OCCURRENCE OF SORGHUM MIDGE *STENODIPLOSIS SORGHICOLA (COQ.)* DURING THE SECOND CROP GROWING SEASON ON THE PACIFIC COASTAL PLAIN OF NICARAGUA

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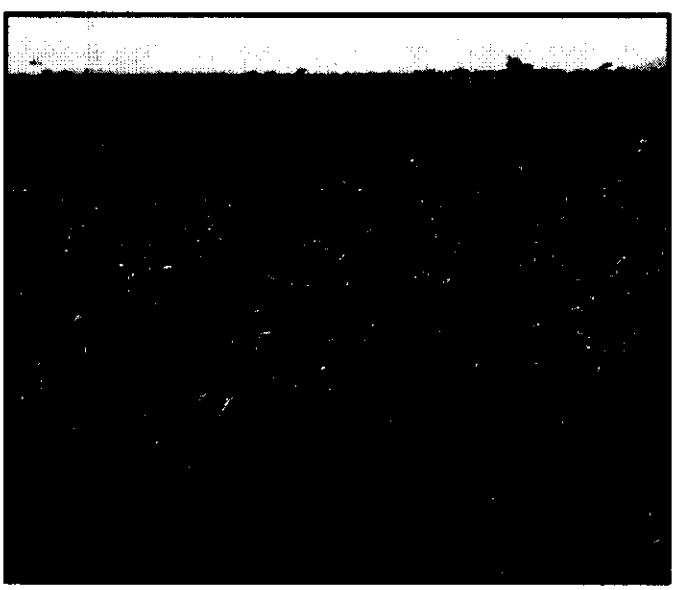
RESUMEN

La mosquita de la panojas del sorgo, *Stenediplosis sorghicola* (Coq.) es una de las plagas mas importantes que atacan al sorgo en Nicaragua. Varios estudios fueron conducidos en el pacifico de Nicaragua durante 1998 y 1999 para determinar hospederos y la actividad de esta plaga durante la segunda fecha de siembra de este cultivo (Postrera). Hembras ovipositaron en sorgo desde mediados de Septiembre hasta los últimos días de Diciembre. Cuando sorgo no se encontraba presente, hembras ovipositaron en sorgo escobero, *Sorghum bicolor* (L.) o pasto Jonson, *Sorghum halepense* L. Pasto Jonson florea durante todo el año y puede servir como hospedero mientras las otras especies de sorghum no se encuentran en el campo. Cuando estos tres hospederos estaban floreando al mismo tiempo, las hembras exhibieron una fuerte preferencia para ovipositar en sorgo. Basado en estas observaciones la mosquita de la panoja del sorgo puede estar activa durante todo el año en el pacifico de Nicaragua. Conocimiento de la ocurrencia y comportamiento de la mosquita en el area, es muy importante para el desarrollo de estrategias de manejo de esta plaga.

Palabras claves: Sorgo, Mosquita de la panoja del sorgo, Hospederos, Comportamiento.



ABSTRACT

The sorghum midge, *Stenodiplosis sorghiciola (Coq.)*, is an important pest of sorghum in Nicaragua. Studies were conducted on the Pacific coastal plain in Nicaragua in 1998-1999 to determine host plants and seasonal activity of this insect during the second crop-growing season. Females oviposited on sorghum from mid-September to late-December. When sorghum was not present, females oviposited on broomcorn, *Sorghum bicolor* (L), or Johnsongrass, *Sorghum halepense* L. Johnsongrass blooms throughout the year and can serve as a breeding host when other host plants are not present. When these three hosts were in bloom simultaneously, females exhibited a strong oviposition preference for sorghum. Based on these observations, the sorghum midge can be active throughout the year on the Pacific coastal plain in Nicaragua. Knowledge of occurrence and behavior of the sorghum midge in this region is helpful in developing management tactics for this pest.

Keywords: Sorghum, Sorghum midge, Behavior

The sorghum midge, *Stendiplosis sorghicola* (Coq.), is reported to be an important insect pest of sorghum. *Sorghum bicolor* (L.) Moench, in Nicaragua (Pineda 1997). Current literature indicates that this insect breeds only on plants in the genus *Sorghum* (Walter 1941). In Nicaragua, there is limited information on the relationship of this species with plants other than sorghum. Knowledge of sorghum midge relationships with host plants in specific geographical areas is essential in developing effective management programs for this pest. Therefore, studies were conducted on the Pacific coastal plain in Nicaragua in 1998-1999 to determine sorghum midge occurrence and host plants during the second crop-growing season.

MATERIALS AND METHODS

Sorghum, broomcorn (*S. bicolor* var. *technicum*) and Johnsongrass (*Sorghum halepense* (L). Pers.) panicles in and around crop production fields were caged with paper bag traps (Fig. 1) to collect sorghum midge adults emerging from panicles. Cages were applied at the end of the first (May plantings) and during the entire second (August plantings) sorghum growing seasons. Twenty panicles of sorghum and/or twenty panicles of Johnsongrass were sampled at random at intervals of 7 to 18 days, from mid-September to mid-November and 14 to 52 days from mid-November to early January from each of four farms near Managua. The farms were located at Los Altos de Masaya, National Center for Agricultural Research (NCAR), Tipitapa and La Paz Centro. Broomcorn plants (20 panicles selected at random) were sampled from late August to late September at NCAR where the plants were grown under cultivation in a field located about 100 meters from the nearest sorghum field.

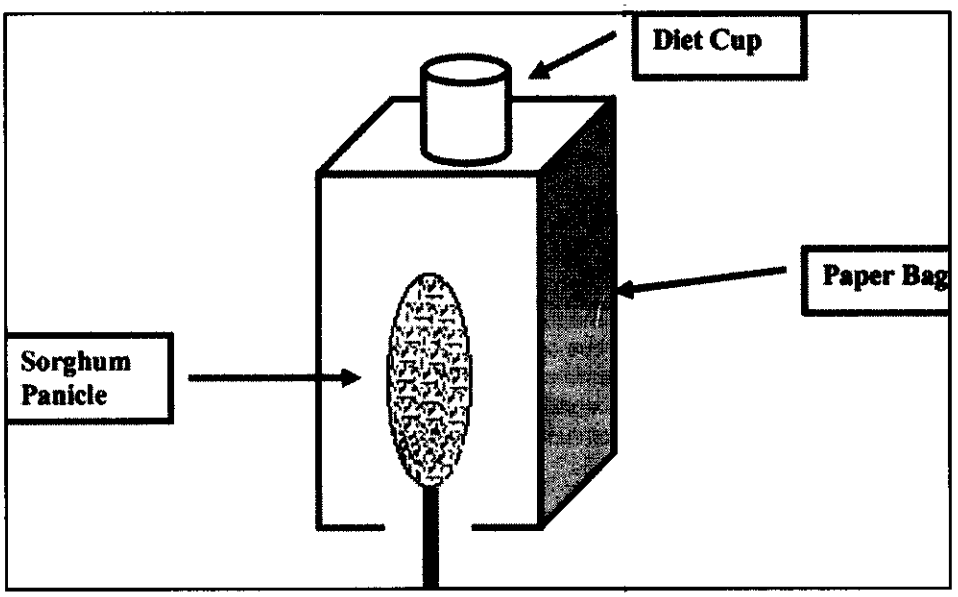


Figure 1. Diagram of a paper bag trap designed to collect adult sorghum midge in the field.

The paper bag trap consisted of a dark brown paper bag (number 10, DURO Bag Manufacturing Co., P.O. Box 16250, Richmond, VA 23224) with a 4 cm diameter hole cut in the bottom. A 29.6 ml clear plastic diet cup (Fill-Rite Inc., Newark, New Jersey 07104) with the inner surface covered with Vaseline® (Chesebrough-Pond's USA Co., Greenwich, CT 06830) was placed over the hold and taped to the outer surface of the bag. The paper bag was placed over the selected panicle as soon as bloom was completed. The bag was stapled around the base of the panicle to prevent sorghum midge adults and other insects from escaping. Adults that emerged from the panicles moved toward the light visible through the plastic cup, entered the cup and were trapped in the Vaseline. Bags covering the panicles remained in the field for at least 22 days, depending on rainfall, to ensure that most adults had emerged. When bags were removed from the panicles, the cups were separated from the bags and midge adults trapped in the Vaseline were counted. When adults were trapped in high numbers, xylene was used to separate insects from the Vaseline in order to make accurate counts. Although Johnsongrass blooms throughout the year (A. Molina, personal communication) and can serve as a continuous host for development of sorghum midge, this host was sampled only during the period from late August 1998 to early February 1999. Sorghum planted in late June was in bloom in August, but the crops were not sampled for sorghum midge infestations. Samples were not collected from mid-November until early January.

Stages of bloom for broomcorn and Johnsongrass were recorded on each sample date and related to phenology of the sorghum crop and sorghum midge. The number of sorghum midge adults per panicle was used to develop an infestation curve for each host plant species, using each location as a replication and plotting the mean and standard deviations of the samples.

RESULTS AND DISCUSSION

Broomcorn was in bloom from mid-August through late-September. Sorghum midge adults were collected in the paper bag traps on this host in relatively small numbers (less than 22 per panicle) from August 28 to September 30 (Fig. 2). As broomcorn blooms became limited and Johnsongrass and sorghum blooms increased in number, the latter two species served as hosts for sorghum midge. Two small peaks of sorghum midge emergence from Johnsongrass panicles were recorded, both at lower levels than the highest number of sorghum midges collected on broomcorn (Fig. 2). One peak occurred in late September and a second in early January. Based on emergence records, greater numbers of sorghum midge adults were collected on broomcorn compared with Johnsongrass (difference >100%, $P<0.05$), reflecting the ovipositional preference by sorghum midge for broomcorn over Johnsongrass.

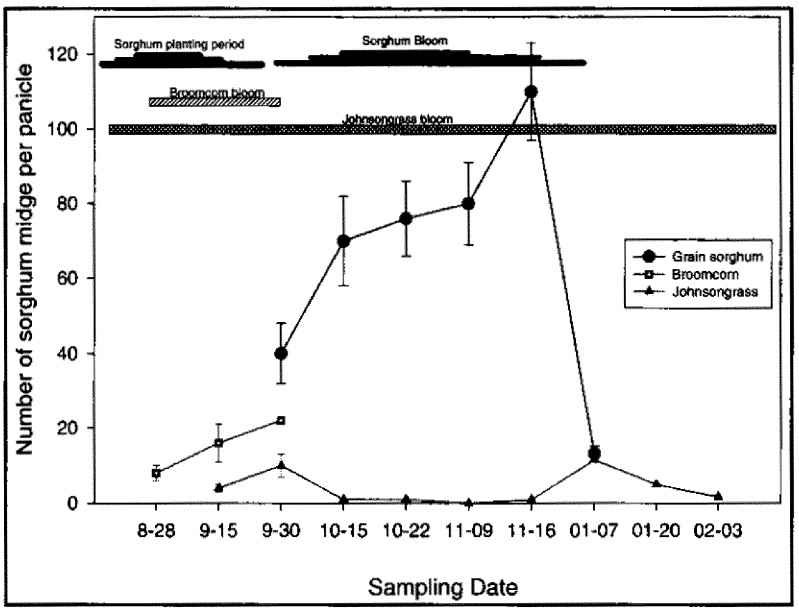


Figure 2. Numbers of sorghum midge on grain sorghum, broomcorn and Johnsongrass during the second sorghum growing season (August to January). Managua, Nicaragua, 1998-1999.

Sorghum midge adult emergence peaks on Johnsongrass were recorded in late July in Texas (Brooks and Gilstrap 1986) and Mississippi (Pitre and Gourley 1980). The two peaks of sorghum midge emergence from Johnsongrass in the present study were related to midge colonization of Johnsongrass when sorghum was not in bloom or when a relatively small number of plants was in bloom (Fig. 2). Sorghum midge adults were collected in greater numbers from sorghum than from broomcorn or Johnsongrass on September 30 and in greater numbers from sorghum than from Johnsongrass during the following month and one-half which supports an ovipositional preference for sorghum over the other two host plants (Fig. 2).

The emergence of sorghum midge adults from sorghum panicles from September 30 to January 7 represented sorghum midge ovipositional activity during the second growing season. Adult emergence peaked in mid-November and declined to a low level in early January. Harris (1961) reported a similar three to four month (July to October) sorghum midge emergence from sorghum in a location in Nigeria at a similar latitude to the study area in Nicaragua.

Since sorghum is grown in two seasons on the Pacific coastal plain of Nicaragua, farmers plant the crop over several weeks during each growing season. Sorghum crops in bloom may be found approximately seven months of the year in this region. The availability of sorghum, Johnsongrass and/or broomcorn blooms for sorghum midge oviposition during this time contributes to a sustainable infestation of sorghum midge in the area.

The decline in numbers of sorghum midge during November is associated with the reduced area of sorghum in bloom. Although the environment from January to May is harsh and sorghum is not grown in the area during this time, sorghum midge can utilize Johnsongrass as a host to sustain populations. Based on infestations of sorghum midge on several host plant species during the second growing season and anticipated dynamics of this pest on sorghum in the first growing season, a bimodal population curve with a peak in mid-November and another peak in mid-July (based on sorghum planting dates during the first growing season in Nicaragua) is expected. These peaks could be associated with periods when the greatest number of sorghum fields in the area are in bloom (Pineda, 1997). Management of Johnsongrass in the proximity of sorghum fields might be beneficial in reducing infestations of sorghum midge on sorghum in crop production areas. Pitre et al. (1975) reported that this pest management tactic is not always practical due to high costs. The practice of removing suitable host plants around sorghum crops could reduce the use of insecticide for control of this pest on sorghum. Nevertheless, insecticides used as needed remain the principal recommended practice for control of sorghum midge on sorghum on the Pacific coastal plain of Nicaragua.

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