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EMERGENCE PATTERN OF THE SORGHUM MIDGE, *CONTARINIA SORGHICOLA*[1], AND ITS PARASITE, *APROSTOCETUS DIPLOSIDIS*[2,3]

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ABSTRACT

Seed heads of 'DeKalb E-57' sorghum, planted on 26 April, 16 May, and 1 June 1976, were harvested in the soft dough stage and placed in emergence cages to determine the temporal pattern of emergence for the sorghum midge, *Contarinia sorghicola* (Coquillet), and its parasite, *Aprostocetus diplosidis* Crawford.

Midge emergence began at the end of the milky stage, peaked 5-6 days later, and was completed in 10-11 days. Parasite emergence began 7-8 days after the end of the milky stage, peaked at 12-14 days, and was completed in 18-19 days. The emergence of the 2 insects overlapped from the 7th to 11th day after the end of the soft dough stage. Toxic residues of insecticides, applied to kill emerging adult midges, could be present for 7 days after the end of the soft dough stage without harming the adult parasites.

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[2]Eulophidae: Hymenoptera.
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The sorghum midge, *Contarinia sorghicola* (Coquillet), an important insect pest of grain sorghum in many countries around the world has inflicted losses totalling millions of dollars per year (Geering 1953, Harris 1961, 1969, Thomas and Cate 1971, Huddleston et al. 1972). The midge is most difficult to observe and control because of its concealment within the seeds of the sorghum spikelets. Field observations (Dean 1910) have indicated that the endoparasite *Aprostocetus diplosidis* Crawford produces mortality in late season midge populations. These observations were confirmed by Dean (1911) and Walter (1941) who referred to *A. diplosidis* as the most prominent and aggressive parasite of the sorghum midge. Increasing midge parasitization by *A. diplosidis* was observed as the sorghum growing season progressed during 1976 at Quincy, Florida. Adults of the parasite *A. diplosidis* and adults of the sorghum midge emerged from infested sorghum heads in an overlapping pattern, an observation which agreed with that of Dean (1911) who recorded a 6:1 ratio of parasite/midge from samples taken in late summer.

Knowledge of the temporal pattern of emergence for the 2 insects could help to avoid possible exposure of the parasite adult to chemicals intended for the adult midge. This would prevent substantial mortality of the parasite population and aid in biological control of the midge in subsequent plantings. Hence, in 1976, studies were initiated in Florida to determine the emergence periods for both pest and parasite.

Materials and Methods

'DeKalb E-57' sorghum was planted on 26 April, 16 May, and 1 June 1976 at the University of Florida Agricultural Research and Education Center, Quincy, in 4-row plots arranged in a randomized complete block design with 4 replications. The plots were treated with Atrazine® at 2.1 kg Ai/ha for weed suppression and with 560.4 kg/ha of 5:10:15 fertilizer before planting; plots were 18.5 m long, with 91.4 cm between rows. The sorghum, grown under rainy conditions, was planted by machine at a seed rate of about 9.66 kg/ha.

At the milky (soft dough) stage of development, 25 sorghum heads per replicate were removed from the 2 middle rows of each plot on 26 July, 4 August, and 12 August 1976. The sorghum heads were placed into 25.4 X 34.3 X 50.8 cm emergence cages. Emerging sorghum midges and parasites were collected in 2.5 cm diam by 4.8 cm plastic vials inserted into the side of each cage. The vials were coated with petroleum jelly on the inside walls to entrap the emerging insects. Samples were held for 20 days emergence under laboratory conditions of 24 ± 2°C and 80% R. H., and monitored daily by inspecting the vials, recording numbers of midges and parasites and removing all insects that emerged in each 24 h period. Monitoring and counting were terminated when midge and parasite emergence stopped. Data collected were averaged for the 4 replicates and converted into percent emergence of the total population per day.

Results and Discussion

Sorghum midge emergence from the heads began at the end of the milky stage, peaked 5 to 7 days later, and was completed in 10-11 days (Fig. 1).

Parasite emergence began 6-8 days after the milky stage, increased at the tenth day, and peaked at 12 to 14 days. Emergence of the midge and parasite overlapped from the 7th to 11th day with small numbers of parasites emerging before the 11th day regardless of planting dates.

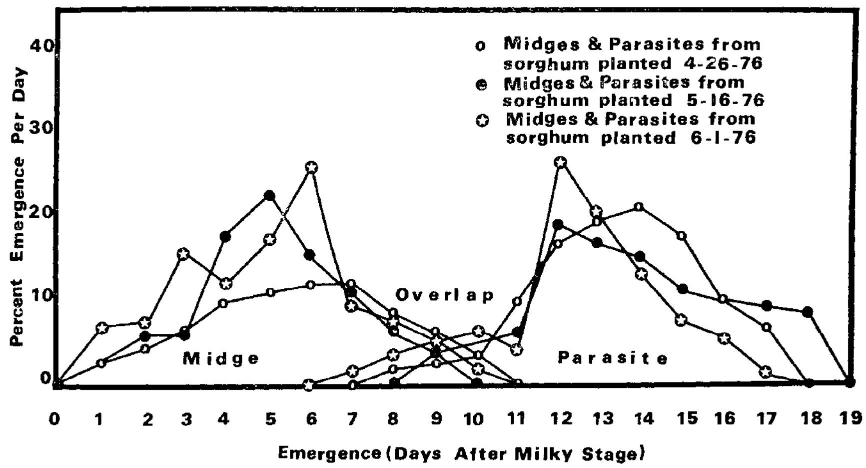

Fig. 1. Emergence of the sorghum midge, *Contarinia sorghicola* (Coquillett), and its parasite *Aprostocetus diplosidis* Crawford from sorghum heads at Quincy, Florida.

In programs where parasite-induced midge mortality is expected to complement chemical midge control, a knowledge of emergence patterns provides a means for optimization of chemical and biological mortality. Insecticide residues could be present on sorghum heads until the 7th or 8th day after the milky stage sufficient to kill emerging midge adults. Residues present after the 8th day, however, must not be lethal to the midge parasite if populations are to be maintained to aid in controlling subsequent midge generations.

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