
International Journal of Advanced Research in Biological Sciences

ISSN : 2348-8069

www.ijarbs.com

Research Article



Entomological survey on cotton whitefly in district Bahawalpur

Maqbool Shah¹, Ahmad Nawaz², Rahat Hussain Rashid³, Mazher Farid Iqbal⁴, Faryad Hussain⁵,
Sohaib Aslam⁶ and Mansoor-ul- Hasan⁷

Pest Warning and Quality Control of Pesticides, Bahawalpur¹, Hasilpur² and Rajanpur³

⁴Adaptive Research Station, Sialkot

⁵Directorate General Agriculture (Ext. & A. R) Punjab-Lahore

⁶Foramen Christian College Lahore-54000

⁷Department of Agri-Entomology, University of Agriculture, Faisalabad

*Corresponding author: adappbwp@gmail.com

Abstract

An entomological survey on pest scouting of whitefly in standing cotton was conducted to evaluate month-wise comparison of spots of Above and Below Economic Injury Level (AEIL and BEIL) in District Bahawalpur during 2012-2013. Spot-wise population of whitefly was recorded 3.15%, 0.00% as above EIL with 80.75% and 88.96% below EIL during May in both the years respectively. However 15.76% and 5.04% spots were recorded above EIL and 77.97%, 86.69% below EIL during June in both the years. During July gradually increased spots were recorded 18.65%, 8.92% of above EIL and 81.35% and 91.08% below EIL. During August above EIL of spots were recorded 17.51%; 11.46% with below EIL was 81.49% and 88.54%. However in September 23.13%, 19.68% spots infested were AEIL with 76.87% and 80.48% were recorded BEIL. During October maximum 34.45% spots were recorded above EIL but 65.55% spots were recorded BEIL during 2013. However during 2012, the spot-wise population of whitefly trend decreased as 16.67% above EIL but 83.33% spots was below EIL. Spot-wise comparison showed significant result ($P < 0.05$) in above economic injury level (AEIL) of whitefly i.e. 59 and 25 spots in September during both years. However during October 44 and 31 above EIL spots showed non significant effect ($P > 0.05$) with each other but highly significant ($P < 0.05$) result with all rest of the months. Maximum spots were recorded below EIL i.e. 147; 146; 126; 115 and 112 were statistically non significant ($P > 0.05$) to each other during 2013. However highest spots recorded below EIL i.e. 147; 146 were showed non significant ($P > 0.05$) result with each other but showed significant result ($P < 0.05$) with all rest of the treatments during 2012. At the end it was concluded that population of whitefly was increasing above EIL gradually with the passage of time up-to October. However the cotton growers should be vigilant during June-October. However the farmers were advised to do regular pest scouting in their fields with the consultation of plant doctors in crucial time to avoid high infestation of whitefly.

Keywords: Pest Scouting, Survey, Cotton, Whitefly, Bahawalpur, Punjab-Pakistan

Introduction

Cotton (*Gossypium hirsutum* L.) is cash crop popularly known as silver fiber, back bone of Pakistan; considered the fourth largest producer and third largest consumer throughout the world (Zeeshan et al. 2010). Cotton having a share of 1.4% in GDP, 6.7% in agriculture value addition and an important source of raw material to the textile industry. During

July-March 2013-14, textile industry fetched foreign exchange earnings of US\$ 10.385 billion. The crop was cultivated on an area of 2806 thousand hectares, 2.5% less than last year's area of 2879 thousand hectares. The production stand over 12.8 million bales during this period against the target of 14.1 million bales, showing decline of 9.2% against the target and

decline of 2.0% over the last year production of 13.0 million bales. The cotton production is decreased due to fall in the area sown which is due to low rates of cotton nationally and internationally prevailed during last two years that discouraged the growers to put more area under crop and shifting the area to maize and rice crops in some districts of Punjab due to their better market returns (Anonymous, 2013). However the growth of agriculture is expected 1.2% compared to 0.6 % (Anonymous, 2011). Huge pest complex is recorded in cotton crop; however maximum quantity of pesticides were sprayed to break out the life cycle of pest. The crop was lost upto 30-40% by the attack of Insect Pest (Huque, 1972). Several insect pests are responsible for causing yield reduction in cotton either directly through sucking cell sap or even eating different parts of plant. Insect pests are major limiting factors in producing cotton and hundreds of species of insect pests found in a cotton field, but 10-15 of those species are capable of producing economical damage (Greene, 2012). Whiteflies (Homoptera: Aleyrodidae) are small insects that feed on nymphs and adults on plant sap with piercing-sucking mouthparts (Stewart, 1914). Heavy infestations weaken plants and cause wilting and yellowing of leaves. Honeydew excretions from feeding nymphs accumulate on plants, giving them a sticky but shiny appearance. Sooty mold developed on honeydew can cover leaves and stain the lint. This is generally not a serious problem in the Mid-South because rain will often “wash” the lint. However, the accumulation of honeydew and sooty mold is an indication of heavy infestations that may need to be treated with insecticides (Stewart, 1914). Whiteflies are polyphagous insect that feed on a large number of host plants fruit trees, vegetables, ornamentals, weeds and field crops. However, the magnitude of infestation and the nature and extent of injury vary with plant species, seasons and localities. That can be attributed to the presence of biotypes (A and B) in this species, especially the 'B' biotype which is a very voracious feeder (Tayyib et al. 2014). Adults and larvae of *B. tabaci* feed by sucking the phloem and are attracted by yellow color. In relation to its host plant, *B. tabaci* is affected by the external physical characteristics of the leaf, e.g., hairiness vs. glabrousness, sticky glandular trichomes, leaf shape (okra/ super okra) foliage density; and the internal chemical characteristics of leaf, e.g., pH of leaf sap as sources of mechanisms of resistance in cotton (Berlinger, 1986). A serious outbreak of cotton whitefly (*Bemisia tabaci*) was occurred in August, 1974

and completely destroyed the crop in parts of Lahore, Sahiwal, Faisalabad, Jhang, Sargodha and Rahim Yar Khan Districts where majority of the farmers had to plough up their cotton fields (Yunus et al. 1980). The continuous and indiscriminate use of synthetic pesticides led to adoption of IPM approaches which are very useful potential means of ameliorating commodity losses to pests, thereby enhancing the long term sustainability of agro-ecosystem. Under Integrated Pest Management (IPM) the host plant resistance is internationally recognized approach. The varietal resistance can play an important role in compatible with different pest control tactics of IPM (Ali and Ahmad, 1982; Jin et al. 1999 and Khan et al. 2003). However entomological survey was carried out on cotton whitefly infestation in the area of District Bahawalpur to evaluate spot wise comparison of whitefly during 2012-2013.

Materials and Methods

An entomological survey on pest scouting of whitefly in standing cotton was conducted to evaluate month-wise comparison of spots of Above and Below Economic Injury Level (AEIL and BEIL) in District Bahawalpur during 2012-2013. The success of entomological survey was done by interviewing the farmers of each spot. The entire District was divided into small pockets and pest scouting was done by Mario Method, however pest scouting was done at morning and evening time. The EIL of both nymph and adult of whitefly was 4-5/leaf during the whole season. The attack was recorded from three upper, middle and lower portions of leaves from randomly selected plant then taken its average. The survey showed that maximum farmers were used Pyriproxyfen @ 1000 ml/ha followed by acetameprid @ 375g/ml/ha and buprofezin @ 1500g/ha for controlling whitefly of cotton. When bolls were mature and opened at the end of September and later on 2-3 picking was applied in the field. The data collected were statistically analyzed by analysis of variance technique at 5% level of probability (Steel and Torrie, 1980).

Results and Discussion

Fig. 1 showed that Spot-wise population of whitefly was recorded 3.15%, 0.00% as above EIL with 80.75% and 88.96% below EIL during May, 2012-2013. However 15.76% and 5.04% spots were recorded above EIL and 77.97%, 86.69% below EIL

during June in both the years. During July gradually increased in spots were recorded 18.65%, 8.92% of above EIL and 81.35% and 91.08% below EIL. During August above EIL of spots were recorded 17.51%; 11.46% with below EIL was 82.49% and 88.54%. However in September 23.13%, 19.68% spots infested were AEIL with 76.87% and 80.48% were recorded BEIL. During October maximum 34.45% spots were recorded above EIL but 65.55% spots were

recorded BEIL during 2013. However during 2012, the spot-wise population of whitefly trend decreased as 16.67% above EIL but 83.33% spots was below EIL. The population of whitefly was increasing in AEIL gradually with the passage of time up-to October. These results were supported by Tayyib (2014) who reported that Imidacloprid and acetamiprid was most effective against sucking insectpest of cotton especially whitefly.

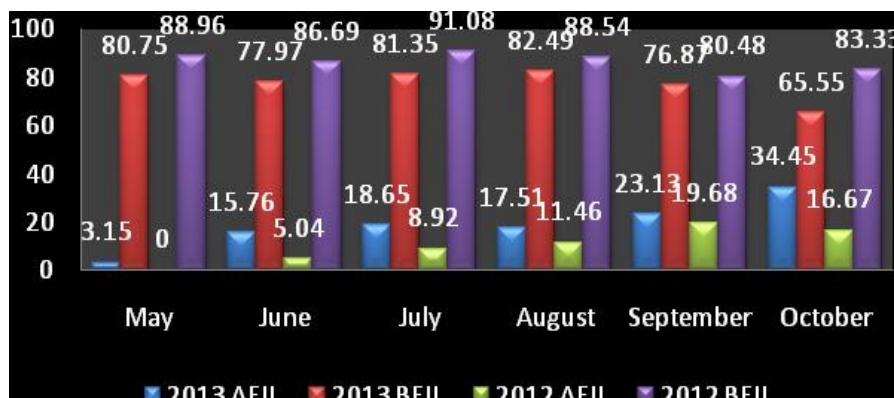


Figure 1 showing month-wise comparison of percentage spots of aboveeconomic injury level (AEIL) and below economic injury level (BEIL)

Table 1 revealed that Spot-wise comparison showed significant result ($P < 0.05$) in above economic injury level (AEIL) of whitefly i.e. 59 and 25 spots in September during both years. However during October 44 and 31 above EIL spots showed non significant effect ($P > 0.05$) with each other but highly significant ($P < 0.05$) result with all rest of the months. Maximum spots were recorded below EIL i.e. 147; 146; 126; 115 and 112 were statistically non significant ($P > 0.05$) to each other during 2013. However highest spots recorded below EIL i.e. 147; 146 were showed non

significant ($P > 0.05$) result with each other but showed significant result ($P < 0.05$) with all rest of the treatments during 2012. Studies showed that the cotton whitefly, *Bemisia tabaci* had been recorded feeding on 540 host plants belonging to 77 families (Basu, 1995). They also suggested that Movento and Imidacloprid were proved to be highly effective against sucking pests of cotton. *B. tabaci* laid less number of eggs on sparsely hairy cotton variety and most of the eggs were laid on velvet hairy variety (Butter and Vir, 1991).

Table 1 showing Spot-wise comparison of above economic injury level (AEIL) and below economic injury level (BEIL) during 2012-13

Month	Spots AEIL		Spots BEIL	
	2013	2012	2013	2012
May	31 b	19 b c	146 a	147 a
June	34 b	14.3 c	147 a	146 a b
July	3 c	0 d	64 b	71 c
August	23 b	7 c d	115 a	121 b
September	59 a	25 a b	126 a	112 b
October	44 a b	31 a	112 a	127 b

At the end it was concluded that population trend of whitefly increased above EIL gradually with the passage of time. However the cotton growers should be vigilant to implement following actions. 1) Field and water channel should be free from all types of weeds. 2) Whitefly should be controlled in alternate hosts like in vegetables. 3) Seed should be treated with Imidachloprid @ 5g/kg of seed or suitable available insecticides to provide initial control measures against this pest. 4) Regular pest scouting or Integrated Pest Management (IPM) should be implemented with the consultation of plant doctors in crucial time to avoid high infestation of whitefly.

References

Ali, A. and M. Ahmad. 1982. Biophysical resistance in different varieties of cotton against insect pests. Pak. Ento. 4: 27-32.

Anonymous, 2013. Economic survey of Pakistan Ministry of Food and Agriculture and Livestock Stat. Division Govt. of Pakistan Islamabad pp-26.

Anonymous, 2011. Economic survey of Pakistan Ministry of Food and Agriculture and Livestock Stat. Division Govt. of Pakistan Islamabad.

Basu, A.N., 1995. *Bemisiatabaci* (Gennadius): crop pest and principal whitefly vector of plant viruses. Oxford & IBHPubl. Co. Pvt. Ltd., New Delhi, pp.183.

Berlinger MJ (1986). Host plant resistance to *Bemisiatabaci*. Agriculture, Environment, 17:69-82. Ecosy.andEnvir. 17: 69-82.

Butter, N.S. and B.K. Vir. 1991. Response of whitefly *Bemisiatabaci* to different cotton genotypes under glass house conditions. Ind. J. Ento. 53(1):115-119.

Greene JK (2012). South Carolina Pest Management Handbook for Field Crops. Pp. 91-105.

Huque, H., 1972. Cotton Entomology: In Cotton in Pakistan Center cotton Commit. Karachi. pp 183-238.

Jin, Z. Q., G. D. Cao, S. S. Luo, J. M. Hong and Y. Q. Hung. 1999. Insect resistance and yield of different insect resistant hybrid cotton cultivars. Zhejiang NongyeKexue, 3: 142-144.

Khan, M. T., M. Naeem and M. Akram. 2003. Studies on the varietal resistance of cotton against insect pest complex of cotton. Sarhad J. Agri. 19:93-96.

Stewart, S. D. 1914. Cotton Insects. Agricultural Extension Services. University of Tennessee.

Steel, R. G. D. and J. H. Torrie. 1980. Principals and procedures of Statistics, McGraw Hill Book Co., New York.

Tayyib, M., A. Suhail, M.J. Arif and M.A. Khan, 2014. Whiteflies (Aleyrodidae: Homoptera) of Punjab Pakistan. Pak. Ento. 36(1):31-34.

Yunus, M., M. Yousuf and G. Gilani, 1980. Insect and spider mite pests of cotton in Pakistan. Final report P. L. 480 Project., Deptt. Ent. Univ. Agric., Faisalabad, pp. 256.

Zeeshan A., Khan, T. M., and Noorka, I. R. 2010. Detail analysis to determine gene action for lint (%) and fiber traits in upland cotton. Int. J. Agri. Appl. Sci. 2(1):11-14.