Entomology

A Braconidae Parasite (*Bracon* sp. near *celer* Szepligeti) on Pigeonpea Pod Fly (*Melanagromyza chalcosoma* Spencer) in Farmers' Fields in Southern and Eastern Africa

E M Minja[1] and **T G Shanower**[2] (1. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), East African Cereals and Legumes Research Program, PO Box 39063, Nairobi, Kenya, (Present address: ICRISAT Lilongwe, PO Box 1096, Lilongwe, Malawi); and 2. ICRISAT Asia Center, Patancheru, Andhra Pradesh 502 324, India (Present address: United States Department of Agriculture, Agricultural Research Station, 1500 N Central Avenue, Sidney-MT 59270, USA))

Pod fly (*Melanagromyza chalcosoma* Spencer) is one of the major insect pests affecting, pigeonpea (*Cajanus cajan* [L] Millsp.) in southern and eastern Africa (Lateef 1991, Minja 1997). It is also a common pest in pods of several other legumes grown in the region (Le Pelley 1959). The results of recent surveys in farmers' fields in four major pigeonpea-growing countries in southern and eastern Africa showed that pod-fly damage on seed ranged from 0-46% in Kenya, 0-4% in Malawi, 0-7% in Tanzania, and 0-13% in Uganda (Minja 1997). The small black fly lays eggs through the wall of the developing pod and the maggot feeds by tunnelling the green seed. Two or more larvae often develop and pupate in one locule. In Kenya, up to 40 pupae were observed in a single pod containing an average of 5 seeds (Minja 1997). The brown puparium is formed inside the pod but outside the seed (Reed et al. 1989). These puparia are commonly associated with a single white parasite cocoon in pods, Sithanantham and Reddy (1990) reported the occurrence of the white cocoons in Kenya, Malawi, and Zambia. The distribution and potential of this parasite to control pod fly in the region is not known. Preliminary assessment on the incidence and distribution of the parasite were made during field surveys in 1995 and 1996.

Surveys were conducted in the major pigeonpea-growing areas in Kenya, Malawi, Tanzania, and Uganda. Samples of pigeonpea pods were collected from farmers' fields and research farms. In the laboratory, the pods were opened to determine the pests, associated natural enemies, and seed damage. Records on pod fly included the number of larvae, pupae, and parasite cocoons or imagos in each pod. Fresh cocoons recovered from pods were left in the laboratory for adult emergence. Open cocoons, where the wasp had emerged, were also recorded. The total number of pod flies and parasites were recorded separately for each sample. The number of parasites recorded were expressed as a proportion of the total host and parasite population taken together.

Pod fly and white cocoons of the parasite were recorded in Kenya, Malawi, Tanzania, and Uganda (Table 1). The adult wasps were identified as *Bracon* sp. near *celer* Szepligeti [A.K. Walker, HE det.]. A few adult wasps were also observed laying eggs on green pigeonpea pods in the field in Kenya. Pod fly populations were greater in Kenya than in other countries. Infestations were high in locations where the crop matured late in the season or during the cool weather. However, areas along the ocean coast, i.e., areas below 500 m altitude including the Coastal Province in Kenya, Lindi and Nachingwea in Tanzania, had insignificant pod fly infestations, and no parasites were recorded. These results indicate that there is some degree of association between the host and its natural enemy. The results further show that as the pest population increased, the incidence of the parasite also increased. These results, though preliminary, indicate that the parasite is widespread and it could be an important factor in the management of pod fly on pigeonpea. The biology, ecology, and behavior of the parasite in relation to its host and crop phenology are not known. There is a need to carry out studies on this parasite to fully establish its role and potential in the management of pod fly on pigeonpea.

Table 1. Parasitism (%) *of Bracon* sp. on pigeonpea pod fly (*Melanagromyza* sp.) in Kenya, Malawi, Tanzania, and Uganda, 1995 and 1996 seasons.

Country	No. of fields sampled	Total pod fly population unit^{-1}	Mean parasitism (%)
Kenya	44	755.1	5.2
Malawi	20	13.5	2.6
Tanzania	34	38.2	3.0
Uganda	17	285	2.3

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Adjusting Pigeonpea Sowing Time to Manage Pod Borer Infestation

S S Dahiya[1], Y S Chauhan[2], C Johansen[2], and **T G Shanower[2]** (1. Chaudhury Charan Singh Haryana Agricultural University (CCS HAU), Krishi Vigyan Kendra, Sonipat, Haryana, India; and 2. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, Andhra Pradesh, India (Present address: United States Department of Agriculture, Agricultural Research Station, 1500 N Central Avenue, Sidney-MT 59270, USA)

In India, pigeonpea [*Cajanus cajan* (L.) Millsp.] accounts for about 16% of the area and 19% of the production of all pulse crops. Pigeonpea is a comparatively recent introduction in Haryana, India. It has become the second most important pulse crop in the state after chickpea as evidenced by increase in area, from 2200 ha in 1976/77 to around 50 000 ha in 1993/94. It is used for both grain and fuel wood.

The grain yield of pigeonpea is considerably reduced by pod borer (*Helicoverpa armigera)* infestation. Chemical control of pod borer is not popular among farmers due to the difficulties of spraying or dusting (plants >2 m in height) and economic costs. Therefore, there is a need to exploit agronomic practices which can reduce the infestation of pod borer. Data from several experiments suggested that early sowing was critical to obtaining higher yields and good economic returns, but it was not clear if it was due to a lower level of pod borer infestation. Therefore, the susceptibility of the short-duration pigeonpea variety Manak to pod borer in relation to different sowing times was studied on farmers' fields in Sonipat District, Haryana, during the 1995 and 1996 rainy seasons.

During the 1995 and 1996 rainy seasons, 15 on-farm trials of > 1000 m^2 area, five each for different sowing times, i.e., first week of May (early sown), mid-May (15th-25th), and mid-June (15th-25th), were conducted. The level of pod damage was recorded on 10 randomly selected plants in each sowing, and yield was recorded from the entire area. The crop was not sprayed with any insecticide.

The early-sown crop had less than 10% pod borer damage (Table I). In contrast, pod damage to pigeonpea sown in mid-May and mid-June was 20-40%. The year x sowing date interaction was not significant. Grain yield decreased with a delay in sowing (Table 1).

Grain yield was negatively correlated with both sowing time (r = -0.98) and pod borer damage (r = -0.93). Pod borer damage was also associated with sowing time (r = 0.99). In the past, the advantage of early sowing had

Table 1. Effect of sowing time on pod damage by *Helicoverpa armigera* and yield of pigeonpea, Sonipat, Haryana, India, 1995 and 1996 rainy seasons.

	Pod damage (%)			Yield (t ha^{-1})		
Sowing time	1995	1996	Mean	1995	1996	Mean
1st week of May (1-7 May)	5	8	6.5	1.70	1.50	1.60
Mid-May (15-25 May)	28	25	26.5	1.10	1.20	1.15
Mid-June (15-25 June)	40	38	39.0	1.00	1.00	1.00
SE	±0.86				±0.061	
SE (interaction)	±1.1				±0.079	