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MINERAL CONTENTS CHANGES DUE TO FRUIT ROT FUNGAL PATHOGENS OF IVY GOURD (*COCCINIA INDICA* WIGHT & ARN.)

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ABSTRACT

Minerals changes were observed from healthy and artificially inoculated carbendazim resistant and sensitive isolates of Ivy gourd (Coccinia indica) fruit rot pathogens viz. Bipolaris tetramera, Alternaria pluriseptata, Macrohomina phaseolina and Geotrichum candidus. Mineral contents were estimated by atomic absorption using acid hydrolysis method. Both healthy and infected parts showed presence of minerals such as Calcium (Ca), Phosphorus (P), Magnesium (Mg), Manganese (Mn), Iron (Fe), Zinc (Zn) etc. Results showed that Calcium contents were observed more in M. phaseolina (3.31%) than other pathogens. In case of Phosphorus, M. phaseolina (1.5%) showed more content followed by G. candidus (1.4%). Magnesium content was found more in B. tetramera (0.721mg/L) than others. G. candidus (0.320mg/L) and B. tetramera (0.311 mg/L)) showed maximum Manganse contents. In case of Iron, M. phaseolina (1.94mg/L) showed maximum followed by A. pluriseptata (1.9 mg/L). Zinc content was found more in G. candidus (0.300mg/L) infected fruit than others. In healthy fruits mineral contents were increased in respect to infected.

KEY WORDS

Minerals, Coccinia indica, fruit rot pathogens, atomic absorption.

INTRODUCTION

Coccinia indica (Synonym: *Coccinia grandis, Coccinia cordifolia)* family *Cucurbitaceae* commonly called little gourd or Rantondli in Marathi, Bimba in Sanskrit and Kandutikibel in Hindi. It is indigenous to Bengal and other parts of India. *C. indica* grows abundantly all over India, Tropical Africa, Australia, and Fiji throughout the oriental countries[1]. The plant has also been used extensively in Ayurvedic and Unani practice in the Indian subcontinent[2]. It has long tuberous fleshy roots, smooth and green fruits. Microscopy of root shows parenchyma, phelloderm, pericyclic fibers, stone cells, starch grains. Transverse Section (TS) of leaves show upper and lower epidermis, ranunculae stomata, uniserate multicellular trichomes. Fresh juice of roots is used to treat diabetes; tincture of leaves is used to treat gonorrhea, paste of leaves is applied to the skin diseases. Dried bark is a good cathartic. Leaves and stem are antispasmodic and expectorant. The fleshy green fruit is very bitter. Green fruit is chewed to cure sores on the tongue[3, 4, 5, 6 & 7].

Ivy gourd has 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 [8] which reveals that it contains carbohydrates, glycosides, oil and fats, proteins, amino acids, saponins, tannins, phytosterol, alkaloids, phenolic compounds gum, mucilage and

flavonoids. Therefore the present investigation was made to study the estimation of minerals from healthy and infected fruits of ivy gourd.

MATERIALS AND METHODS

Drying and powdering of fruit rot material

This was studied by inoculating the *C. indica* fruit with spore and mycelial suspension of resistant and sensitive isolates with the help of cork borer (4mm), a deep well (3mm) was prepared. Seven day after Inoculation, fruits were dried at 40°C in hot air oven and powder was obtained in grinder. The samples were extracted in ethanol and were analyzed for all the minerals estimations.

Estimation of Minerals

For the determination of mineral elements (Calcium, Phosphorus, Magnesium, Manganese, Iron, Zinc) sample extract was prepared following the method described by[9&10]. Oven dried *Coccinia indica* fruit material powder 0.5 g was treated with 20 ml concentrated HNO_3 in a beaker and covered with a glass lid still the primary reaction was subsided. It was then subjected to slow heating on a hot plate to dissolve the plant material. After cooling to room temperature, 10 ml of Perchloric acid (70 %) were added into the beaker and it was heated strongly until reduced to 2-3 ml clear solution. This extract was cooled to room temperature, diluted to 100 ml with distilled water and kept overnight. Next day, it was filtered through Whatman No. 1 filter paper and stored at room temperature. Mineral content was determined using atomic absorption spectra (Perkin Elmer A Analyst 200) at Shivaji University, Kolhapur. All the chemicals and reagents were used analytical grade (Merck and Loba). The samples were analyzed for mineral content after sufficient dilutions as required with double glass distilled water using atomic absorption technique[11].

Statistical analyses

Statistical analyses of the experiments were performed by using the book of 'An Introduction to Biometry' [12].

RESULTS AND DISCUSSION

Mineral analysis was determined from fruits of Ivy gourd are shown in (**Table.1**). It was noted that the content of all parameters in the pathoge ns were varied in sensitive and resistant strains.It was seen that minerals were reduced in infected fruit rot of *C. indica* when compared with health y ones. Results showed that Calcium contents were observed more in *M. phaseolina* (3.31%) followed by *G.candidus* (3.12%) while reduced in *B.tetramera.* In case of Phosphorus, *M. phaseolina* (1.5%) showed more content followed by *G. candidus* (1.4%) while *A.pluriseptata* infected fruits reduced the Phosphrous content. Magnesium content was found maximum in *B. tetramera* (0.721mg/L) than others. *G. candidus* (0.320mg/L) and *B. tetramera* (0.311 mg/L) showed maximum Manganese contents. In case of *Iron*, *M. phaseolina* (1.94mg/L) showed maximum followed by A. *pluriseptata* (1.9 mg/L). Zinc content was found more in *G. candidus* (0.300mg/L).In general resistant isolates showed maximum mineral contents but all minerals were decreased with respect to healthy. The study also shows that the infection of ivy gourd fruit by pathogens had a significant impact in reducing the nutritional value. The nutritional value of fruits can be improved by ensuring the plant received adequate protection before and after harvest.

Among the contents, only Vitamin-C, phenol, pectin and mineral contents were found to be increased in infected samples of Mulberry (*Morus* sp.) leaves over healthy samples[13 & 14] reported that minerals (Calcium and iron) were

found to be increased after infection of sugarcane fleshes. The infected bananas showed a decrease in the quantity of total soluble sugar, protein, ash, ascorbic acid and mineral elements when compared with the control of fruit[15]. The nutritional and mycoflora changes of groundnut (*Arachis hypogea*) were investigated during a storage period of twenty weeks and results of mineral analysis in mg/100g revealed that all minerals decreased with storage period[16]. The levels of minerals were significantly ($p < 0.05$) lower in diseased leaves compared to the healthy (control) leaves indicating that the infection of onion leaves by purple blotch pathogen (*Alternaria porri*) had a significant impact in reducing the nutritional value of the onion leaves [17].

Table1.Mineral contents of *C. indica* fruits infected with sensitive and resistant isolates of Pathogens.

Minerals/ Pathogens	Isolates	Calcium (%)	Phosphorus (%)	Magnesium (mg/L)	Manganese (mg/L)	Iron (mg/L)	Zinc (mg/L)
	Healthy fruit	4.9	1.6	0.802	0.406	1.113	0.311
Bipolaris tetramera	Sensitive	1.22	1.2	0.601	0.210	0.670	0.210
	Resistant	1.66	1.3	0.721	0.311	0.790	0.219
Alternaria pluriseptata	Sensitive	2.7	1.00	0.418	0.126	0.560	0.124
	Resistant	3.8	0.601	0.540	0.268	1.9	0.210
Macrohomina phaseolina	Sensitive	4.1	1.1	0.462	0.240	0.914	0.170
	Resistant	3.31	1.5	0.650	0.247	1.94	0.260
Geotrichum candidus	Sensitive	3.00	1.1	0.511	0.207	0.521	0.211
	Resistant	3.12	1.4	0.610	0.320	0.715	0.300
SE±m		0.38	0.09	0.04	0.26	0.19	0.02
CD at 05%		0.88	0.24	0.10	0.07	0.42	0.05
CD at 01%		1.28	0.34	0.13	0.10	0.61	0.67

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