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Effect of pH, 8-Hydroxyquinoline sulphate, Sucrose and Wetting Agents on Vase life and quality of Chrysanthemum cut flowers cv. Zembla White

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ABSTRACT

Cut chrysanthemum cv. Zembla white were treated with solution pH (3.5 or 7.0), 8-HQS at 20 ppm, sucrose at 2% and wetting agents, Tween 20 or TritonX-100 at 0.01% on vase life, maximum water absorption, leaf life and chlorophyll content of chrysanthemum (Dendranthema grandiflora) cv. Zembla white. The longest vase life, the maximum water absorption, the longest leaf life obtained with treatment (8-HQS 200 ppm+ sucrose 2%+ Triton X-100) at solution pH 7.0. While the highest chlorophyll content obtained with treatment (8-HQS 200ppm+ sucrose 2%+ Tween 20 0.01%

Key words: chrysanthemum cut flowers pH, 8-HQS, Sucrose, wetting Agents.

Introduction

Chrysamthemum (*Dendranthema grandiflora*) cut flowers were subjected to different distilled water pH (3.5 or 7.0), germicides, sugars and wetting agents. Durkin (1979) found an increase in flow rate of water through rose stem segments, with decrease in pH from 6 to 3. Marusky (1969, 1971) found that 8-HQS, is the most effective in inhibiting both bacterial and physiological vascular blockages. Sugar is also known to improve the water balance in flowers, it regulate the closure of stomata (Marusky 1969). It is also found that cut chrysanthemum (Dendranthema X grandiflorum) Ramat, with Tween 20 (0.01%) improved vase life Durkin (1981).

Materials and Methods

This study was carried out in the Lab. of Hort. Dept. Faculty of Agriculture, Ain Shams Unv. Cairo, Egypt, for the two successive seasons 2016 and 2017 to investigate the effect of levels of solution pH (3.5 and 7.0), 8-hydroxyquinoline sulphate at 200 ppm, sucrose at 2% and two wetting agents Tween 20 or Triton X-100 at 0.01% on the vase life, maximum water absorption (MWA), leaf life and chlorophyll content of cut chrysanthemum flowers cv. Zembla white.
Cut chrysanthemum flowers were obtained from private farm at 15th of Feb. 2016 and 2017. The flowers were cut at the commercial maturity. Half of the petals began to open lower leaves were removed up to 35 cm. from the cut stem base. Then the flowers were cut to 50 cm long, and placed in vases contain a recently prepared (1000 cm^3.) of the following solutions.

1. Control (distilled water) with pH 3.5
2. Control (distilled water) with pH 7.0
3. 8-HQS 200 ppm with pH 3.5
4. 8-HQS 200 ppm with pH 7.0
5. 8-HQS 200 ppm+ Sucrose 2% with pH 3.56.
6. 8-HQS 200 ppm+ Sucrose 2% with pH 7.0
7. 8-HQS 200 ppm+ Sucrose 2% Tween 20 at 0.01% with pH 3.5
8. 8-HQS 200 ppm+ Sucrose 2% Tween 20 at 0.01% with pH 7.0
9. 8-HQS 200 ppm+ Sucrose 2% + Triton X-100 at 0.01% with pH 3.5
10. 8-HQS 200 ppm+ Sucrose 2% + Triton X-100 at 0.01% with pH 7.0

The experiment were performed in laboratory its temperature averaged 21± 2°C and relative humidity 50-60% and under light intensity of 1000 lux from cool white fluorescent 12h. a day.

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The experiment were performed in laboratory its temperature averaged 21_ 2°C and relative humidity 50-60% and under light intensity of 1000 lux from cool white flurorescent 12 h. a day.

The following data were recorded:

- Vase life (days) vase life was terminated when the petals began to wilt.
- Maximum Absorption rate (M.A.R)%
- Leaf life (Days): leaf life was terminated when the terminated when the leaves turn dark.
- Chlorophyll leaves content after 7 days of the start of the experiment . Chlorophyll was measured by using chlorophyll. Meter Minolta, SPAD 502, It measure the relative amount of chlorophyll present by measuring the transmittance of the leaf in two wave bands 600-700 and 400-500mm. The youngest fully expanded mature leaves is used.

The design of the experiment was a randomized complete with 3 replicates and every replicate have 5 flowers.

Statistical Analysis:

The data were subjected to analysis of variance according to Steel and Torrie, (1981) and the method of Duncan's was used to compare among differentiate means (Duncn, 1955).

Results

Vase life:

First season: Results in Table (1) concerning vase life showed significantly that the longest vase life obtained from treatment (10) than the control or the other treatments. Also, treatments with pH 7.0 showed an increase in vase life than pH. 3.5 in all treatments.

Furthermore, data showed that the addition of sucrose in treatment (5 and 6) increased vase life significantly than the addition of 8-HQS only in treatment (3 and 4).

Data showed also the addition of Tween 20 or Triton X-100 under pH 7.0 increased vase life significantly than treatments with pH 3.5.

Maximum Absorption Rate (MAR) %:

Data presented in Table (1) showed that (MAR)% was abstained with treatment (10) significantly than the other treatments. Data also showed that all treatments wit pH 7.0 recorded significantly the highest (MAR) % than treatments with pH 3.5, Except control treatment that showed that pH 3.5 was more effective than pH 7.0.

Data showed also that the addition of triton X-100 at pH 7.0 was more effective than the addition of Tween 20 at pH 3.5.

Leaf life (Days):

Data presented in Table (1) showed that the highest leaf life significantly was treatment (8 and 10) than the other treatments Also, data showed significantly that there were a great increase in leaf life with pH 7.0 than pH 3.5 in all treatments.

Data showed also that the addition of Trition X-100 or. Tween 20 or sucrose at pH 7.0 resulted significantly the highest leaf life than pH 3.5

Chlorophyll content in leaves:

Data presented in Table (1) showed that the highest chrorophyll content was obtained with treatment (8) than all the other treatments.

Also, chlorophyll content showed significantly an increase in treatments with pH 7.0 than pH 3.5. In addition data showed that the addition of sucrose increased chlorophyll content than the addition of 8-HQS.

Data also showed that the addition of Tween 20 gavel significantly the highest chlorophyll content than the addition of Triton X-100 at pH 7.0. As well as, the similar results were observed in the second season.

Table 1: Effect of pH, 8-HQS, sucrose and wetting agents on vase life, Maximum absorption rate, leaf life and chlorophyll content of chrysanthemum cv. Zembla white in the two seasons of 2016-2017

Treatments	First Season			
	M.A.R	Vase life	Leaf life	Chlorophyll
1. pH 3.5	32.1 ED	13.13 E	8.13 C	45.13 BC
2. pH 7.0	26.16 E	15.13 ED	15.16 AB	51.2 AB
3. pH 3.5	27.86 E	18.16 CDE	10.2 BC	22.2 D
4. pH 7.0	32.16 ED	19.13 BCD	15.23 AB	33.1 D
5. pH 3.5	29.13 ED	19.16 BCD	10.16 BC	40.16 CD
6. pH 7.0	33.13 CDE	22.13 ABC	17.13 A	47.16 BC
7. pH 3.5	36.2 BCD	23.16 ABC	10.23 BC	33.13 D
8. pH 7.0	40.23 BC	24.2 AB	17.13 A	55.16 A
9. pH 3.5	42.2 B	23.23 ABC	8.13 C	42.2 C
10. pH 7.0	65.1 A	26.13 A	17.23 A	45.1 BC

Means with the same letter are not significantly different.

Table 2: Effect of pH, 8-HQS, sucrose and wetting agents on vase life, Maximum absorption rate, leaf life and chlorophyll content of chrysanthemum cv. Zembla white in the two seasons of 2016-2017

Treatments	Second Season			
	M.A.R	Vase life	Leaf life	Chlorophyll
1. pH 3.5	24.13 CD	12.2 C	8.16 C	42. 16 BCD
2. pH 7.0	21.16 D	14.1 BC	14.2 AB	48.16 CB
3. pH 3.5	29.2 CD	19.13 AB	10.13 BC	25.2 E
4. pH 7.0	31.13 C	20.86 A	15.13 AB	35.13 D
5. pH 3.5	30.16 C	19.13 AB	10.26 BC	40.13 CD
6. pH 7.0	32.2 C	23.2 A	17.16 A	49.2 B
7. pH 3.5	33.13 C	23,2 A	10.23 BC	35,13 D
8. pH 7.0	54.16 B	25.16 A	17.16 A	57.2 A
9. pH 3.5	47.23 B	23.16 A	8.13 C	40.16 CD
10. pH 7.0	63.1 A	25.10 A	17.16 A	45.13 CB

Means with the same letter are not significantly different.

Discussion

The effect of pH, germicide, sucrose and wetting agents on cut chrysanthemum was examined. Data showed that adding sucrose increased vase life, Absorption rate, leaf life and chlorophyll content than control or 8-HQS alone.

Furthermore, It was found that adding wetting agents to the solution increased vase life, absorption rate, leaf life, and chlorophyll content than adding sucrose or germicide alone. Also, pH play an important role in this experiment and showed that 7.0 pH was better than 3.5 pH in all treatments. Jones *et al.* (1993) showed that using Triton X-100 with 0.01 % as pulsing increased solution uptake, fresh weight and vase life of sunflower (*Helianthus annus* L.) Acock and Nicohlas (1979) stated that sugar accumulates in the flower tissues, increase their osmotic concentration, and improve their ability to absorp water and maintain turgidity.

Dominic J. Durkin (1980) stated that wetting agents lower the surface tension of water, increasing lateral water flux which expedites air removal and the reestablishment of continuous xylem water colums.

Burdett, (1970), Gilman and Steponkus, (1972) found that continuous treatment with (8-HQS), extends the vase life of cut rose flowers.

Kuiper *et al.,* (1995) found that sucrose supply increases the longevity of many cut flowers, since sucrose can act as a source of nutrition for tissues approaching carbohydrate starvation, flower opening and subsequent water relations. Similar finding were obtained by Lalonde *et al.* (1999) and Downs (1988).

Conclusion:

Solution pH 7.0 with triton X-100 or Tween 20 improved vase life, water absorption, leaf life, chlorophyll content than pH 3.5 with the same components.

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