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Temporal Occurrence of *Spodoptera exigua* (Lepidoptera: Noctuidae) in Sekinchan, Selangor

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Abstract: Adult of *Spodoptera exigua* populations were monitored in Sekinchan using pheromone traps between 28 January 2003 and 24 April 2004. They were captured all the time in the studied area, although the numbers fluctuated. The highest number of adult catches per trap per day was 6.63 individuals between 15 to 22 August 2003, followed by 6.52 individuals between 19 June to 4 July 2003. The lowest number of adult catches per trap per day was 0.65 individuals between 5 to 22 November 2003. In general, capture increased in the middle part of the year with four capture peaks occurring between April and August 2003. Thus, this date could be used as a benchmark to determine when and if population levels are high enough to have the potential to cause economic damage to crops in Sekinchan, Selangor.

Key words: *S. exigua*, population, pheromone trap

Introduction

The beet armyworm, *Spodoptera exigua* (Hübner) has been considered an occasional pest associated with hot and dry conditions (Stewart *et al*., 1996). They have found severe beet armyworms outbreaks occur following early seasons with multiple insecticide applications or when it is unusually dry. Eveleen *et al*. (1973) suggested that *S. exigua* abundance is favored by frequent insecticide use; otherwise it is considered a secondary or induced pest in some crops. A vast study on adult population of *S. exigua* has been done in the United States of America (for examples by Adamczyk *et al*., 2002; Hendricks *et al*., 1995; Raulston *et al*. 1997), since it has become a serious pest especially on cotton (Hendricks *et al*., 1995; Ruberson *et al*., 1994a,b). However, in Malaysia, such study was scanty. The only recorded information are by Palasubramaniam *et al*. (2000) and Sivapragasam and Syed (2001). Thus, this study was conducted to determine the presence of adult *S. exigua*, particularly the male species and to monitor their population in the studied area.

Materials and Methods

Study Site

Field study was carried out in Parit 5, Sekinchan, Selangor. The site is a vegetables plantation which was located in a paddy field area and used to be a paddy field. Size of the study area is 3 acres. Crop which has been planted in this experimental area during the study was long beans, lady's finger, cucumber, brinjal and chilli. Usually there are two types of crops being planted simultaneously. For example, long beans with lady's finger or cucumber with lady's finger or cucumber with brinjal or long beans with brinjal or chilli with brinjal. These crops were planted according to the farmers' selection due to the market price.

Adult's Trapping

Adult population was monitored by using DELTA trap baited with synthetic beet armyworm sex pheromone impregnated into rubber septa that lured males to the traps. Twelve traps were allocated in the study area and they were arranged randomly (Fig. 1). The traps were suspended about 1 m above ground from a 1 reinforcement stick formed in an inverted L shape anchored in the soil. Each trap was separated by about 10 meters (i.e., at 10 beds distance). Traps were serviced between 7 to 35 days but usually around every 2 weeks. During the trap servicing, the adult catches were counted and recorded on site and also the pheromone and plastic layer with sticky glue sprayed on it was changed. Trapping was made from 28 January 2003 until 24 April 2004.

Weather records on temperature, relative humidity and rainfall were obtained from the Meteorological Department at Petaling Jaya. They actually gathered the data from a meteorological station at the Pusat Pertanian, Tanjung Karang.

Data Analysis

Number of moths caught per trap per day was used as the basic unit for purposes of analyses and graphic illustrations. The data were handled this way because the number of days for trapping the adults varied. This is due to the availability of transportation or the weather condition. Correlation analyses were performed to determine the relationship between the moth populations and abiotic factors.

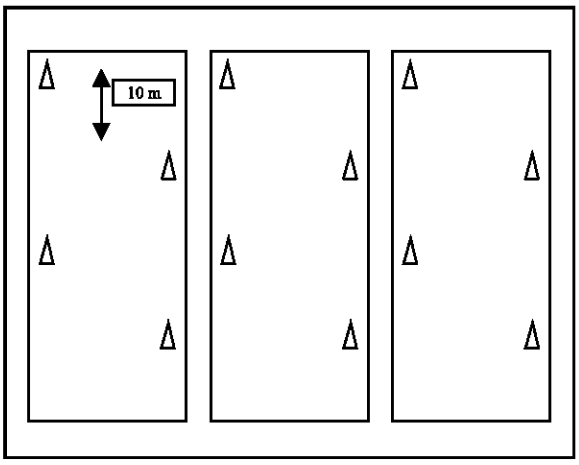

Fig. 1: DELTA trap arrangement in the field

Results

Adults of *S. exigua* were captured all the time in the studied area, although the numbers fluctuated (Fig. 2). A total number of 14203 male moths were caught throughout the study. The highest number of adult catches per trap per day was 6.63 individuals between 15 to 22 August 2003, followed by 6.52 individuals between 19 June to 4 July 2003. The lowest number of adult catches per trap per day was 0.65 individuals between 5 to 22 November 2003. In general, capture increased in the middle part of the year with four capture peaks occurring between April and August 2003 (Fig. 2).

The averaged temperature ranges from 26.88 to 28.52°C, relative humidity 78.56 to 86.14% and rainfall 0.00 to 11.25 mm. This study found that climatic factors did not influence the moth

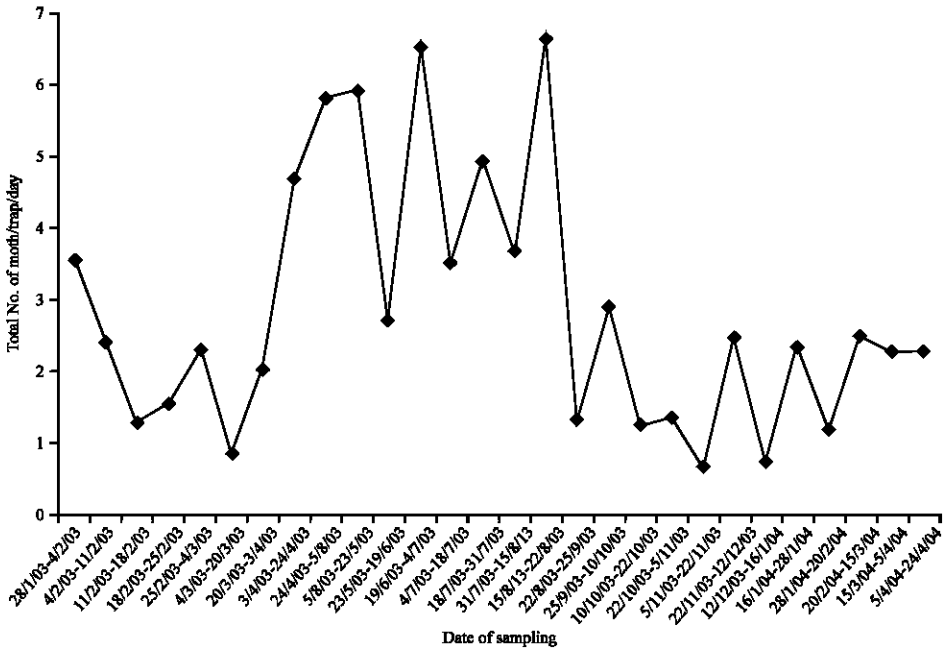

Fig. 2: Adult catches in Sekinchan, Selangor

populations. There were no correlation between the adult catches with the means of temperature (r = 0.1556), relative humidity (r = 0.265) and rainfall (r = 0.08).

Discussion

This study has found that the *S. exigua* adults were present throughout the study, i.e., from the 28 January 2003 until 24 April 2004 in Sekinchan, Selangor, although their number was fairly low compared to Palasubramaniam *et al.* (2000). Their short period survey (i.e., one week in October, 1998) in Batang Kali, Selangor at the onion plantation caught 21.43 individuals of moth per trap per day. Besides Selangor, they also have done some survey in several places in Johor such as in Johor Bahru, Batu Pahat, Kluang and Kota Tinggi for six months (i.e., from July until December, 1997) and in Air Hitam for one week (i.e., in February, 1998), using the pheromone trap. However, the number of catches per trap was not as high as in Batang Kali i.e., 24.0, 1.0, 5.1, 2.0 and 37.0, respectively. While, Sivapragasam and Syed (2001) reported that maximum number of male caught in Cameron Highlands were 10.57 per trap per day. Meanwhile, in Mississippi, USA, Hendricks *et al.* (1995) reported that during the growing season, captures ranged from 2.1 moths to 399.8 per trap per night.

Since Malaysia is not a seasonal country, the abiotic factors were found not influencing the moth populations in this study. This is somewhat similar to Jaipet (1998) finding. He stated that climatic factors did not have much influence on the moth accept they showed highest negative correlation with maximum humidity. Nevertheless, it was observed that the availability of the host plant is the factor that attracting the moths to the study plot. The same phenomenon was encountered by Raulston *et al.* (1997) in northeastern Mexico. They reported that the increases in trap capture in the fall could have resulted from increased of host availability associated with the onset of the high rainfall season. Thus, the fluctuation in the number of adult catches could be due to the larval host range and

their abundance within or between the study areas, where there were other vegetables cultivated area. Similar occurrence was also reported by Adamcyzk *et al.* (2002) in Mississippi.

On contrary, Smith (1989) has often observed that beet armyworms outbreaks are more serious in the dry years than in wet ones. There are several possible explanations for this phenomenon. The availability of moisture and free water can greatly enhanced the induction and spread of entomopathogen epizootics. Beet armyworms are attacked by various fungal and viral pathogens. The beet armyworms are fairly easily dislodged from plants and heavy rains may knock larvae from plants and drown them (Ruberson *et al.*, 1994b). However, the weather in Sekinchan was considered moderate i.e., not really dry, in order to cause outbreak of the *S. exigua*. Perhaps, a more prolonged duration of study should be made in the future, in order to determine the relationship between the weather and their population in much detail.

During the field study, even though the host plant in the study plot was not much available or not exist, the pheromone traps still catches the adults of *S. exigua*. This shows that the adults came from the adjacent area of the study plot. This occurrence is supported by Capinera (1999) who reported that the adults frequently invade from surrounding crops or weeds. Moreover, French (1969) and Feng *et al.* (2003) stated that the beet armyworm is capable of long distance dispersal of hundreds of miles in relation to weather patterns.

Stewart *et al.* (1996) found that there were relationship between the number of early season insecticide applications and rainfall, but not temperature to percent yield loss caused by beet armyworm. They indicate that the more early season insecticide applications are made and the drier the weather, the greater the risk of beet armyworm outbreaks. Further, Eveleens *et al.* (1973) stated that *S. exigua* on cotton in California is typically a secondary pest, likely to become abundant after insecticide applications against *Lygus hesperus*. While, in this study, the farmers were observed to spray insecticides once a week and were more frequent during the raining days. Perhaps, this could be another reason of the moth existence year around in the study plot due to the elimination of its natural enemies by the insecticides. However, their relationship was not certain and further studies are needed to document these patterns more extensively.

The pheromone trap was used to monitor the adult populations in this study. This is because Parker *et al.* (1995) stated that the pheromone is useful for monitoring and to determine the entry of the pest into the field. However, the pheromones will not control beet armyworm. Hendricks *et al.* (1995) demonstrated that sharp decline in catch coincided closely with nights when low air temperature fell below 48°F. Apparently, male beet armyworm flight and response to sex pheromone emitted from the trap baits were significantly reduced when temperature fell below 48°F between 11 pm and dawn. Further, Sappington *et al.* (2001) stated that sampling adult populations with pheromone traps can provide an indication of relative population changes in an area, but specific relationship, if any, between numbers of moths captured in traps and infestation levels in fields is not known.

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References

Adamczyk, Jr. J.J., M.R. Williams, J.T. Reed, D.W. Hubbard and D.D. Hardee, 2002. Spatial and temporal occurrence of beet armyworm (Lepidoptera: Noctuidae) moths in Mississippi. Florida Entomol., 86: 229-232.

Capinera, J.L., 1999. Beet armyworm, *Spodoptera exigua* (Hibner) (Insecta: Lepidoptera: Noctuidae). Entomology and Nematology Department Series, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, pp: 4

Eveleen, K.G., R. Van Den Bosch and L.E. Ehler, 1973. Secondary outbreak induction of beet armyworm by experimental insecticide applications in cotton in California. Environ. Entomol., 2: 497-503.

Feng, H.Q., K.M. Wu, D.F. Cheng and Y.Y. Guo, 2003. Radar observations of the autumn migration of the beet armyworm *Spodoptera exigua* (Lepidoptera: Noctuidae) and other moths in northern China. Bull. Entomol. Res., 93: 115-124.

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

Hendricks, D.E., D.W. Hubbard and D.D. Hardee, 1995. Occurrence of beet armyworm moths in cotton-growing areas of the lower Mississippi river delta as indicated by numbers caught in pheromone traps from April to November 1994. Proceedings 1995 Beltwide Cotton Production Conference, 2: 802-804.

Jaipet, A., 1998. Population Dynamics of Vegetable Insect Pests. AVRDC-ARC Research Report 1998. pp: 4 http://www.arc-avrdc.org/html_files/Areewun Jaipet.html

Palasubramaniam, K., R. Thiagarajan and A.B. Othman, 2000. Status of Beet Armyworm (*Spodoptera exigua*) in Peninsular Malaysia. In: Proceedings of the Plant Health Seminar, Zakaria, S. (Ed.). Malaysian Plant Protection Society, pp: 123-126.

Parker, B.L., N.S. Talekar and M. Skinner, 1995. Field guide: Insets pests of selected vegetables in tropical and subtropical Asia. Publication 94-427, pp: 2 http://www.avrdc.org/LC/tomato/armyworm.html.

Raulston, J.R., D.W. Spurgeon and O. Zamora, 1997. Spatial and temporal patterns of beet armyworm trap captures in Northestern Mexico. Proceedings 1997 Beltwide Cotton Production Conference, 2: 1229-1232.

Ruberson, J.R., G.A. Herzog, W.R. Lambert and W.J. Lewis, 1994a. Management of the beet armyworm (Lepidoptera: Noctuidae) in cotton: Role of natural enemies. Florida Entomol., 77: 440-453.

Ruberson, J.R., G.A. Herzog, W.R. Lambert and W.J. Lewis, 1994b. Management of the beet armyworm: Integration of control approaches. Proceedings 1994 Beltwide Cotton Production Conference, pp: 857-859.

Sappington, T.W., S.M. Greenberg and R.A. Tisdale, 2001. Location of beet armyworm (Lepidoptera: Noctuidae) egg mass deposition within canopies of cotton and pigweed. Environ. Entomol., 30: 511-516.

Sivapragasam, A. and A.R. Syed, 2001. The genus *Spodoptera* with emphasis on the ecology and natural enemies of the beet armyworm, *Spodoptera exigua* Hubner in Malaysia. Malaysian Plant Protection Society Newsletter October 2001, pp: 6-7.

Smith, R.H., 1989. Experiences with beet armyworm control in cotton in 1988. Proceedings Beltwide Cotton Production Conference, pp: 273-275.

Stewart, S.D., M.B. Layton, Jr. and M.R. Williams, 1996. Occurrence and control of beet armyworm outbreaks in the cotton belt. Proceedings 1996 Beltwide Cotton Production Conference, pp: 846-848.