks durability in total. This would always ensure the consumers at least one week vase life at their home.

Among the cut flowers studied the following kept for a long period standing in tap water: Achyranthes sp. (4 wks), Heliconia sp. (> 2 wks), Kalanchoe quartiniana (> 2 wks), Luzula nivea (> 4 wks), Streptosolen jamesonii (> 2 wks) and Trachelium caeruleum (> 2 wks).

Those needing special pretreatment were Delphinium belladonna hybrid 'Völkerfrieden' (silver thiosulphate) and Euphorbia leucocephala (boiling).

Finally some were rejected despite their good keepability: Achyranthes sp. (inflorescence too small), Megaskepasma erythroclamys (no flower control) and Streptosolen jamesonii (uneven growth).

Introduction

Since 1982 we have had a project at the Institute of Glasshouse Crops in Denmark, where we collect potentially new cut flowers, observe their growth, evaluate their flowering and keeping ability, their growth rate and energy use (Bredmose, 1982a; 1983). Thereafter a growing programme is developed using methods described earlier (Bredmose, 1976).

Some crops or cropping methods, new to the Danish cut flower production in glasshouse, have been described (Bredmose, 1982b; Pilgaard, 1983; Bredmose & Pilgaard, 1984; Geertsen & Bredmose, 1984; Pilgaard, 1984; Geertsen, 1985; Geertsen & Bredmose, 1986). Also a few crops, which are partly produced in the glasshouse and partly in the open, have been described (Geertsen & Bredmose, 1985a, b).

One of the most important abilities that a new cut flower should posses is a good keepability. As good keepability we suggest two weeks of vase life in total. This would always ensure the consumers at least 7 days vase life at their home. Only exceptionally a shorter keeping quality should be tolerated.

In the following I will present some post harvest results concerning plants which proved to have a potential as new cut flowers as well as plants which were later rejected.

Materials and methods

The plants used in the experiments as reported on here, are listed in table 1.

The vase life of the plants was studied using ten stems per plot. The flowers standing in tap water were compared to flowers standing in a floral preservative solution. Only if it was needed a special post harvest treatment was used.

The standardized conditions for the vase life tests appear in table 2.

Results and discussion

Plants of Achyranthes sp. were grown at 18°C minimum air temperature. 50-60 cm long stems were harvested in June, placed in tap water or in water plus 15 g per liter of Chrysal (Mention of a trade name does not imply its approval to the exclusion of other products that may also be suitable). Their vase life was 4 weeks in water as well as in Chrysal. The lowest part of the inflorescences became dry but not withered. Roots developed on many of the stems while standing in the tubes. Despite the good vase life, the inflorescence as a commercial produce was evaluated as too small and the colour too pale.

Stems of Delphinium belladonna hybrid 'Völkerfrieden' were harvested when a few of the lower flowers had opened. In an experiment cut stems of Delphinium were pretreated with either tap water or 0.5 mM silver thiosulphate (STS) for either 1 hour or 20 hours. Afterwards they were placed under standard conditions in either tap water or Chrysal.

The inflorescences pretreated with STS and subsequently placed in tap water kept for 12 days. It did not matter whether the pretreatment with STS had lasted for 20 hours - as found by Shillo et al., 1980 - or just for 1 hour.

The flowers from the other combinations of the experiment began shattering after a few days and lasted for only 5-8 days.

Following harvest the stems of Euphorbia leucocephala, Lotsy produce latex. The post harvest life of cut inflorescences has been investigated using boiling of the stems as a pretreatment combined with adding a floral preservative to the vase solution (table 3).

The most successfull treatment was a combination of dipping 5 cm of the stems into boiling water for 30 seconds and adding a floral preservative to the vase water. By doing so the inflorescences and leaves could last for 16 days.

Heliconia sp. inflorescences can be cut when 2 or 3 bracts are open. According to Broschat & Donselman, 1983, flowers (inflorescences) will not open further once cut.

When we cut our clone of Heliconia sp. (H. psittacorum-like) with 2-3 bracts open and place them in tap water the inflorescences may develop 1-2 more bracts before the vase life is terminated. During this period 20-25 single flowers have bloomed. Use of Chrysal 15 g per l. resulted in yellowing of the leaves. We have measured the vase life of Heliconia standing in tap water being 2-4 weeks depend- ing on the time of the year. Shortest when harvested in December to January the darkest period in Denmark.

Figure 1 show the time course of opening and closing of single flowers on inflorescences of terminal stems of Kalanchoe quartiniana, A. Rich. when placed in either tap water or in a floral preservative solution post harvest.

When a floral preservative is added more buds tends to develop into flowers compared to tap water. One single flower lasts for approximately one week. According to the prescription the experiment was terminated when 50 per cent of the flowers had withered and were closed, which happened after 16 days. The successive development of the flowers over a long period of time may be a problem for this kind of inflorescences. This phenomenon is seen in many species of Kalanchoe.

The other types of Kalanchoe we are working with, for example K. 'Schnittstern', keep for 2-3 weeks standing in tap water. We do not recommend the use of floral preservative for cut Kalanchoe.

Luzula nivea, (L.) DC is a very productive Juncaceae. The stems are harvested when all the single flowers in the inflorescences have developed. The cut flowers can be used fresh as well as dry. As fresh the longevity is more than a month. Pollen production is quite comprehensive therefore shaking of the stems before marketing is recommended.

Megaskepasma erythroclamys has an interesting inflorescence comprising the reddish bracts and the whitish flowers. A few cut inflorescences have kept for 2-3 weeks standing in tap water. Unfortunately we are not able to control the flowering.

The vase life of Streptosolen jamesonii, Miers is excellent when standing in tap water and poor in preservative solution (table 4). This is the case for the single flower as well as for the whole inflorescence. More flowers develop in tap water whereas more buds abscise in floral preservative solution. Despite the good keepability Streptosolen has been rejected because of its uneven growth.

In table 5 is shown results from post harvest experiments with Trachelium caeruleum, L. The best effect came from harvesting the stems when approximately one fourth of the flowers were fully developed. This is in accordance with Kalkman, 1982 and Anon., 1984. Pretreating the stems using 0.5 mM STS for 1 hour increased the vase life with approximately 2 days. The room temperature during pretreatment did not have any substantial influence on the subsequent keepability. When Chrysal was added to the vase water it caused a drying out of the leaves and the colour of the flowers faded. Usage of tap water gave satisfactory development and longevity.

We recommend harvesting when one fourth to one third of the flowers have developed, and thereafter placing the stems in cold storage for 24 hours at 5°C. During the vase period tap water can be used, at least in Denmark. An analysis of Årslev tap water shows pH = 7.5; ec = 0.7; Cl = 31 ppm; Ca = 135 ppm.

From the cut flowers studied the following kept for a long period held in tap water: Achyranthes sp. (4 wks), Heliconia sp. ($\geq$2 wks), Kalanchoe quartiniana ($\geq$2 wks), Luzula nivea ($\geq$4 wks), Streptosolen jamesonii ($\geq$2 wks) and Trachelium caeruleum ($\geq$2 wks).

Those needing special pretreatments were Delphinium belladonna hybrid 'Völkerfrieden' (silver thiosulphate) and Euphorbia leucocephala (boiling).

Finally some were rejected despite their good keepability: Achyranthes sp. (inflorescence too small), Megaskepasma erythroclamys (no flower control) and Streptosolen jamesonii (uneven growth).

I could also add Cestrum aurantiacum, C. roseum and Melanthium virginicum which were rejected because of the smell of the leaves or flowers. Nice cut flowers like Lantana camara, Isoplexis canariensis, Leonotis leonurus, Crotalaria retusa, and Asclepias curassavica were rejected because of too short vase life.

The vase life test has proved to be an efficient method for screening the potentially new cut flowers.

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Table 1 -

Cut flower species	Plant family	Origin
Achyranthes sp.	Amaranthaceae	Thailand
Delphinium 'Völkerfrieden'	Ranunculaceae	-
Euphorbia leucocephala	Euphorbiaceae	Central America
Heliconia sp.	Heliconiaceae	Central & South America
Kalanchoe quartiniana	Crassulaceae	Malawi, Ethiopia
Luzula nivea	Juncaceae	Southern Alps
Megaskepasma erythroclamys	Acanthaceae	Venezuela
Streptosolen jamesonii	Solanaceae	Columbia, Ecuador
Trachelium caeruleum	Campanulaceae	Western Mediteranean area

Table 2 - Standardized conditions for carrying out keeping quality tests of cut flowers at the Institute of Glasshouse Crops in Denmark.

Air temperature:	20°C.
Air humidity:	60% RH.
Daylength:	12 h, 07-19.
Irradiation, installed:	29 W m^{-2}.
Irradiation, in plant height:	5 W m^{-2}.
Light source:	Fluorescent light, 50% TL 33 + 50% TL 55
Air change:	0.3 volume h^{-1}.
Placing of flowers:	Individually in glass tubes.
Vase life measurements:	Daily.
Vase life termination:	When leaves, flowers or stems lose turgidity and/or decorative value.
Vase life termination, inflor.:	When 50% of single flowers lose turgidity and/or decorative value.

Table 3 - Average vase life for cut Euphorbia leucocephala stems as influenced by combinations of pretreatment and vase solution.

Treatment	Vase life, days	Mean separation by Duncan's multible range test at 5% level
No boiling/ Chrysal 15 g l^{-1}	2.4	c
No boiling/ tap water	6.4	b
Boiling 5 cm stem 30 sec./ tap water	7.7	b
Boiling 5 cm stem 30 sec./ Chrysal 15 g l^{-1}	16.7	a

Table 4 - Keeping quality of Streptosolen jamesonii stems harvested in May. 9 stems per plot were placed in either tap water or in Chrysal, 7.5 g per l.

Vase solution	Keepability, days		Number of	
	Inflores-cence	Single flower	Flowers developed	Buds abscised
Water	17	11	26	11
Pres.sol.	7	8	17	15

Table 5 - Keeping quality of Trachelium caeruleum. Main effects. The factors, developmental stage, pretreatment with STS, temperature during pretreatment and floral preservative, were combined in a factorial design using 9 stems per plot. 50-55 cm long stems produced at 17°C were harvested in September.

	Percentage flowers open		
Developmental stage	25%	50-75%	>75%
Vase life, days	17.5	16.2	12.1
Pretreatment		0.5 mM STS 1h	Tap water
Vase life, days		15.4	12.9
Room temperature/pretreatment		6°C	20°C
Vase life, days		14.4	13.9
Preservative solution		Chrysal 15 g/l	Tap water
Vase life, days		11.8	16.5

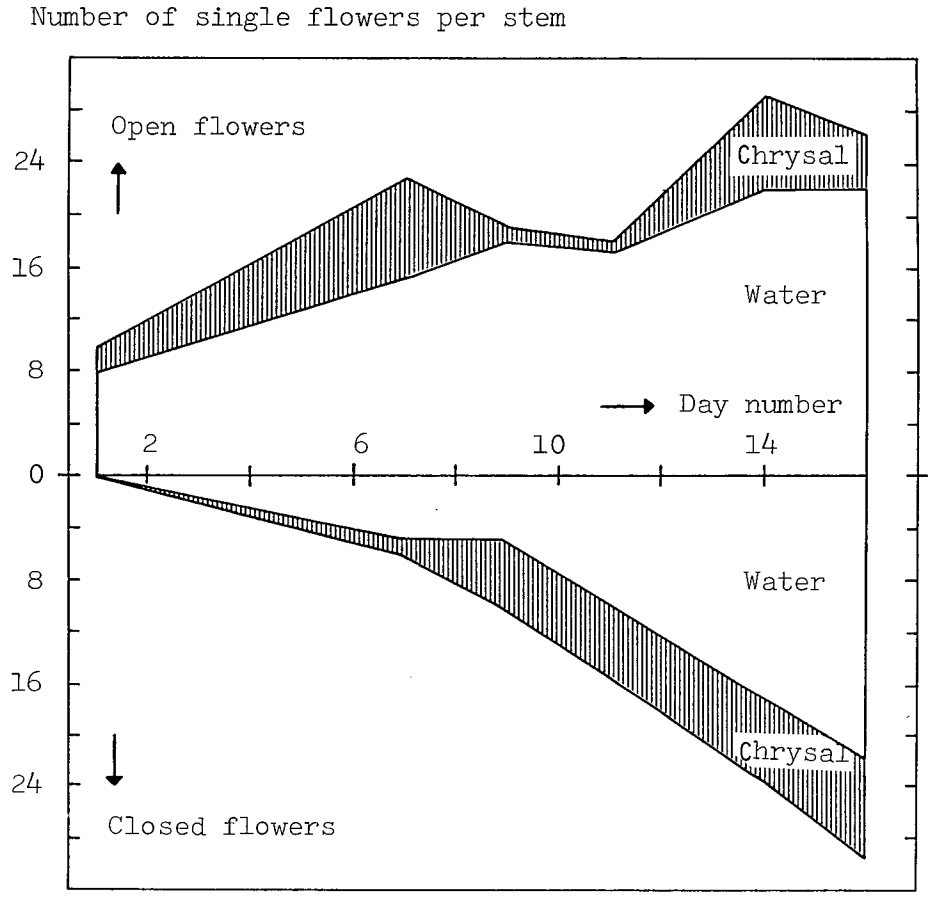

Figure 1. - Keeping quality of Kalanchoe quartiniana grown at 18°C, 8 hrs daylength, harvested in April. Vase life measured under standard conditions. Time course of opening and withering (closing) of single flowers on inflorescences of terminal stems placed in tap water or in a floral preservative (15 g Chrysal per 1) solution.