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Review on Effect of Essential Oil on Vase Life of Cut Flowers

Dejene Tadesse Banjaw*
Ethiopian Institute of Agricultural Research, Ethiopia

Review Article

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***For Correspondence**

Dejene Tadesse Banjaw, Ethiopian Institute of Agricultural Research, Ethiopia.

E-mail: dejenebanjaw@gmail.com

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ABSTRACT

Longer vase life of cut flowers is preferred in flower cultivation and marketing as good quality trait for retailers and consumers. Longevity of flower shelf life has been influenced by various biotic and a biotic factors. It can be improved using different preservatives substances. Natural essential oils widely evaluated among which *Thyme*, *Rosemary*, *Geranium*, *Mint*, *Eucalyptus*, *Ajowan*, *Savory*, *Coriander*, *Dill* and *Artemisia* include some of the aromatic plants used for production of the extracts. For instance, *Thyme* essential oil was tested and positive responses were reported in case of *Lisianthus*, *Gerbera*, *Narcissus*, *chrysanthemum*, *Alstroemeria*, and carnation cut flowers vase life longevity. It was reported as vase life of Carnation cut flower improved by essential oil obtained from *Artemisia*, *Rosemary*, *Coriander*, and Dill. *Rosemary* and *Peppermint* essential oils suggested as they can be used in prolonging *Alstroemeria* cut flowers vase life. Most studies reported usefulness of essential oils for floriculture as noble alternative substitute to other silver and chemical compounds because of their antimicrobial activities and environmental friendly nature of the extracts. Different scientific findings on application of essential oil on vase life of cut flowers reviewed in this paper.

INTRODUCTION

Flower production is one of the strategies in horticulture sector in many countries of the world including Ethiopia. Flower production has been started few years ago in Ethiopia and becoming new area of growth and transformation plant of the country [1]. Floriculture has great social and economic advantages. The main products include cut flowers. However, flower production is influenced by various a biotic and biotic factors. Like other horticultural crops cut flowers need proper post-harvest management operations. This is because of the fact that vase life or duration of cut flowers is one of the most important post-harvest issues in flower industry [2]. Hussen and Yassin [1] reported 10-30% losses due to post-harvest damage in rose cut flowers emphasizing post-harvest loss as main problem of floriculture. Hence, keeping freshness and other quality characters of cut flowers requires clear understanding and management of factors that lead to the decline of the products.

Cut flowers post-harvest life is affected by plant genetic, environment, agronomic and chemical factors. In addition water stress and microorganisms that grow in vase solution affect duration of cut flowers [3]. Because of such problems different growers use different environmental friendly materials and techniques in order to prolong vase life of cut flowers and to ensure quality as well as healthy of sellers and buyers. Many authors reported as essential oil extends vase life of many cut flowers [3-5]. For instance, Nahrabadi et al. [6] reported that *Eucalyptus* and *Rosa damascena* essences and combination of them at 200 mg/L^{-1} with 4% sucrose increased the vase life and some qualitative traits of *gerbera* cut flowers.

On the other hand, Bayat et al. [2] reported *Zataria multiflora* and *Echinophora platyloba* essential oils as safe and nature friendly compounds to extend the vase life of cut *Lisianthus* flowers. Essential oils are extracted from different parts of aromatic plants by various methods. They considered as input for many industries. Aromatic plants have been given research priority in Ethiopia and different endemic and exotic plant types were registered as variety. Essential oils produced from such plants can be alternative input for flower industry in the country because of their antimicrobial activity and environmentally friendly.

However, even though there is a wider opportunity to use aromatic plants extracts, there is limited information concerning essential oil utilization as alternative in vase life longevity of cut flowers in the country. Therefore, the aim of this study paper is to review effect of essential oil on vase life of cut flowers in Ethiopia for further understanding and information provision for users.

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ESSENTIAL OIL

An essential oil is an aromatic volatile substance extracted from blossoms, seeds, fruits, fruit peels, leaves, stems, barks, wood and roots. It is used as odorants, flavorants, and pharmaceutical ingredients. Essential oil is safe and environmentally friendly natural plant product that has strong antimicrobial properties against some pathogens [2]. Due to expansion and establishment of the food, soft drinks, alcoholic drinks, pharmaceuticals and cosmetics industry and various chemical industries essential oil demand has been increasing worldwide. Besides, essential oils have great role in floriculture industry because of its environmental friendly properties and its antimicrobial properties in prolonging cut flowers freshness and post-harvest durations.

CUT Flower

Cut flowers are fresh very perishable parts of plants such as blooms or inflorescences and some attached plant materials cultivated in protective structure. They are used for decorative purposes and used during weddings and funerals, gifts on occasions and in times of illness, and at holidays and to beautify homes and public places. The most important thing in cut flower handling is its post-harvest treatments to prolong vase life [1].

Different cut flowers types evaluated according to their fitness to different quality parameters considered by customers or consumers at each marketing stages. Cut flowers evaluated based on their water up take, transpiration rate, water balance, increase or decrease in fresh weight, vase life, and anatomical traits [7-10].

Vase Life of Cut Flower

Vase life is post-harvest duration of a cut flower and it varies among species and cultivars [11]. It is one of the quality traits as it represents amount of time spent and the conditions that flowers experience while in transit from farm to end user. The longevity of cut flowers is one of the main challenges of floriculture industry [12]. This is because of the fact that vase life of cut flower consideration as a quality criterion. Flower vase life depends upon many factors such as post-harvest treatments in flower industry are mainly designed to maintain flower freshness and to extend its vase life until the final utilization by end users. In addition to controlling and maintaining cut flower quality, keeping its longevity is another mandatory in flower markets as short postharvest vase life is one of the most important problems of the cut flowers [7].

Thus, the techniques of prolonging the vase-life of cut flowers have to be given special attention as they play great role for growers, traders and final users. The use of preservative compounds in the vase solution is one of the common methods to extend the vase life of cut flowers [13]. Because of this, herbal extracts and essential oils as preservative compounds becoming popular in prolonging vase life of cut flower.

Essential Oil for Improving Cut Flowers Vase Life

According to Sardoei et al. [14] post-harvest vase life longevity and maintaining good quality include major post-harvest practices in floriculture so as to make products deliver to customers with acceptable quality. Different preservatives have been used in various flower companies. Positive response of essential oil addition to vase solution with respect to cut flower water up take, its relative fresh weight and freshness of flower has been reported [2]. Longest time, petal water content and relative water content in vase life of *Lisianthus* cut flower with *Thyme* at 50 ppm [9] and with *Zataria multiflora* 200 ppm and *Echinophora platyloba* 100 ppm essential oils [2] reported.

In addition, positive effects of *thyme* essential oil was reported in post-harvest handling of various cut flowers such as *Gerbera* Cut Flowers [15,16], cut *narcissus* flowers [14], *chrysanthemum* cut flowers [4] and highest *Alstroemeria* cut flower longevity related to the concentration of 4000 mg/L^{-1} of thymol [10]. It was also reported as *thyme*, lavender, *savory*, *ajowan* essential oils prolonged carnation vase life and recommended because of natural, safe and biodegradable nature of the extracts [11,17].

The role of *thyme*, *savory* and *ajowan* essential oils as alternative input to chemical substance for extending vase life of gladiolus cut flowers studied and essential oils recommended with regards to alternative to compounds containing silver and chemical preservatives [18]. *Thyme* essential oil widely used in research works evaluating its effect on vase life of cut flowers. Many reports showed as *thyme* essential oil improves postharvest vase-life and quality of cut *gerbera* flowers Jafarpour et al. [19] and also Hashemi et al. [20] reported the usefulness of thymol, menthol and eugenol in increasing *chrysanthemum* cut flower vase-life.

According to Dashtbay and Hashemabadi [21] and Hashemabadi et al. [22] 10% *geranium* essential oil improved vase life of *chrysanthemum* cut flowers. Furthermore, 30% *Artemisia* essential oil and 200 mg/L^{-1} rifampin [5] and *geranium* essential oil [13] were suggested as the most efficiency and enhancing impact on postharvest quality of cut *chrysanthemum* flowers as postharvest vase life prolonged. Therefore, one can easily understand that essential oil from diversified aromatic and medicinal plants has been used in different flower production and post-harvest handling of cut flower that might be because of the antimicrobial properties of the plant extracts. This may be best alternative instead of chemical substances.

Another finding on post-harvest vase life treatment of carnation cut flower resulted as essential oil from *coriander* and *dill* were effective in prolonging the duration [7]. According to the report of Hashemabadi et al. [22] 12% *Artemisia* and Anethum essential oils induced the maximum vase life of cut carnation flowers. Moreover, effect of extract of *rosemary* as a treatment

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on extending vase life and some qualitative characteristics of cut flowers was studied and suggested as it postpones flower deterioration and provides positive effect on increasing quality and vase life as its application at 25% with 6% sucrose in the preservative solution increased vase life of carnations cut flowers for 24 days [8] and *rosemary* essential oil significantly increased the diameter of *Alstroemeria* cut flowers [10]. Furthermore, Babarabie et al. [23] reported that *rosemary* and *peppermint* essential oils having high antimicrobial effect reduce the amount of microorganisms in the solution and increase the freshness and quality of flower color and prevent the discoloration and reduction of pigment in the petals of *Alstroemeria* cut flowers.

Besides, studies by Hashemabadi et al. [24] showed that *Mentha pulegium* extracts containing preservative solution for extending vase life of rose cut flowers and that of Marandi [12] showed as essential oils of *ajowan* and *savory* has to be used in combination with other substances like silver thiosulphate in order to get best result with regard to gladiolus cut flower vase life.

CONCLUSION AND FUTURE PROSPECTS

Essential oil is extracted from aromatic and medicinal plants. Ethiopia is a country rich in such plants diversity. Recently aromatic and medicinal plants got special attention national wise because of their essential oil importance for various industrial uses. Performances of different plants were being studied among which varieties have been released and registered. On the other hand, different domestic and exotic companies engaged in essential oil distillation and marketing sector. Abyssinia essential oil private limited company, Arty herbal private limited company and Tabor essential oil private limited company are some of the companies working on herbs and essential oil businesses.

As indicated in this review paper many authors reported as plant extracts are noble alternative for longevity and quality of many types of cut flowers. *Thyme*, *rosemary*, *geranium*, *coriander*, *Artemisia* and *mint* account some of the aromatic and medicinal plants whose essential oils were tested and resulted in positive responses in post-harvest treatment of cut flowers. All the plants are among herbs prioritized in national aromatic and medicinal plants research system of Ethiopia from which three *rosemary* and *mint* varieties each and one *geranium* and one *Artemisia* variety released and registered. Many more plants for essential oil were being studied. This indicates potential for essential oil production in the country.

Fast growing intensive commercial flower cultivation and marketing has been started and the sector is becoming advantageous industry with respect to social and economic point of view in Ethiopia. Hence, availability of domestic and exotic plants for essential oil production, presence of research works and positive out puts on oil bearing plants and increasing tendency in aromatic and medicinal plants in open field and green house condition have to be seen as an opportunities for domestic essential oil utilization in different sectors including floriculture industries in Ethiopia. Essential oil is being an alternative input in green houses that can reduce cost of importing materials substances that can be used for prolonging vase life of cut flowers.

However, despite herbs for essential oil as well as flowers largely being produced in Ethiopia, there is no research output and no information available concerning essential oil utilization and its impacts on cut flowers vase life in the country. Therefore, the importance of essential oil for vase life longevity of cut flowers in flower industry has to be supported by national research system in collaboration with commercial growers in order to find out cost effective and environmentally friendly alternative essential oils preservatives.

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