Changes in some Biochemical Parameters of Ivy Gourd (Coccinia Indica Wight and Arn.) Fruits after Infection of Fruit Rot

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Abstract

Biochemical changes were observed from healthy and artificially inoculated carbendazim resistant (Ap13) and sensitive (Ap11) isolates of Ivy gourd (Coccinia indica) fruit caused by Alternaria pluriseptata (Karst & Har). There was a significant variation between healthy and infected fruit which showed significant changes with respect to estimation of ash content, total sugar, reducing sugar, non reducing sugar, starch, polyphenol, total ash, Nitrogen, Phosphorus, DNA, RNA, Calcium, Iron, Magnesium, Zinc, Manganese and crude protein. Among them, total sugar (35.4 mg/g) was increased in healthy fruits. But in Polyphenols (17.401 mg/100gm) it was decreased in healthy fruits as compared with infected fruits followed by starch (15.00 mg/g) and others. Infected fruit of C. indica by both resistant and sensitive isolates reduced the contents of all parameters. This was more pronounced due to utilization of nutritious compounds of the fruits by fungal pathogen for their growth and metabolism which causes deterioration of the nutritious compounds of the fruits.

Keywords: Alternaria pluriseptata; biochemical changes; Coccinia indica; Carbendazim

Introduction

Ivy gourd (Coccina indica Wight and Arn) which belongs to the family Cucurbitaceae, is the most important vegetable and medicinal plant, distributed in Tropical Asia, Africa, Pakistan, India and Sri Lanka [1,2]. It is a climber and trailer [3]. The fruit of Coccina indica is used as vegetable when it is green in colour and eaten fresh when ripened into bright scarlet color. The young leaves and shoot tips of ivy gourd are used in Asia for cooking purpose [4]. Aqueous and ethanolic extracts from the plant have shown hypoglycaemic principles [5,6]. Every part of this plant is valuable in medicine and various preparations which have been mentioned in indigenous system of medicine for skin diseases, bronchial catarrh, and bronchitis and unani systems of medicine [7]. The plant also showed hypoglycemic activities [8,9,10].

There are about 120 genera and 825 species in this family. Members of the Cucurbitaceae are commonly known as gourds or cucurbits and include some important crop species such as Cucumber, Squash, Pumpkin, Luffa and Melons [11]. Most of the plants in this family are annual vines but there are also woody vines, thorny shrubs and trees [12]. Ivy gourd contains vitamin ‘A’, β-carotene and is a good source of protein. The phytochemical screening of the 50% methanolic extract obtained from whole parts of ivy gourd [13] revealed the presence of carbohydrates, glycosides, oil and fats, proteins, amino acids, saponins, tannins, phytosterol, alkaloids, phenolic compounds gum, mucilage and flavonoids. Application of fungicides formed a new tissue, which has protected the expanding tissue and prevented the fruit infection. A single application of the fungicide reduced the postharvest decay up to 25-50% [14]. The present investigation was made to evaluate the biochemical changes observed in Ivy Gourd due to infected fruit rot caused by C. indica.

Materials and Methods

Total 15 isolates of Alternaria pluriseptata were isolated from infected part of Coccinia indica fruits and maintained on Czapek Dox agar medium (CZA). Alternaria pluriseptata isolates were tested against carbendazim fungicide by food poisoning test [15]. Carbendazim sensitive (Ap13) and resistant (Ap11), isolates were tested for biochemical analysis.

This was studied by inoculating C. indica fruits with spore suspension of resistant and sensitive isolates. A deep well (13mm) was prepared for spore suspension with the help of cork borer (8mm). After inoculation for 8 days, fruits were dried at 40°C in hot air oven and powder was obtained after crushing in grinder. The samples were extracted in ethanol and analyzed for all the biochemical estimations [16].

Results and Discussion

Fifteen isolates of Alternaria pluriseptata were tested against carbendazim fungicide. The sensitivity (MIC) of carbendazim resistant (Ap13) showed 5000 µg/ml while sensitive (Ap11) showed 2900 µg/ml. The sensitivity ranged from 2900 to 5000 µg/ml (Table 1). Biochemical analysis determined from fruits of Ivy gourd are shown in (Table 2). It was noted that the content of all parameters in the pathogen varied in sensitive and resistant strains. It was seen that total sugars were reduced in infected fruit of C. indica when compared with healthy ones.

Total sugars in the fruit infected with sensitive and resistant isolates were variable. Among them total sugar (35.4 mg/g) was increased in healthy fruits, but reduced to sensitive (25.48 mg/g) and resistant (28.00 mg/g). But in case of Polyphenol it was decreased (17.401 mg/100gm) in healthy however, increased to sensitive (11.142 mg/100g) and resistant (12.24 mg/100g) followed by starch. In case of crude protein, Nitrogen, DNA, RNA, and Calcium were decreased due to infection of both isolates. There was slight increase in Polyphenols in fruit inocu-

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There are reports supporting the characteristic of resistant isolates. There was increase in production of amino acids in the isolate of *Phosphorus and Calcium*, it was reduced in infected fruit. In case of resistant and sensitive isolates in the healthy fruit. In case of infected by other pathogens [30]. Similarly, the investigation carried out and revealed less content of ascorbic acid, total sugar and capsaicin in fruit heavily infected due to dieback [31]. Biochemical changes were observed from the infected fruit of *Cucumis sativus* and there was reduction Nitrogen, Protein, ascorbic acid and DNA and RNA due to the infection of fruit rot disease [32].

**Conclusion**

Exposure on consumption of these spoiled fruits may be responsible for serious health hazards. The nutritional value of fruits chiefly depends on the quality and quantity of nutritive substances. Various fungi cause rots in fruit of ivy gourd. Post-harvest losses of fruits are very high and diverse post infection; biochemical changes reduce their food and market value considerably. Results of study showed that fungal infection brought about nutritional changes in fruits. This was more pronounced due to utilization by fungal pathogen for their growth and metabolism and causes deterioration of the nutritious of the fruits.

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