# Changes in Vitamin – C Content of Different Varieties of Mango and Papaya Fruit Due to Post Harvest Fungi (M.S.) India

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***Abstract-*** In the present investigation emphasis has been given on to study the changes in vitamin C content of mango and papaya pulp due to post harvest fungi. It was found that maximum decrease in vitamin C content was caused due to post harvest fungi in local ( Kesar, Beed, Jalna, Nanded and Aurangabad) varieties of mango. Vitamin C content in local ( A'bad, Jalna, Nanded, Hingoli ) Varieties of papaya was hampered due to post harvest fungi.

***Index Terms***- Changes in vitamin C content, post harvest fungi, mango and papaya fruit.

## I. Introduction

Fruits are nature's wonderful packed with vitamin, minerals, antioxidant and many phytonutrients (Plant derived micronutrient). They are absolute feast to our sight, not just because of their colour and flavour but help body to keep fit and healthy. Fruit are low in calories and fat and are a source of simple sugars, fiber and vitamin which are essential for optimizing our health. Fruit provides plenty soluble dietary fiber which help to ward of cholesterol and fats from the body and to get relief from constipation as well. Fruits contain many anti-oxidant like poly- phenolic flavonoids, vitamins C, anthocyanins. These compounds firstly, help body to protect from oxidant stress , disease, and cancers and secondly, help body to develop capacity to fight against there ailments by boosting our immunity level. Many fruits, when compared to vegetable and cereals, have very high anti- oxidant values which is something" measured by their oxygen radical absorbent capacity"

Fruit and vegetable contribute 92.3 present of total horticultural production. The area under fruit cultivation is 6.6 million hectors with a total production of 75.8 million tones. India is the second largest producer of fruit in the world after China. It is however the largest producer of mango, banana, papaya, sapota pomegranate and amla. About 40 percent of the world mangoes and 30 percent of the world banana and papayas are produced in India.

Mango is considered as fruit of excellence and thus has prominent position among commercial fruit growth in India. Mango plays an important role in balancing the diet of human being by providing energy, carbohydrates, sugar, dietary fiber, protein, vitamin A, vitamin C, calcium magnesium, phosphorus, potassium.

Papaya (Carica Papaya L.) belong to family caricaceae is an economically important and popular fruit crops cultivated in tropical and subtropical regions of the world. Tree melon normally greenish, Yellow or orange colour. Papayas are large pear – shaped which are all high in vitamin A, C and folate. The latest is obtained by making a cut on the surface of green fruit early morning and repeating four to five days until latex ceases to flow. The latex contains two proteolytic enzymes, papain and chymopapain.

In India fruit have been found to be infected with several disease in the field as well as vary significantly in the transport and storage. Most of the disease have been studied in detail in relation to epidemiology and management strategies. A post harvest fruit of physical and biological changes due to micro organism like fungi and bacteria.

In the present study bio-deterioration of fruit were carried out. To study the bio deterioration of mango and papaya fruit, They were artificially inoculated with equal amount of sporualtion of *A. alternata, Aspergillus flavus, Aspergilus nigar, Botryodiplodia theobromac, Colletotrichum gloeosporiodes , Fusarium oxysporum, phoma caricae, penicillium chryosogenum, phytopthora nicotina, Rhizopus stolonifer*. After incubation period biochemical changes in mango and papaya pulp were estimated by standard biochemical method.

It was observed that vitamin C content of mango and papaya were found to be decrease due to some post harvest fungi. Ghosh et al., (1966) reported that vitamin C was totally absent after 8 days in mango fruit tissue infected with *Colletotrichum gloeosporioides*. Srivastava and Tandan (1966) observed the vitamin C content was depleted due to *Botryodiplodia* in Langra and dashehari varieties of mango fruit. Oladiran and Iwu(1992) inoculated tomato fruit with *Fusarium equiseti, F. chalamydosporium, Geotrichum candidum, Acremonium recifei, Aspergillus flavus, A niger*. Where they found that these fungi showed decline ascorbic acid content with days of incuabation when compared with control uninoculated fruit Odebode and Sansui (1996) studied the influence of fungi viz. *Botryodiplodia theobromae, Rhizopus orzae, Aspergillus niger*.

A. *flavus* and *Fusarium equiseti* associated with bananas on nutritional content during storage, where they found that, the infected bananas showed decrease in the quantity of total soluble sugars, protein, lipid ascorbic acid and mineral element when compared with the control fruit.

According to Gadgile (2011) sugar content, protein content, vitamins C content and cellulose content of pulp of Alephanso, Dasheri, Kesar, Beinshan and local mango varities was depleted

by all tested post harvest fungi viz *Aspergillus flavus, A. fumigatus and penicillum digitatcum, Collectotrichum gloeosporioides and Rhizopus arrhizus*.

## II. MATERIAL AND METHOD

Changes in vitamin C content: Vitamin C content was estimated by standard titration method. 5 ml of standard solution of standard ascorbic acid (100 mg/ml) was pipette out into a conical flask, then 10 ml of 0.4% oxalic acid was taken and it was titrated with dye solution. After that 2gm sample was extracted in 0.4% oxalic acid and volume was made up to 100 ml by 0.4% oxalic acid. From that solution 5ml of sample was pipette out into conical flask and titrated with dye solution. End point was pink color finally amount of Ascorbic acid in mg/100ml pulp was estimated by using following formula.

Amount of ascorbic acid mg =

$$\frac{0.5\text{mg}/v_1\text{ml} \times V_2\text{ml}/5\text{ml} \times 100\text{ml}/\text{wt of sample}}{100 \text{ ml pulp}} \times 100$$

where, $V_1$ ml = Volume standard ascorbic acid.
$V_2$ ml = Volume of sample ascorbic acid.

## III. RESULT AND DISCUSSION

I) Changes in vitamin C content in kesar, local ( Beed, Jalna, Nanded and Aurangabad) varieties of mango due to post harvest fungi were studied and result are given in table -1

**Table -1 Changes in vitamin C (gm/100ml) content of Mango pulp due to post harvest Fungi.**

| Fungi | Varieties of Mango | | | | |
|---|---|---|---|---|---|
| | Kesar | Local Beed | Local Jalna | Local Nanded | Local A'bad |
| *Aspergillus flavus* | 10.0 | 8.6 | 10.8 | 11.1 | 11.1 |
| *Aspergillus niger* | 10.2 | 8.7 | 14.0 | 8.2 | 10.9 |
| *Colletotrichum gloeosoprioides* | 6.3 | 7.7 | 10.0 | 8.1 | 9.1 |
| *Botryodiplodia theobromae* | 9.0 | 8.9 | 11.5 | 11.2 | 12.0 |
| *Penicillum Chrysogenum* | 9.7 | 10.0 | 10.7 | 8.8 | 11.1 |
| Control | 13.4 | 14.0 | 18.3 | 15.7 | 18.4 |

From the table-1 it was observed that maximum decrease in vitamin –C Content was caused due to *collectotrichum gloeosporioides* in kesar, local Beed, local Jalna, local Nanded and local Aurangabad varieties of mango while, in local Nanded it was due to *Aspergillus niger Botryodiplodia theobromae in kesar, Aspegillus flavus in local Beed; Penicillum crysognum in local Jalna; Colletotrichum gloeosporioides in local Nanded and Aspergillus niger* were also caused maximum depletion of vitamin C content.

II) Changes in vitamin C content in Local (Jalna, local Aurangabad, local Beed, local Nanded and Hingoli) varieties of papaya due to post harvest Fungi were studied and results are given in table-2.

**Table-2 Cahnges vitamin C (gm/100ml) content of Papaya pulp due to post harvest fungi.**

| Fungi | Varieties of Papaya | | | | |
|---|---|---|---|---|---|
| | Local Jalna | Local A'bad | Local Beed | Local Nanded | Local Hingoli |
| *Alternaria alternata* | 1.2 | 1.2 | 1.3 | 1.5 | 1.4 |
| *Aspergillus niger* | 1.2 | 1.3 | 1.2 | 1.3 | 1.8 |
| *Collectotrichum gloeosporioides* | 1.5 | 1.4 | 1.5 | 1.4 | 1.6 |
| *Fusarium oxysporum* | 1.3 | 1.5 | 1.2 | 1.4 | 1.7 |
| *Phoma caricae* | 1.4 | 1.7 | 1.6 | 1.2 | 1.2 |
| *Phytopthora nicotina* | 1.5 | 1.8 | 1.4 | 1.5 | 1.4 |
| Control | 1.7 | 2.0 | 1.8 | 1.7 | 1.9 |

From the table-2 it was observed that *Alternaria alternata and Aspergillus niger* caused maximum decrease in vitamin C content in local Jalna, local Aurangabad, local Beed while in local Nanded and local Hingoli, vitamin C content was depleted due to *phoma caricae*. On the other hand in local Nanded variety of papaya, *Colletotrichum gloeosporioides and Fusarium oxysporum* caused maximum decrease in vitamin C content.

Similar result have been reported by several workers. Tandon (1970) , found that ascorbic acid of mango pulp was decreased due to A. niger. Vitamin C content of mango fruit was depleted by phomopsis mangiferae and phoma exigua ( Reddy and Laxminarayan, 1984). Similarly Arya (1993) reported the mango fruit infected with *Botryodiplodia theobromae* showed decrease in vitamin C content.

Same type of result have been reported in guava ( Singh and Tandon 1971); Madhukar and Reddy, 1991; Bashyal et.al., 2009, Amla ( Reddy and Laxminarayan 1984 and Sharma and Sumbali, 2009), Citrus ( Agrawal and Ghosh, 1979), Musambi ( Singh and Sinha,1982). In conclusion, depletion of chemical composition may be due to utilization of these components as a substrute by fungi while, the loss of vitamin C during patnogensis may be due to production of suitable ascorbic acid degrading enzymes either by the fungus or by host pathogen interaction.

It is therefore advocated that fruit be utilized within the two to three weeks after harvest. This will not only prevent excessive infection of the pulp by fungal pathogens but will also eliminate the possibilities of contamination with mycotoxins and other related metabolites of infecting human health.

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## REFERENCES

[1] Agrawal, G.P. and Ghosh K. (1979). Post inection changes in as ascorbic content in lemon, musambi and orange fruits infected by colletotrihum gloeosporioides. Indian phytopath 32:108-109.

[2] Arya, A. (1993). Tropical fruits diseases and pets, kalyani publishers, New Delhi.

[3] Bashyal, B.M., Abhilash, A. and Kamil Deeba (2009). Physiochemical changes in guava fruit inoculated with pathogenic fungi. J. Mycol. pl. Pathol. 39: 511-512

[4] Bisen, P.S. (1974) : Effect of fungal infection on in Vitamin C content of apples. Curr.Sci. 43:625-626

[5] Chaudahry, M., Kaur, M. and Deshpande K.B. (1980). Biochemical changes during fruit rot of apple. Indian phytopath. 33:331-332.

[6] Gadgile, D.P. (2011) Studied on post harvest diseases of mango fruits. Ph.D. thesis submitted to Dr. Babasaheb Ambedkar Marathwada, University.

[7] Ghosh, A.K., Bhargava, S.N. and Tandan R.N.( 1966). Studies on Fungal diseases of some tropical fruit. I.V. Post infection changes in ascorbic acid content of mango and papaya. Indian phytopath. 21.262-268

[8] Madhukar, J. and Reddy S.M. ( 1991). Biochemical changes in guava fruit due to the infection by two pathagenic fungi. Indian J. mycol. pl. pathol.21:179-182

[9] Odebode, A.C. and Sansuij. (1996). Influence of fungi associated with banana on nutritional content during storage Z. lebensum unters. Forsch, 202: 471-473.

[10] Oladiran, A.O. and L.N. Iwu (1992) Change in ascorbic acid and carbohydrate contents in tomato fruit infected with pathogen. Plant foods for human nutrition. 42 (4): 373-382.

[11] Prasad, M.M. (1971). Post –infection changes in vitamin C content of banana fruit. curr.sci. 46: 197-198.

[12] Reddy, S.M. and Laxminarayana P. (1984). Post infection changes in ascorbic acid contents of mango and amla caused by two fruit rot fungi. curr. sci. 53: 927 -928.

[13] Sharma, R. and Sumbali G. (2009): status of ascorbic acid content in India gooseberry ( Phyllanthus emblica) after post- harvest pathogenesis by two fungal species. J. Mycol.pl. pathol. 39: 99-100.

[14] Singh, R.H. and Tandan R.N. (1971). Vitamin C content of guava fruit infected with Aspergillus niger. Indian phytopath. 24: 807-809.

[15] Singh Yash Paul and sumbali Geeta 2000. Ascorbic acid status and aflotoxin production in ripe fruit of jujube infected with Aspergillus flavus. Indian phytopath 53: 38-41.

[16] Singh, A. and Sinha K.K. ( 1982). Biochemical changes in musambi fruit inoculated with species of aflotoxin production aspergilli. curr.sci. 51: 841-842.

[17] Shrivastava, M.P. and Tandan R.N. (1966) : Effect of Botryodiplodia infection on the vitamin C content of mango fruit. curr. sci. 35: 419.

[18] Tandon, R.N. (1970). Certain problems of post harvest disease of fruit and vegetable. Indian phytopath 13:1-15.

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