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Floral Preservatives

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Abstract

The vase life or postharvest longevity of cut flowers can be depicted as the prolonged existence of cut flowers in the vase while retain their desirable qualities and it has the great importance in cut flower industry. The postharvest senescence which directs to short vase life of cut flowers has been identified as a major drawback in cut flower marketing and commercialization. A cut flower is a more complex organ with different morphological units *i.e.*, sepals, petals, androecium, gynoecium, stem, and leaves, which are contributing toward their overall appearance. The postharvest senescence of cut flowers occurs due to several interrelated or individual physiological processes which are taking place in the different morphological units of cut flowers.

Introduction

Floral Preservatives are the chemical formulations used for extending the vase life of flowers. Besides increasing vase life, floral preservatives help to improve opening of flower, increase in flower size, shape and color. Many commercial formulations for extending flower vase life are now available in liquid or powder form in many countries like UK, USA and Holland.

Floral preservatives have two basic constituents: sugar and biocide. Sugar provides a source of additional food to the cut flower whereas the biocide checks the growth of bacteria, fungi and other microorganisms in the vase water. Besides, floral preservatives may also have other ingredients such as inorganic salts, growth regulators and ant-ethylene compounds which help in maintaining the quality of the cut flower.

Types of Floral Preservatives

Floral preservatives can be applied as: (i) pulsing solutions; (ii) bud opening solutions; and (iii) holding or vase solutions.

i) Pulsing Solutions

Pulsing refers to short duration (16-24 h) pre-shipment or pre storage treatment. It involves loading the flowers with high concentration of carbohydrates (sucrose) to replenish the supply of food to the harvested stems. The effect of such a treatment lasts throughout the entire vase life of the flower. Pulsing is always done at room temperature.

ii) Bud Opening Solutions

Harvesting the flowers at bud stage offers many advantages. Besides reducing crop span, it makes handling and transportation relatively very easy as compared to opened flowers. Immature buds of many flowers can be made to open in chemical solutions, referred to as 'bud opening solutions'. The components of bud opening solutions are essentially the same as those of pulsing solutions, but in case of bud opening solutions, lower concentrations (2 to 5 percent) of sucrose are used.

ii) Holding or Vase Solutions

Holding or vase solutions are meant to hold flowers continuously, till it reaches consumer or till the termination of vase life. The level of sucrose in vase solutions is, kept very low (0.5 to 2 percent). Many commercial vase preservatives are available for use in many countries as holding solutions and are required to be used as per recommendations of the manufacturer. The constituents and their concentrations in holding solutions may vary according to the flower species and cultivars (Asrar, 2012).

Constituents of Floral Preservatives

The main constituents of floral preservatives are: (i) Water; (ii) Sugar; and (iii) Biocides. Besides, mineral nutrients, acidifying agents, anti-ethylene compounds and growth regulators are also used in floral preservatives. The brief account of these constituents is given herewith.

i) Water

Water content of flowers after harvest affects vase life in terms of its quantity as well as quality. Tap water can be harmful due to its high pH (alkalinity), presence of total dissolved solutes (TDS) and toxic ions. High pH promotes the microbial growth and hence, reduces vase life. Therefore, acidifying water to low pH (3.0-3.5) is advantageous because it decreases microbial growth and considerably improves water uptake by the stem.

Sensitivity of different flowers to the presence of TDS in vase water varies. Vase life of rose and chrysanthemum flowers decreases at low level of TDS (200 ppm) in water whereas flowers like gladiolus show decline in vase life when TDS in water is relatively high (more than 700 ppm). The presence of sodium ions in vase water is detrimental for roses whereas fluorides are highly toxic to some flowers like gladiolus, gerbera, freesia, chrysanthemum and rose. In such cases, it is always advantageous to use distilled water.

ii) Sugar

Sugar act as additional food source and also improves water balance of cut flowers. Sucrose is the most widely used sugar in floral preservatives. The optimum concentration of sugar required; however, varies from species to species and type of the treatment since sugar promotes microbial growth; it is usually combined with biocides before use (Hussen and Yassin, 2013).

iii) Biocides or Germicides

Biocides are chemical compounds which are used to inhibit microbial growth in vase water as well as on the stem surface. Important biocides used for treating cut flowers are 8-hydroxyquinoline citrate, silver nitrate, aluminum sulphate, citric acid, slow release chlorine compounds and quaternary ammonium compounds.

8-hydroxyquinoline citrate (8-HQC) is very effective broad spectrum biocide. It acidifies water and also induces partial closure of stomata. This compound is used at the concentration of 200-600 ppm (Reddy *et al.,* 1994).

Silver nitrate ($AgNO_3$) is also very effective biocide. $AgNO_3$, at the concentration of 25 ppm completely inhibits the microbial growth. High concentration (1000-1200 ppm) of $AgNO_3$, can also be used as short term (10-15 minutes) treatment $AgNO_3$, has, however, very low mobility and remains concentrated at the cut surface of the stem where it inhibits microbial growth. A lot of concern is however, being voiced in the developed countries regarding the use of silver, as being a heavy metal; it is considered to be an environmental hazard.

Aluminium sulphate (Al_2SO_4) reduces pH of the solution, very effectively inhibits bacterial growth and also causes partial stomatal closure, thereby increasing vase life. Citric acid has been reported to improve vase life of roses, chrysanthemum, gladiolus and carnation. It acts as an acidifying agent, lowers pH of the solution and also prevents blockage of xylem vessels.

Conclusion

Improving the postharvest 4life of cut flowers has been promoted and insightful understandings on several factors which determine the postharvest life of cut flowers are imperative to enhance the vase life of cut flowers. One of the most important and effective way to extend the vase life is usage of the floral preservatives since it increases the longevity of many cut flowers, since they act as a source of nutrition for tissues approaching carbohydrate starvation. It may also act as osmotically active molecule thereby leading to the promotion of subsequent water relations.

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