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STUDIES ON BIOCHEMICAL CHANGES IN HEALTHY AND INFECTED TUMERIC (*Curcuma longa Linn.*)

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ABSTRACT

The biochemical changes were studied from healthy and infected rhizomes of *Curcuma longa* due to fungal infection. There was variation between healthy and infected rhizomes which showed significant changes with respect to content. The protein,fats,curcumin,turmerone, total minerals, oleoresin and total ash of infected plant reduced due to infection, carbohydrates content was only increased in the infected plant.

Key Words: Biochemical changes, turmeric, Fungal infection.

INTRODUCTION

Turmeric (*Curcuma longa Linn*.) belonging to the family Zingiberaceae, i.e. a tropical rhizomatous crop cultivated for its rhizomes. The yield of turmeric has been reported to vary greatly depending on cultivars, climate, planting time and maturity at harvest. Turmeric is the dried rhizome and the major constitutes contains appreciable quantities of protein (6.3%), lipids (5.1%), carbohydrates (69.4%) and fats (8.9%). Turmeric is rich in minerals like phosphorus, calcium, iron and vitamin A. Active compounds in turmeric are typically classified as non-volatile and volatile. Major non-volatile curcuminoids are curcumin, demethoxycurcumin and bisdemethoxycurcumin. Curcumin is the pigment that lends to develop the bright stunning yellow colour of turmeric (Vergheses, 1999).

Growers use part of one season's yield as planting stock for the next season, thereby increasing the possibility of perpetuating endogenous diseases. This practice also competes with the use of rhizomes for human consumption, thus making it difficult to establish large scale turmeric plantations (George, 2003).

Turmeric is infected by fungi, bacteria, nematodes and other pests. The fungal diseases of turmeric suffers from foliar and rhizome diseases. InIndia, this disease complex is prevalent in most of the turmeric growing areas viz. responsible for losses to the extent of 50% or more (Joshi and Sharma, 1982). Rhizome soft rot caused by *Pythiummyriotylum*Dreschl.is one of the destructive diseases of turmeric which causes considerable biochemical changes in turmeric rhizome. Such biochemical changes in rhizomes reduce their market value considerably.

MATERIALS AND METHODS

Collection of plant materials

The healthy and infected rhizomes of *Curcuma longa* were collected in clean plastic bags from cultivated field at harvest from Basmat, Dist. Hingoli in Maharashtra, India.

Isolation of fungal pathogens

The infected rhizomes, of turmeric collected from field were brought to the laboratory to obtain pure culture. Isolation of pathogens was made on Potato Dextrose Agar (PDA). The isolated funguses were examined morphologically, for the identification of *Pythiummyriotylum* was confirmed by referring the standard literature of Vander Plaats-Niterink (1981).

Preparation of extracts

The healthy and infected *Curcuma longa* rhizomes were first washed well and soil was removed from the rhizomes. Rhizomes were washed three times with distilled water to remove the traces of soil from the rhizomes. The rhizomes were air dried at room temperature and coarsely powdered. The different biochemical contents i.e. protein, carbohydrate, fats, total minerals,curcumin,turmerone,oleoresin and total ash. Samples were analysed chemically according to official analytical chemist (AOAC) and Asta method (1997).

RESULTS

The results obtained in percentages of healthy and infected rhizomes of turmeric were protein (6.72, 5.32), carbohydrates (70.32,72.48), fats (3.98, 2.76), total minerals (8.38, 7.14), curcumin (2.20,1.40), turmerone (0.97, 0.52), Oleoresin (10.00, 6.98),total ash (7.04, 5.93) contents respectively.

Table 1. Biochemical changes in Healthy and fungal infected rhizome

Sr. No.	Biochemical Contents	Healthy (%)	Infected (%)
1	Proteins	6.72	5.32
2	Carbohydrates	70.32	72.48
3	Fats	3.98	2.76
4	Total Minerals	8.38	7.14
5	Curcumin	2.20	1.40
6	Turmerone	0.97	0.52
7	Total Ash	7.04	5.93
8	Oleoresin	10.00	6.98

DISCUSSION AND CONCLUSION

The present investigation revealed changes in biochemical components in healthy and infected rhizomes of turmeric. The protein, fats,curcumin,turmerone, total minerals, oleoresin and total ashcontent of infected plant reduced due to infection while carbohydrate content was increased in the infected plant. Similarly, Jagtap*et al*., (2011), reported increased starch content in the infected plant. Jeun and Hwang (1991) reported that carbohydrates increase the severity of the infection and that they may serve as easily metabolized carbon substrates for the pathogen.

The nutritional and market value of rhizomes chiefly depends on the quality and quantity of biochemical contents. The various fungi cause rotting of rhizomes of turmeric. Post-harvest losses of rhizomes are very high and biochemical changes reduce their food and market value considerably. The observation of present study shows that fungal infection brought about biochemical changes in rhizomes. This was more pronounced due to infection of fungal pathogen during their growth and metabolism that causes deterioration of the nutritious of the rhizomes.

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