

ESTIMATION OF PROTEIN CONTENT IN FENNEL (*FOENICULUM VULGARE*) INFECTED WITH *RAMULARIA* BLIGHT AND POWDERY MILDEW

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ABSTRACT

Quantification of protein and total amino acids forming them was studied in fennel (*Foeniculum vulgare*) infected with *Ramularia* blight and powdery mildew. The content of proteins, total, free and bound amino acids were recorded in healthy and diseased counter parts. Different plant parts showed variation in their protein, total, free and bound amino acids contents. Diseased plant parts show relatively higher amount of proteins, total, free and bound amino acids than the normal counter parts.

Key Words: Protein, *Ramularia Foeniculi*, *Oidium Sps.*, *Foeniculum Vulgare*

INTRODUCTION

Fennel (*Foeniculum vulgare*) belongs to family Umbelliferae (Apiaceae) and is believed to be native of the Mediterranean and near Eastern regions. Rajasthan contribute a large fennel growing as well as production areas. The seeds of fennel are used as a condiment or spice in curries, pickles and in cooking. Fennel seeds have many medicinal properties also. In view of the great economic importance of fennel, powdery mildew and *Ramularia* blight diseases are major problem of fennel cultivation in our country.

Present study was undertaken to understand physiological changes of diseased plant parts. The biochemical estimation (quantification) of total proteins was estimated.

MATERIALS AND METHODS

Normal and fungus infected fennel plant parts, growing in fields of Khatipura (Jaipur div.) were collected and their morphological studies were undertaken. Quantification of proteins and amino acids of diseased and normal leaf, stem and fruits of fennel was carried out by standard methods. Total proteins were estimated by Lowry's method (1951) and OD was recorded at 750 nm. Qualitative estimation and separation of protein was carried out by SDS-PAGE gel system (Lammeli, 1970). Aminoacids were estimated by Lee and Takahashi method (1966) and OD was recorded at 570 nm.

RESULTS AND DISCUSSION

As shown in Table 1 and Fig: 1, the protein content like that of total carbohydrates was found to be significantly increased in leaf, stem and fruits of diseased plant. A statistically significant increase in total, free and bound amino acids were recorded upon disease attack in leaf, stem and fruit tissues Fig: 2,3 and 4 however protein and aminoacids content in mildewed leaf, stem and fruits were recorded to be somewhat more compared to blighted leaf, stem and fruit tissues. Results of protein electrophoresis are presented in Table 2 and Fig: 5 & 6. Table 2 showed Rm values of protein bands. Differential banding pattern was observed in normal and diseased tissues of *Foeniculum vulgare* Mill. *in vivo* state.

Singh (2005) and Bansal (2006) reported significant increase in infected tissues due to increased protein synthesis. More protein recorded in fungus infected tissues might be associated with the activities of the pathogen (Chadha and Srivastava, 1971). Similar view has been reported by Maheshwari and Chaturvedi, 1976; Suhas *et al.*, 1979; Tyagi *et al.*, 1981; Maheshwari *et al.*, 1984; and Mathur, 2002. increased occurrence of protein was observed in intracellular mycelium of pathogen (Debnath, 2000; Yadav, 2004 and Singh, 2005).

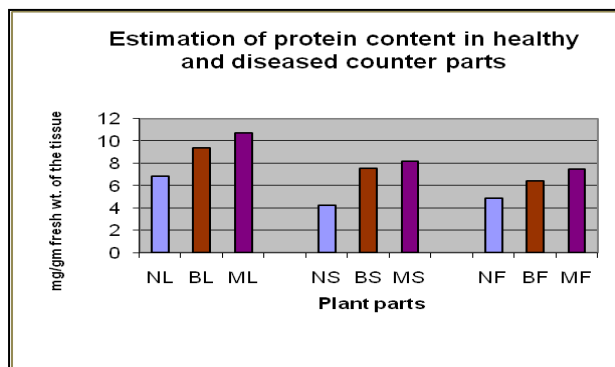


Figure 1: Estimation of protein content

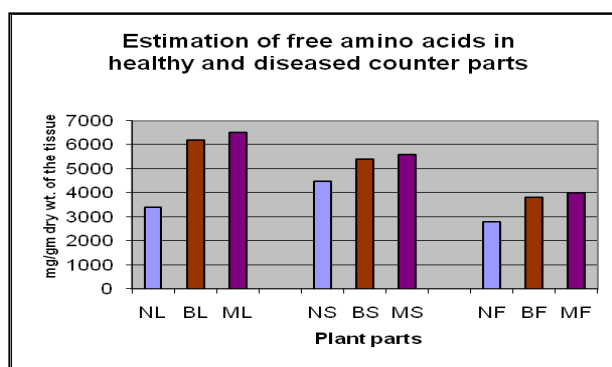


Figure 2: Estimation of free Amino acids

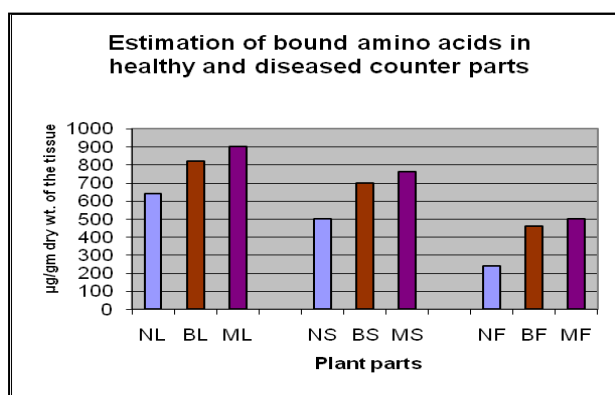


Figure 3: Estimation of bound Amino acids

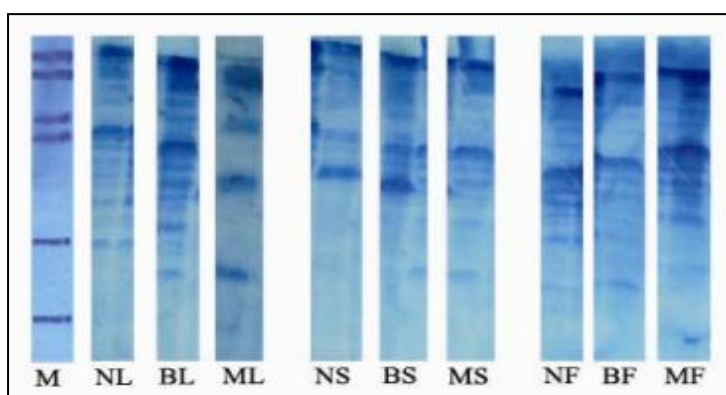


Figure 4: SDS-PAGE for protein estimation

Table 1: Rm values of protein fraction analyzed by SDS-PAGE of normal and diseased leaf, stem and fruits of *Foeniculum vulgare* Mill. (in cm)

S. No.	NL	BL	ML	NS	BS	MS	NF	BF	MF
1.	0.268	0.236	0.096	0.354	0.376	0.268	0.215	0.236	0.268
2.	0.322	0.322	0.215	0.397	0.430	0.301	0.258	0.279	0.290
3.	0.365	0.354	0.430	0.430	0.462	0.333	0.301	0.483	0.333
4.	0.397	0.645	0.473	0.483	0.505	0.376	0.430	0.537	0.587
5.	0.580	0.677	0.666	0.666	0.591	0.526	0.483	0.591	0.580
6.	0.602	0.720	0.709		0.623	0.569	0.516	0.645	0.634
7.	0.774	0.774	0.741			0.666	0.559	0.698	0.688
8.		0.860	0.784						
9.			0.860						

NL = Normal leaf, BL = Blighted leaf, ML = Mildew leaf, NS = Normal stem, BS = Blighted stem
 MS = Mildew stem, NF = Normal fruit, BF = Blighted fruit, MF = Mildew fruit.

Short Communication

Mitter (1997) and Nema (1991) also studied the aminoacids contents of plants in pathogenic state. The amino acids of the host tissues have been suggested to play an important role in defense mechanism of host against the pathogen (Lal *et al.*, 1980 and Pradhan, 1987). Gall *et al.* (1994) investigated soluble protein profile in *Brassica napus* infected with *Heptosphaeria maculans* and reported increased protein content in diseased tissues. Similarly Jain *et al.* (1995) also reported increased protein contents in *Coriander sativus* infected by *Protomyces macrosporus*. Higher protein content were also quantified by Gel-system in *Trigonella foenum-graceum* (Methi) infected with *Erysiphe polygoni* (Bansal 2006) and later by Deepak (2007) in *Cuminum cyminum* infected with blight disease.

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