Insect Pest Incidence on Long-duration Uganda Pigeonpea Lines at Kabete in Kenya

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Pigeonpea (*Cajanus cajan* (L.) Millsp.) is an important food legume that is both consumed and traded in the local markets in northern Uganda and across the border in southern Sudan. Germplasm collection has not been made and improved varieties have not been disseminated widely in northern Uganda partly due to civil strife in the main pigeonpea growing areas in Gulu, Kitgum, and Moyo. Efforts were made by staff of the Pigeonpea Improvement Project for Eastern and Southern Africa in 1998 to visit a few farmers in Kitgum and Gulu and collect seed samples of the long-duration local landraces. The visit capitalized on the peaceful period that has been prevailing in the area for the past two years.

The common and widespread insect pests on pigeonpea in Kenya and Uganda include the pod-boring Lepidoptera *(Helicoverpa armigera* Hubner, *Etiella zinkenella* Trcitschkc, *Maruca vitrata [= testulalis]* Geyer, and *Lampides* sp.), pod-sucking bugs (dominated by *Clavigralla tomentosicollis* Stal), and seed-feeding Diptera (*Melanagromyza chalcosoma* Spencer) (Minja et al. 1996, Night and Ogenga-Latigo 1994). Most of the available information was gathered from surveys conducted in farmers' fields on traditionally grown medium-duration landraces in Lira and Apac districts.

Seed from eight local long-duration landraces were collected from farmers' fields in Kitgum and Gulu in September 1998. The seed was planted in the second week of November 1998 at Kabete in Kenya. Plots consisted of two rows of 10 m at a spacing of 1.5 m x 1.0 m. The plots were constantly weeded by hand and the plants were not sprayed.

Insect pest incidence and damage assessments were carried out at pod maturity in September/October 1999. Three samples of 50 pods each were randomly drawn from the middle of each plot leaving a 2-m border at row edges. Each pod was examined for pod and seed damage and the insect pest that caused the damage. The number of seeds damaged by each pest group was expressed as a proportion of the total number of seeds plot^{-1}.

The insect pests that caused damage on the pigeonpea lines were pod fly (*M. chalcosoma*), pod borers (*E. zinkenella, Lampides* sp., and *H. armigera*), and pod sucking bugs (C. *tomentosicollis*). In general total seed damage was low and the percentage damage by pod fly ranged from 2-7%. Pod fly accounted for 80% of the total seed damage on the lines, pod borers 12.7% and pod-sucking bugs 6.3% (Table 1). ICEAPs 00954, 00955, 00956, and 00957 had relatively higher levels of damage and could be described as more susceptible than the other lines. ICEAP 00953 and 00958 appeared to be more tolerant to pod fly. ICEAP 00955 has slightly larger seeds and less number of pods compared to other lines, and the seed coat is brown. The other lines set more pods and have speckled cream seed coats. Observations from multilocation trials in Kenya and Tanzania indicated that when cream seeded genotypes from low to medium altitude were grown in high altitude locations such as Kabete [1825 m above sea level (a.s.l.)], their

Table 1. Pod and seed damage (%) due to insect pests on Uganda pigeonpea lines at Kabete, in Kenya during 1998/99.

Line No.	Total seed in sample	Pod damage due to borers (%)	Pod borers	Seed damage (%)		
				Sucking bugs	Pod fly	Total
ICEAP 00953	164	0.0	0.2	0.2	2.3	2.7
ICEAP 00954	166	5.7	1.7	0.2	6.4	8.3
ICEAP 00955	163	2.7	1.2	0.2	6.8	8.2
ICEAP 00956	110	6.8	2.2	0.0	5.8	8.0
ICEAP 00957	148	1.9	0.7	1.6	7.0	9.3
ICEAP 00958	153	1.0	0.4	0.0	2.0	2.4
ICEAP 00959	135	0.0	0.0	0.5	5.1	5.6
ICEAP 00960	205	0.0	0.0	0.6	5.1	5.7
Mean	156	2.3	0.8	0.4	5.1	6.3
SEM	6.97	1.53	0.43	0.41	1.40	1.90
LSD (0.05)	21.14	4.64	1.30	1.24	4.25	5.76

seed turned brown. The original seed from Uganda was cream. Eight lines have been planted at Kiboko (940 m a.s.1.) where the temperatures are higher than Kabete and the seeds are therefore expected to have cream color.

References

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Natural Enemies of Pod Borers in Pigeonpea

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Natural enemies of *Helicoverpa armigera* have been reported by several workers in the past (Bhatnagar 1981, Pawar and Jadhav 1983, and Reed et al. 1989). Published information on the predation of the larvae of *Maruca vitrata, Nanaguna breviuscula,* and *Grapholita critica* is very scanty. The parasitization of *G. critica* by *Apanteles taragamae* has been reported earlier by Paramanik and Basu (1968) from West Bengal and by Lateef and Reddy (1984) from Andhra Pradesh, but there is no earlier record of this parasitoid on *M. vitrata.* Similarly, information on parasitization of *N. breviuscula* is not available in literature. This paper reports the natural enemies of pod borers in pigeonpea in Bhubaneswar, Orissa.

During the rainy season of 1994 and 1995 the occurrence of both nymphs and/or adults of mud wasps, spiders and praying mantis was recorded in 12 randomly selected plants at 0800 h and at 1700 h at weekly intervals commencing from the vegetative stages of the crop. The extent and period of parasitization of *N. breviuscula, M. vitrata,* and *G. critica* were studied in the laboratory at the Department of Entomology, Orissa University of Agriculture and Technology. Fifty late-instar (4th- to 6th-instar) larvae of each borer species were collected randomly from the pigeonpea fields at weekly intervals and were reared individually in specimen tubes (10 x 2.5 cm). Fresh plant buds, flowers, and pods were provided daily to the larvae till pupation or mortality due to parasitization. The extent and period of parasitization were computed for each parasitoid species. The parasitoid species were identified by Dr T C Narendran, Professor, Department of Zoology, University of Calicut, Kerala.

The activities of the predators such as spiders, praying mantis, and wasps (Fig. 1) were observed between mid-August and mid-December (33rd to 50th week) and their numbers ranged from 0.1 to 3.5, 0.0 to 1.2, and 0.0 to 0.9 plant^{-1} respectively (Table 1). Maximum abundance of the predators was recorded during the last week of September (39th week) which coincided with high population of the pod borers during flowering to pod elongation stage. The spiders, praying mantis, and hymenopterous wasps (*Delta conoideum* Gmelin *D. campaniforme esuriens* Fab, and *D. pyriforme* Fab.) predated on the larvae of *M. vitrata, N. breviuscula, G. critica,* and *H. armigera.* The predation of H. *armigera* by these predators confirmed the observations by Bhatnagar (1981), Pawar and Jadhav (1983) and Reed et al. (1989).

The braconid *A. taragamae* (Fig. 2) parasitized the larvae of *M. vitrata* and *G. critica* (2.0% to 7.0% and 2.0% and 2.0% to 9.0% respectively) during mid-September (37th week) to late-December (52nd week) (Table 2). Maximum parasitization of *M. vitrata* (7.0%) was recorded in mid-November (46th week) and that on *G. critica* (9.0%) during September (39th week). On an average, the extent of parasitization of *M. vitrata* was 4.7 ± 2.0% and that of *G. critica* 3.8 ± 2.8%.

Table 1. Predators of pigeonpea pod borers.

Predators	Crop season	Period of occurrence (std. wk)	Population (plant^{-1}) Range	Mean ± SD
Spiders	1994-95	33-46	0.1-4.1	1.9 ± 1.4
	1995-96	34-50	0.0-3.2	1.5 ± 1.5
Mean		33-50 (39)[1]	0.1-3.5	1.5 ± 1.1
Praying	1994-95	37-46	0.1-1.3	0.6 ± 0.4
mantis	1995-96	38-50	0.0-1.9	0.6 ± 0.6
Mean		37-50 (39)[1]	0.0-1.2	0.5 ± 0.4
Wasps	1994-95	38-45	0.0-1.0	0.4 ± 0.4
	1995-96	38-48	0.0-0.9	0.4 ± 0.4
Mean		33-48 (39)	0.0-0.9	0.4 ± 0.3

1. Indicates peak period of activity.