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PHYLLODY MLO AND WITCHE'S BROOM DISEASE ON FABA BEAN (*VICIA FABA* L.) - A NEW RECORD FROM BIHAR

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ABSTRACT

Faba bean (*Vicia faba* L.) plants showing symptoms of shoe stringed leaves, phyllody and flower abortion was observed in experimental fields of ICAR Research Complex for Eastern Region Patna. All tests were positive for phytoplasma infection from plants showing symptoms. This is the first report of a phytoplasma infecting faba bean in Bihar, and the first report of a phytoplasma in this group infecting faba bean.

Key Words: *Legumes, Phytoplasma Vicia faba L., Phyllody MLO Witche's Broom*

Faba bean (*Vicia faba* L.) is also known as broad bean, horse bean, field bean, windsor bean in various languages,. Faba bean is cultivated in different states in considerable area particularly in the State of Uttar Pradesh, Bihar, Punjab, Haryana, Jammu Kashmir, Rajasthan Karnataka and Madhya Pradesh. Faba bean is agronomically viable alternative to cereal crop especially in rice and /or wheat based cropping system.

Among the various biotic constraints, the diseases have always been the major limiting factor for realising faba bean yield potential. It is being attacked by more than 100 pathogens (Hebblethwaite, 1983) and newer pests and newer areas of its cultivation. The disease was first reported by Nour (1962) who succeeded in transmitting the pathogen through grafting but not by sap inoculation or with the leafhopper (*Empoasca lybica*) Berg. The association of MLOs with a disease in faba bean was first reported by Cousin *et al.* (1970) from Morocco but there is no evidence concerning the relationship of this disease with faba bean phyllody in Bihar. Since the disease appears to be a potential threat to the cultivation of faba bean, especially in Bihar, further study of the disease and of its causal MLO seemed justified. In this part of our study, some ecological aspects of the disease were investigated with special regard to host reactions and the effect of temperature on symptom expression (ICARDA, 1984 and 1987).

MATERIAL AND METHODS

Brief surveys were made on faba bean crops grown at the experimental farm of ICAR Research farm at Patna, during the winter season of 2010-11. Diseased plants of affected germplasm (Accessions Nos 2010312 and 2010411) were collected from several experimental plots, sealed in polythene bags and shipped to Division of Plant Pathology IARI, for symptomatological and host range studies.

RESULT AND DISCUSSIONS

Symptom development

Symptom development in faba bean germplasm (Accessions Nos. 2010312, 2010411) was recorded. During this period a succession of symptoms was observed and the eventual syndrome involved the entire plant. Under field conditions, diseased faba bean plants were only recognizable at late stages of disease development, i.e. with phyllody and witches' broom. The first symptoms consisted of mild yellowing, vein clearing and slight inward folding of newly formed leaves in the apical region of the plant. In such plants, flower symptoms started to show-up one week later. Young plants that developed systemic infection during flower bud initiation invariably produced phylloid flowers, whereas virescent, phylloid and healthy flowers were observed in older plants. Some flower buds in late infected plants were found to produce pods with fertile or aborted seeds. In these pods vivipary was frequently observed Bos (1957 and 1978).

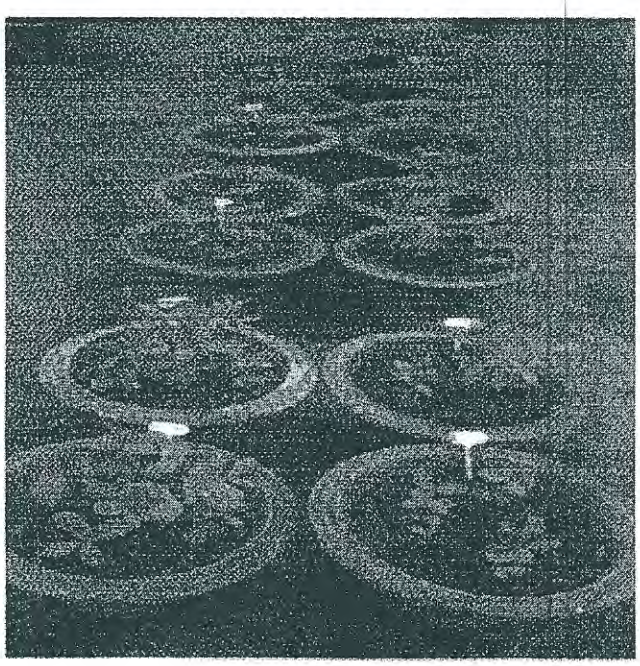
Symptom development in graft-inoculated plants of faba-bean was recorded at 2-day intervals during the first 6 weeks after grafting and then at 2-4 day intervals for 6 months. During this period a succession of symptoms were observed and the eventual syndrome involved the entire plant. The first symptom appeared within two weeks after grafting and consisted of mild yellowing, vein clearing and slight inward folding of newly formed leaves in the apical region of the plant. In such plants, flower symptoms started to show-up one week later. Young plants that developed systemic infection during flower bud initiation invariably produced phylloid flowers (Fig. 1), whereas virescent, phylloid and healthy flowers were observed in older plants Jones *etal.* (1984). Some flower buds in late infected plants were found to produce pods with fertile or aborted seeds. In these pods vivipary was frequently observed. The hypocotyls of developing seedlings ruptured through the walls of pods while their roots developed inside the pod (Fig. 2).

Phylloid flowers from severely affected faba bean

Fig.1 New record of Phyllody MLO and Witche's Broom in faba bean from Bihar

Fig. 2: Faba bean being evaluated under field conditions

Fig.3: Faba bean being evaluated under controlled condition



plants showed excessive proliferation of receptacle. Primary proliferation was followed by secondary and tertiary proliferations which contributed to witches' broom symptoms. New virescent flowers continued to arise for as long as five months. Excessive sprouting of buds in vegetative basal parts of the plant started about 6 weeks after grafting and coincided with complete cessation of apical growth. In advanced disease stages bud proliferation became excessive, while the main stem became yellow and finally desiccated Bos (1957 and 1978) and Jones et al. (1984). These visible above-ground symptoms were also accompanied by characteristic modifications of the root system. They consisted of root proliferation and excessive necrosis. Nodulation was highly affected and diseased plants produced small necrotic and deformed nodules Bos (1957 and 1978).

The disease mentioned and described above is being reported first time from Bihar. It is an important disease of faba bean crop having capacity to collapse the plant at any stage especially during peak vegetative and reproductive phase resulting to less or on pod bearing some time pods may produce without seeds. The economic importance of this disease is already reported by several workers of India and abroad also. It is noticed that some time due lax approach this may cause havoc in production of faba bean. Since the nature and causal organism (CO) of disease is unique and first time reported from Bihar. Now we have to sensitize faba bean grower to this disease also as prevention is better than cure is the key principal to manage this disease effectively. Cultural practices like adoption of crop rotation and selection of resistant varieties are the preventive measure before taking the crop, whereas use of systemic pesticide and other fungicides, antibiotics are some of profilactive and curative measure can be adopted.

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Table 1. Stages of disease symptom development

MLO disease	Stages of symptom development		
	I	II	III
Faba bean phyllody (FBP)	Light yellowing of the leaves and gradual greening of petals	Successive yellowing and shedding of older leaves and Phyllody	Witches, broom of vegetative origin, production of small yellowing leaves axillary bud proliferation dieback of bunches, No further proliferation

Table 2: Days taken for development of disease symptom in affected faba bean plant

Accession Nos	Stages of symptom development (Mean time taken in days)					
	Initial symptoms		First floral Symptom		Witches, broom Growth	
	Mean time in days	T.P.S.S / T.N.T.P	Mean time in days	T.P.S.S / T.N.T.P	Mean time in days	T.P.S.S/T .N.T.P
2010312	24	12/12	31	10/12	49	9/12
2010411	23	14/14	29	14/14	45	10/14
2010517	-	0/14	25	2/14	-	0/14

T.P.S.S= Total plant showing symptoms
T.N.T.P = Total number of tested plant

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