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Effects of EthylBloc sachet treatment on roses

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1 Preface

This research was done by the business unit 'Greenhouse Horticulture' of Wageningen UR for Floralife® Europe GmbH and started in November 2006.
The objective was to demonstrate the benificial effects of EthylBloc sachet treatments on ethylene sensitive cut flowers when applied during the shipment from South America to Europe.
The EthylBloc sachet is a 2.5 g packet of powder containing ethylene action inhibitor, 1-methylcyclopropene (1-MCP). Once activated and placed in a flower box, the sachet will release 1-MCP slowly and constantly, so that flowers will be exposed to 1-MCP during the entire shipping duration. The treatment will prevent negative effects of ethylene (both internal and external) such as flower drop, wilting and leaf yellowing, thereby improving the vase life of ethylene-sensitive cut flowers.

2 Material and Method

The research was done according to the proposal in appendix 1, with some changes stated in the following summary.

Three cultivars of cut roses were tested in this study.
1. Eliza, 2. Engagement and 3. Versilia

The treatments were:
Standard: Current pre-treatment: Current pre-treatment procedure with Chrysal RVB was followed by the farm.
EthylBloc: EthylBloc sachet treatment: After the harvest, flowers were pretreated with Floralife Hydraflor 100. The sachet treatment was done in the boxes.

Flower boxes were shipped to the Netherlands following regular shipping methods used for cut flower shipments between Colombia and Netherlands.

Once arrived at the PPO lab, flowers were processed and prepared for simulation of transport, storage and consumer phases.
Flower stems were re-cut and all leaves that would be below the solution level were removed. Flowers were placed in buckets containing water treated with Chrysal Professional T-bag. Each flower bucket was placed in a transport box and closed. The boxed were held at 2°C for 2 days.
After this simulated transport, the flower buckets were taken out of the boxes and held at room temperature (20°C) for 4 days to simulate the storage phase. Flowers continued to receive the T-bag treatment.
At the end of storage phase, flowers of all the treatments were exposed to 1 ppm ethylene for 22 hours at room temperature inside an enclosed chamber.
Flowers were transferred to vases filled with Chrysal clear rose food (10 g/L). Each vase contained 3 flowers from 3 different cultivars. Each 3 flowers in each vase served as one replicate. There were 4 replicates per treatment. There were total of 9 flower stems per vase. Flower vases were placed in interior evaluation room for vase life evaluation.
The data were statistically analyzed for each cultivar using ANOVA and mean separation techniques.

3 Results

Table 1 shows the vase life of the roses

Table 1. Vase life in days of the roses of the two treaments. Different characters symbolizes differences between treatments within a cultivar, according to a ANOVA test with p=0.05

cv	Standard	EthylBloc
Eliza	4.8 a	5.6 a
Engagement	7.3 a	7.1 a
Versilia	5.1 a	4.9 a

There were no differences between the treaments in non of the tested cultivars. The roses suffered from Botrytis, but we accepted that and only ended vase life by reason of Botrytis, when the flowers completely fell apart from the Botrytis disease.

The reasons for ending vase life are shown in table 2.

Table 2. Reasons for ending vase life for all rose flowers.

	Flower wilting		Blueing		Bent neck		Botrytis	
	Standard	EthylBloc	Standard	EthylBloc	Standard	EthylBloc	Standard	EthylBloc
Eliza	6	4	6	5		1		2
Engagement	9	11			2		1	1
Versilia	10	10			1		1	2

Flower wilting was the main reason for ending vase life, exept for Eliza, where blueing was also an important criterium. There were no major differences in criteria for ending vase life between the treatments.

Photo 1 to 3 show the roses on day 5, of both treatments.

Photo 1. Rose Eliza on day 5 of the vase period.
Left: 3 representative flowers of Standard, right: 3 representative flowers of EthylBloc.

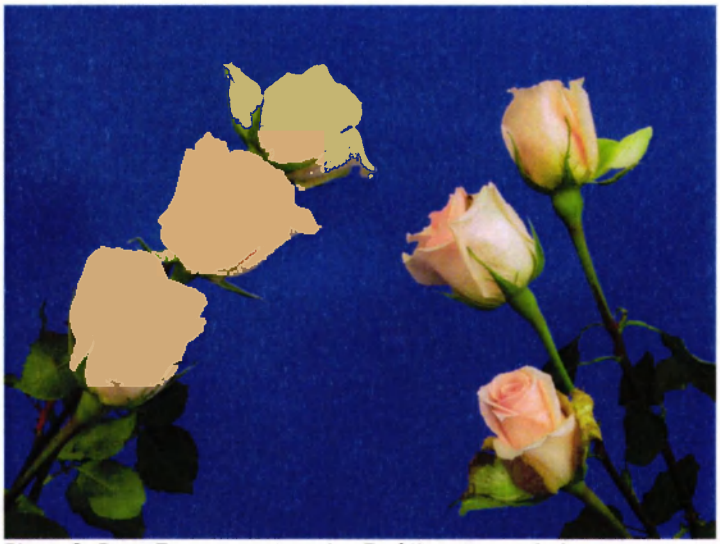

Photo 2. Rose Engagement on day 5 of the vase period.
Left: 3 representative flowers of Standard, right: 3 representative flowers of EthylBloc.

Photo 3. Rose Versilia on day 5 of the vase period.
Left: 3 representative flowers of Standard, right: 3 representative flowers of EthylBloc.

The photos show no differences between the treatments, in performance of the roses on day 5. Wilting and Botrytis (brown petals) are clearly visible in both treatments.

4 Conclusion

There was no benificial effect found of the EthylBloc Sachet treatment, compared to the standard treatment, on roses in this experiment. This could be due to the fact that the used cultivars were not sensitive to ethylene, or that reduction of the vase life by ethylene damage was overruled by early wilting or Botrytis. The rather short vase life in this experiment could be caused by the relative long period of retail simulation.

Appendix 1

Proposal for EthylBloc Sachet Trial at Applied Plant Research, Wageningen University, Netherlands

Trial Objective: *To demonstrate the beneficial effects of EthylBloc sachet treatments on ethylene* sensitive cut flowers when applied during the shipment from South America to Europe

Trial Information:

Researcher: Casper Slootweg

Location: Applied Plant Research (PPO), Wageningen University, Netherlands

Conditions:

1. Sourcing of flowers is Floralife responsibility and all flowers to be delivered on the same day.
2. Floralife will provide EthylBloc Sachets, and the flower food for the vase life test

Trial Coordination in Colombia: Cristina Cortes, Floralife Sales Rep in Colombia

Research Protocol

Objective: To compare the EthylBloc sachet treatment and current industry procedures for preventing ethylene induced damage in cut flowers.

EthylBloc Sachet: EthylBloc sachet is a 2.5 g packet of powder containing ethylene action inhibitor, 1-methylcyclopropene (1-MCP). Once activated and placed in a flower box, the sachet will release 1-MCP slowly and constantly, so that flowers will be exposed to 1-MCP during the entire shipping duration. The treatment will prevent negative effects of ethylene (both internal and external) such as flower drop, wilting and leaf yellowing, thereby improving the vase life of ethylene-sensitive cut flowers.

Plant Material:

Twelve cultivars of cut flowers will be tested in this study. Cut flowers grown at MultiFlora Farm, Colombia will be used. All flowers will be harvested on the same day, and flower stems with uniform length and maturity will be used for the trail. Following is the list of flower cultivars.

Especie	Variedad ramos/Tratamiento	Cultivo	Municipio	Departamento
Rosa Grado 60	Versilia 2 ramos	Agricola Cunday	Madrid	Cundinamarca
Rosa Grado 60	Eliza 2 ramos	Agricola Cunday	Madrid	Cundinamarca
Rosa Grado 60	Engagement 2 ramos	Agricola Cunday	Madrid	Cundinamarca

Treatments:

1. ***Current pre-treatment***. Current pre-treatment procedure that is followed by the farm for each crop will be done. This may or may not include anti-ethylene treatments.
2. ***EthylBloc sachet treatment***. After the harvest, flowers will be placed in Floralife Hydraflor 100 solution (5 ml/L) and kept for 2 hrs at room temperature or overnight at cooler (depending on their current procedure). The sachet treatment will be done in the boxes (see below).

Procedure at the Farm:

After the pre-treatments, flower stems will be bunched, and placed in boxes. There should be at least 15 stems per treatment per cultivar. Flower stems from different treatments should be packed in separate boxes. Depending on the box size, each treatment will have one or two boxes.

EthylBloc Sachet. The box/es of flowers for EthylBloc sachet will be treated as follows. The number of sachets per box will be selected based on the box size. Two sachets will be used for boxes less than 3 ft3 volume or 4 sachets for boxes 3-6 ft3 in volume. Sachets will be dipped in clean water for one second and placed immediately inside the box. Sachets should be placed in either side of the box close to flower heads. Box lids will be closed immediately and prepared for shipping.

Flower boxes will be shipped to the Netherlands following regular shipping methods used for cut flower shipments between Colombia and Netherlands.

Procedure in the Lab:

Once arrived at the PPO lab, flowers will be processed and prepared for simulation of transport, storage and consumer phases.

Transport Phase:

Flower stems will be re-cut and all leaves that would be below the solution level will be removed. Flowers will be placed in buckets containing water treated with Chrysal Professional T-bag. Each flower bucket will be placed in a transport box and closed. The boxed will be held at 2-3 C for 2 days.

Storage Phase:

Flower buckets will be taken out of the boxes and held at room temperature (20 C) for 4 days to simulate the storage phase. Flowers will continue to receive the T-bag treatment.

Ethylene Exposure:

At the end of storage phase, flowers of all the treatments will be exposed to 1 ppm ethylene for 16-24 hours at room temperature inside an enclosed chamber. Ethylene will be injected to the chamber to generate 1 ppm concentration, and this ethylene concentration will be maintained for 16-24 hr duration.

Consumer Phase:

Flowers will be transferred to vases filled with Chrysal Clear Flower food (10 g/L). Each vase will contain 3 flowers from 3 different crops (cultivars). Each 3 flowers in each vase will serve as one replicate. There will be total of 9 flower stems per vase. Flower vases will be placed in interior evaluation room for vase life evaluation. Following factors will be taken into account during the evaluation.

1. Flower Opening.
2. Petal wilting and shattering

3. Leaf yellowing
4. Overall vase life

Number of stems required at farm level:

15 stems per treatment x 2 treatments = 30 stems minimum per cultivar

Number of stems for vase life evaluation:

2 treatments x 4 replicates x 3 stems per replicate = 24 stems per cultivar

Number of vases required = 4 vases.

Analysis of Data:

The data will be statistically analyzed for each cultivar using ANOVA and mean separation techniques.