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Role of Botanicals and Essential Oils in Enhancing the Vase Life of Flowers

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Abstract

Vase life of cut flowers is limited by some factors such as senescence, weight loss and decay of microorganisms. Vase life can be doubled by the judicious use of floral preservatives in the vase solutions. Botanicals and essential oils contain more amounts of growth regulators like auxin, cytokinin, gibberellin and also sugars which are very much useful to increase the vase life of flower. Botanicals are eco-friendly and slowdown the ethylene production and essential oils extracted from plants has antimicrobial action thereby reduce spoilage by microbes.

Introduction

Floriculture comprises of cutflowers, loose flowers and ornamentals play a major role in economy of the Country. Most of the cut flowers are highly perishable due to high respiration rate and excessive weight loss. Enhancement of vase life of cut flowers is an important area in horticultural research.

Problems Associated with the Perishability of Flowers

The vase life of cut flowers is limited by some factors such as senescence, weight loss, decay of microorganisms like bacteria, yeast and fungi that contaminate the vase water as well as secrete enzymes which dissolve the cell wall, causing blockage of xylem vessels.

Nearly 20-40 percent of the cut flowers are lost due to improper post- harvest handling. These post- harvest losses can be reduced by adopting suitable post-harvest techniques namely temperature management during storage and following strict sanitation procedures in the grading and packing rooms.

Increasing Vase Life of Flowers

Vase life is post harvest duration of a cut flower and it varies among species and cultivars. Vase life can be doubled by the judicious use of floral preservatives in the vase solutions. Of greater significant importance in cut flowers, is the maintenance of turgidity. Holding solutions must essentially contain sugar and germicides. The sugars provide a respiratory substrate, while the germicides control harmful bacteria and prevent plugging of the conducting tissues. Sugars are the source of energy for respiration, which maintains turgidity, plays an important role in the flower freshness. Sucrose treatment leads to an increase in the mechanical rigidity of the stem, which is due to cell wall thickening and lignification of vascular tissues. Two major factors which play a dominant role in postharvest physiology

of the cut flowers are supply of carbohydrates and water balance in the stem.

The use of preservatives in the vase solution is one of the common methods to extend the vase life of cut flowers. Recently, herbal extracts and essential oils have been emerging as popular preservatives that prolong vase life of cut flower. (Dejene Tadesse Banjaw *et al.,* 2019).

Botanicals in Enhancing Vase Life

A botanical is a plant or plant part valued for its medicinal or therapeutic properties, flavour and scent. Some of the botanicals used as floral preservatives are essential oils, coconut water, coconut milk, sour orange extract, apple fruit extract, leaf extracts of *Psidium guajava*, leaf extracts of *Piper betel*, leaf extracts *of Jatropha curcas,* etc.

Mechanism of Botanicals in Enhancing the Vase Life of Flowers

Fruit extracts contain malic acid, citric acid, fructose and coconut water & milk contain auxins, gibberellins, cytokinins and sugar to improve the vase life of cut flowers. High polyphenols and anthocyanins content are act as antioxidants. They make the solution more acidic. They slow down the ethylene production also prevent the growth of microorganisms. Dishaben (Dishaben K. Patel *et al.,* 2018).

Essential Oil in Enhancing Vase Life

Essential oils also called volatiles are aromatic oil liquids extracted from various aromatic plant materials such as flowers, seeds, leaves, bark, wood, fruits and roots. Essential oils are organic natural substances that are not only safe but also eco-friendly. They have antibacterial, antifungal, antioxidant and anti-carcinogenic properties.

Essential oils are organic in nature, safe and environmentally friendly, those have strong anti- microbial properties against some pathogens. The main constituents of essential oils are phenolic and mono-terpenic compounds. The anti-microbial mechanism is due to synthetic inhibition of DNA, RNA, proteins and polysaccharides. Essential oils also contain high level of phenolic compounds such as carvacrol, thymol and eugenol. Lavender oil, Thyme oil and Geranium oil are effective against particular bacteria and fungi. The levels of essential oils and their compounds are necessary to inhibit microbial growth in vase solution. Main components of essential oils in *Thymus argaeus* were linalool, terpenol, linalooyl acetate and thymol. Anti-oxidant activity of extract will be determined by radical-scavenging method (Dejene Tadesse Banjaw *et al.,* 2019).

Mechanism of Essential Oils on Inhibition of Microorganisms

Hydrophobicity nature of essential oils enables them to partition the lipids of the bacterial cell wall and mitochondria, disturbing the cell structures and rendering them more permeable. Essential oils successfully inhibit microbial respiration and increase the plasma membrane permeability, which results in death of bacterial cells after massive ion leakage. Phenolic compound affect the microbial structure, causing swelling as a result of its increased permeability. Increases in cytoplasmic membrane permeability appear to be a consequence of the loss of the cellular pH gradient and decreased ATP levels resulting in the death of the cell. (Kantharaj, Y *et al.,* 2018).

Table 1: Application of Botanicals in flowers to increase Vase Life

Botanical	Dose	Application
Turmeric Oil	1 ppm	Increased the vase life, fresh weight, water uptake, and slow bud opening in rose.
Ajowan EO	500 ppm	The maximum vase life (20.00 days), fresh weight (85.10%) and solution uptake in Gladiolus.
Thyme EO	100 mg/l	Maximum vase life (14.71 days) and relative fresh weight (74.21 g/ stem) in Chrysanthemum.
Lavender oil	150 mg/lit	Maximum vase life (16.4 days) and minimum colony count (121.00 CFU/ml) in Carnation.
Rosemary	25%	Increased the vase life of Carnation and inhibits the growth of Microorganisms in vase solution and increased water uptake.
Sage extract	50 micro litre/ 100 ml	Maximum Vase Life.
Coconut Water	50%	Increase Vase life in Anthurium.
Clove Oil	500 ppm	Maximum vase life (14.33 days), water uptake (220.00 ml), minimum spike fresh water losses, minimum microbial count and spike base rot.
Coconut tender nut water	25%	Natural Floral Preservative and thus increase the vase life in Tuberose.

Table 1: Continue...

Botanical	Dose	Application
Apple fruit extract	45 ml	Maximum Vase life and flower diameter in Alstroemeria.
Sour Orange extract	4 ml/lit	Maximum vase life and minimum unopened bud in Narcissus.
Piper Extract	10%	Complete inhibition of microbial growth in holding solution, delayed bent neck and ethylene production and maintained freshness of leaves in Rose.
Artemisia Oil	30%	Longest vase life and lowest fresh weight loss in Chrysanthemum.
Eucalyptus + *Rosa damascena* essences	200 mg/lit	Increased the vase life and some qualitative traits of gerbera cut flowers with addition of 4% Sucrose.
Carum copticum	500 ppm	Increase vaselife, fresh weight and solution uptake in Gladiolus.
Carvacrol	50 ppm	Increase the vase life in Gerbera.
Pepper Mint	100 ppm	Vase life extended upto 13-14 days in Alstroemeria.

Conclusion

Botanical extract are not only safe but eco-friendly. They are natural organic substances, which prevents the microbial proliferation on the vase solution, which in turn will extend the flower vase life. Essential oils along with its antimicrobial properties also keep the living place very pleasant and joyfull. Undoubtfully these can be used as alternative to the chemical floral preservatives.

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