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Morphological Characteristics of Roses Cut Flower after Vase Life

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Abstract

Investigation was conducted under controlled conditions in the laboratory for plant production at the Faculty of Agriculture in Osijek. The cut roses used in the study were „*Red Naomi*". Three different mediums of 300 ml volume were used in the study: ordinary tap water, *Chrysal clear*, *Crystal soil* gel. After symptoms of decay such as weariness of neck and yellowing and drying of petals were observed, each rose was taken out of medium and the volume of the residual liquid was measured. Leaves, neck and head of decayed roses were separately weighed, placed in paper bags and dried at 70 ºC for 24h and 48h respectfully. The smallest loss of medium volume (5.45 %) was recorded in cut roses that were stored in the *Crystal soil* gel, while the greatest loss of medium volume (47.71 %) was recorded in cut roses stored in *Chrysal clear*.

Key words: water, chrysal, crystal, cut flower, rose

Introduction

After cutting, flower loses contact with the mother plant and consequently with water, food and growth regulators as well. For a successful development of flower after cutting, these components and favorable storage conditions need to be provided. The main problems with storage can be divided into five groups (http://www.chrysal.academy.com): damage due to the presence of ethylene, yellowing of leaves and leaf-falling, nutrition deficiencies, lack of water, xylem blockage due to the presence of bacteria. Flower Food (floral preservatives) is essential to maintain the biological function of flowers and leaves after cutting and during storage towards a longer duration. Flower food that can be found on the market contains high percentage of sucrose (about 95%), supplement against microbial growth, and some resources contain preservatives that help lower the pH value of water.

Insufficient water supply causes the neck bending and insufficient bud opening. During storage rose cut flower often shows symptoms of water stress, wilting leaves, insufficient flower opening and neck bending (Van Doorn, 1988). Furthermore, the fact that neck is lees woody, causes a part of stem of neck carrying a floral heavy head to bend and therefore turgor decline. The rate of water absorption becomes lower than the rate of transpiration and water loss occurs. Period from harvesting to storage should not be longer than 30 minutes. Air plug appears on the stem i.e. air bubbles enter into the xylem blocking the water flow through stem. This phenomenon is called cavitation. In the research of Spinova et al. (2007), rose cut flowers were put through a period of dehydration and then put back into the water tracking the speed of transpiration. Transpiration increased with flower exposure to dehydration and with increasing cavitation. Slowing the loss of fresh mass and the extension of flower vase life is achieved by re-cutting the base of stem (Liao et al., 2001).

Storage temperature affects the durability of cut flower, temperatures above 20 °C affect the transpiration intensity and speed of bud opening and thus reduce the durability of cut flowers. At 30 °C storage temperature duration of rose cut flower was 5 days, while at 20 °C flower lasted 10 days. Also roses with a shorter vase life have transpired more water (Teklić et al., 2002).

Byung-Hun et al. (2006) in a hydroponic growing of roses for cut flower, set the two preharvest treatments with relative humidity on constant 60 % and 85% respectfully. Relative humidity of roses grown at 85 % had an increased transpiration, and therefore the shorter vase life. According to Slootweg (1995) good water balance is one of the most important factors of cut flowers vase life.

Considering that the ambient temperature i.e. water temperature during flower storage in a vase may play an important role in the rehydration of cut flowers after a period without water after harvest, in the survey with 20 types of cut flowers author found the slowest uptake of water was at 20 °C, and the fastest in cold water (0 °C).

The aim of this study was to investigate morphological characteristics of rose cut flower after vase life in three different mediums.

Material and Methods

Investigation was conducted under uncontrolled conditions in the laboratory for plant production at the Faculty of Agriculture in Osijek. The cut roses used in the study were scented cultivar "Red Naomi" from Netherlands, manufacturer Schreurs grown at local rose producer in Valpovo. The family was growing roses for cut flower in a 180 m^2 greenhouse with a total of 1.700 seedlings of different rose varieties.

For the purposes of this experiment roses were harvested early in the morning. Immediately after harvesting, roses were put into clean water and transported to Osijek. Period from harvest to experiment set up was about three hours. The experiment was set up in glass jars with lids with three openings for each flower. All roses used in the experiment were uniform with semi-open buds. In the experiment, three types of preserving mediums were used: clean tap water at room temperature, Chrysal clear and Crystal soil (gel). Crystal soil gel was soaked in water the day before experiment. The volume of all three medium was 300 ml. Experiment was set up in three repetitions for each treatment (medium). Each repetition consisted of 3 jars with 3 roses. The overall experiment consisted of 81 rose cut flowers (Figure 1.). The length of the roses stalk was 50 cm and the cut of the stalk was straight at an angle of 90°. Room temperature during the experiment was on average 24.3 ºC with average relative humidity of 60 %. There was no additional liquid or pruning of stems during experiment.

Results and Discussion

After symptoms of decay such as weariness of neck and yellowing and drying of petals were observed, each rose was taken out of medium and the volume of the residual liquid was measured. Vase life of rose cut flower in Chrysal was on average 11 days, in tap water 8 days and in gel only 5 days (Kraljičak et al., 2012).

Leaves, neck and head of decayed roses were separately weighed, placed in paper bags and dried at 70 ºC for 24h and 48h respectfully. To determine the dry weight, plant material was weighed after drying.

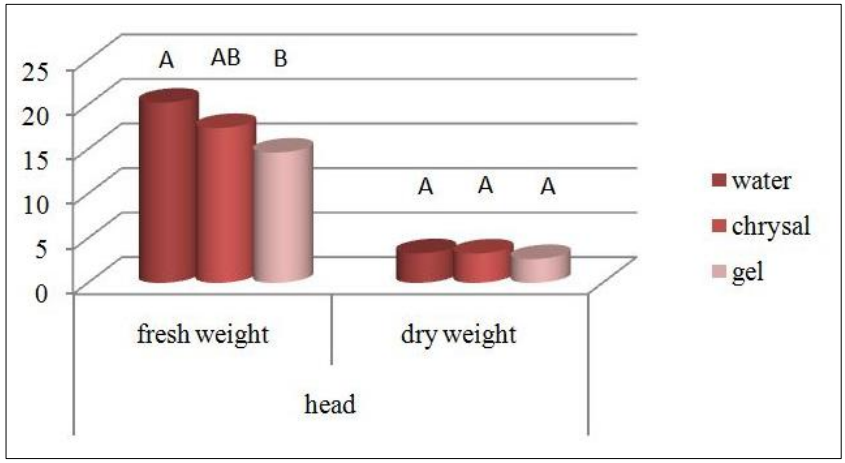
Statistical analysis showed that the medium volume after flower decay was significantly different (p = 0.01) between the three different storage media of cut roses (Table 1). The smallest loss of media volume was recorded in cut roses kept in a gel and was only 5.45 %. The largest medium volume loss of 47.71 % was recorded in cut roses kept in Chrysal, while medium volume loss in cut roses kept in tap water was 35.78 %. Plant transpiration and medium volume loss in the jars are in relation to one another as well to the medium in which the plants were kept. The highest transpiration intensity was recorded in cut roses kept in Chrysal medium 143.11 ml followed by transpiration intensity in the water 107.33 ml and 16.33 ml in the gel.

Tab. 1. The medium volume before and after flower decay (ml), transpiration intensity and percentage of medium loss
Запремина медијума прије и након трулења цвијета (ml), интензитет транспирације и просјечни губици медијума

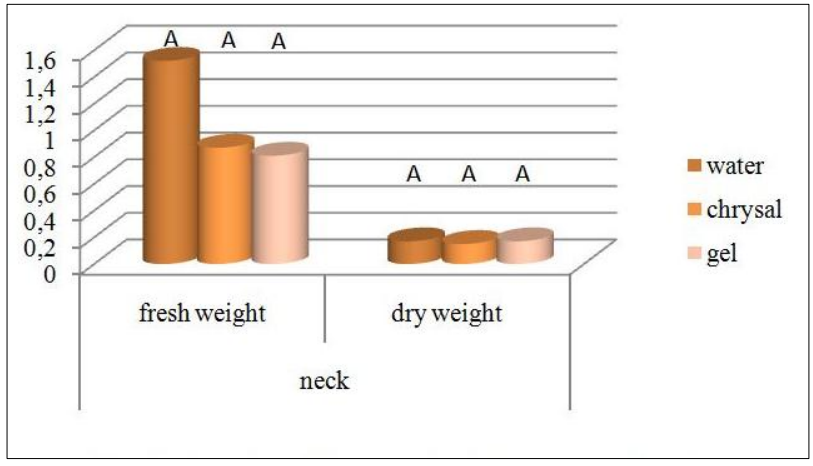
		WATER (W)	CHRYSAL (C)	GEL (G)
Medium average (ml) *Просјек медијума (ml)*	before/*прије*	300,00	300,00	300,00
	after/*послије*	192,66[b]	156,88[c]	283,66[a]
Transpiration intensity (ml) *Интензитет транспирације (ml)*		107,33	143,11	16,33
Medium loss (%) *Губици у медијуму (%)*		35,78	47,71	5,45

Significantly higher fresh weight of the roses head (p = 0.05) was recorded in plants kept in tap water compared to plants kept in the gel. There were no differences compared to plants kept in Chrystal. Minimum mass of the roses head was recorded in plants kept in the gel (14.64 g), which is 38.25 % less than in plants kept in the water and 17.78 % less than in plants kept in Chrysal (Graph 1). No significant difference between the dry weight of roses head in flowers kept on different media was recorded. The maximum dry weight of roses head was recorded in plants kept in tap water 3.33 g, while the lowest dry weight (2.68 g) was recorded in plants kept in the gel.

There was no difference in roses neck fresh weight and dry weight with respect to individual storage media. The largest rose neck fresh weight was recorded in plants kept in the water (1.52 g), while the lowest fresh weight was recorded in the plants kept in gel (0.81 g). The maximum rose neck dry weight (0.17 g) was recorded both in plants kept in the water as well as in plants kept in the gel. Dry weight of the plants kept in Chrysal was 0.15 g (Graph 2).

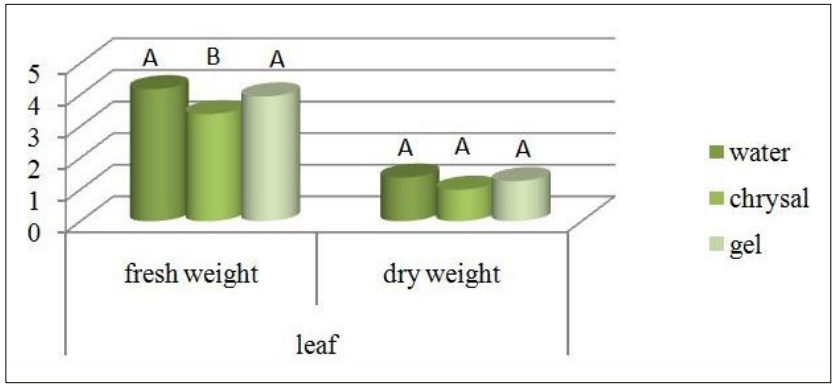


Graph 1. Fresh and dry weight of the roses head
Свјежа и сува маса чашице руже



Graph 2. Fresh and dry weight of the roses neck (g)
Свјежа и сува маса стабла руже

The rose leaf fresh weight was significantly higher in plants kept in water ($p = 0.05$) compared to plants kept in Chrysal. No difference in leaf fresh weight was observed between plants kept in water compared to the one kept in gel. However, significantly higher leaf fresh weight was recorded in rose kept in gel ($p = 0.05$) in comparison with the plants kept in Chrysal (Graph 3). There was no difference in roses leaf dry weight with respect to individual storage media.



Graph 3. Fresh and dry weight of the roses leaves (g)
Свјежа и сува маса листова руже

Conclusions

Despite the quality of cut roses, due to high storage temperatures (average temperature of 24.3 °C) during the experiment, there was an increase in the transpiration intensity and the appearance of rapid flower head opening of rose kept in water and Chrystal. Decay of flower head was observed in roses kept in gel at the beginning of the experiment which is confirmed through calculated values of fresh weight of the head and the transpiration intensity. As the rose is a woody plant, medium gel did not show to be favourable for keeping cut roses. The rate of water absorption was lower than the rate of transpiration causing a turgor decline and as a rose neck is less woody bending of flower heads occurs. The best medium for keeping cut roses flower, depending on vase life duration and on flower head opening, is Chrysal. In Chrysal medium highest rate of medium loss and transpiration intensity was recorded.

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Морфолошке особине резаног цвијета руже након гајења у вази

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Сажетак

Истраживање је спроведено у контролисаним условима у лабораторији за биљну производњу Пољопривредног факултета у Осијеку. У истраживању су коришћене резане руже „*Red Naomi*“. Три различита медијума запремине 300 ml су коришћена: обична вода из славине, *Chrysal clear* и *Crystal soil* гел. Након симптома трулења, попут изнурености стабла и жућења и сушења латица, сваки цвијет је изолован из медијума, при чему је измјерена запремина преостале течности. Листови, стабло и чашица трулих ружа су посебно измјерене, стављене у картонске кесе и осушене на 70 ºC у току 24 и 48 часа. Најмањи губитак запремине медијума (5.45 %) је констатован код ружа које су биле потопљене у *Crystal soil* гел док је највећи губитак запремине медијума (47.71 %) констатован код ружа које су биле потопљене у Chrysal *clear* медијум.

Кључне ријечи: вода, *crystal*, резани цвијет, ружа

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