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EFFECT OF HYDRATION TREATMENTS AND MAGNETIZED WATER ON WATER UPTAKE, VASE LIFE AND QUALITY OF THE CUT SPIKES OF GLADIOLUS *(Gladiolus hybrida l.)* cv. "ROSE SUPREME "

Abdel-Kader, H. H.; M. M. Kassem and Hanan A. Zaky
Vegetables and Floriculture Dept., College of Agric., Mansoura Univ.

ABSTRACT

This study was carried out three consequent times during spring of 2013 at the Postharvest Laboratory of Vegetable and Ornamental Plants Department, Faculty of Agriculture, Manso0ura University, Egypt in order to study the effects of hydration treatments and magnetized water on water uptake, relative fresh weight and vase life of cut gladiolus (*Gladiolus hybrid L.*) spikes cv. "Rose Supreme ". Three hydration treatments (room temperature water, 0.1 Tween 20 solution, and warm (40 °C) water) and four water types (tap and magnetized tap water in addition to distilled and magnetized distilled water types) were tested. The experiment was analyzed as a factorial experiment in a randomized complete block design with 5 replicates. The experiment was replicated twice (carried out three times), and a combined analysis was carried out to represent the analyzed data. The results showed that hydration treatments and the use of magnetized water affected water uptake, vase life, and fresh weight of cut gladiolus spikes. As for hydration treatments, warm water and Tween 20 treatments resulted in longer vase life and better increase in fresh weight than room temperature treatment.

The results showed that water uptake was highest in case of Tween 20 solution at the beginning of the vase life and decreased thereafter, but spikes placed in warm (40 °C) water had steadier trend in water uptake throughout the vase life. As for water types, the use of magnetized distilled water resulted in longest vase life and highest increase in relative fresh weight of gladiolus spikes in addition to steadier trend in water uptake among the four water types. Longest vase life was achieved using both warm magnetized distilled and warm magnetized tap water, followed by magnetized water (either distilled or tap) plus Tween 20. However, highest increase in fresh weight was achieved using warm magnetized distilled water. Water uptake data showed that best results in longevity and fresh weight increase were related to the trend of water uptake by the flowers throughout the vase life. It is recommended that magnetized water could be used for the preparation of cut flowers preservatives .

INTRODUCTION

Gladiolus (*Gladiolus grandiflorus L*.) is an ornamental plant native to South Africa, and is a member of the Iridaceae family, having approximately one hundred and fifty known species (Jenkins et al., 1970). It is an excellent cut flower for indoor decoration in vases and one of the most important cut flowers in the world market. Gladiolus produces very attractive cut flowers with long spikes, and the life of the spike is determined by the life of individual florets, and opening of the closed buds on the spike. Many of the florets on the spike should open before the wilting of the bottom florets, since the number of senescent florets determine the end of the spike's vase life. The longevity of florets is short between 3 or 5 days (Mayak *et al.,* 1974).

Vase life termination for many cut flowers is characterized by wilting (He et al., 2006). Longevity of cut flowers is influenced by water uptake, transpiration and balance between these two processes (Da Silva, 2003). Blockage of the xylem vessels in cut flowers could be caused by aspired air, bacteria, particulate matter, macromolecules, and/or pectic enzymes (Rogers, 1973; Durkin, 1981; van Doorn, 1997; Put et al., 2001 and He et al., 2006). When the vessels of the stem are blocked, the limited water uptake accompanied by continuous water loss by the cut flower organs result in net loss of water from the flower tissues and wilting (Serek et al., 1995; van Doorn, 1997 and Hassan, 2005).

Disruption of water columns in the stem vessels by air embolism is one of the main factors causing water deficit (van Meeteren, 1992; Loubaud and van Doorn, 2004). Air is aspired into the opened xylem vessels at the cut surface of the flower stem directly after cutting and during shipment or storage (van Doorn, 1990).The presence of air emboli was reported to be a factor disturbing the rehydration of flowers (Evans et al., 1996) and its presence could even help the formation of other types of permanent xylem occlusion (van Doorn and Cruz, 2000). There moval of this air emboli is a main reason for ability of the cut flower to restore water uptake (Durkin, 1979 and 1980; van Doorn, 1990; van Meeteren, 1992; van Meeteren and van Gelder, 1999).

The use of degassed water, warm water, and wetting agents were reported to overcome air embolism and to improve water uptake and rehydration of many cut flowers (Rogers, 1973; Durkin, 1979 and 1980; Slootweg, 1995 ;Evans et al., 1996; van Doorn, 1990 and van Meeteren et al., 2006).These methods depended on dissolving gases, increasing the kinetic energy of water, lowering pH and /or reducing the surface tension of water.

Magnetic or magnetized water (water treated by the magnetic field or pass through a magnetic field device) is now considered to have effect on plant growth and development. Exposure of water to magnetic field was reported to reduce pH of the water, increase its ability to dissolve gases, and reduce its surface tension (Busch et al., 1985; Parsons et al., 1997; Cho and Lee 2005; Cai et al., 2009).

In the last decade there was a debate about using tap water or other types of water to replace the use of distilled water for keeping the cut flowers (van Meeteren et al., 2000; Abdel-Kader, 2004; Saleem et al., 2014).

The major idea of this research was to test the effects of magnetizing distilled or tap waters in combination with wetting agent, warm water and room temperature water on water uptake and vase life and quality of cut gladiolus spikes.

MATERIALS AND METHODS

The experiment was conducted at the Postharvest Laboratory of Vegetable and Ornamental Plants Department, Faculty of Agriculture, Mansoura University, Egypt, during 2013 and 2014 years. Gladiolus cut flower spikes [Gladiolus hybrida cv. Rose Supreme] were used in the present work. Gladiolus cut flower spikes were a product of a well-known commercial farm in EL-Kanater EL-Khyrea, Egypt.

Flower spikes were cut early in the morning when the basal two florets were fully opened. Stems were, then, warped in polyethylene sheets and immediately transported to the Laboratory under dry cool conditions. Upon arrival, spikes were graded according to the length of the spike and number of florets along the stem. Spike stems were, then, cut in air to 70cm in length and leaves were removed leaving 3 leaves per spikes. Gladiolus spikes were weighed and their original fresh weight was recorded. Spikes were placed individually in graduated cylinder (100 ml) containing the designated solutions till the end of their vase lives under Laboratory conditions of 24 hours fluorescent light about (1500 lux), 25±2 °C, and 50 ± 5% relative humidity (RH). A group of five graduated cylinders were filled with water only without flowers were set in order to calculate the average daily water evaporation from the cylinders, as the average decrease in water level in the five cylinders.

Vase life of the flowers was terminated when either the wilted florets reached more than 50% from the total number of the florets on the spikes or when the spike lost more than 10% of its original fresh weight.

Treatments:

The treatments included 3 hydration treatments (room temperature water, 0.1% Tween 20 solution and warm 40 °C water) and 4 water types (tap water, magnetized tap water, distilled water and magnetized distilled water).

Magnetized water was prepared out of water exposed to magnetic field through fixing two pieces of magnet by distance (15*2.5 cm) for 48 hours around abottle containing each water source. The tap water used was regular drinking water of the laboratory tap, and its chemical analysis is shown in Table (A).

Table [A] Chemical analysis of tap water.

E.C.	**0.88 (mmoh/cm)**
Total dissolved solids (T.DS)	563.2 ppm
pH	7.7
Anions (meq / l)	
CO_3^{--}	0
HCO_3^{-}	0.1
CL^{-}	1.4
SO_4^{--}	2.9
Cations (meq / l)	
Ca^{++}	1.2
Mg^{++}	1.8
Na^{+}	1.25
K^{+}	0.15

Experimental Design

The experiment was designed as a factorial experiment in complete randomize design with 5 replicates.

Data Recorded:

Vase life No of days from placement of the spikes in solutions until it was terminated.

Maximum relative fresh weight (%).The percentage of the maximum relative fresh weight was the estimated as percentage of greatest increase in the original fresh weight of gladiolus spikes

Water uptake (ml/20g fresh weight/day) Solution uptake by the spike was calculated as the daily decrease in solution of the graduated cylinder containing the spike, after subtracting the mean daily evaporation value., and the amount of solution uptake was related to 20 gm of the spike fresh weight according to(Hatamzadeh et al., 2012) as follows:

Water uptake =× 20
(ml/20 gm fresh weight/day)

Statistical analysis:

The obtained data were statistically analyzed according to Gomez and Gomez (1984). Costat statistical analysis program was used, and the differences between the means of the treatments were considered significant when they were equal or more than least significant difference (L.S.D) at 5% level.

The experiment was replicated twice (carried out three times), and when there was insignificant differences between the two experiment a combined analysis was carried out to represent the analyzed data.

RESULTS AND DISCUSSION

1. Effect of hydration treatments and water types on daily water uptake of cut gladiolus spikes:

Effect of hydration treatments on daily water uptake of cut gladiolus spikes.

Data in Table (1) show that water uptake in the first day was highest in case of Tween 20 treatment, while in the second, third fourth day had the lowest water uptake. Data also show that no significant differences existed in water uptake between warm water and room temperature water in water uptake in the first four days. However, water uptake by spikes of the three treatments did not show any significant differences starting from the fifth day of vase life till the end of the experiment.

Figure (1) shows that at the beginning of the vase life, the trend of water uptake of spikes placed in Tween 20 solution was the highest, while that of spikes placed in in warm water was lowest. The figure also shows that the trend of water uptake of all hydration treatments decreased by time, but after few days, the trend of water uptake of spikes placed in Tween 20 solution decreased sharply, while that of spikes placed in either warm or room temperature treatments decreased steady.

Effect of water types on daily water uptake of cut gladiolus spikes.

According the data in Table (2), it is clear that in the first and second day, spikes placed in magnetized tap water had highest water uptake. No significant differences existed in water uptake among all treatments starting from the third day until the seventh day of vase life. However, by the last two days of the vase life, spikes placed in magnetized distilled water had highest water uptake.

Figure (2) shows that at the beginning of the vase life, water uptake of spikes placed in magnetized tap water was the highest, while that of spikes placed in magnetized distilled water was the lowest. The figure also showed that water uptake of spikes in all water types decreased by time. However, the trend of water uptake by spikes placed in magnetized distilled water was much better and decreased very steady and better than other types. In addition, the trend of water uptake by spikes placed in distilled water was slightly better than those of other two tap water types after 6 days of the vase life.

Effect of the interaction between hydration treatments and water types on daily water uptake of cut gladiolus spikes.

For the sake of convenience, the interaction effects were split to 3 figures (A, B, and C) representing the trend of uptake of the four water types at room temperature, Tween 20, and warm solution hydration treatments respectively.

When using room temperature water (Fig 1A), gladiolus spikes placed in magnetized tap water had highest water uptake at the beginning of the vase life followed by tap water and distilled water, while those placed in magnetized distilled water had the lowest uptake. However, water uptake tended to decrease throughout the vase life, and water uptake by spikes placed in magnetized tap water decreased sharply by the last few days of vase life.

Similarly, when Tween 20 was used (Fig. 1B), spikes placed in magnetized tap water had the highest water uptake followed by those placed in tap water. Although water uptake of all spikes tended to decrease by time, water uptake of spikes placed in magnetized distilled water or distilled water decreased in a less sharp trend than those placed in either magnetized tap water or tap water.

The trend of water uptake of spikes placed in different warm water types (Fig. 1C) show that the trend of water uptake of spikes placed in warm tap or distilled water were highest at the beginning of the vase life and decreased sharply thereafter. To the contrary, the trend of water uptake of spikes placed in warm magnetized distilled water was very steady from the beginning of the vase life and throughout the experiment. The trend of warm magnetized tap water was low and decreased in a sharper trend than other warm water types.

It seems that high temperature interferes with the effect of magnetizing on the solutes in tap water.

2. Effect of hydration treatments and water types on maximum relative fresh weight of cut gladiolus spikes:

Effect of hydration treatments on maximum relative fresh weight of cut gladiolus spikes.

Spikes hydrated with warm water had greater increase in relative fresh weight, followed by those placed in Tween 20 solution, while those placed in room temperature water had the lowest increase in fresh weight (Table 3).

Effect of water type on maximum relative fresh weight of cut gladiolus spikes.

The same Tables (3) also show that spikes placed in either tap water or magnetized distilled water had greater increase in fresh weight than other two water types.

Effect of the interaction between hydration treatments and water types on maximum relative fresh weight of cut gladiolus spikes

Table (3) show that the greatest increase in fresh weight of gladiolus spikes was achieved when spikes were placed in warm magnetized distilled water followed by placement in Tween 20 plus magnetized distilled water and tap water, while lowest increase in fresh weight was realized in room temperature magnetized tap water.

3. Effect of hydration treatments and water types on vase life of cut gladiolus spikes:

Effect of hydration treatments on vase life of cut gladiolus spikes.

It is obvious from Table (4) that warm water was more effective in improving vase life of gladiolus cut spikes compared with other two hydration treatments.

Effect of water type on vase life of cut gladiolus spikes.

The data of Table (4) also show that magnetizing distilled water significantly improved vase life of the spikes compared with other water types.

Effect of the interaction between hydration treatments and water types on vase life of cut gladiolus spikes.

As for the interaction among hydration treatments and water types, it is obvious from Table (4) that longest vase life of gladiolus spikes was achieved by placing them in warm magnetized tap water and warm magnetized distilled water.

DISCUSSION

Air is aspired into the opened xylem conduits at the cut surface, directly after cutting a flower stem (van Doorn, 1990), disturbing the rehydration of flowers (Evans et al., 1996). Rehydration of the cut flower will depend on the rate by which aspired air will be replaced by water, once the stems are placed in water (van Ieperen et al., 2002).

The results showed that warm water and Tween 20 treatments resulted in longer vase life and better increase in fresh weight than room temperature treatment. The data showed that water uptake was highest in case of Tween 20 solution at the beginning of the vase life and decreased thereafter, but spikes placed in warm (40 °C) water had steadier trend in water uptake throughout the vase life. These two methods were reported to overcome air embolism by affecting the properties of water molecules, the wetting agent by reducing the surface tension of water and the hot water through increasing the kinetic energy of water (Rogers, 1973; Durkin 1979, 1980 and 1981).

As for water types, the use of magnetized distilled water resulted in longest vase life and highest increase in relative fresh weight of gladiolus spikes in addition to steadier trend in water uptake among the four water types. Earlier report by Staby and Erwin (1978) , showed that the use of deionized or distilled water compared to tap water increased vase life of chrysanthemums by 150 and 235%, respectively. The use of tap water for handling cut flowers is not recommended, because of variations between different tap water sources in salt composition (van Meeteren et al., 2000).

The interaction between hydration and water type treatments showed that Longest vase life was achieved using both warm magnetized distilled and warm magnetized tap water, followed by magnetized water (either distilled or tap) plus Tween 20. These results indicate that the use of warm water was better than Tween 20 when combined with magnetized water, magnetizing water improved the hydration ability of both distilled and tap water.

As a result of hydrogen bonding, electrons are easily distributed amongst water clusters (Del Giudice et al., 2010) capable of interacting with magnetic fields and electromagnetic radiation (Montagnier et al., 2011). In addition, Cai et al., (2009) reported that when water was exposed to a magnetic field, the physicochemical properties of water were changed with time, there was a decrease of surface tension and an increase of viscosity over the treatment time, and the water became more stable having more activation energy.

Our results showed that the use of magnetized water (distilled or tap) combined with warm water improved water uptake, and subsequently fresh weight and vase life of cut gladiolus spikes. The exposure of water to magnetic field was reported to reduce pH of the water, increase its ability to dissolve gases, and reduce its surface tension (Busch et al., 1985; Parsons et al., 1997; Cho and Lee, 2005; Cai et al., 2009) , and these factors could lead to overcoming air bubbles formed after cutting the flower stem. In addition, the effect of magnetized water on the trend of water uptake, in this experiment, might be related to its improved ability to dissolve gasses. van Ieperen et al., (2000) reported that At the start of vase life, air will be trapped between the water column and the pit membranes of the vessels inside the xylem, and it would be dissolved into surrounding water in order to be removed from these cut open vessels.

Because, in most cases, consumers will not use deionized water for their cut flowers (Macnish et al., 2005), there is a debate about the use of deionized water in postharvest of cut flowers, since research was made about using tap water or other types of water to replace the use of distilled water for keeping the cut flowers (van Meeteren et al., 2000; Abdel-Kader, 2004; Saleem et al., 2014). van Meeteren et al., (2002) reported that Low concentrations of several ions commonly present in tap water could positively influence the water balance of cut chrysanthemums flowers. Therefore, the results of this experiment, gives a potential of using magnetized tap water in cut flower preservatives.

Table [1] Effect of hydration treatments on daily water uptake of gladiolus spikes.

Hydration treatments \ Days	Water uptake (ml/20 gm flower wt. /day)								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Room temperature water (control)	6.90	6.62	4.70	4.16	3.46	2.52	2.89	2.11	2.36
0.1% Tween 20	10.13	4.48	3.44	3.02	3.43	2.13	2.55	2.29	2.47
Warm water (40ċ)	6.37	5.93	4.13	3.61	2.94	2.69	2.97	2.27	2.44
L.S.D 5%	1.76	1.97	0.89	0.86	N.S.	N.S.	N.S.	N.S.	N.S.

Data in table is result of combined analysis of three consequent experiments.

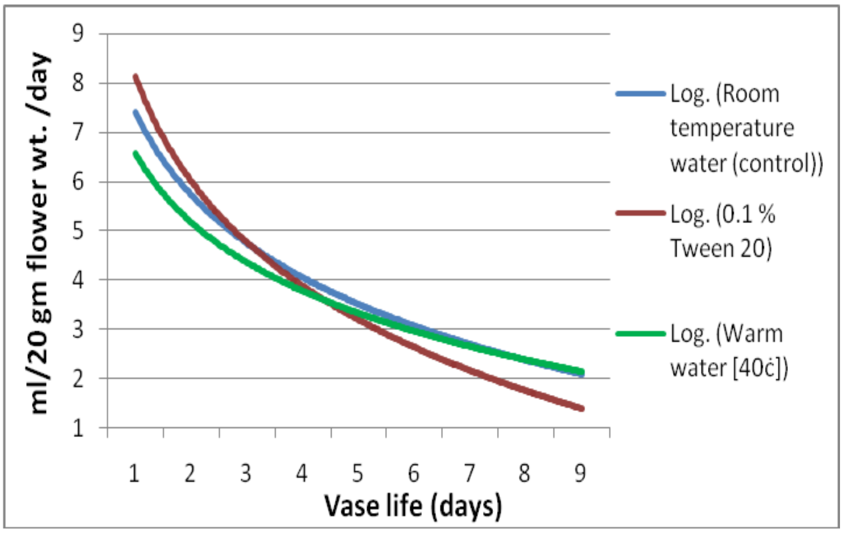

Figure [1]. Logarithmic trend lines of the effect of hydration treatments on daily water uptake of gladiolus spikes.

Table [2]. Effect of water type on daily water uptake of cut gladiolus spikes.

Days / Water types	Water uptake (ml/20 gm flower wt. /day)								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Tap water	9.04	5.69	3.93	4.25	3.20	2.33	2.61	1.88	2.05
Magnetized tap water	9.90	6.92	3.93	2.97	3.62	2.18	2.58	1.99	2.20
Distilled water	6.44	6.13	4.47	3.31	2.88	2.35	2.70	2.04	2.17
Magnetized distilled water	5.82	5.06	4.04	3.88	3.40	2.92	3.32	2.97	3.27
L.S.D 5%	1.54	1.06	N.S.	N.S.	N.S.	N.S.	N.S.	0.69	0.93

Data in table is result of combined analysis of three consequent experiments.

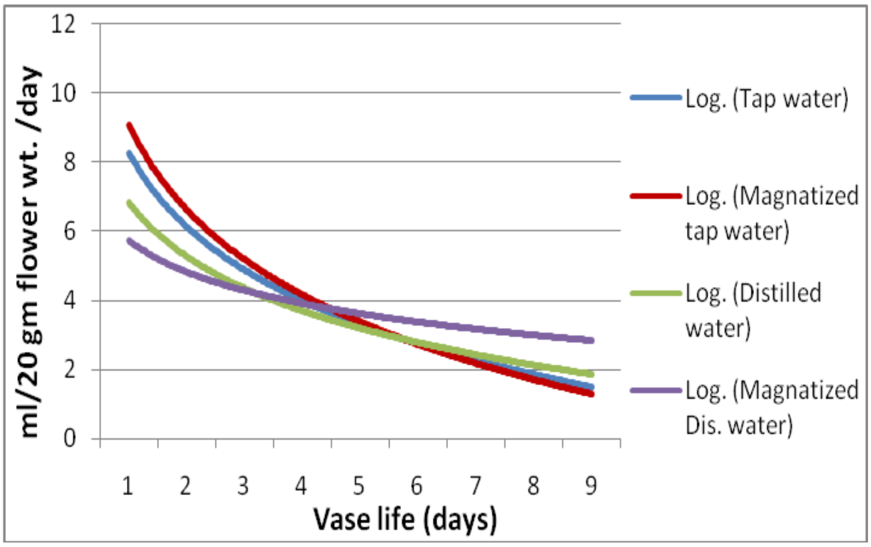

Figure [2]. Logarithmic trend lines of the effect of water type on daily water uptake of cut gladiolus spikes.

Figure [3]. Logarithmic trend lines of the effect of the interaction between the three hydration treatments and different water types on daily water uptake of gladiolus spikes.

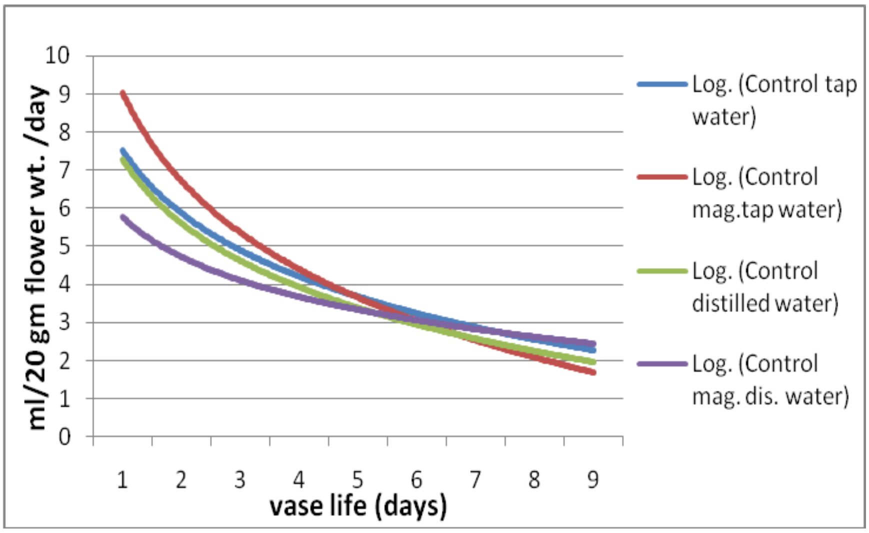

Figure [3A]. Logarithmic trend lines of the effect of the four water types using room temperature water (control) on daily water uptake of gladiolus spikes

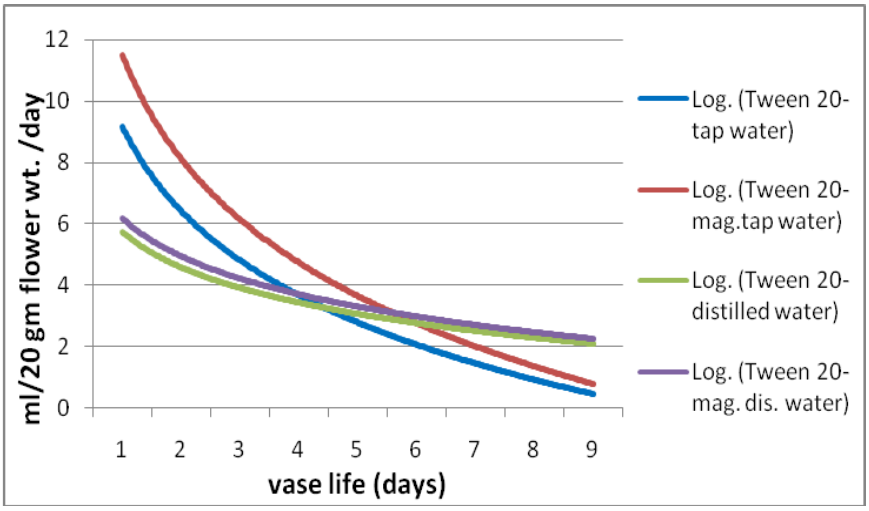

Figure [3B]. Logarithmic trend lines of the effect of the four water types using water containing Tween 20 on daily water uptake of gladiolus spikes.

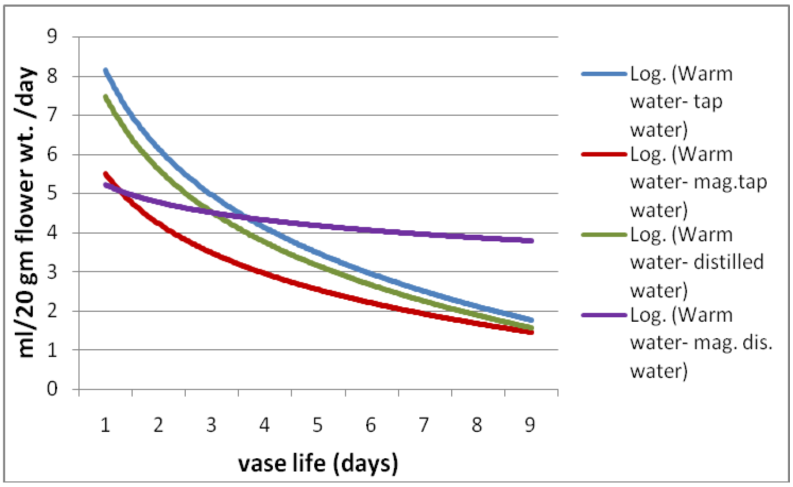

Figure [3C]. Logarithmic trend lines of the effect of the four water types using warm water on daily water uptake of gladiolus spikes

Table [3] Effect of hydration treatment and water type on maximum relative fresh weight of cut gladiolus spikes.

Water type(B) / Hydration treatments (A)	Maximum Relative fresh weight (%)				
	Tap water	**Magnetized tap water**	**Distilled water**	**Magnetized distilled water**	**Mean of (A)**
Room temperature water (control)	105.6	102.9	109.2	105.6	105.8
0.1% Tween 20	112.6	106.4	106.8	116.2	110.5
Warm water (40 ċ)	112.8	109.6	104.4	124.3	112.8
Mean of (B)	110.3	106.3	106.8	115.4	
L.S.D 5%	A 1.5	B 2.1	AB 5.2		

Data in tables result of combined analysis of three consequent experiments.

Table [4] Effect of hydration treatments and type of water and their interaction on vase life of gladiolus spikes.

Water type (B) / Hydration treatments (A)	Vase life (days)				
	Tap water	**Magnetized tap water**	**Distilled water**	**Magnetized distilled water**	**Mean of (A)**
Room temperature water (control)	8.67	8.67	8.67	9.33	8.83
0.1% Tween 20	9.33	8.33	8.67	9.67	9.00
Warm water(40 ċ)	9.00	10.00	9.00	10.00	9.50
Mean of (B)	9.00	9.00	8.78	9.67	
L.S.D 5%	A 0.64	B 0.65	AB 1.07		

Data in table is result of combined analysis of three consequent experiments.

REFERENCES

Abdel-Kader, H.H. (2004).Effect of different types of water on the postharvest keeping quality of cut Rose flowers (*Rose hybrid L.*)cv. "Eccentric". J. Agric. Sci. Mansoura Univ., 29(7): 4973-4989.

Busch, K.W., M.A. Busch, D.H. Parker, R.E. Darling and J.L. McAtee Jr. (1985). Laboratory studies involving magnetic treatment devices. Corrosion 85, NACE Houston Paper No. 251.

Cai, R., H. Yang, J. He and W. Zhu (2009).The effects of magnetic fields on water molecular hydrogen bonds. J. Mol. Structure, 938: 15-19.

Cho, Y. and S. Lee (2005). Reduction in the surface tension of water due to physical water treatment for fouling control in heat exchangers, International Communications in Heat and Mass Transfer 32 : 1–9.

Da silva JAT. (2003). The cut flower: Postharvest considerations. Journal Biol. Sci., 3:406-442.

Del Giudice E., E. C. Fuchs and G. Vitiello (2010). Collective molecular dynamics of a floating water bridge. Water, 2 : 69-82.

Durkin, D.J. (1979). Effect of millipore filtration, citric acid, and sucrose on peduncle water potential of cut rose flower. J. Amer. Soc. Hort. Sci., 104: 860–863.

Durkin, D. J. (1980) Factors effecting hydration of cut flowers. Acta Horticulture113:109-117.

Durkin D. J. (1981). Reading comprehension in struction in five basel reader series. Reading Research Quarterly, 16(4): 515-544.

Evans, R.Y., J.-M. Zheng and M.S. Reid (1996). Structural and environmental factors affecting the postharvest life of cut roses. Acta. Hort., 424 : 169–173.

Gomez, K.H. and A.A. Gomez (1984). Statistical procedures for agriculture research. John Willy and Sons, Inc., New York.

Hassan, F. (2005). Postharvest studies on some important flowers crops. Doctoral thesis, corvinus University of Budapest, Budapest, Hungary.

Hatamzadeh, A.; S. Rezvanypour and M.H. Asil (2012). Postharvest life of Alstroemeria cut flowers is extended by thidiazuron and benzyl adenine. South Western J. of Hortic. Biol. and Environ., 3(1):41-53.

He, S., DC. Joyce, DE. Lrving and JD.Faragher (2006). Stem end blockage in cut Grevillea, crimson Yullo, in inflorescences. Postharvest Biol. Technol, 41:78-84.

Jenkins, J. M., R. D. Milholland, J. P. Lilly, M. K. Beute (1970). Commrcial gladiolus production in North Carolina. Agric. Ext. Circu1., 44: 1-34.

Loubaud, M. and van Doorn, W.G. (2004) Wound-induced and bacteria induced xylem blockage in roses, Astilbe, and Viburnum. Postharvest Biol. Technol. 32:281–288.

Mayak S., A.H. Halevy, S. Sagie, A. Bar-Yoseph and B. Bravdo (1974).The water balance of cut flowers. Physiol. Plant. 32:15.

Macnish, A.J., R.T. Leonard, K. Hughes and T.A. Nell (2005). Bacteria-free solutions. Florists' Rev. June, 2005, pp. 57–60.

Montagnier L., J. Aissa, E. Del Giudice, C. Lavallee, A. Tedeschi and G. Vitiello (2011). DNA waves and water. J. Phys., Conf. Ser. 306.

Parsons, S.A., B.L. Wang, S.J. Judd and T. Stephenson (1997). Magnetic treatment of calcium carbonate scale – effect of pH control.Wat. Res., 31(2):339-342.

Put, H.M.C., A.C.M. Clerkx and D.J. Durkin (2001).Anatomy of cut rose xylem observed by scanning electron microscope. Acta Hort. (ISHS), 547:331-339.

Rogers, M.N. (1973).A historical and critical review of postharvest physiology research on cut flowers.Hort Sci. 8. 189-94.

Saleem, M.; M. A. Khan; I.Ahmad and R.Ahmad. (2014). Vase water effects on postharvest longevity and water relations of *Gladiolus grandiflorus* 'White Prosperity'. Pak. J. Agri. Sci., 51(1): 137-141.

Serek, M., G. Tamari, EC.Sisler and A. Borochov (1995). Inhibition ethylene – induced cellular senescence symptoms cyclopropene by 1-Methyl cyclopropene, a new inhibitor of ethylene action. Physiol Plant, 94:229-232.

Slootweg, G. (1995). Effect of water temperature on water uptake and vase life of different cut flowers.Acta Hort. (ISHS) 405:67-74.

Staby, G.L. and Erwin, T.D., 1978. Water quality, preservative, grower source and chrysanthemum flower vase-life. HortScience 13, pp. 185–187.

van Doorn, W. G. (1997) Water relations of cut flowers.Horticultural reviews 18: 1-85.

van Doorn, W.G. (1990). Aspiration of air at the cut surface of rose stems and its effect on the uptake of water. J. Plant Physiol. 137, 160–164.

van Meeteren, U., (1992). Role of air embolism and low water temperaturein water balance of cut chrysanthemum flowers. Sc. Horti. 51,275–284.

van Doorn W.G. and P. Cruz (2000). Evidence for a wounding-induced xylem occlusion in stems of cut chrysanthemum flowers. Postharvest Biol. Technol., 19 : 73–83.

van Meetern U. and H. van Gelder (1999). Effect of time since harvest and handling conditions on rehydration ability of cut chrysanthemum flowers.Postharvest Biol. Am. Soc. Hortic. Sci. 92: 633-640.

van Meereren U., H. van Golder and W. van Leperen (2000).Reconsideration of the use of deionized water as vase water in postharvest experiments on cut flowers. Postharvest Biology and Technology, 18: 169-181.

van Meeteren, U. Lourdes A.´evalo-Galarz, and W. G. van Doorn. (2006). Inhibition of water uptake after dry storage of cut flowers: Role of aspired air and wound-induced processes in Chrysanthemum. Postharvest Biology and Technology 41: 70–77.

van Ieperen, W., U. van Meeteren and H. van Gelder (2000). Fluid ionic composition influences hydraulic conductance of xylem conduits. J. Exp. Bot. 51, 769–776.

van Ieperen, W., U. van Meeteren and J. Nijsse (2002). Embolism repair in cut flower stems: a physical approach. Postharvest Biol. Technol. 25, 1–14.

تأثير معاملات الهدرجة والماء الممغنط على إمتصاص الماء وعمر وجودة ازهار الجلاديولاس

هشام هاشم عبد القادر ، محمود مكرم قاسم و حنان عبد الحميد زكى
قسم الخضر والزينة – كلية الزراعة – جامعة المنصورة

تم اجراء هذه الدراسه فى معمل الخضر والزينه بكلية الزراعة جامعة المنصورة ثلاث مرات خلال الربيع فى عامى ٢٠١٣-٢٠١٤ بهدف دراسة تاثير معاملات الهدرجة والماء الممغنط علـى المـاء الممـتص والـوزن الطـازج الاصـلى وطـول عمـر ازهـار الجلاديـولاس المقطوفـة (Gladiolus hybrida)حيث تم استخدام ثلاث معاملات للهدرجة وهي الماء على درجة حرارة الغرفة ؛ محلول المادة الناشرة Tween 20 ؛ الماء المدفئ لدرجة حرارة (40°C)، بالاضافه الى استخدام اربعة انواع من الماء هما (ماء الصنبور؛ ماء الصنبور الممغنط ؛ الماء المقطر ؛الماء المقطر الممغنط)، وتم تصميم التجربه كتجربة عامليه فى قطاعات كاملة العشوائيه مكونه من ٥ مكررات . تم تكرار التجربة مرتين (نفذت التجربة ثلاث مرات) و تم تحليل النتائج المتحصل عليها بطريقة combined analysis للتجارب الثلاثة.

وأوضحت نتائج التجربه ان كل من معاملتي الهدرجة والماء الممغنط قد أثروا على إمتصاص الماء والوزن الطازج وعمر ازهار الجلاديولاس المقطوفه.حيث ان معاملتي الماء المدفئ ومحلول الماده الناشره اديا الى اطالة عمر الازهار و اعطاء افضل زيادة فى الوزن الطازج ويليهما بعد ذلك معاملة الماء بدرجه حرارة الغرفة.ولقد أظهرت البيانات ان المعاملة بمحلول المادة الناشرة قد ادى الى حدوث زيادة في إمتصاص الماء فى بداية عمر الازهار تلاها بعد ذلك انخفاض فى معدل الامتصاص.إلا أنه في حالة وضع ازهار الجلاديولاس في الماء الدافئ كان معدل امتصاص الماء منتظما لحد كبير طوال فترة عمر الازهار. بالنسبه لانواع المياه فان استخدام الماء المقطر الممغنط اعطى اعلى زيادة فى عمر الازهار والوزن الطازج الاصلى فى ازهار الجلاديولاس المقطوفة بالاضافة الى إنتظام معدل امتصاص الماء بين انواع المياه الاربعه. وتم الحصول على أطول عمر للأزهار باستخدام الماء المقطر الممغنط الدافئ وماء الصنبور الممغنط الدافئ وتلاهما الماء الممغنط لكل من الماء المقطر وماء الصنبور مع اضافة الماده الناشرة.ولقد تم تحقيق اعلى زيادة فى الوزن الطازج باستخدام الماء المقطر الممغنط الدافئ.كما أظهرت بيانات امتصاص الماء ان أفضل نتائج متحصل عليها من حيث اطالة عمر الازهارواكبر زيادة الوزن الطازج كان مرتبطا بمعدل امتصاص الماء طوال فترة حياة الازهار.ولقد تم التوصية باستخدام الماء الممغنط في تحضير محاليل حفظ الزهور.