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EFFECT OF FUNGAL INFECTIONS ON NUTRITIONAL VALUE OF PAPAYA FRUITS

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ABSTRACT

The nutritional value of fruits chiefly depends on the quality & quantity of nutritive substances. Various fungi give rise rots in fruits of papaya. The fungi are very selective in their nutritional requirements. They either colonize on fruit surface or breaks enriched complex nutrients. In this study, five fungus were isolated from papaya which are responsive to great loss in nutrients especially proteins and carotenoids. Also, sugar content reduced, while quantity of simple sugars is interestingly increased during fungal infection.

Key words: Papaya fruit, fungus, nutrition, biochemical.

INTRODUCTION

The papaya fruit has worldwide economic importance. The papaya fruits are mostly used in the case of liver problem, infection, constipation and neural disorders. This is an important tropical fruit rich in protein, vitamins and minerals. It has high level of vitamin-C.

Postharvest losses due to fungal infections are significantly high in papaya fruits. Raymond (1989) and Ishaku (1989) estimated the post harvest losses of tropical fruits to the extent of 25% of the production in Nigeria. Such a numerous studies conducted during the last few decades have established the fact that both qualitative and quantitative changes occurs in infected fruits.

The fungi influenced the stored substances by absorbing them or by converting some of the substances into simpler ones. The quantity of various free and bound amino acids and organic acids is altered and gradual decrease in sugar and vitamin-C content is observed with the advancement of disease. Such biochemical changes in fruits reduce their market value considerably. In present investigation, the effect of fungal infections on protein, nitrogen, free amino acids, total sugars, reducing sugars and ash content of papaya fruits were studied.

METHODS AND MATERIALS

Infected papaya fruit samples collected in clean polythene bags from different locations, and brought to the laboratory, swabbed in 70% ethanol for 2 min, washed with several changes of sterilized distilled water and blotted dry with sterile filter papers. The nature of spots, rots and extent of tissue damage in fruits were carefully estimated. Isolations were made from infected fruits on PDA medium in 9cm petriplates and incubated at 28± 1ºC for 3 days. Pure culture obtained from emerging mycelial colonies were maintained on PDA slant and later identified by morphological examination, referring to Gilman (1971); Smith(1960); Tilak(1998) and with other standard literature. The pathogenicity of various fungi isolated from infected papaya fruits was carried out in laboratory by following Koch's postulates.

Healthy and apparently uninjured ripened fruits of uniform size were washed with distilled water. Surface sterilized with 95% alcohol and air dried. Surface sterilized fruits wounded to 2×2×2mm. Spore suspension of *Rhizopus stolonifer*, *Aspergillus flavus*, *Penicillium digitatum*, *Curvularia lunata* and *Fusarium moniliforme* were inoculated to papaya fruits separately. Then the fruits were incubated at 28± 1ºC for 8 days.

The healthy fruits without inoculation served as control. The healthy and inoculated fruits were analyzed for nitrogen, protein, total sugar, reducing sugar, total free amino acids, non reducing sugar and ash content. The nitrogen content was estimated by conventional Microkjedalh's method and multiplied by factor 6.25 to determine the protein percentage. Free amino acids were estimated by the method of Jayaraman (1984). The changes in total suger and reducing sugar were estimated by following the method of Dubols et al. (1956) and Miller (1959) respectively. The ash content was estimated by following the method of Hart and Fisher (1971). The estimation of ascorbic acid has done by following the method described by Sadasivam and Manickam (1992).

RESULTS AND DISCUSSIONS

Pathogens responsible for the postharvest diseases of papaya are mostly fungi. Losses due to postharvest diseases are enormous in tropics and subtropics. Keeping this view the importance of fruit in our diet, the efforts are required to minimize the losses which can save at least 20% of our fruit production. In present investigation there is decrease in total sugar and increase in reducing sugar was observed in infected papaya fruits.

Table 1: Essential biochemical changes due to infection in papaya fruits.

Fungal Pathogen (%)	Nitrogen (%)	Protein (%)	Amino acids (%)	Total Sugar (%)	Reducing Sugar (%)	Vit C (%)	Total Ash (%)
R. stolonifer	0.20	1.30	3.90	5.05	4.80	1.30	0.24
F.moniliforme	0.19	1.24	3.78	4.98	4.92	1.15	0.66
C.lunata	0.18	1.17	3.31	4.90	4.75	1.25	0.56
P. digitatum	0.25	1.61	3.90	4.83	4.78	1.30	0.48
A.flavus	0.22	1.42	4.10	4.87	4.95	1.24	0.54
Control	1.12	7.00	10.7	10.6	4.00	2.25	2.18

Generally it is observed that the quantity of the amino acids in free as well as bound forms increased in infected fruits. Increase in free amino acid may be due to proteolysis of fruit proteins catalyzed by the fungal enzymes (Arya, 1993). The increase in protein bound amino acids to be due to the association of fungal mycelium with fruit tissues. Vitamin-C of both healthy and infected fruits decline as fruits are stored but the decline is more pronounced in the infected fruits. Healthy fruits are very rich in mineral content while in papaya infected with R.stolonifer; there is decrease in mineral content heavily due to the secretion of cell wall degrading enzymes and by toxin produced by pathogen.

CONCLUSION

It is concluded from above investigation that the postharvest infectional changes in papaya fruits discussed here clearly showed that the significant biochemical changes reduced nutritive value of papaya fruits and ultimately renders them unfit for human consumption and reduces their market value.

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REFERENCES

1. Arya Arun (1993). Tropical Fruits- Diseases and Pests, Kalyani Publishers, New Delhi.
2. Dubols, M.G. Hariltan, K. A., Robers, P. A. and Smith, F. (1956). Analytical chemistry 28:350-356.
3. Gilman, J.C. (1971). A manual of soil Fungi, 2nd edn, Iowa. State College Press, Ames, Iowa, 450p.
4. Hart, D.L. and Fisher, H.J. (1971). Modern food analysis. Springler-Verlarg, New Delhi.
5. Ishaku, B. C. (1989). Two post-harvest fungal infection of the carica papaya. Fruits in Ibadan. M.Sc. dissertation, University of Ibadan, Nigeria.
6. Jayaraman, J. (1984). Laboratory Manual of Biochemistry. Willey Eastern Ltd. New Delhi.
7. Miller,G. L. (1959). Analytical chemistry 31:426-428.
8. Raymond, W. D. (1966). The importance of moulds on the deterioration of Tropical food and feeding stuffs. SCI Monograph No. 23, pp: 21-30.
9. Sadasivam, S. and Manickam, A. (1992). Biochemical methods for agricultural sciences. Willey Eastern Ltd.
10. Smith, G. (1960). Industrial microbiology; Fungi; Industrial applications. 5th edn. Arnold, London.pp 399.
11. Tilak, S.T. (1998). Aerobiology, Satyajeet Prakashan. Pune, India.pp.504.

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