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Biochemical degradation (deterioration) in Turmeric Leaves and rhizomes infected with Taphrina maculans.

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Abstract: In the present study an attempt has to be made to know the biochemical changes in the leaves and rhizomes of turmeric due to leaf blotch disease caused by the Pathogen *Taphrina maculans*. The estimation of biochemical components such as curcumin, Phenols, non-reducing and reducing sugar contents were carried out from different varieties of turmeric. It was found that in diseased plants the Curcumin and Phenol content gets increased and reducing and non-reducing sugar content gets decreased as compared to healthy plant.

Key-words: *Taphrina maculans*, Turmeric leaf blotch, Healthy turmeric leaves.

Introduction:

Turmeric (*Curcuma longa* L.) is an important Commercial spice crop belonging to family Zingiberaceae. It is a rhizomatous plant and distributed throughout tropical and subtropical regions of the world. It is used in diversified forms as a condiment, flavoring and coloring agent and as a principal ingredient in Indian culinary as curry powder.

It is commonly grown in the states of Andhra Pradesh, Tamilnadu, Karnataka, Kerala, Bihar, Orissa and Maharashtra. The different varieties of turmeric cultivated in India are Tekurpeta,Erode, Rajapuri, Salem, Lokhandi, Chintamani, Allepy, Armour, Duggirala and Waigaon (Indiresh et al; 1990). There is variation in morphology , rhizome and quality in different varieties of turmeric (Philip, 1978).

Apart from its uses as a spice, it is used in traditional medicine in Asian countries such as India, Pakistan and Bangladesh. It is having anticancer, anti-inflammatory, antiviral, anticancer, antioxidant and anti- diabetic properties (Hamid et al., 2014). The turmeric rhizome contains Curcumin,Tumeron, Zingeberene and Oleoresin. The yellow orange colour of turmeric is due to presence of Curcumin which is a part of oleoresin and it is having antioxidant properties (Ghosh et al., 1982). Such a economically valuable crop gets affected by *Taphrina maculans* fungi causing leaf blotch of turmeric reducing its quality and productivity. Due to infection of *Taphrina maculans* there are certain degradative changes in the curcumin, phenol, non-reducing and reducing sugars of turmeric plant. In the present study, these changes in different varieties of turmeric were studied.

Materials and Methods :-

The biochemical changes in the leaves and rhizomes of turmeric due to leaf blotch disease were studied. The estimation of biochemical components such as curcumin, phenols, non reducing and reducing sugar contents were carried out from the different varieties of turmeric. The leaves and rhizomes from healthy and diseased plants were taken separately in paper bags. The leaves were cut into small pieces, put in paper dishes and dried in oven at 50°C temperature.

The dried samples of leaves and rhizomes were grind in laboratory grinder and sieved with test sieves to prepare fine powder. The samples prepared for chemical analysis were filled in small polythene bags. The estimation of biochemical chemicals from Leaves and rhizomes were analysed as given by Sadasivam (1992).

Observation Table

Table No. 1 : Changes in Curcumin and phenol content in different varieties of turmeric infected with *Taphrina maculans* Butler

Sr. No.	Variety	Curcumin (%)		Increase %	Total phenol (mg/g)		Increase %
		Healthy	Diseased		Healthy	Diseased	
1	Rajapuri	1.45	1.60	16.10	0.42	0.46	4.12
2	Lokhandi	2.00	3.10	29.90	0.37	0.39	2.24
3	Salem	1.20	2.20	42.50	0.30	0.30	2.20
4	Waigaon	3.40	3.72	10.70	0.40	0.42	2.01

Table No. 2 : Changes in Sugar content of different varieties of turmeric infected with *Taphrina maculans* Butler

Sr. No.	Variety	Non-reducing (mg/g)		Decrease %	Reducing (mg/g)		Decrease %
		Healthy	Diseased		Healthy	Diseased	
1	Rajapuri	20.10	16.20	20.90	32.00	20.10	36.80
2	Lokhandi	17.20	14.00	18.80	25.82	15.90	38.00
3	Salem	29.90	13.80	36.00	45.88	21.12	52.80
4	Waigaon	24.88	15.70	35.10	38.00	18.22	51.00

Results and Discussion:

The results in table 1 revealed that in all tested varieties curcumin content was higher in diseased plants as compared to healthy plants. The curcumin content was in the range of 1.45 to 3.40 % in healthy plants whereas in diseased plants, it was in the range of 1.60 to 3.72 %. The percent increase of curcumin was observed highest in infected plants of Salem variety (42.50%)

and it was lowest in Waigaon (10.70%.). The observations clearly showed that curcumin content gets increased in plants infected with *Taphrina maculans* Butler.Observations in Table 1 also revealed a higher Phenol content in diseased plants as compared to the healthy plants of all varieties. Total phenol content in healthy plants was in the range of 0.30 to 0.42 mg/g whereas, in diseased plants, it was in the range of 0.30 to 0.46 mg/g. Data clearly revealed that total phenol was higher in Rajapuri and lowest in Salem variety.

Observations in Table 2 revealed that non-reducing sugar content was lower in diseased plants as compared to healthy leaves in all varieties.In healthy leaves non-reducing sugar was in the range of 17.20 to 29.90 mg/g whereas in diseased leaves it was in the range of 13.80 to 16.20 mg/g.

Data presented in Table 2 also indicates that there is lower content of reducing sugars in diseased plants as compared to healthy plants of all varieties tested. In healthy leaves, reducing sugar was in the range of 25.82 to 45.88 mg/g whereas in diseased plants, it was in the range of 15.90 to 21.12 mg/g.

Conclusion:

From the analysis of biochemical constituents in the leaves of Turmeric infected by *Taphrina maculans*, it was found that in diseased plants the curcumin and phenol content get increased while reducing and non-reducing sugar content gets decreased as compared to healthy plants.

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