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**Effect of different dates of sowing on the severity of
French bean rust (*Uromyces appendiculatus*)**

Neeraj Sharma, Narender Bharat and SK Gupta

Abstract

Appropriate sowing dates along with adapted variety has paramount significance in improving the pod yield, quality and management of the disease. Aim of experiment was to determine the proper sowing date for better disease management and to harness optimum yield. Study was conducted on Falguni variety of French bean to evaluate the effect of different dates of sowing on severity of rust. Minimum rust severity and maximum green pod yield was recorded in the sowings done during the month of May as compared to June sowings. Minimum rust severity of 22.35 per cent was recorded for the sowing date of 22nd May closely followed by 29th May with a severity of 26.42 per cent. However, maximum rust severity of 38.40 percent was recorded for the sowing date of 26th June which was at par with 19th June sowing with rust severity of 36.70 per cent. Generally, a positive co-relation was observed between delayed date of sowing of the crop and disease severity of bean rust. Yield was inversely proportional to disease severity and maximum green pod yield was recorded on 22nd May sowing (4.18 kg/plot) followed by 29th May (3.03 Kg/plot) and 15th May (2.08 Kg/plot) sowings, which did not differ significantly among themselves. However, minimum green pod yield (1.97 Kg/plot) was recorded in 26th June sowing.

Keywords: French bean rust, *Uromyces appendiculatus*

Introduction

French bean (*Phaseolus vulgaris* L.) is one of the most important leguminous kharif pulse and vegetable crop, grown throughout the hills of India. With the introduction of pencil type of beans which are fibreless, meaty type, tender and brings lucrative returns to the farmers. The area under this crop has increased tremendously during last decade in Himachal Pradesh but rust disease, caused by *Uromyces appendiculatus* (Pers.) Unger, which was not prevalent earlier in the state, was first time noticed in 2006 on pencil type of beans. The disease has been observed to be predominant and destructive with severity ranging from 15 to 80 per cent particularly on pencil type of beans and often appearing in epidemic proportions in major bean growing areas resulting in extensive damage to the crop causing huge losses to the farmers (Gupta *et al.*, 2008) [3]. In India, the losses in green pod yield due to this disease ranged in between 4.7 to 69.0 per cent (Sharma, 1989) [5]. Cultural and crop agronomic practices play a vital role for the management of diseases to harness the full yield potential of a crop. Hence, the present investigation was carried out to evaluate the effect of different dates of sowing on severity of French bean rust under field conditions as a cultural management strategy.

Materials and Method

The effect of different dates of sowing on the severity of rust was studied by conducting a field trial in Randomized Block Design (RBD) at the Departmental Farm of Plant Pathology, UHF, Nauni under natural epiphytotic conditions during the kharif season of 2010. Seeds of a highly susceptible cv. Falguni were sown at 7 days intervals in plots (2x2 m), replicated thrice starting from 15th May, 2010 till 27th June 2010. Data on the severity of disease was recorded at different intervals by following 0-5 scale of Stavely (1983) with slight modifications (Table 1) and green pod yield were recorded periodically.

Table 1: 0-5 Scale for recording rust severity

Rating/Grade	Infected Leaf Area (%)	Symptoms
0	0	Apparently healthy foliage
1	0.01 – 5.0	Small brown powdery uredosori covering 1% or less of the leaf area
2	5.1 - 10.0	Few spots on leaves, typical uredosori covering 1 to 10 % leaf area.
3	10.1 – 25.0	Uredosori covering up to 25% leaf area. No stem infection.
4	25.1 – 40.0	Uredosori covering upto 40% leaf area on both surfaces with 10% stem infection.
5	>40	More than 40 % of leaf areas covered under lesions. Lesions on stems, branches and petiole; defoliation starts to occur.

Results and Discussion

The data revealed that minimum rust severity and maximum green pod yield was recorded in the sowings done during the month of May as compared to June. Minimum rust severity of 22.35 per cent was recorded for the sowing date of 22nd May closely followed by 29th May with a severity of 26.42 per cent. However, maximum rust severity of 38.40 percent was recorded for the sowing date of 26th June which was at par with 19th June sowing with rust severity of 36.70 per cent. Generally, a positive co-relation was observed between delayed date of sowing of the crop and disease severity of bean rust. Maximum disease severity was recorded on 6th September observation followed by 30th, 23rd and 16th August in descending order. Maximum disease severity of 59.59 per cent was recorded in 26th June sowing.

Yield was inversely proportional to disease severity and maximum green pod yield was recorded on 22nd May sowing (4.18 kg/plot) followed by 29th May (3.03 Kg/plot) and 15th May (2.08 Kg/plot) sowings, which did not differ significantly among themselves. However, minimum green pod yield (1.97 Kg/plot) was recorded in 26th June sowing.

The disease was found to be minimum in May sowings, which might be due to the monsoon season coupled with warm temperature making the microclimate unfavorable for the development of disease. Maximum green pod yield was

also recorded in 22nd May sowing, followed by 29th and 15th May sowings, while minimum in June sowings, which clearly indicated that availability of sufficient moisture in soil during June-July favored luxuriant growth of the May sown plants while the June sowings coincided with the post monsoon season with more relative humidity and less rains which favored the disease development. However, Veerapa and Rajkomar (1985) [7] observed that best yields of beans were obtained in May-June sowings. Mishra *et al.* (1998) [4] conducted a field experiment where *Phaseolus vulgaris* cultivar Arka Komal was sown on 7 dates between October 12 and November 23. The optimum sowing date was November 9 when the incidence of rust (*Uromyces appendiculatus*) was lowest and mean green pod yield was 8.51 t/ha. Getachew *et al.*, (2015) [2] also reported that the incidence of rust was generally affected by sowing time. The highest rust incidence was recorded when Snap bean was sown on 2nd August, whereas the lowest rust incidence was scored from the crop sown on 17th August. This is due to the fact that at the early sown plants were exposed to longer duration of humidity and lesser period of sunlight which aggravated the development of rust disease. Furthermore, Bose *et al.* (2002) [1] also confirmed that the rust infection on green bean was severe under high humidity conditions.

Table 2: Effect of different dates of sowing on disease severity and green pod yield of French bean

Date of observation Date of sowing	Disease Severity (%)				Overall Mean	Green Pod Yield (kg/ plot)
	16/08/2010	23/08/2010	30/08/2010	6/09/2010		
15/05	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	2.80
22/05	11.33(19.66)	15.87(23.45)	26.73(31.11)	35.46(36.53)	22.35(27.69)	4.18
29/05	13.77(21.76)	19.31(26.06)	33.59(35.40)	38.99(38.63)	26.42(30.46)	3.03
5/06	14.64(22.47)	22.31(28.05)	36.60(37.21)	42.69(40.78)	29.02(32.13)	2.33
12/06	15.00(22.75)	24.23(29.47)	37.63(37.82)	47.06(43.30)	30.98(33.34)	2.20
19/06	18.26(25.28)	28.23(32.08)	42.42(40.62)	57.90(49.52)	36.70(36.88)	2.03
26/06	18.99(25.83)	29.23(32.71)	45.79(42.57)	59.59(50.51)	38.40(37.90)	1.97
Overall Mean	13.14(19.68)	19.86(24.54)	31.82(32.11)	40.24(37.04)		

Figures in parentheses are arc sine transformed values

Effect CD_{0.05}

Date of sowing (0.58)

Date of observation (0.44)

Date of sowing x Date of observation (1.16)

Yield 1.50

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