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Comparison of Infestation Ratio of Pink Bollworm (*Pectinophora gossypiella* Saund.) and Spiny Bollworm (*Earias insulana* Boisd.) on Blind Bolls in Arid Regions

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Abstract: This study was carried out to compare the infestation ratio of Pink Bollworm, PBW (*Pectinophora gossypiella* Saund.) and Spiny Bollworm, SBW (*Earias insulana* Boisd.) on blind bolls in Harran (Şanlıurfa), Kızıltepe (Mardin) and Bismil (Diyarbakır) Plains during 2002-2003. The blind bolls were collected from cotton fields at the end of the harvest and the infestation ratio with these pests was determined. Infestation ratio, the numbers of PBW and SBW larvae of that three plains were compared with each other. At the end of this study, Harran Plain was recorded as the most infested area with these bollworms. The population of PBW larvae was higher than that of SBW in Harran Plain. In contrast, the population of SBW larvae was higher than that of PBW in Bismil and Kızıltepe Plains. The infestation ratio with these bollworms of collected blind bolls in Harran, Kızıltepe and Bismil Plains in 2002-2003 was found as, 73.71, 65.28, 11.57, 22.00, 6.28 and 6.71%, respectively. In addition, PBW was recorded for the first time Kızıltepe and Bismil Plains with this study.

Key words: Pink bollworm, spiny bollworm, blind boll, cotton, infestation ratio

INTRODUCTION

The Harran-Şanlıurfa, Kızıltepe-Mardin and Bismil-Diyarbakır Plains, in Southeast Anatolian region, are quite important plains for cotton growing. Cotton sowing areas in these provinces (Şanlıurfa, Mardin and Diyarbakır) were 249744 ha and total yield was 802219 ton^[1]. These sowing areas occupy 80.31% of all Southeast Anatolian Project's cotton areas.

Pectinophora gossypiella Saund. (Gelechiidae) and *Earias insulana* Boisd. (Noctuidae) which are in Lepidoptera order are important pests of cotton. PBW is an important pest of cotton throughout the world. PBW was described from larvae recovered from infested cotton bolls in India in 1843^[2]. SBW is an important cotton pest in Israel^[3], Syria^[4] and Turkey^[5,6].

SBW was found in Diyarbakır^[7,8] and in Şanlıurfa cotton growing areas^[5,9]. SBW was not recorded in Mardin previously. Similarly, PBW was not recorded in Diyarbakır and Mardin provinces. Both pests have limited the cotton production in the Harran Plain and economic aspects of this damage were reported in previous studies^[6,10].

The aim of this study was to survey the plains and to determine the infestation ratio of PBW and SBW on Blind bolls in Harran, Kızıltepe ve Bismil Plains. In addition, the

plains were compared with each other in terms of infestation ratio.

MATERIALS AND METHODS

This study was carried out during the years of 2002 and 2003 in Harran, Kızıltepe and Bismil Plains. Randomly selected cotton plants were examined for the presence of PBW and SBW. After the harvest of cotton, randomly selected seven cotton fields (each 1 ha) from each plains were selected to collect the blind bolls. The PBW and SBW were determined on randomly selected 100 blind bolls at each field. After the examination of bolls in the laboratory, the bolls with PBW and/or SBW were classified as bolls with larvae and the bolls without larvae were classified as infested without larvae.

RESULTS

PBW and SBW cause damage to cotton production. Although PBW was found in Harran Plain for the first time by Özpınar *et al.*^[11], its population increased in recent years, because farmers use cotton seeds unconsciously and they do not recognize the pest. Growers do not know the biological and physical properties of the pest so that they cannot control them properly.

Table 1: Infestation ratio and the number of larvae of Pink bollworm and Spiny bollworm on blind bolls in Harran Plain during 2002 and 2003

	Place	NCB	NIB (Piece)	IR (%)	NBL (Piece)	NBWL (Piece)	SBW	PBW
2002	Huzurlu	100	42	42.00	36	6	1	69
	Çavdarlı	100	69	69.00	67	2	1	138
	Uğurlu	100	87	87.00	86	1	1	291
	Yardımcı	100	94	94.00	94	0	3	273
	Yenice	100	66	66.00	62	4	1	109
	Mutlukaya	100	78	78.00	70	8	0	132
	Külünçe	100	80	80.00	77	3	1	201
	Average	100	516	73.71	492	24	8	1213
2003	Huzurlu	100	56	56.00	51	5	-	119
	Çavdarlı	100	69	69.00	67	2	4	126
	Uğurlu	100	67	67.00	67	0	0	125
	Yardımcı	100	66	66.00	60	6	-	98
	Yenice	100	82	82.00	82	-	-	170
	Mutlukaya	100	66	66.00	66	-	1	130
	Külünçe	100	51	51.00	43	8	-	70
	Average	100	457	65.28	436	21	5	838

Table 2: Infestation ratio and the number of larvae of Pink bollworm and Spiny bollworm on blind bolls in Kızıltepe Plain during 2002 and 2003

	Place	NCB	NIB (Piece)	IR (%)	NBL (Piece)	NBWL (Piece)	SBW	PBW
2002	Akyüz	100	6	6.00	6	-	6	-
	Akalın	100	19	19.00	9	10	9	-
	Doyuran	100	7	7.00	4	3	4	-
	Tanrıveren	100	19	19.00	10	9	10	-
	Araköy	100	2	2.00	2	-	2	-
	Altıntoprak	100	12	12.00	7	5	5	2
	Çağıl	100	16	16.00	5	11	5	-
	Average	100	81	11.57	43	38	41	2
2003	Akyüz	100	26	26.00	22	4	22	-
	Akalın	100	28	28.00	22	6	24	-
	Doyuran	100	38	38.00	32	6	32	3
	Tanrıveren	100	18	18.00	14	4	16	-
	Araköy	100	18	18.00	14	4	16	-
	Altıntoprak	100	12	12.00	7	5	5	2
	Çağıl	100	14	14.00	10	4	12	-
	Average	100	154	22.00	121	33	127	5

Table 3: Infestation ratio and the number of larvae of Pink bollworm and Spiny bollworm on blind bolls in Bismil Plain during 2002 and 2003

	Place	NCB	NIB (Piece)	IR (%)	NBL (Piece)	NBWL (Piece)	SBW	PBW
2002	Üçtepe	100	10	10.00	8	2	8	-
	Köseli-I	100	1	1.00	1	-	1	-
	Köseli-II	100	6	6.00	4	2	4	-
	Merkez	100	9	9.00	6	3	6	-
	Konukçu	100	6	6.00	4	2	4	-
	Babahaklı	100	8	8.00	5	3	5	-
	Çöltepe	100	4	4.00	3	1	3	-
	Average	100	44	6.28	31	13	31	-
2003	Üçtepe	100	8	8.00	2	6	1	1
	Köseli-I	100	3	3.00	-	3	-	-
	Köseli-II	100	6	6.00	3	3	1	2
	Merkez	100	4	4.00	-	4	-	-
	Konukçu	100	2	2.00	-	2	-	-
	Babahaklı	100	9	9.00	4	5	5	-
	Çöltepe	100	15	15.00	8	7	8	-
	Average	100	47	6.71	17	30	15	3

NCB: No. of collected bolls

NIB: No. of infested bolls

IR: Infestation ratio

NBL: No. of bolls with larvae

NBWL: No. of bolls without larvae

SBW: No. of Spiny Bollworm

PBW: No. of Pink Bollworm

Though PBW already caused important damage to cotton in Harran Plain, it is a new pest for Kızıltepe and Bismil Plains. The SBW reached its population peak in Harran Plain especially in Akçakale district, near Syria border in 1999^[12].

Infestation ratio of PBW and SBW in Harran Plain in 2002 and 2003 was 73.71 and 65.28%, respectively. The infestation ratio of the pests decreased in 2003. Similarly,

the number of PBW and SBW larvae were decreased in 2003 (Table 1).

Infestation ratio of PBW and SBW in Kızıltepe Plain in 2002 and 2003 was 11.57 and 22.00%, respectively. The infestation ratio caused by PBW and SBW increased twice as much in 2003. This was reflected by the increase of larvae in blind bolls. Both larvae of the pests, especially SBW larvae, were increased in Kızıltepe plain (Table 2).

Infestation ratio of PBW and SBW in the Bismil Plain in 2002-2003 was 6.28 and 6.71%, respectively. The infestation ratio of the pests in 2003 was increased a little bit compared to 2002. Although PBW was not found in Bismil Plain in 2002, it was found in the locations of Üçtepe and Köseli-II in 2003. In addition, The number of SBW larvae was decreased (Table 3).

The number of PBW larvae determined on blind bolls during, 2002-2003, was found in Harran Plain where it is highly infested. The number of larvae in 2002 and 2003 were 1213 and 838 piece (Table 1), respectively. In 2003, the number of PBW larvae were decreased with the decrease of infestation ratio in Harran Plain. While PBW was not found on blind bolls in the Bismil Plain in 2002, three larvae were found in 2003 (Table 3). The number of PBW larvae recorded in the Kızıltepe Plain in 2002 and 2003 was two and five piece, respectively (Table 2).

The number of SBW larvae, was determined on blind bolls during 2002 and 2003, was maximum in The Kızıltepe Plain, 41 and 127 piece (Table 2), respectively and minimum larvae number during 2002 and 2003 was in the Harran Plain eight and five piece, respectively, (Table 1). According to the years, while the number of SBW larvae was decreased in the Harran and the Bismil Plains (Table 3), an increase recorded in the Kızıltepe Plain.

DISCUSSION

With this study, the economical damages of PBW and SBW were determined in Harran, Bismil and Kızıltepe Plains in the GAP region. The economical damage of PBW is still persistent in the Harran Plain although its population shows variation from year to year. Ünlü and Yıldız^[13] reported that the variations in the infestation rates of PBW was related to the sowing dates and delay in the sowing dates resulted in the reduction of population of the pest. It was reported that PBW made peak in the second week of June in Arizona^[14] and in Harran Plain^[6] where climatic conditions are similar. Delay in sowing date of cotton, caused by rainfall, cause delay in the square time of cotton, therefore, PBW cannot make peak and as a result of that, its population decreased.

PBW made its first damage in Kızıltepe and Bismil Plains. Certificated seeds should be used for this pest in this area. Because, the reasons for the increase of population of PBW in Harran Plain are; the pest makes its first damage in bolls and this damage cannot be recognized by the farmers and the farmers use this infested seeds. The damage of the pest should be explained and demonstrated to the farmers.

It was determined that SBW did not make economical damage every year. But, the damage was prevalent close

to Syrian border. Stam and El-Mosa^[4] reported that SBW was the main pest for cottons. Ünlü and Kornoşor^[12] reported that the pest crossed over the Syrian border and made the damage in Harran Plain and Akçakale and its close proximity. The pest is more common in Kızıltepe and Bismil Plains than that of PBW. Therefore, the damage of which is more serious.

The damages of the pests have showed variation from year to year. The populations of the pest decreased in the second year of the study in Harran Plain. The population of the pests increased in Kızıltepe Plain. In Bismil, PBW was found for the first time, however, population of SBW decreased.

As a result, certificated seeds should be used, in Kızıltepe and Bismil Plains, legal precautions should be taken for the PBW and the farmers should be educated. For SBW, the precautions should be seriously taken in Kızıltepe where the damage is quite important.

REFERENCES

1. Anonymous, 1998. www.tarim.gov.tr, 15.06.2004.
2. Avidov, Z. and I. Harpaz, 1969. Plant Pests of Israel. Israel Universities Press, Jerusalem.
3. Noble, L.W., 1969. Fifty years of research on the pink bollworm in the United States. USDA Agric. Handbook, 357: 62. In: Chu, C.C., T.J. Henneberry, R.C. Weddle, E.T. Natwick, J.R. Carson, C. Valenzuela, S.L. Birdsall and R.T. Staten, 1996. Reduction of Pink Bollworm (Lepidoptera: Gelechiidae) populations in the Imperial valley, California, Following Mandatory short-season cotton management systems. J. Econ. Entomol., 89: 175-182.
4. Stam, P.A. and H. El-Mosa, 1990. The role of predators and parasites in controlling populations of *Earias insulana*, *Heliothis armigera* and *Bemisia tabaci* on cotton in the Syrian Arab Republic. Entomophaga, 35: 315-327.
5. Kıray, Y., 1964. Çukurova Bölgesi pamukları ve diğer kültür bitkilerinde zarar yapan *Earias insulana* (Boisd.) böceğinin biyolojisi ve mücadelesi üzerinde araştırmalar. Doktora Tezi. Kemal Matbaası, Adana, pp: 119.
6. Ünlü, L., 2001. Şanlıurfa'da Pamuk Alanlarında Zararlı Olan Lepidoptera Türlerinin Saptanması, populasyon Değişimleri, Doğal Düşmanları ile Dikenlikurt (*Earias insulana* Boisd.)'un Biyolojisi ve Bitki Fenolojisi Arasındaki İlişkilerin Belirlenmesi. Ç.Ü. Fen Bilimleri Enstitüsü Bitki Koruma Anabilim Dalı, Adana. Doktora Tezi., pp: 110.

7. Uygun, N., H. Başpınar, E. Şekeroğlu, S. Kornoşor, A.F. Özgür, I. Karaca, M.R. Ulusoy ve C. Kazak, 1995. GAP alanında zirai mücadele politikasına esas teşkil edecek zararlı ve yararlıların saptanması. GAP Bölgesi Bitki Koruma Sorunları ve Çözüm Önerileri Sempozyumu, Şanlıurfa, pp: 99-119.
8. Göven, M.A., 1995. Güneydoğu Anadolu Bölgesi pamuk ekim alanlarındaki zararlılar ile ilgili sorunlar ve çözüm önerileri. GAP Bölgesi Bitki Koruma Sorunları ve Çözüm Önerileri Sempozyumu, 27-29 Nisan 1995, Şanlıurfa, pp: 282-289.
9. Ünlü, L. ve S. Kornoşor, 1996. Şanlıurfa ilinin Noctuidae (Lepidoptera) türleri üzerinde sistematik araştırmalar. Türkiye III. Ent. Kong. Bildirileri, 24-28 Eylül, Ankara, pp: 487-497.
10. Ünlü, L., 2003. Pamukta Zarar yapan Pembekurt [*Pectinophora gossypiella* Saund. (Lepidoptera: Gelechiidae)]ve Harran Ovasındaki Populasyon Gelişimi. HR.Ü. Zir. Fak. Dergisi, 7: 19-26.
11. Özpınar, A., L. Ünlü ve Ş. Yıldız, 1998. Şanlıurfa İlinde Pamuk Zararlısı Dikenlikurt (*Earias insulana* Boisd.)'un Bulaşma Oranı ve Populasyon Gelişmesinin Belirlenmesi. HR.Ü. Zir. Fak. Dergisi Cilt:2: Sayı, 4: 1-10.
12. Ünlü L. ve S. Kornoşor, 2002. Harran Ovasında Pamukta Zarar Yapan Lepidopterlerin Populasyon Değişimlerinin Belirlenmesi. Atatürk Ü. Zir. Fak. Dergisi, 33: 253-257.
13. Ünlü, L. ve. Yıldız, 2004. The effects of different cultural practices on Blind Boll infestation of Spiny Bollworm (*Earias insulana* Boisd.) and Pink Bollworm (*Pectinophora gossypiella* Saund.) in cotton growth in the Harran Plain. Harran Universities Ziraat Fakültesi Dergisi Clit 8 Sayı 3 (In Press).
14. Slosser, J.E. and T.F. Watson, 1972. Population growth of the Pink Bollworm. Ariz. Agric. Exp. Stn. Tech. Bull., pp 32.