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EFFECT OF POST HARVEST TREATMENTS ON TOMATO (SOLANUM LYCOPERSICUM) AND ITS REMEDIATION BY PLANT EXTRACTS

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Abstract

Tomatoes are grown for its edible fruits, which can be consumed either fresh as a salad or after cooking as snacks. Tomatoes are a store house of antioxidants such as lycopene, ascorbic acid. A major problem with the storage and marketing of fresh tomatoes is their relatively fast deterioration in quality and short shelf life. Hence, different post-harvest methods are employed in reducing the losses and extending the shelf life. In this experimental set up tomato fruits were randomly selected. The vitamin C and lycopene content of healthy tomatoes was observed. The infected tomatoes were pin pricked and dipped in aqueous and ethanol Allium sativum extracts for one hour. The same treated tomatoes were analysed for vitamin C and lycopene content. Vitamin C and lycopene content of infected untreated (control) tomatoes was also observed. Results indicated that there was an increase in vitamin C and lycopene content of infected aqueous and ethanol (1 hour) A. sativum treated tomatoes as compared to untreated infected (control) tomatoes, though not to the level of vitamin C and lycopene contents, as obtained in healthy (control) tomatoes. Thus A. sativum extracts were beneficial in retarding loss of vitamin C and lycopene content in infected treated tomatoes.

Key words: Environmental factors, Fungi, Pathogenic, Plant extracts, Tomato

I. INTRODUCTION

The tomato (Lycopersicon esculentum) is one of the most widely consumed fresh vegetable in the industrialized world (Thybo et al., 2006). Botanically, tomatoes are fruits (berry), but they are commonly referred to as vegetable. Fresh-market tomatoes are a popular and versatile fruit vegetable, making significant contributions to human nutrition throughout the world for their content of sugars, acids, vitamins, minerals, lycopene and other carotenoids, among other constituents (Simonne et al ., 2006). Being a climacteric and perishable vegetable, tomatoes have a very short life span, usually 2-3 weeks. Tomatoes are consumed widely throughout the world and their consumption has recently been demonstrated to possess health benefits because of its rich content of phytonutrients (Hsu et al., 2008). The use of chemical preservatives and antimicrobial extracts from plants to prolong the shelf life of food crops during storage are actively being investigated. Plants and their constituents have proved successful as potent fungi toxicant that appear harmless to humans (Beye, 1978). Udo et al. (2001) reported the possibility of utilizing alcoholic extract of garlic to protect potato and yam against rots during storage. Most homes in this part of the world do not have refrigerators or when they do, have limited

access to electricity and other modern methods of preservation. It is therefore difficult to store fresh tomatoes for more than a day under these conditions. Hence the present investigation was undertaken to study the effect of plant extract on physico-chemical characteristics.

II. MATERIALS AND METHODS

Preparation of plant extract

The standard stock solutions of plant extract was prepared with different separately in two solvents viz., sterile distilled water and ethanol as per the procedure given by Sindhan et al. (1999) and Dubey and Dwivedi (1991) respectively.

Aqueous extract

Aqueous plant extracts were prepared from different plant parts in pestle and mortar by washing with tap water followed by sterile water and then crushed in pestle and mortar in sterile distilled water at the rate of one gram air dried in 1ml of water (1:1 w/v). The pulverized mass was squeezed through four folds of muslin cloth and finally through Whatman filter paper (No.1). This was the standard solution (100%) of plant extract and the same solution was diluted with distilled water to desired concentrations.

Ethanol extract

For obtaining the ethanol extract, fresh plant material was collected, washed and dried at room temperature, crushed and suspended in 80% ethanol and filtered after one hour through Whatman filter paper (No. 1). All the filtrates were centrifuged at 5000 rpm for 20 minutes and the supernatants were collected in 100 ml Erlenmeyer flasks. Ethanol extracts were evaporated to dryness in vacuum rotary evaporator. On cooling their aqueous suspensions were prepared in the ratio 1:1 (w/v).

Tomatoes were collected from local markets and the vitamin C and lycopene content of healthy tomatoes was observed. The infected tomatoes were pin pricked and dipped in aqueous and ethanol Allium sativum extracts for one hour. The same treated tomatoes were analysed for vitamin C and lycopene content. Vitamin C and lycopene content of infected untreated (control) tomatoes was also observed.

III. RESULTS AND DISCUSSION

Effect of Allium sativum extracts on vitamin C content of tomato

Data on vitamin C content is presented in Fig. 1. The vitamin C content of healthy tomato was 28.10 mg/100g. The vitamin C content of infected tomatoes was observed to be 16.01 mg/100g. Comparison between healthy and infected (untreated) tomatoes were found to be significant at ($p<0.001$). It was observed that infected tomatoes treated with ethanol garlic extract for 1 hour recorded an increase in vitamin C content (20.64 mg/100g) similarly, infected tomatoes treated with aqueous garlic extract of 1 hour recorded an increase in vitamin C content (19.43 mg/100g) and were found to be significant at ($p<0.01$) when compared with infected (control) tomatoes. Both the treatments showed an increase in vitamin C content but ethanolic treatment showed more increase than aqueous treatment.

Effect of Allium sativum extracts on lycopene content of tomato

Data on lycopene content is presented in Fig. 2. Lycopene content of healthy tomatoes was observed to be 150 µg/100g. Lycopene content of infected tomatoes was observed to be 140 µg/100g. Comparison between healthy and infected (untreated) tomatoes were found to be significant at ($p<0.001$). It was observed that infected tomatoes treated with ethanol garlic extract for 1 hour recorded an increase in lycopene content (145 µg/100g) similarly, infected tomatoes treated with aqueous garlic extract of 1 hour recorded an increase in lycopene content (142 µg/100g). Significant difference at ($p<0.001$) was observed between infected (control) tomatoes and 1 hour ethanol treated tomatoes. The significant difference at ($p<0.05$) was observed between infected (control) tomatoes and 1 hour aqueous treated

tomatoes.

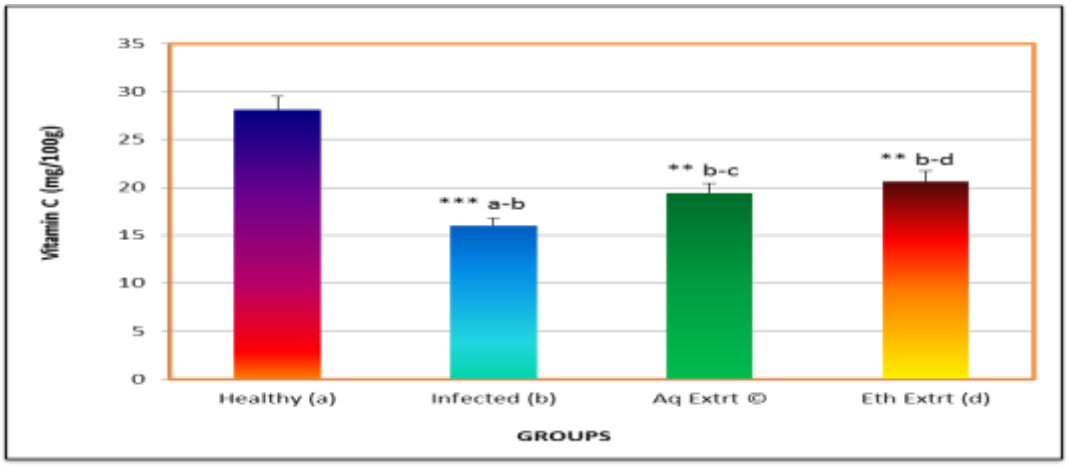

Fig. 1: Effect of Allium sativum extracts on vitamin C content of tomato (Lycopersicon esculentum)

** and *** represent statistical significant p at least <0.01 and <0.001, respectively

Results obtained in the present study (Fig. 1-2) indicate that A. sativum extract treatments were beneficial in retarding loss of lycopene and vitamin C content of tomato fruits. Infected fruits treated with A. sativum extracts had more lycopene and vitamin C content which was significantly higher than in untreated infected control samples. The reas Aq. Extract (c) E Ethl. Extract (d) s have the potential in preventing rapid loss of vitamin C and lycopene. It was observed from the results that both the aqueous and ethanolic extracts were effective but ethanolic extracts showed better results as compared to aqueous as being organic, dissolves more organic compounds resulting in the release of greater amount of active antimicrobial components. Phenolic substances have been found to play a protective effect on the ascorbic acid. The presence of phenolics in the fruit cells may help to maintain the ascorbic acid content (Miller and Evans, 1997). Thus the A. sativum treatment maintains quality characteristics as compared to the fruits of infected control sets. This is supported with the results obtained by Babarinde and Adegoke (2013), Gharezi et al. (2012).

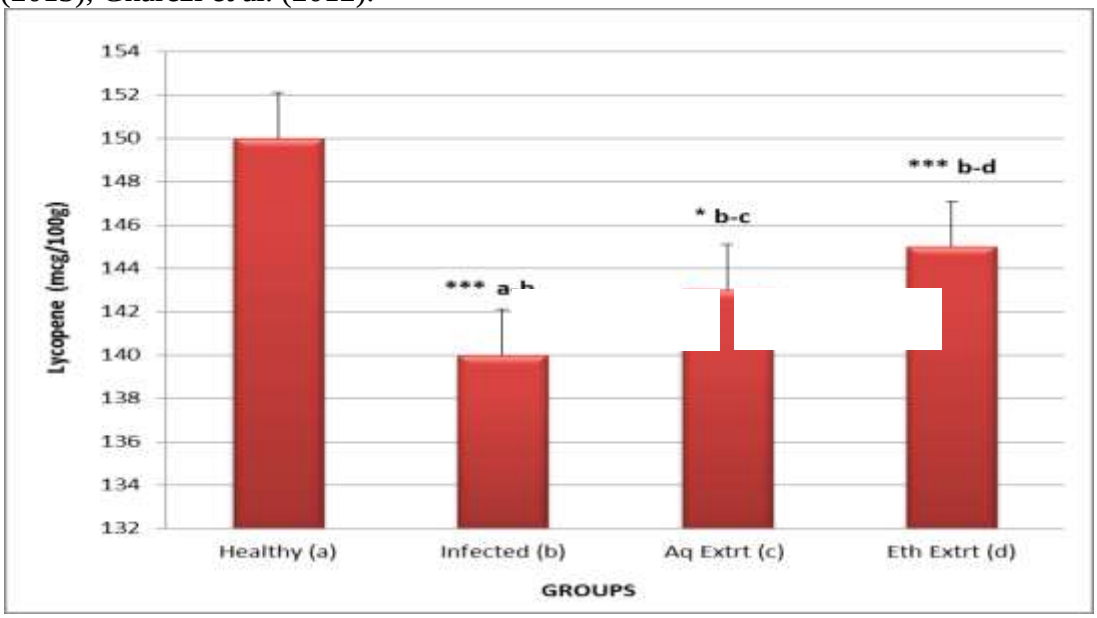

Table 2: Effect of Allium sativum extracts on lycopene content of tomato (Lycopersicon esculentum)

*and *** represent statistical significant p at least <0.05 and <0.001, respectively

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