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Screening of field bean genotypes for tolerance to spotted pod borer, (*Maruca vitrata* Fab.)

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Abstract

The present study was made to evaluate field bean genotypes for tolerant against field bean spotted pod borer. The experiment was conducted during 2017-18, at college of agriculture, IGKV, Raipur, Chhattisgarh. By growing a total of 118 genotype accessions on July, 2017 in an augmented design. The study revealed that the major insect pest spotted pod borer was attacking in field bean genotypes. The incidence of a spotted pod borer started from last week of October. Further incidence was increased and recorded the peak activity of spotted pod borer larvae per plant were observed during second week of December with the population of 2.96 larvae/plant. The result of screening the field bean genotypes against spotted pod borer showed that among the 118 genotypes, 14 genotypes were least preferred by insect pest and considered as tolerant. However, 102 and 2 genotypes were moderately and highly susceptible.

Keywords: *Dolichos lab lab*, screening, genotypes, *Maruca vitrata*

Introduction

Dolichos lab lab (L.) popularly known as field bean, hyacinth bean, dolichos bean, country bean, butter bean and Poor-man's bean. Indian bean is an important pulse-cum-vegetable crop is cultivated for its fresh tender pods, seeds and also for cattle feed in India. The fresh and dried seeds constitute as major vegetarian source of proteins in the human diet of Indians. The protein content of field bean varies from 20.0 to 28.0 per cent is quite high. (Schaaffhausen, 1963)^[9].

Losses due to pod damage are estimated to be 11.1 to 36.4 per cent in different parts of India. Spotted pod borer (*Maruca vitrata* Fab.) is the most serious pest of field bean worldwide (Liao and Lin, 2000)^[5]. Larvae of this insect attack flower buds, flowers and young pods inducing over 80% yield losses (Arodokoun *et al.*, 2003)^[11]. *Maruca vitrata* Fab. Is a serious pest of grain legumes in the tropics and sub-tropics because of its extensive host range, destructiveness, and distribution (Margam *et al.*, 2011)^[6]. Furthermore, Periasamy *et al.* (2015)^[8] discovered that *M. vitrata* Fab. Is a genetically complex species hence, it is one of the major constraints in increasing the production and productivity of grain legumes. The larva feeds inside the pods causing damage to the developing seeds. It is characterized by formation of webs, which aid in movement from one plant and pod.

Insect pests are known to cause damage at all the stages of crop growth. About 56 insects have been recorded in field bean in India (Govindan, 1974)^[3]. But only a few of them cause serious and economic damage to different plant parts from the time of sowing to harvesting. The important pests of field bean in the southern Agro climatic zone of Andhra Pradesh include sap sucking pod bugs *viz.*, *Riptortus pedestris* F, *Clavigrella gibbosa* Spinola, *Anoplocnemis phasiana* F. and pod borers such as *Helicoverpa armigera* (Heubner), *Maruca vitrata* Geyer and *Exelastis atomosa* etc (Thippeswamy and Rajagopal, 1998)^[11].

Materials and Methods

During the period of July, 2017 screening trial was laid out with 118 cultivars with the spacing of 2x1 m² of field bean in the Horticulture Farm, IGKV, College of Agriculture, Raipur.

During the period of study incidence of spotted pod borer, *Maruca vitrata* were recorded from the podding stage. Three plants were tagged in each genotype and observed at 10 days intervals from the initiation of infestation of spotted pod borers at the time of podding.

The pod damage was recorded by selecting three plants from each genotype. From each plant five peduncles were randomly selected and pods on the selected peduncles were examined for

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M. vitrata (Fab.) infestation. The number of infested pods on each peduncle were then expressed as percentage. Based on the per cent pod damage, the damage score for each genotype was calculated and were given the resistant rating 1-3 as suggested by Kamakshi (2006)^[4].

According to the percentage of damage, the genotypes are classified into 3 groups for further analysis.

0 – 25%: tolerant

25 – 40%: Moderately susceptible

> 40%: Highly susceptible

Result and Discussion

The first and second instar larvae bore into flower buds and web out the tender pods and later instar bore pods. The spotted pod borer population ranged from 0.09 to 2.96 larvae per plant was observed during the crop season. Spotted pod borer appeared during third week of October (44 SMW) with the population of 0.09 larvae per plant. There were continuous increases, in its population with slight fluctuation in the subsequent 10 days interval observation. The peak population of 2.96 larvae per plant was recorded during the first week of December (49 SMW).

Table 1: Overall population of pod borers on field bean genotypes at ten days interval, during *Kharif*, 2017

SMW	Months and date	Spotted pod borer (larvae/plant)
44	2017, Oct 28-7	0.09
45	Nov 8-17	0.73
47	Nov 18-27	1.59
48	Nov 28-6	2.85
49	Dec 7-16	2.96
51	Dec 17-26	2.43
52	Dec 27-5	1.34
2	2018, Jan 6-15	0.14
Mean		1.52

The present finding are in conformation with the finding of S. Srinivasa Reddy *et al.* (2016)^[10], wherein the pod borer (*M. vitrata* Fab.) in field bean revealed that the highest pod borer larvae population was recorded during 47th and 49th standard week with 3.2 and 3.6 larvae per plant, respectively. During *kharif* 2016-17 the incidence of *M. vitrata* on field bean was commenced from 45th Standard week and continued upto 4th standard week. The peak incidence of *M. vitrata* population was recorded at 50th standard week with 4.3 larvae per plant.

Yadav *et al.* (2015)^[12] revealed that population of spotted pod borer was ranging 0.2 to 2.4 larvae per plant. The incidence of this pest started in 35th SMW and gradually increased and attended a peak 2.4 larvae/plant during 38th SMW.

Patel *et al.* (2010)^[7] revealed that spotted pod borer, *M. vitrata* on cowpea was initially noticed during middle of March at pod setting stage and reached to its highest (1.21 larvae/plant) level during fourth week of March.

To screen out tolerant genotypes against spotted pod borer (*M. vitrata*) of field bean

The overall spotted pod borer infestation due to *M. vitrata* on 118 genotypes was ranged from 16 to 44 per cent in different genotypes, accordingly and were categorized as per their reaction pattern.

Among the 118 genotypes, 14 genotypes were recorded as tolerant to spotted pod borer with the overall infestation of 16-24 per cent. However, 102 genotypes were observed as moderately susceptible comprised with overall infestation of 26-38 per cent, while genotypes IS-37 and IS-44 were highly susceptible with the infestation of 44.28 and 42.02 per cent, respectively.

Table 2: Screening of field bean genotypes resistant against spotted pod borer (*M. vitrata* Fab.)

Percent damage	Category	No. of larvae/plant	No. of genotypes	Name of genotype
16-24	Resistant /tolerant	1.21-1.60	14	IS-1, IS-2, IS-26, IS-32, IS-51, IS-52, IS-81, IS-88, IS-103, IS-107, IS-113, IS-115, IS-74 and IS-84.
26-38	Moderately susceptible	1.61-2.62	102	IS-3, IS-4, IS-5, IS-6, IS-7, IS-8, IS-9, IS-10, IS-11, IS-12, IS-13, IS-14, IS-15, IS-16, IS-17, IS-18, IS-19, IS-20, IS-21, IS-22, IS-23, IS-24, IS-25, IS-27, IS-28, IS-29, IS-30, IS-31, IS-33, IS-34, IS-35, IS-36, IS-38, IS-39, IS-40, IS-41, IS-42, IS-43, IS-45, IS-46, IS-47, IS-48, IS-49, IS-50, IS-53, IS-54, IS-55, IS-57, IS-58, IS-59, IS-60, IS-61, IS-62, IS-63, IS-64, IS-65, IS-66, IS-67, IS-68, IS-69, IS-70, IS-71, IS-72, IS-73, IS-77, IS-79, IS-80, IS-83, IS-86, IS-87, IS-89, IS-90, IS-91, IS-92, IS-96, IS-97, IS-98, IS-99, IS-100, IS-101, IS-102, IS-104, IS-105, IS-106, IS-108, IS-109, IS-110, IS-111, IS-112, IS-114, IS-116, IS-117, IS-118, IS-75, IS-76, IS-78, IS-82, IS-85, IS-93, IS-94 and IS-95.
>42	Highly susceptible	2.63-3.08	2	IS-37 and IS-44
	Mean		118	

The genotypes were grouped into three categories *viz.*, 14 genotypes had shown tolerant (16-24 %) incidence to spotted pod borer of field bean whereas, 102 genotype showed incidence 26-38 per cent under were moderately susceptible and two genotypes *i.e.*, IS-37 and IS-44 were under highly susceptible >42 per cent category, respectively.

The present studies are collaborated with Boit *et al.* (2018)^[12] reported that pod infestation in fieldbean due to pod borer complex was in the range of 10 to 70 per cent.

Kamakshi (2006)^[4] similarly reported the present finding and stated that field bean genotype GA-2-27 for pod borers incidence was highly susceptible with 49 per cent, while HA-

4 was a resistant genotype with 18 per cent pod incidence (*M. vitrata* and *H. armigera*).

Conclusion

Over incidence of spotted pod borer among the 118 field bean genotypes, 14 were as resistant (16-24%) and 102 as moderately susceptible (26-38%), whereas only two genotypes IS-37 and IS-44 were as highly susceptible (>42%).

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