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## Effect of Post-Harvest Treatments by Using Various Plant Extracts on Quality of Tomato (*Lycopersicon esculentum*)

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The tomato (*Lycopersicon esculentum*) is one of the most widely consumed fresh vegetable in the industrialized world [1]. 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 [2]. 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 [3]. 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 [4]. Udo *et al.* [5] 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.

### 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.* [6] and Dubey and Dwivedi [7] respectively.

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### 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).

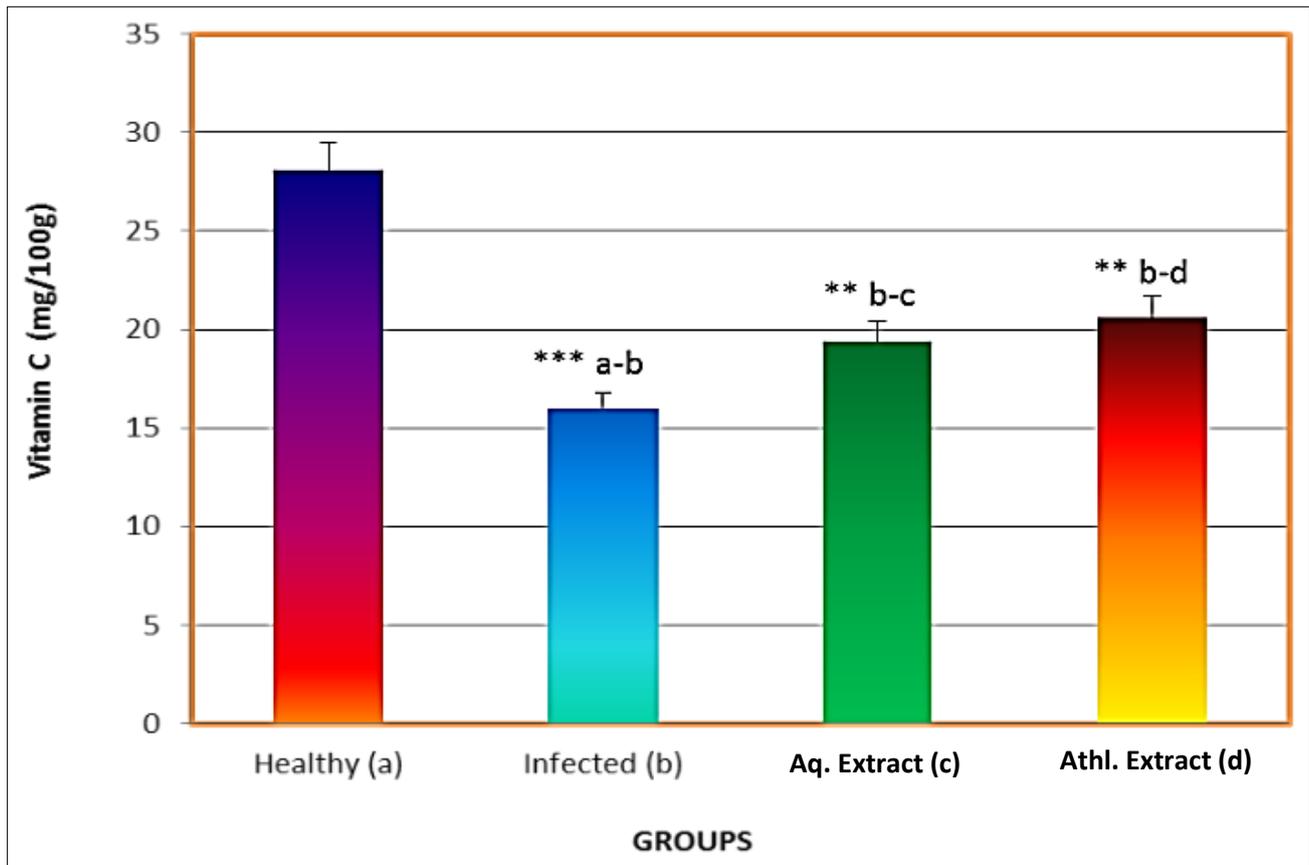
Tomatoes were collected from local markets and the vitamin C and lycopene content of healthy tomatoes was observed. The infected tomatoes were pin pricked and dipped in aqueous and ethanol *Allium sativum* extracts for one hour. The same treated tomatoes were analyzed for vitamin C and lycopene content.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

### 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

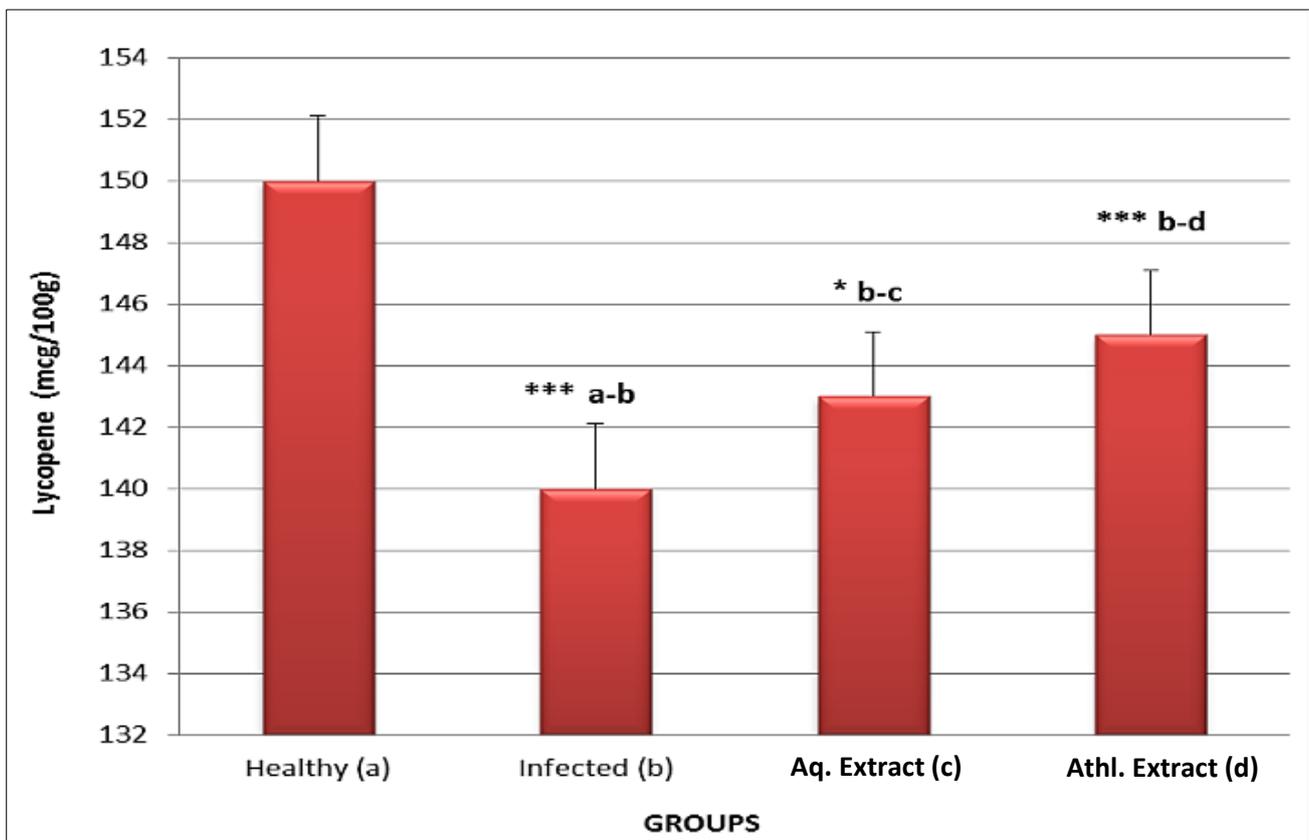
significant at ( $p < 0.01$ ) when compared with infected (control) tomatoes. Both the treatments showed an increase in vitamin C

content but ethanolic treatment showed more increase than aqueous treatment.



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

Fig1 Effect of *Allium sativum* extracts on vitamin C content of tomato (*Lycopersicon esculentum*)



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

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

*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.

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 reason being that *A. sativum* extracts 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 [8]. 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 [9], Gharezi *et al.* [10].

**SUMMARY**

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 analyzed 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.

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