



Evaluation of Some Compounds and Cold Storage for Improving Postharvest Quality of Sunflower and Rose Cut Flowers

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V. SUMMARY AND CONCLUSION

Four seasons were carried out at the Department of Plant Production, Faculty of Agriculture "Saba Basha", Alexandria University in December (2018-2019) on *Rosa hybrida* L. cv. "Black magic" cut flowers, June and January (2019-2020) on *Helianthus annuus* L. cv. "Sunbright Supreme" (sunflower) cut flowers.

This study aimed to find out the effect of dry cold storage duration and vase life periods as well as pulsing solutions on the postharvest quality of *Helianthus annuus* L. cv. "Sunbright Supreme" and *Rosa hybrida* L. cv. "Black magic" cut flowers to help the growers to extend the marketing periods and export seasons as long as possible using cold storage facilities without affecting cut flowers standard characteristics. Thus, experimentally, the aims of these study were to:

- Define the impact of mixtures of different compounds that used as pulsing solutions before cold storage to prolong the vase life and reduce senescence of sunflower and roses cut flowers.
- Define the impact of the duration of dry cold storage on vase life, physiological characteristics, and chemical contents of sunflower and roses cut flowers.

Cut flowers were harvested at uniform length and weight in the early morning and then covered with a polyethylene sheet, and moved quickly to the laboratory at room temperature, normal relative humidity, and light from a white fluorescent lamp. All stems were cut back even to 50 cm before postharvest treatments, and removed the leaves of the lower third part of stems to avoid contamination in solutions of postharvest treatments. Cut flowers were placed in plastic containers containing pulsing solutions consisting of various compounds for 24 hours before refrigerated storage.

Composition of Pulsing Solutions:

1. Control (tap water).
2. Hydroxyquinoline sulfate (8-HQS) 200 mg/L +Sucrose 2%.
3. Olive leaf extract 100 mg/L +Sucrose 2%.
4. Lupine extract 100 mg/L +Sucrose 2%.
5. Olive leaf extract 100 mg/L+ Coriander oil 300 mg/L+25mg/L Kinetin +Sucrose 2%.
6. Olive leaf extract 100 mg/L + Dill oil 300 mg/L+25mg/L Kinetin +Sucrose 2%.
7. Lupine extract 100 mg/L+ Coriander oil 300 mg/L +25mg/L Kinetin +Sucrose 2%.
8. Lupine extract 100 mg/L + Dill oil 300 mg/L+25mg/L Kinetin +Sucrose 2%.
9. Salicylic acid 200 mg/L+ 25 mg/L Kinetin +Sucrose 2%.
10. Citric acid 150 mg/L +25 mg/L Kinetin +Sucrose 2%.

3drops
of
Tween
20

Cut flowers were stored for 0, 1 and 2 weeks, under dry conditions wrapped in cellophane paper on 2°C and 90-95 % RH. The flowers were moved to glass containers (vases) have 400 ml of tap water to determine vase life and other tested traits. The temperature of the laboratory was (18+2° C), relative humidity (R.H.) was about (50-60%)

and a white fluorescent lamp was used to light. Data was recorded through vase life periods on the initial, fourth and eighth day.

The experimental design was a Split-Split Plot Design. The duration of cold storage (S) was considered as the main plot, whereas the subplot was the vase life periods (V). On the other hand, the pulsing solutions (P) were the sub-sub plot. The total number of treatments was 90 treatments (3 cold storage durations (S) \times 3 vase life periods \times 10 pulsing solutions (P)). Each treatment was contained three replicates; thus, the number of experimental units was 270 (90 treatments \times 3 replicates). Three cut flowers were placed in each experimental unit per treatment in each replicate. The total number of flowers used were 810 flowers of Rose or Sunflower cut flowers in each season.

The Results Could be Summarized as Follows:

1. Effect of Duration of Cold Storage on Postharvest Characteristics of *Helianthus Annuus* L. cv. "Sunbright Supreme" and *Rosa hybrida* L. cv. "Black magic".

- Cold storage duration affected significantly on vase life of *Helianthus annuus* and *Rosa hybrida* flowers.
- increasing in the duration of cold storage resulted in a significant decrease in vase life in both seasons.
- The maximum vase life of *Helianthus annuus* L. cv. "Sunbright Supreme" and *Rosa hybrida* L. cv. "Black magic" was achieved by control (un-stored) followed by the first duration of cold storage, while the minimum vase life was obtained by the second duration of cold storage.
- Generally, there were significant decrease in fresh weight, flower diameter, chlorophyll index, water uptake, water loss, and water balance. Likewise, the total sugars, non-reducing sugars, and protein content in leaves as well as carotenoids and anthocyanin pigments in flowers with increasing of cold storage duration.
- Otherwise, increasing cold storage duration fulfilled a significant increase in the number of bacteria in vase solution and reducing sugar content in leaves in both seasons.

2. Effect of Vase Life Periods on Postharvest Characteristics of *Helianthus Annuus* L. cv. "Sunbright Supreme" and *Rosa hybrida* L. cv. "Black magic".

- Increasing of vase life periods significantly decreased chlorophyll index, water uptake, water balance, the protein content of leaves, carotenoids and anthocyanin pigments of *Helianthus annuus* and *Rosa hybrida* flowers.
- On the other hand, a significant increasing in fresh weight, flower diameter, water loss, total sugars, reducing sugars, and non-reducing sugars in leaves was obtained via increasing vase life periods in both seasons.

3. Effect of Pulsing Solutions on postharvest Characteristics of *Helianthus Annuus* L. cv. "Sunbright Supreme" and *Rosa hybrida* L. cv. "Black magic".

- The highest fresh weight of *Helianthus annuus* L. cv. "Sunbright Supreme" was obtained by pulsing solution 10 in both seasons. On the other hand, the maximum fresh weight of *Rosa hybrida* L. cv. "Black magic" was recorded by pulsing solutions 7 and 8 in the first season and 5,8, and10 in the second season.
- The different pulsing solutions resulted in a significant increase in flower diameter. The biggest flower diameter was recorded by pulsing solutions 10 and 5 in the first and second seasons of *Helianthus annuus* L. cv. "Sunbright Supreme", respectively.
- Pulsing solutions 6 and 8 achieved the highest chlorophyll index in the first and second seasons of *Helianthus annuus* L. cv. "Sunbright Supreme" respectively. Otherwise, there were no significant differences between pulsing solutions in both seasons of *Rosa hybrida* L. cv. "Black magic".
- The maximum water uptake was recorded by pulsing solutions (5 and 8) in both seasons, additionally pulsing solution 7 in the second season of *Rosa hybrida* L. cv. "Black magic".
- The lowest water loss was achieved via the pulsing solution 5 in both seasons of *Helianthus annuus* L. cv. "Sunbright Supreme", while it was recorded by pulsing solutions 3 and 9 in the first and second seasons of *Rosa hybrida* L. cv. "Black magic".

- The better water balance was obtained by pulsing solutions 5 in the first season of *Helianthus annuus* L. cv. "Sunbright Supreme" and both seasons of *Rosa hybrida* L. cv. "Black magic", besides, pulsing solution 8 in the second season of *Helianthus annuus* L. cv. "Sunbright Supreme".
- Pulsing solutions 10 and 2 of *Helianthus annuus* L. cv. "Sunbright Supreme" and 3 and 10 of *Rosa hybrida* L. cv. "Black magic" resulted in the highest decrease in the total sugars content of leaves.
- Pulsing solutions resulted in a significant decrease in reducing and non-reducing sugars content of leaves in both seasons of *Helianthus annuus* L. cv. "Sunbright Supreme". The pulsing solutions 2 and 3 recorded the lowest content of reducing sugars of leaves of *Rosa hybrida* L. cv. "Black magic", while pulsing solutions 10 and 5 recorded the lowest content of non-reducing sugars of leaves of *Rosa hybrida* L. cv. "Black magic".
- The maximum protein content of leaves of *Helianthus annuus* L. cv. "Sunbright Supreme" was achieved by pulsing solutions 2, 3, and 5, while it was recorded by pulsing solution 6 in both seasons of *Rosa hybrida* L. cv. "Black magic".
- The highest content of carotenoid pigment was obtained by pulsing solutions 9 and 10 in both seasons of *Helianthus annuus* L. cv. "Sunbright Supreme".
- The lowest number of bacteria was obtained by pulsing solutions of 5, 7, and 9 and 3 and 10 in the first and second seasons of *Helianthus annuus* L. cv. "Sunbright Supreme" and pulsing solutions 5 and 8 in the first and second seasons of *Rosa hybrida* L. cv. "Black magic".
- The maximum vase life of *Helianthus annuus* L. cv. "Sunbright Supreme" was recorded by pulsing solution 5 in both seasons, besides, pulsing solutions 3 and 8 in the second season.
- The maximum vase life of *Rosa hybrida* L. cv. "Black magic" was achieved by pulsing solution 8 in both seasons with an absence of significant differences between pulsing solutions 7 and 6 in both seasons and pulsing solution 5 in the second season.

Recommendation:

- Depending on the previous results, it might be recommended that the first duration of dry cold storage (one week) on 2°C and 90-95 % RH, was suitable for maintaining

the vase life of *Helianthus annuus* L. cv. "Sunbright Supreme" and *Rosa hybrida* L. cv. "Black magic".

- The most effective pulsing solution on the vase life of *Helianthus annuus* L. cv. "Sunbright Supreme" was the pulsing solution 5 (Olive leaf extract 100 mg/L + Coriander oil 300 mg/L +25mg/L Kinetin +Sucrose 2%).
- The pulsing solution 8 (Lupine extract 100 mg/L + Dill oil 300 mg/L +25mg/L Kinetin +Sucrose 2%), pulsing solution 6 (Olive leaf extract 100 mg/L + Dill oil 300 mg/L +25mg/L Kinetin +Sucrose 2%) and pulsing solution 7 (Lupine extract 100 mg/L + Coriander oil 300 mg/L +25mg/L Kinetin +Sucrose 2%) were the most effective on the vase life of *Rosa hybrida* L. cv. "Black magic".