SPATIAL AND TEMPORAL PATTERNS OF BEET ARMYWORM TRAP CAPTURES IN NORTHEASTERN MEXICO

J. R. Raulston, D. W. Spurgeon, and O. Zamora
USDA-ARS, Subtropical Agricultrual Research Laboratory
Weslaco, TX
J. Loera
SARH-INIFAP, Campo Experimental Rio Bravo
Rio Bravo, Tamaulipas, Mexico
E. Salgado
SARH-INIFAP, Campo Experimental Del Sur Tamaulipas
Cuauhtemoc, Tamaulipas, Mexico

Abstract

Eighteen trapping sites were established in the Mexican state of Tamaulipas and adjacent areas of Nuevo Leon and San Luis Potosi, and the U.S. Lower Rio Grande Valley, to determine the spatial and temporal patterns of beet armyworm response to pheromone traps. Peak beet armyworm captures occurred in the fall and winter (primarily in October and November) at all sites. At most locations, trap captures in the spring and summer were low relative to the peak capture periods. The period of low capture may have resulted from a lack of available host plants caused by low rainfall during this period. Although beet armyworm moths were captured at all locations, there was considerable variation in the magnitude of capture and no major population source areas were indicated. The differences in capture profiles and magnitudes, suggest that environmental conditions and host plant availability may be more important than migration in governing the presence and magnitude of local populations within this region.

Introduction

The beet armyworm is a polyphagous agricultural pest occurring over much of the world. It is considered a sporadic pest that may reach outbreak proportions when pesticide applications disrupt beneficial insect populations (Hogg and Gutierrez 1980, Summy *et al.* 1996). Recent outbreaks in many U. S. cotton growing regions have accentuated the lack of knowledge of the basic ecology and population dynamics of the beet armyworm relative to population interactions on inter- and intra-regional scales. The beet armyworm does not diapause (Fye and Carranza 1976) and winter ranges are limited to zones capable of sustaining reproductive hosts. Thus, invasions of the pest into temperate zones normally result from migratory movement. Beet armyworm migrations have been documented in England, Europe, and Asia (e.g. Mikkola and Salmensuu 1965, Hurst 1964 and 1965, Mikkola 1967 and 1970, French 1969, Aarvik 1981) Mikkola and Salmensuu (1965), through analyses of meteorological events, hypothesized that beet armyworm moths detected in Denmark originated from an outbreak in Central Asia, requiring a flight of 3,500 km. Using similar techniques French (1969) back-tracked beet armyworm adults arriving in England to sources in North Africa.

Following a severe beet armyworm outbreak on cotton in the Lower Rio Grande Valley (LRGV) of Texas in 1995 (Summy *et al.* 1996), an extensive pheromone trapping system was installed in northeastern Mexico to compare regional trap capture profiles. These data will be useful in determining if inter-regional movement within the study area influences localized beet armyworm population dynamics. Land use and irrigation patterns vary greatly across the study area with the most intensive row crop agriculture located in the LRGV, Abasolo, and southern Tamaulipas. General Teran is a major citrus production area while much of the central region of Tamaulipas is rangeland with some dryland sorghum production. Small plots of dryland corn, planted throughout the year, are pervasive across the entire region. A brief description of the agricultural production in the region is provided by Raulston and Houghtaling (1986). The objective of the current study was to determine the spatial and temporal patterns of beet armyworm pheromone trap capture across northeastern Mexico relative to those occurring in the LRGV.

Materials and Methods

Seventeen trapping sites were established in the state of Tamaulipas and adjacent areas of Nuevo Leon and San Luis Potosi during October of 1995 (Fig. 1). An additional trapping site was installed at Mission, TX on the U. S. side of the LRGV. At each site three bucket type pheromone traps (Universal Moth Traps) were suspended about 1 m above ground from a 1/2" reinforcement bar formed in an inverted "L" shape. Traps at each site were separated by about 50 m. Traps were baited on a monthly basis with beet armyworm pheromone impregnated into rubber septa and a Vaportape II® (Hercon Environmental Company, Emigsville, PA) strip was placed in each trap bucket to kill the moths. Traps were serviced three times weekly. Captured moths were packaged and returned to the laboratory where they were identified and counted. Data are presented as the mean daily capture/trap.

Results and Discussion

Although the numbers varied greatly, beet armyworm moths were captured at all locations in the study region. At most locations, capture increased in the latter part of the year with capture peaks occurring in October and November (figs. 2 to 7). Following the peaks, there was a general decline with low captures (relative to the peak at any given location) occurring through much of the spring and summer.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1229-1232 (1997)
National Cotton Council, Memphis TN

Notable exceptions occurred at LRGV (Mission, Rio Bravo, and Valle Hermoso) (fig. 2), General Teran (fig. 3), Abasolo (fig. 4), Casas, and Ciudad Victoria (fig 5). Capture in the LRGV (fig. 2) appeared more consistent throughout the year than at other sites. This consistency may have resulted from the intensity of irrigation and year-round cropping in this area. Low spring and summer trap captures throughout much of the central and southern regions of Tamaulipas may have been associated with low rainfall during that time of year. Concomittantly, increases in trap capture in the fall could have resulted from increased host availability associated with the onset of the high rainfall season in these regions.

These data indicate the beet armyworm is pervasive throughout the study region, however no discrete population source areas are indicated. Considering the mobility of the adult, inter-regional movement within the study region probably occurs. However, the differences in capture profiles and magnitude, suggest that environmental conditions and host plant availability may play the more important role in governing local populations within this region.

References

Aarvik, L. 1981. The migrant moth *Spodoptera exigua* (Hűbner) (Lepidoptera: Noctuidae) recorded in Norway. Fauna Norv. 28: 92.

French, R. A. 1969. Migration of *Laphygma exigua* Hubner (Lepidoptera: Noctidae) to the British Isles in relation to large-scale weather systems. J. Anim. Ecol. 38: 199-210.

Fye, R. E. and R. L. Carranza. 1973. Cotton pests: Overwintering of three lepidopteran species in Arizona. J. Econ. Entomol. 66: 657-659.

Hogg, D. B. and A. P. Gutierrez. 1980. A model of the flight phenology of the beet armyworm (Lepidoptera: Noctuidae) in cental California. Hilgardia. 48: 36 pp.

Hurst, G. W. 1964. Meteorological aspects of the migration to Britain of *Laphygma exigua* and certain other moths on specific occasions. Agric. Met. 1: 271-281.

Hurst, G. W. 1965. *Laphygma exigua* immigratins into the British Isles, 1947-1963. Intern. J. Bioclim. Biomet. (Ams.) 9: 21-28.

Mikkola, K. 1967. Immigrations of lepidoptera recorded in Finland in the years 1946-1966, in relation to air currents. Ann. Ent. Fenn. 33: 65-99.

Mikkola, K. 1970. The interpretation of long-range migrations of *Spodoptera exigua* Hb. (Lepidoptera: Noctuidae). J. Anim. Ecol. 39: 593-598.

Mikkola, K. and P. Salmensuu. 1965. Migration of *Laphygma exigua* Hb. (Lepidoptera: Noctuidae) in northwestern Europe in 1964. Ann. Zool. Fenn. 2: 124-139.

Raulston, J. R., and J. E. Houghtaling. 1986. Circumstantial ecological evidence for *Heliothis virescens* migration into the Lower Rio Grande Valley of Texas from northeastern Mexico. pp34-47, *in* A. N. Sparks (ed.), Long-Range Migration of Moths of Agronomic Importance to the United States and Canada: Specific Examples of Occurrence and Synoptic Weather Patterns Conducive to Migration. USDA-ARS, ARS-43. 104 pp.

Summy, K. R., J. R. Raulston, D. W. Spurgeon, and J. Vargas. 1996. An analysis of the beet armyworm outbreak on cotton in the Lower Rio Grande Valley of Texas during the 1995 production season. pp. 837-842, Proc. Beltwide Cotton Prod. Res. Conf., National Cotton Council, Memphis, TN.

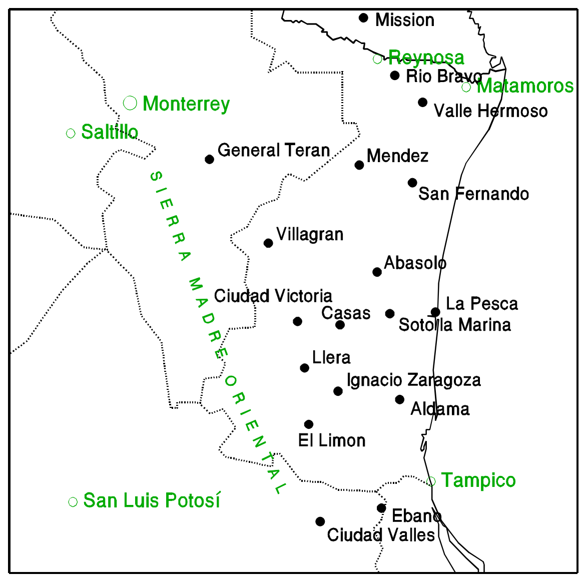

Fig. 1. Beet armyworm trapping sites (●) in northeastern Mexico and South Texas, 1995-1996.

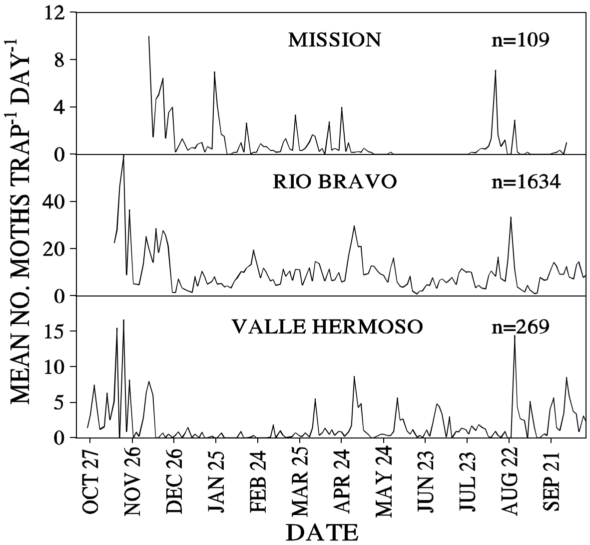

Fig. 2. Beet armyworm trap capture profile (1995-1996) from trap locations in the Lower Rio Grande Valley.

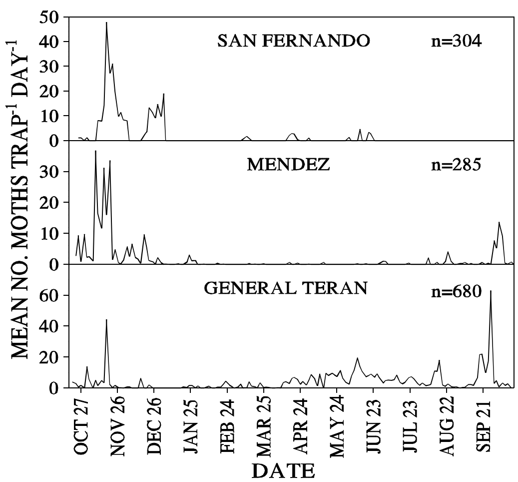

Fig. 3. Beet armyworm trap capture profiles (1995-1996) from trap locations in the northern zone of study region.

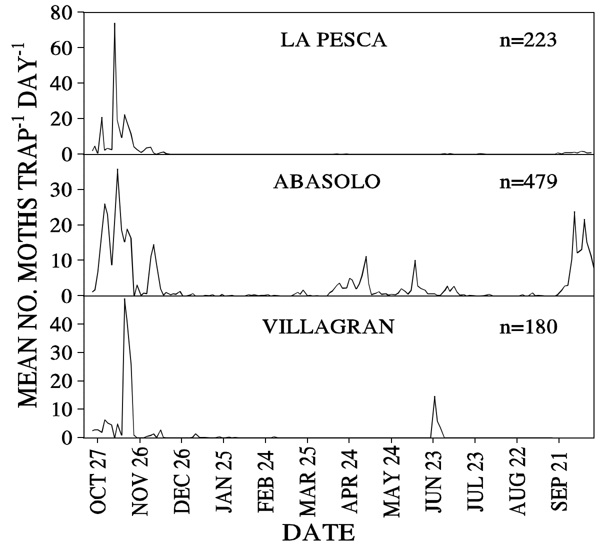

Fig. 4. Beet armyworm trap capture profiles (1995-1996) from trap locations in the north-central zone of study region.

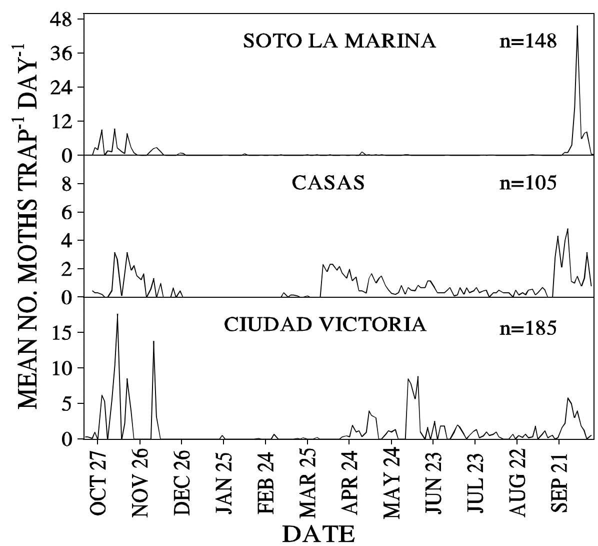

Fig. 5. Beet armyworm trap capture profiles (1995-1996) from trap locations in the central zone of study region.

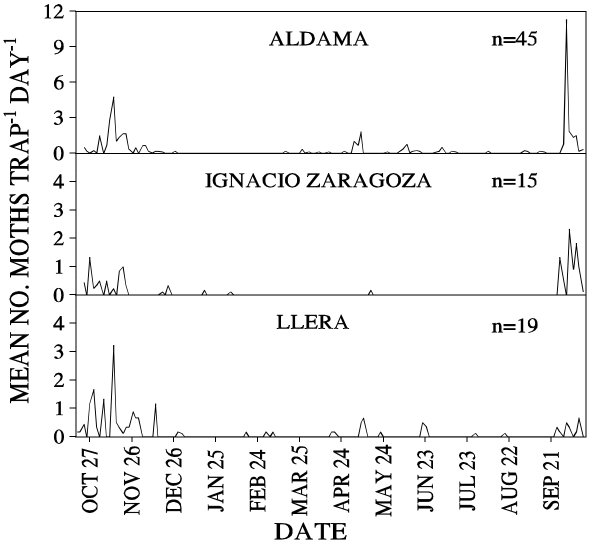

Fig. 6. Beet armyworm trap capture profiles (1995-1995) from trap locations in the south-central zone of study region.

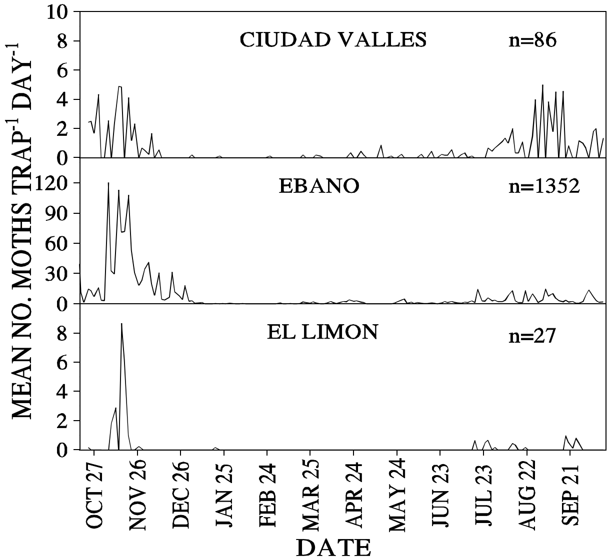

Fig. 7. Beet armyworm trap capture profiles (1995-1996) from trap locations in the southern zone of study region.