IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 5, May 2015.
www.ijiset.com

ISSN 2348 – 7968

Incidence of Podfly, Melanagromyza obtusa (MALLOCH) and its Influence on Weight Loss in Different Pigeonpea Genotypes

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ABSTRACT

Evaluation of twenty pigeonpea genotypes of medium duration for their tolerance against podfly revealed that there exists a variation among different pigeonpea genotypes with respect to number of maggots and pupae ranging from 0 - 4 and 0 - 6 per pod, respectively. The genotype, 2011-5 recorded highest number of maggots and pupae per pod *i.e.*, 1.5 and 1.7, respectively. Studies on per cent weight loss in grains due to podfly showed that the average weight loss was 60.0 per cent with the range of 47.8 (ICP 13212) to 86.6 per cent (2011-5) in different pigeonpea genotypes.

KEYWORDS: Pigeonpea, tolerance, podfly, maggots, pupae and weight loss

INTRODUCTION

Pigeonpea [*Cajanus cajan* (L.) Millsp.] is the second important pulse crop grown in India. In India, pigeonpea is grown in 3.81 million ha with an annual production of 3.02 million tonnes and productivity of 806 kg ha^{-1} whereas, in Andhra Pradesh, the area, production and productivity of pigeonpea is 4.81 lakh ha, 2.5 lakh tonnes and 520 kg ha^{-1}, respectively (Anonymous, 2014). The production of pigeonpea is very low even in the era of green revolution. In the recent years, there has been significant decline in the pigeonpea production in India, leading to price increase and reduction in per capita availability. The relatively low crop yields may be attributed to non-availability of improved cultivars, poor crop husbandry and exposure to a number of biotic and abiotic stresses in pigeonpea growing regions. Among the various constraints, insect pests are one of the major and important ones affecting the productivity of pigeonpea apart from ecological and biological constraints.

ISSN 2348 – 7968

* Part of the M.Sc (Ag.) thesis submitted to Acharya N.G. Ranga ASgricultural University, Hyderabad.

Among the major pod infesting insects, pod fly *Melanagromyza obtusa* is the most serious and important pest of pigeonpea (Ahmad, 1938) and an important emerging constraint to increase the production and productivity of this crop under subsistence farming conditions causing 10-80% damage (Shanower *et al*., 1999; Kumar and Nath, 2003) and estimated to cause a monitory loss of US$ 256 million annually (Anonymous, 1992). The extent of damage varies according to variety, date of sowing and agronomic conditions. Therefore, an attempt has been made to ascertain per cent weight loss due to podfly in different pigeonpea genotypes.

MATERIALS AND METHODS

Field experiment was conducted at Regional Agricultural Research Station (RARS), Lam Farm, Guntur during *kharif*, 2013 to evaluate the resistance/tolerance levels against podfly (*M. obtusa*) in a Randomised Block Design (RBD) with 20 genotypes including the local check variety (LRG 41). Each genotype was replicated twice. Each germplasm accession was accommodated in two rows each of 4 m length with 1.8 m x 0.2 m spacing between rows and plants, respectively. No insecticidal spray was taken up throughout the crop growth period. Observations on number of maggots and pupae per pod and per cent weight loss in damaged grains due to podfly were recorded among different genotypes.

The matured sample pods were split open to count the number of maggots and pupae and the average number per pod was calculated. For estimating per cent weight loss, the sample pods were opened and seeds were collected. Precaution was taken not to throw any damaged seed while opening the pods. Hundred healthy and 100 podfly damaged seeds were taken and the per cent weight loss was calculated using the following formula.

$$\text{Per cent weight loss} = \frac{A - B}{\text{Weight of 100 healthy grains}} \times 100$$

A = weight of 100 healthy grains

B = weight of 100 infested grains

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RESULTS AND DISCUSSION

Number of maggots and pupae per pod

Observations showed that there exists a variation among different pigeonpea genotypes with respect to number of maggots ranging from 0 - 4 and pupae ranging from 0 - 6 per pod (Table 1). However, the variation was found to be non-significant. The genotype, 2011-5 recorded highest number of maggots and pupae *i.e.*, 1.5 and 1.7, respectively whereas, the genotype ENT-11 recorded least number of maggots (0.5) while, the genotype WRG-51 recorded least number of pupae (0.5) per pod. The present findings were in agreement with the reports of Kumar *et al.* (2003) and Nath *et al.* (2008). Keval *et al.* (2010) reported that highest mean population of podfly was recorded in NDA-5-25 (0.57 maggots/ 10 pods), followed by MAL-20 (0.46 maggots / 10 pods), PDA 85-5E (0.33 maggots/10 pods), MAL-13 (0.31 maggots / 10 pods), MAL -27 (0.28 maggots / 10 pods) and the lowest in KAWR 92-2 (0.21 maggots/ 10 pods).

Weight loss

The results showed that the test weight varied from 8.5 (BWR 376) to 14.9 g (2011-5) among different pigeonpea genotypes indicating large amount of variation exists amongst the genotypes. Similarly, the weight of hundred damaged grains due to podfly varied from 2.0 (2011-6) to 5.9 g (ICP 13212). Thus, weight loss in grains due to podfly varied from 4.9 (ICPHaRL 4985-5) to 12.9 g (2011-5). Ultimately, on an average there was 60.0 per cent weight loss in grains among different pigeonpea genotypes due to podfly with the horizon of 47.8 (ICP 13212) to 86.6 per cent (2011-5) indicating that large amount of variation exists amongst genotypes (Table 1). The results were in agreement with the findings of Singh and Singh (1987) who reported that loss in grain weight (%) in pigeonpea due to podfly varied from 25.1 to 68.0 per cent. The genotype, 2011-5 which recorded the highest number of maggots and pupae per pod also showed the highest per cent weight loss of grains *i.e.*, 86.6 per cent. These findings conclude that more than one maggot or pupae exist in a single pod and cause damage. Further, it was also concluded that a single grain is sufficient to complete the life cycle of podfly.

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ISSN 2348 – 7968

Table 1: Number of maggots and pupae per pod in different pigeonpea genotypes and their influence on weight loss due to podfly.

Name of the Genotype	No. of maggots per pod (Range)	Mean No. of maggots per pod	No. of pupae per pod (Range)	Mean No. of Pupae per pod	Weight of 100 grains (g)		Weight Loss (g)	Weight Loss (%)
					Healthy	Damaged		
ICP 7035	0 – 2	1.1 (1.5)	0 – 3	1.4 (1.6)	12.3	5.7	6.6	53.7
ICPHaRL 4978-5	0 – 2	0.9 (1.4)	0 – 2	1.1 (1.5)	9.6	3.5	6.1	63.5
2011-7	0 – 1	0.6 (1.3)	0 – 2	0.7 (1.3)	12.7	5.6	7.1	55.9
2011-6	0 – 2	0.9 (1.4)	0 – 2	1.4 (1.6)	11.6	4.4	7.2	62.1
2011-5	0 – 3	1.5 (1.6)	0 – 5	1.7 (1.6)	14.9	2.0	12.9	86.6
PPE-45-2	0 – 2	0.8 (1.3)	0 – 2	1.2 (1.5)	12.7	5.7	7.0	55.1
ICP 13212	0 – 3	0.6 (1.3)	0 – 3	1.1 (1.5)	11.3	5.9	5.4	47.8
ENT 11	0 – 1	0.5 (1.2)	0 – 2	0.9 (1.4)	11.4	4.4	7.0	61.4
BSMR 853	0 – 1	0.6 (1.3)	0 – 2	0.6 (1.3)	12.3	5.5	6.8	55.3
WRG 47	0 – 3	0.9 (1.4)	0 – 3	1.1 (1.5)	10.4	3.7	6.7	64.4
SM 97	0 – 2	0.7 (1.3)	0 – 2	0.8 (1.3)	9.2	4.2	5.0	54.3
BWR 376	0 – 2	1.0(1.4)	0 – 2	1.2 (1.5)	8.5	3.3	5.2	61.2
SM 18	0 – 3	1.3 (1.5)	0 – 3	1.4 (1.6)	12.8	5.3	7.5	58.6
ICPHaRL 4985-5	0 – 2	0.7 (1.3)	0 – 2	1.2 (1.5)	10.0	5.1	4.9	49.0
ICPL 85063	0 – 2	0.6 (1.3)	0 – 4	0.6 (1.3)	10.7	5.4	5.3	49.5
WRG 51	0 – 2	0.7 (1.3)	0 – 2	0.5 (1.2)	10.0	3.0	7.0	70.0
LRG 102	0 – 4	1.4 (1.6)	0 – 6	1.5 (1.6)	12.8	2.4	10.4	81.3
LRG 103	0 – 3	1.2 (1.5)	0 – 4	1.6 (1.6)	10.3	4.5	5.8	56.3
ICPHaRL 4985-4	0 – 2	1.0 (1.4)	0 – 3	1.2 (1.5)	12.4	5.4	7.0	56.5
LRG 41 (Check)	0 – 4	0.9 (1.4)	0 – 6	1.3 (1.5)	12.5	5.3	7.2	57.6
Mean	---	0.9	---	1.1	--	--	--	60.0
F test	---	NS	---	NS	--	--	--	Sig.
SEm±	---	0.1	---	0.1	--	--	--	1.6
CD (P = 0.05)	---	0.2	---	0.3	--	--	--	4.8
CV (%)	---	12.3	---	13.9	--	--	--	3.8

Values in parentheses are square root transformed values. NS --- Non-significant Sig. – Significant