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Pod Weevil *Apion clavipes* Gerst. (Apionidae : Coleoptera) Infestation on Pigeonpea in West Bengal

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Abstract

Field biology, infestation pattern and damage to seeds by *Apion clavipes* Gerst. on pigeonpea were studied in West Bengal during 2001—2003. Top tier of the plant irrespective of the date of sowing between July and August was preferred by the larva for feeding. The variability of infestation between top, middle and bottom tiers of plant canopy was moderate (*V*=16.08%). The morphology of the pods i. e., bigger, softer and light green pods of 20/105 (Rabi) and smaller, harder and brown pods of UPAS 120 did not show much difference in infestation level and late sown crops were more prone to infestation irrespective of the variety. Significant correlation was found between seed damage and pod infestation. From regression equations Y=0.745 x—0.529 (UPAS 120 in 2001-2002), Y=0.658 x — 0.542 (UPAS 120 in 2002-2003) and Y=0.676 x —1.055 (20/105) (Rabi) in 2002-2003), it could be deduced that 14% pod infestation caused 10% of seed damage.

Key words : *Apion clavipes, Cajanus cajan,*Pigeonpea , Pod weevil.

Infestation of *Apion clavipes* Gerst. on pigeonpea (*Cajanus cajan* Millsap) has been reported from different states of India (Sinha and Yadav 1983, Sachan and Gangwar 1984, Sahay et al. 1999, Akhauri et al. 2001, Rao et al. 2002 and Kumar et al. 2003).

Methods

To study the infestation level at different height of the crop canopy and pod age the 20/105 (Rabi) was sown on 8 July and 21 July 2001-2002 cropping season. Hundred pods at three development stages were collected at random from each of three tiers of crop canopy of ten randomly selected plants from 14 January 2002 and continued at weekly intervals for successive weeks. Incidence pattern and color morphs of pod were studied during the 2002-2003 cropping season on UPAS 120 and 20/105 (Rabi) genotypes of pigeonpea sown on 8 July, 23 July, 7 August and 22 August, 2002. The seeds were sown at a row to row spacing of 70 cm. The plant stand was maintained at a spacing of 35 cm. Incidence of pod weevil was observed from pod initiation till crop maturity at weekly intervals. The observations were recorded on 100 well developed pods by splitting the pods in laboratory to detect pod and seed infestation. The crop was raised by following usual agronomic practices.

Results and Discussion

Adult gravid females scoop out small portion on the dorsal side of developing pod and turning over press the tip of its abdomen into the dug out pit on the pod and push the egg inside the locule of the pod. The egg thus deposited singly remain stuck to the inner wall of the pod locule. The larva after hatching out from the egg finds its way into the developing seed and goes into the cotyledon with its well developed mandibles, moult these thrice and pupate within the seed or may drop into the locule to pupate within the pod. The adult emerging out of the pupa remains within the pod till the cuticle hardens and become black from initial pale creamy brown. Then it cuts it way out by making circular hole on the pod. A seed sustains only one larva for full development. The adults usually feed on the tender leaves of the top tier of the plant canopy by making smaller circular holes. Infestation pattern during the five observations prior to harvest in 2001-2002 the over all infestation level without much fluctuation was low between about 18.60 and 25% (Table 1) indicating slight increase during last observation (third week of February 2002) on plants of first sowing. However, it was quite high on plants of second sowing ranging between about 49.73 and 76.25% considering the last

Table 1. Percentage of infested pods and seeds and infested pods of different strata of crop canopy by *Apion clavipes* Gerst. on pigeonpea var 20/105 (Rabi) during 2001-2002.

Date of observation	Percentage of pod infestation	Percentage of seed infestation	Strata of crop canopy Percentage of pod infestation Top	Middle	Bottom
2002					
14 Jan	18.60	8.09	32.21	17.07	8.00
28 "	24.36	16.21	32.16	18.18	23.64
04 Feb	22.98	16.92	49.02	12.73	9.09
11 "	21.74	14.94	30.19	26.42	9.09
18 "	25.00	14.81	39.62	20.63	16.67
04 Mar	69.23	44.66	79.03	71.43	57.81
11 "	64.09	46.11	67.80	58.62	65.63
18 "	76.25	53.80	61.82	78.95	70.49
25 "	59.09	43.97	76.36	59.02	43.33
01 Apr	49.73	37.62	71.88	37.10	39.34

Table 2. Percentage of infested pods *Apion clavipes* Gerst. on pigeonpea var UPAS 120 and 20/105 (Rabi) during 2002-2003.

Date of observation	Percentage of infested pod UPAS 120	20/105
2002		
23 Dec	40.00	32.43
30 "	8.20	4.44
2003		
06 Jan	23.94	35.00
13 "	23.08	43.75
20 "	9.26	3.22
27 "	11.11	15.79
03 Feb	19.23	9.33
10 "	0.00	5.26
18 "	0.00	0.00
25 "	2.10	0.96
04 Mar	0.94	0.86
11 "	2.80	1.80
18 "	9.71	8.33

observation (first week of April 2002 and third week of March 2002 respectively (Table 1).

Pattern of Infestation

During 2002-2003, infestation level never exceeded 40% on both the varieties observed from the pod initiation stage during end of December 2002 till upto about middle of March 2003. Infestation level up to early February was much higher, with almost no infestation during about mid-February and negligible infestation al later period till crop maturity (Table 2). It therefore appears that incidence and infestation of pod by *Apion clavipes* do not follow the crop growth stage or calendar month of the year always.

Spatial Distribution of Infestation

Apion adults were mostly active at the top tier of the plant canopy as they feed on young succulent leaves. Probably due to this habit of the adults level of infestation was more on pods of top tier of canopy (Table 1) and moderately developed pods irrespective of tier of the canopy was detected to have higher level of infestation.

The variability of infestation was moderate (V=12.11%) and negligible (V=4.19%) on plants of first and second sowing during 2001-2002. But the variability was moderate (V=16.08%) when both the two dates of sowing was considered for the strata of crop canopy. Variation in infestation may be minimized when the level of infestation is either too high (above 60%) or too low (below 3%).

Infestation of pods of different stage of development showed significant variability during both the years of study. It was highly significant on plants of first sowing (V = 34.88%) ** and moderately (V = 19.92%) on plants of second sowing. However, the overall variability was significant (23.83%)* when the date of both the sowing dates were considered in 2001-2002. This insect apparently did not show any preference for pods of distinctly different morphology as found in the study of 2002-2003 when mixed sowing of var UPAS 120 and 20/105 (Rabi) was done. However, significant variability in the level of infestation was found (V=16.33%) for variety with brown oblique stripped pods (UPAS 120) and (V= 37.33%) for variety with bigger pods with light green color (20/105, Rabi). When pods of different stages of development were considered significantly high detectable infestation of moderately mature pods was observed.

Relationship Between Level of Infestation and Seed Damage

Damage propensity of *Apion clavipes* appears

to be quite high. The correlation of seed damage of pod infested was found to be high and positive. During 2001-2002 *r* was + 0.95 when simple correlation was worked out of percentage seed damage on level of pod infested and the regression equation was Y=0.754 x –0.529. During 2002-2003 also this was similarly high with *r* = +0.987 for var UPAS 120 and *R* = + 0.985 for var 20/105 (Rabi) and the corresponding regression equations were Y = 0.658 x – 0.542 and Y = 0.676 x – 1.055. From these equations it could be found out that a damage of 10% seeds was brought about by 14% pod infestation in 2001-2002 and it was about 16% pod infestation for both the varieties observed during 2002-2003. Therefore, taking 10% seed damage as criterion, pod infestation threshold may be taken as about 14% for adoption of control measure to limit damage by *Apion clavipes* on pigeon pea.

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