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Determination of damage caused by major insect pest in long duration pigeonpea genotypes

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Abstract: The experiment was conducted to evaluate the losses caused by major insect pest in long duration pigeonpea and the study revealed that the per cent pod damage caused by pod fly, pod bug and lepidopterous pod borer (LPB) was highest in genotype MAL-31 (43.0 per cent), MAL-32 (19.0 per cent), and BAHAR (7.66 per cent) in 2011-12, respectively. The per cent grain damage caused by pod fly, pod bug and lepidopterous pod borer (LPB) was highest in genotype MAL-31 (21.22 per cent), MAL-13 (5.72 per cent), and BAHAR (2.22 per cent) respectively. In general the grain yield of different genotype differed significantly and ranged from 910 to 1197 kg/ha^{-1} in different genotypes.

Key words: Lepidopterous pod borer, BAHAR, Genotypes

Introduction

India is the world's largest producer of pulses. In country like India where a large population is vegetarian, pulses are the cheap and best source of protein. Pulses are important constituent of the Indian diet and supply a major part of protein requirement. Pigeonpea consisting of 20-21% protein occupies an important place next to chickpea and is widely grown in semi-arid tropical regions of the world and cultivated in 25 countries of the world on 5.8 million ha with 4.4 million tonnes of production, whereas in asia it is grown in 5.07 million ha and producing 3.07 million tonnes in 2011 (FAO 2013). In india, pigeonpea cultivated in 4.07 million ha area with a production of 3.27 million tonnes (Anonymous 2011). Economic loss due to biotic stress factors has been estimated to be $US 8.48 billion (Sarika *et al*., 2013). The productivity of pigeonpea has not increased considerably during last decade in India. The damage caused by insect pests is one of the major reasons of low productivity. More than 200 species of insects have been found feeding on pigeon- pea, although only a few of these cause significant and consistent damage to the crop (Lateef and Reed 1990). The pod borers have been identified as the major constraints in increasing the productivity of pigeon pea (Sahoo and Senapati, 2002).

Pod fly *Melanagromyza obtusa* is a widespread and major pest of pigeonpea in Asia. In a survey conducted by ICRISAT, *Melanagromyza obtusa* was reported to damage 22.5% pigeonpea pods in North India, 21% in Central India and 13.2% in South India (Lateef and Reed, 1981). Several species and genera of pod sucking bugs *Clavigralla gibbosa* attack pigeonpea and other legumes in Asia. The adults and nymphs of all of these bugs use their piercing mouthparts to penetrate the pod wall and suck the liquid from developing seeds. Among the constituents of the pod borer community infesting pigeonpea, Blue butter fly causes the considerable damage to buds, flowers and tender pods. This insect is active from last week of November to first week of March on pigeon pea. Blue butterfly, *Lampides boeticus* L. significantly reduces the crop yield to an extent of 60 to 90% (Durairaj 2006). *Helicoverpa armigera* (Hubner) is a cosmopolitan and highly polyphagous insect which attacks numerous crop plants of agricultural importance all over the world and is the major biotic constraint to increasing pigeonpea production **(**Lateef and Reed 1981). The pod damage is about 39 to 45 per cent caused by this pest. The present study showed that the losses caused by pod borer complex were too much in pigeonpea crop. Effective management strategies have to be developed to reduce the losses caused by the pest. Understanding the biology of the pest and the population dynamics in the crop will yield valuable information for strategizing the management options of that particular pest.

Materials and Methods

The experiment was conducted at Agricultural Research Farm, Banaras Hindu University, Varanasi during the *kharif* season of the year 2011-12. The seven long duration pigeonpea varieties which is commonly cultivated in this area was grown in plots of 5 rows, 4 meters following row to row and plant to plant spacing of 75 cm and 10 cm respectively, during 2011- 12. The crop was grown following the normal agronomic practices in "Randomized Block Design" with three replications and seven treatments. The crop was shown on 20th July during 2011 and harvested on 7th April 2012. For determining the damage by Major Insect Pest the per cent pod and grain damage were considered and observed in the sample collected from all the replication of 7 different genotypes. The sampling for pod and seed damaged assessment by insect pests

Table-1: Extent of pod and grain damage caused by major insect pests in long duration pigeonpea varieties *Kharif* during 2011-12

Genotypes	Days to 50% flowering	% Pod damage by pod fly	% Pod damage by pod bug	% Pod damage by LPB	% Grain damage by pod fly	% Grain damage by pod bug	% Grain damage by LPB	Grain Yield (Kg/ha)
BHUS-5	140	26.66(31.08)	16.00(23.48)	5.66(13.55)	10.95(19.23)	4.20(11.75)	1.46(6.84)	910
MAL-32	145	41.00(39.81)	19.00(25.82)	4.66(12.41)	17.89(25.01)	5.53(13.58)	1.38(6.68)	1197
MAL-31	147	43.00(40.97)	18.66(25.55)	5.00(12.92)	21.22(27.40)	5.08(13.00)	1.33(6.63)	1092
MAL-13	142	33.66(35.34)	18.00(24.87)	5.66(13.52)	17.34(24.50)	5.72(13.74)	1.64(7.22)	945
BAHAR	125	34.66(36.05)	17.33(24.59)	7.66(16.02)	17.20(24.49)	5.72(13.83)	2.22(8.55)	1146
MA-6	135	30.00(33.20)	16.33(23.80)	6.33(14.56)	13.63(21.66)	5.19(13.15)	1.98(8.08)	956
KAWR92-2E	149	32.66(34.85)	18.00(25.09)	4.00(11.37)	15.78(23.41)	5.26(13.25)	1.11(5.98)	916
SEm±		1.83	2.07	1.79	1.49	1.07	0.96	-
C.D(0.05%)		4.45	5.02	4.35	3.63	2.60	2.33	-

() = Figure in parentheses are arc sin transformed values; LPB= Lepidopterous pod borers

was done at 80% maturity of the crops. Five plants from the three central rows in each plot were selected randomly and all the pods from five plots were pooled together and finally 100 pods were picked up pod and grain damage assessment. The data on percent pod and grain damage by major insect pest were recorded separately, during investigation. The grain yield was also recorded for each plot after excluding the borer rows on the two sides of the plot. The grain yield data for each plot was converted to grain yield in kg/ha.

Results and Discussions

Pod and grain damage assessment and yield of long duration pigeonpea genotypes: The investigation showed that the pod damage in long duration pigeonpea genotype was mostly accounted by Pod fly, Pod bug, and lepidopterous Pod borer (LPB). It ranged from 26.66 to 43.0% in case of Pod fly, 16.0 to 19.0% in case of Pod bug and 4.0 to 7.66% in case of lepidopterous Pod borer (LPB). Jaisal *et al.,* (2010) reported that the incidence of Pod fly *(Melanagromyza obtusa),* Pod bug and lepidopterous pod borer (LBP) on long duration pigeonpea genotypes (MA-20, MAL-13, Bahar, MAL-24 and MA-3) Pod damage by Pod fly, Pod bug and LPB was greatest on MA-20 (50.3%), MAL-24 (31.0%) and MAL-6 (14.1%), respectively, Same tends of result was also found by Subharani and Singh (2007) who reported that the damage commenced in the pod filling stage (1.23 and 2.0%) in the third week of January in both years. Srivastava and Mohapatra (2002) studied the extent of pod damage inflicted by LPB and Pod fly varied from 1.0 to 6.3% and 15.1 to 33.1%, respectively. Minja *et al.,* (2000) the insect pests that caused damage on the Pigeonpea (*Cajanus cajan*) lines were pod fly (*Melanagromyza obtusa*), pod borers (*Lampides boeticus* and *Helicoverpa armigera*) and Pod sucking bugs (*Clavigralla gibbosa*). In general, total seed damage was low and the percentage damage by pod fly was 2-7%. Pod fly accounted for 80% of the total seed damage, pod borers 12.7% and pod sucking bugs 6.3%. The grain damage in long duration pigeonpea genotype was mostly accounted by pod fly, pod bug and lepidopterous pod borer (LPB). It ranged from 10.95 to 21.22 per cent in case of Pod fly, 4.20 to 5.72 per cent in case of pod bug and 1.11 to 2.22% in case of lepidopterous pod borer (LPB). These indicated that damage caused by pod fly was more in comparison to pod bug and lepidopterous pod borer (LPB). Various authors all over the country have rated the pod fly as the serious pest in northern part of India (Srivastava *et al.,* 1994; Reddy *et al*., 1998; Minja *et al.,* 2000). The present finding corroborates with the finding of other authors. The per cent pod damage caused by pod fly, pod bug and lepidopterous pod borer (LPB) was highest in genotype MAL-31 (43.0%), MAL-32 (19.0%), and BAHAR (7.66%) in 2011-12, respectively. The per cent grain damage caused by pod fly, pod bug and lepidopterous pod borer (LPB) was highest in genotype MAL-31 (21.22%), MAL-13 (5.72%), and BAHAR (2.22%) respectively. In general the grain yield of different genotype differed significantly and ranged from 910 to 1197 kg/ha^{-1} in different genotypes. The highest grain yield was found on genotype MAL-32 1197 kg/ha^{-1}.

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