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

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ABSTRACT

An investigation was carried out to study the effect of solution pH (3,5 or 7,0), 8-HQs at 200 ppm, sucrose at 2% and wetting agents, Tween 20 or Triton X-100 at 0,01% on vase life, maximum water absorption, leaf life and chlorophyll content of chrysanthemum (*Dendranthema grandiflora*) cv. Navona dark cut flowers. The longest vase life obtained with treatment (8-HQS 200 ppm + Sucrose 2% + Triton X-100 or Tween 20 at 0,001) at solution pH 7.0, The maximum water absorption obtained with treatment (8-HQS 200 ppm + Sucrose 2%+ Triton X-100) at solution pH 7,0. The longest leaf life obtained with the same treatment. The highest chlorophyll content obtained with treatment (8-HQS 200 ppm+ Sucrose 2%+ Tween 20 at 0.01%).

Key words: Chrysanthemum cut flowers, pH, 8- HQS, sucrose, wetting Agents.

Introduction

Chrysanthemum (*Dendranthema grandiflora*) Fam. Asteraceae, cut flowers are the most popular cut flower in Egypt and in the world. The most important ingredients used in vase solutions, water, germicides, sugars and wetting agents. Low water pH (3-4) have long been recognized (Arts 1957), Marousky (1971) demonstrated that low pH retarted stem blockage of roses. (Durkin 1979) found an increase in flow rate of water through rose stem segments with decrease in pH from 6 to 3. It is recommended that all preservative should include one compound with germicidal activity, 8-HQS were the most commonly used germicides at 200-600 ppm (Marousky 1972, 1973). Sucrose is included in most preservative formulation, applied sugar delay senescence processes by delaying degradation of proteins, ribonucleic acids, maintaining integrity and intochondrial structure and function (Halevy and Mayak (1979). Wetting agents greatly improved the flow of water and hydration in roses and chrysanthemum (Durkin 1981).

Materials and Methods

The experiment of this study were carried out in the lab. of Hort. Dep. Faculty of Agriculture, Ain Shams Univ. Cairo, Egypt for the two successive seasons 2016 and 2017, to investigate the effect of two levels of pH (3.5 and 7.0) of the solution, 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 (*Dendranthema grandiflora*) CV. Navona Dark cut chrysanthemum flowers cv. Navona Dark were obtained from private farm at 12th 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

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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. per 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 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 (Duncan, 1955).

Results:

Vase life:

First season: Data presented in Table (1) showed that the longest vase life significantly obtained from treatment (8 and 10) than the control or the other treatments Also, there were a significant increase in vase life with pH 7.0 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 that the addition of Tween 20 or Triton x-100 under pH7.0 increased vase life significantly than treatments with pH 3.5.

Maximum Absorption Rate (MAR) %:

Data presented in Table (1) showed that (MAR%) was obtained with treatment (10) significantly than the other treatments Data also showed that all treatments with pH 7.0 recorded significantly the highest (MAR%) than treatments with pH 3.5, Except control treatments that showed that pH 3.5 was more effective than pH 7.0. Data showed 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 treatment (10, 8 and 6) significantly had the highest leaf life than control treatment or the other treatment Also, data showed significantly that there were a great increase in leaf life with pH 7.0 than pH 3.5 in all treatments.

In addition data showed that the addition of sucrose increased leaf life significantly than the addition of 8-HQS, and pH 7.0 was significantly effective than pH 3.5.

Data showed also that the addition of Triton 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 chlorophyll content was obtained with treatment (6 and 8) than all the other treatment. 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 or than the control.

Data also showed that the addition of Tween 20 gave significantly the highest chlorophyll content than the addition of Triton X-100 at pH 7.0. Similar results were found in the second season Table (2).

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. Navona Dark in the two seasons of 2016-2017

Treatments	First Season			
	M.A.R	Vase life	Leaf life	Chlorophyll
1. pH 3.5	34.16 EF	15,13 E	9.16 D	45.16 D
2. pH 7.0	28.16 F	16.16 DE	15.16 BC	48.16 BC D
3. pH 3.5	31.2 F	17.2 CDE	8.2 D	46.16 CD
4. pH 7.0	41.13 DE	18.13 BCDE	18.13 B	49.1 BCD
5. pH 3.5	44.2 D	22.16 ABCD	12.2 CD	53.16 ABC
6. pH 7.0	64.16 B	24.23 AB	24.2 A	54.42 AB
7. pH 3.5	42.13 D	23.2 ABC	12.13 CD	53.10 ABC
8. pH 7.0	55.16 C	25.13 A	25.13 A	59.16 A
9. pH 3.5	42.16 D	23.23 ABC	12.2 CD	46.2 DC
10. pH 7.0	75.13 A	25.16 A	25.20 A	54.13 AB

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. Navona Dark in the two seasons of 2016-2017

Treatments	Second Season			
	M.A.R	Vase life	Leaf life	chlorophyll
1. pH 3.5	35.13 CD	14.13 C	8.13 E	40.13 E
2. pH 7.0	31.2 CD	15.16 C	14.2 CD	42.23 DE
3. pH 3.5	29.2 D	17.2 BC	8.13 E	42.16 De
4. pH 7.0	33.16 CD	19.13 ABC	19.16 BC	47.1 BCDE
5. pH 3.5	40.16 CB	20.16 ABC	12.16 DE	50.13 ABCD
6. pH 7.0	65.2 A	24.2 AB	24.16 AB	55.23 AB
7. pH 3.5	44.13 B	23.1 AB	12.23 DE	51.13 ABC
8. pH 7.0	65.13 A	25.13 A	24.83 A	56.1 A
9. pH 3.5	58.2 A	22.16 AB	12.16 DE	45.16 CDE
10. pH 7.0	65.13 A	25.23 A	25.2 A	55.13 AB

Means with the same letter are not significantly different.

Discussion

The results showed that the longest Vase life obtained by adding 8-HQS 200 ppm + sucrose 2% + Tween 20 or Triton X-100 0.01 % to the Vase solution at pH 7.0 than pH 3.5As for maximum absorption rate (MAR), vase solution consists of 8-HQS 200 ppm+ sucrose 2% + Triton X-100 (0.01%) with pH7.0 gained the maxim absorption rate.

It was quite apparent from the results abstained with leaf life that solution pH at 7.0 gained the highest leaf life than solution pH at 3.5.

Concerning chlorophyll content, the results showed that adding Tween 20 (0.01%) to the vase solution with 8-HQS 200ppm and sucrose 2% at pH7 gave the highest chlorophyll content in leaves.

Rodney B. 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 absorb water and maintain turgidity.

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 columns.

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

Adding 8-HQS + Sucrose + Triton X-100 or Tween 20 to the vase solution with pH 7 resulted the longest vase life, leaf life, the highest absorption rate and the highest chlorophyll content in leaves.

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