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Research Article

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Incidence of Pod Borer Complex on Different Varieties and on the Different Level of Fertilizer and their Management

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ABSTRACT

Study was conducted to investigate incidence of pod borer complex on different varieties and on the different level of fertilizer" and their management was carried out during the winter kharif season of 2010-11 at the Research Farm, College of Agriculture Gwalior (M.P.) The experiment consist of factorial combination of varieties ICPH 2671 (V_1), JKM 7 (V_2), ICPL 87 (V_3) and fertilizers (Control, 50% RDF +5 t FYM/ha, 75% RDF +5 t FYM, 100% RDF 5 t FYM). In case of all these insects the damage was observed minimum in plots having no fertilizer as compared to the plots having increasing doses of fertilizer. The minimum pod damage was recorded with variety ICPH-2671 as compared to ICPL-87 and JKM-7 with respect to the damage caused by pod borer and pod fly. The plume moth caused minimum damage in JKM-7. These findings reveals that, there was significant differences among different treatment combination on three varieties and four levels of fertilizer dosages.

Keywords: *Pod borer complex, Recommended dose of fertilizer (RDF), Varieties, Fertilizer.*

INTRODUCTION

India is one of the most important pulse growing country in the world perhaps no other country grows such a wide variety of pulses all around the year as does India. In a country with predominantly vegetative dietary habit, the pulses are a major source of protein, from which tur is one, which contains 25.30% protein. Tur, also known as arhar (*Cajanus cajan* (L.) *Millsp*) is the most important Kharif season pulse crop in India. Apart from the importance in diet, it also increases the fertility of the soil by fixing the atmospheric nitrogen with the help of bacteria present in their root nodules and hence, it is used as good rotational crop.

In the world, the production scenario pigeon pea is grown over an area of 3.53 million hectare and produced 2.43 million tonnes of grain, which is consider less. The national average yield is only 688.38 kg/ha. Pigeon pea is grown over an area of 3.53 million hectare and produced 2.43 million tonnes of grain.

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The national average yield is only 688.38 kg/ha. The annual production of Madhya Pradesh is 2.57 lakh tonnes, the average yield in the state is 782 kg/ha. India rank first in area (79 %), production (67 %) at Global level and productivity is only 587 kg/ha (Annual Report 2016-17 - Directorate of Pulses Development) The screening of early maturing pigeon pea genotypes against tur pod bug. Finally based on the number of eggs, nymphs and adults, the least susceptible genotypes were ICPL-85012 and ICPL 85010, whereas, ICPL – 8 and Manak were most susceptible (Shrivastava et al., 2001).

MATERIALS AND METHODS

The present investigation entitled "Effect of varieties and fertility levels on incidece of insect pest of pigeonpea (*Cajanus cajan* (L.) Millsp)" was carried out during the winter kharif season of 2010-11 at the Research Farm, College of Agriculture Gwalior (M.P.)

Details of treatments:

A. Main-plot treatment: Varieties – 3

1. ICPH 2671 (V_1)

2. JKM 7 (V_2)

3. ICPL 87 (V_3)

B. Sub-plot treatment: fertility levels – 4

1. Control

2. 50% RDF +5 t FYM/ha

3. 75% RDF +5 t FYM/ha

4. 100% RDF

Observation to be recorded

Percent pod damage:

Five plants were selected randomly at maturity from each plot. All the pods of these plants were harvested in bulk healthy and damaged pods were sorted out to compute .per cent pod damage In order to estimate magnitude of damage of *H. armigera*, *M. obtusa* and *E. atomosa* the damage pods were all symptomatically sorted out again for three insect and per cent pod damage for each pest was computed separately. Per cent data were transformed to arcsine transformation and subjected to statistical analysis.

Grain yield:

The grain yield was recorded from net plot of each treatment and subjected to statistical analysis.

Analysis of soil

S. No.	Soil components	Percentage	Methods used
1.	Sand	59.8	By Bouyoucos hydrometer method as described by Bouyoucos[2].
2.	Clay	22.6	
3.	Silt	17.6	
Soil constituents		**Value/status**	**Methods**
4.	Available Nitrogen	187.5 kg/ha	Alkaline permanganate method[5]
5.	Available Phosphorus	15.3 kg/ha	Olsen's method[4]
6.	Available Potash	226 kg/ha	Flame Photometer[3] .
7.	Organic Carbon	0.41 %	Rapid Titration method proposed by Walkeley and Black's[6]
Physio-chemical characteristics:			
8.	Electrical conductivity	0.16 dS/m	Solubridge method
9.	pH	7.86	Glass Electrode pH meter

RESULTS AND DISCUSSION

Effect of different variety of pigeon pea on incidence of pod borer complex

Gram pod borer (*Helicoverpa armigera*)

The observations recorded on per cent pod damage by pod borer. *Helicoverpa armizera* showed significant effect of varieties on the incidence of pest infestation. The minimum per cent pod damage (26.7%) was recorded in variety ICPH-2671 which found significantly less than the pod damage recorded in rest of the tested varieties .Whereas, the maximum per cent pod damage (29.3%) was recorded in variety ICPL-87 which found significantly higher than the damage in variety ICPH-2671 but was at par with the damage in variety JKM-7.

Pod fly (*Melenogromyza obtusa)*

Among different varieties, the minimum percent pod damage (41.6%) was recorded in variety ICPH-2671 which found significantly less than pod damage recorded on rest of the

varieties. Whereas, the maximum pod damage (53.3%) was noticed in variety ICPL-87 which found significantly higher than the damage caused by the pod fly in the rest of the varieties except JKM-7. (Table. 2)

Plue moth (*Exalistis atomosa)*

The observation recorded on percent pod damage by plume moth *E. atomosa* showed non significant effect of variety on the incidence of pest infestation. The minimum percent pod damage (19.2%) was recorded in variety JKM-7 which found numerically less than rest of the tested varieties. The maximum percent pod damage (21.1%) was recorded in variety ICPH-2671 and was more than rest of the varieties. How are the per cent pod damage ranged from (19.2%) in verity JKM-7 to (21.1%) per cent in variety ICPH -2671.

Effect of fertilizer levels:

Gram pod borer:

The data recorded on pod damage in the plots receiving different levels of fertilizer were differed significantly. The minimum pod damage (24.9%) was recorded in plot having no fertilizer application, which found significantly less than the damage recorded in the plot. receiving fertilizer application. On the other hand, the maximum pod damage (30.4%) was recorded in the plot receiving 100% RDF which found significantly higher than the plot receiving no fertilizer and 50% and 75% RDF with 5 tonnes FYM/ha. The percent pod damage in the plot receiving 50% RDF + 5 tonnes FYM and 75% RDF +5 tonnes FYM were at par. (Table.1)

Pod fly:

The data recorded in the plot receiving different levels of fertilizer showed significant differences with regards to per cent pod damage. The minimum pod damage (43.1%) was recorded in plot receiving no fertilizer application and found significantly less than the damage recorded in the plot receiving 75%+ 5 tonnes FYM/ha and 100% RDF, but at par with 50% RDF + 5 tone FYM /ha. On the other hand, maximum pod damage (55.2%) was recorded with 100% RDF, which found significantly higher than but was at par with, without fertilizer and r 50 % RDF + 5 tonnes FYM plots, excepted 75% RDF + 5 tonnes FYM per ha.

Plume moth

The data recorded in the plot receiving different levels of fertilizer showed significant differences with regard to percent pod damage, The minimum pod damage (16.9%) was recorded in plot without fertilizer application and found significantly less than the damage recorded in the plot receiving fertilizer application except 50% RDF + 5 tonnes FYM/ha.

The maximum percent pod damage (22.6%) was noticed in the plot receiving 100% RDF and found significantly higher than the damage recorded in plots receiving no fertilizer application. but was at par with the damage recorded in the both receiving rest of the fertilizer levels

Combined effect of varieties and fertilizer levels (V×F):

Gram pod borer:

Observation recorded on percent pod damage exhibited significant effect of varieties with combination of fertilizer levels on the incidence of *Helicoverpa armigera*. The minimum and significantly less per cent pod damage (17.00%) was observed in variety ICPH-2671 grown without fertilizer than rest of the treatment combinations. The maximum per cent pod damage (31.40%) was recorded in variety ICPL-87 grown with 100% RDF which found significantly higher than the damage in variety JKM-7 with fertilizer 75% RDF 5 FYM t/ha.

Pod fly:

Data recorded on per cent pod damage by pod fly indicates the significant effect existed among combination of varieties and different levels of fertilizer. The minimum pod damage (30.4%) was recorded in variety ICPH-2671 grown under without fertilizer application (V1F0) which found significantly less than the damage recorded on rest of the combination except in variety ICPH -2671 grown under 50 % RDF + 5 tonnes FYM/ha (V1F1) whereas, the maximum pod damage (53.6%) recorded in variety ICPH-2671 grown with 100% RDF (V1F3), which found significantly more than the damage recorded in variety ICPH-2671 grown with no fertilizer and 50% RDF+5 tonnes FYM/ha, but was at par to rest of the treatment combination

Plue moth:

Observation recorded on per cent pod damage exhibited significant effect of varieties, combination of and fertilizer levels, on the incidence of *E. otomosa*. The minimum pod damage (15.5%) was observed in variety JKM -7 grown without fertilizer which found at par to rest of the treatment accepted in variety ICPL -87 grown under 100% RDF. The maximum percent pod damage (24.1%) was recorded in variety damage in ICPL-87 grown under 100% RDF which found significantly higher than the JKM-7 grown without fertilizer application but was at par with rest of combination. (Table. 3)

Table 1: Effect of variety, fertilizer and their combined effect on incidence of pod borer (*Heliocoverpa armigera*)

Varieties / Fertilizer	Percent pod damage under different treatments			
	V1	**V2**	**V3**	**MEAN**
F0	17.0(24.30)	30.0(33.16)	27.6(31.67)	**24.9(29.71)**
F1	29.3(31.22)	30.4(33.46)	28.3(32.10)	**29.3(32.26)**
F2	29.4(32.77)	23.9(29.24)	29.8(33.05)	**27.7(31.69)**
F3	31.1(33.90)	28.8(32.43	31.4(34.01)	**30.4(33.45)**
Mean	**26.7(30.55)**	**28.9(32.07)**	**29.3(32.71)**	

Treatment	SE(m)±	CD. at 5%
Variety	0.51	1.51
Fertilizer	0.59	1.03
V×F	1.03	3.01

*** V1 - ICPH 2671, V2 - JKM 7, V3 - ICPL 87**

Table 2: Effect of varieties, fertilizer and their combined effect on incidence of pod fly (*Melengromyza obtuse*)

Varieties / Fertilizer	Percent pod damage under different treatments			
	V1	**V2**	**V3**	**MEAN**
F0	30.4(33.42)	47.7(43.64)	50.9(45.34)	**43.1(40.80)**
F1	33.1(35.09)	48.8(44.31)	52.7(46.55)	**44.8(41.98)**
F2	49.1(44.45)	55.5(48.16)	53.3(46.81)	**52.6(46.47)**
F3	53.6(48.74)	55.7(48.27)	56.4(48.62)	**55.2(48.54)**
Mean	**41.6(40.43)**	**51.9(46.09)**	**53.3(46.83)**	

Treatment	SE(m)±	CD. at 5%
Variety	0.92	2.71
Fertilizer	1.07	3.13
V×F	1.85	5.42

*** V1 - ICPH 2671, V2 - JKM 7, V3 - ICPL 87**

Table 3: Effect of varieties, fertilizer and their combined effect on incidence of plume moth (*Exslistis atomosa*)

Varieties / Fertilizer	Percent pod damage under different treatments			
	V1	**V2**	**V3**	**MEAN**
F0	19.1(25.8)	15.5(22.9)	16.1(23.60)	**16.9(24.10)**
F1	20.5(26.91)	18.2(25.15)	18.9(25.64)	**19.2(25.9)**
F2	22.1(27.88)	22.3(28.15)	18.9(25.72)	**21.1(27.25)**
F3	22.9(28.54)	20.8(27.01)	24.1(29.33)	**22.6(28.30)**
Mean	**21.1(27.28)**	**19.2(25.81)**	**19.5(26.07)**	

Treatment	SE(m)±	CD. at 5%
Variety	1.06	3.11
Fertilizer	1.23	3.55
V×F	2.1	6.22

***V1 - ICPH 2671, V2 - JKM 7, V3 - ICPL 87**

Present study reveals that the minimum and significantly less per cent pod damage (70.00%) was observed in variety ICPH-2671 grown without fertilizer than rest of the

treatment combinations. The maximum per cent pod damage (31.40%) was recorded in variety ICPL-87 grown with 100% RDF which found significantly higher than the damage in variety fertilizer and variety JKM-7 with 75% RDF 5 FYM t/ha. This results corroborate with the findings of Bhadauria et al. (1996) the variety ICPH-2671 grown under without fertilizer condition showed less per cent pod damage caused by pod borer and pod fly in combination to rest of the treatment combination but JKM-7 found to be numerically less infestation by plume moth grows without fertilizer application. As the fertilizer dosages are increases, the per cent pod damage by all the borer complex also increases in all the varieties. The plume moth caused minimum damage in JKM-7. As the fertilizer dosages are increases, the per cent pod damage by all the borer complex also increases in all the varieties. Nitrogen is the major nutrient required by insects and in most cases the main limiting factor for optimal growth of insects (Rostami et al., 2016). Application of nitrogen fertilizer normally increases herbivore feeding preference, food consumption, survival, growth, reproduction, and population density except in few instances where nitrogen fertilizer reduces the herbivore performance.

CONCLUSION

The maximum percent pod damage (22.6%) was noticed in the plot receiving 100% RDF. and found significantly higher than the damage recorded in plots receiving no fertilizer application, but was at par with the damage recorded in both receiving rest of the fertilizer levels. These findings conclude that application of the higher amount of fertilizer increase the infestation of pest ultimately leads to heavy damage.

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