

IMPORTANCE OF *HIBISCUS TRIONUM* L. WEED, AS A SOURCE OF INSECT PESTS INFESTING COTTON PLANTS AT KAFR EL-SHEIKH GOVERNORATE

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Abstract

The role and importance of the bladder hibiscus weed plant, *Hibiscus trionum* L., as a source of economic pests infesting cotton plants, was studied at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate during the two cotton growing seasons 1999 and 2000. Nine insect species; 7 pest and 2 predatory species were recorded on the weed plants. The three pest species; *Oxycarenus hyalineipenne* (Costa), *Bemesi tabaci* (Genn.) and *Aphis gossypii* (Glov.) occurred in relatively high numbers, while the others; *Earias insulana* (Boisd.), *Thrips tabaci* Lind., *Spodoptera littoralis* (Boisd.), *Empoasca lybica* (de Berg.) and the two predatory species; *Scymnus interruptus* (Goez.) and *Orius albidipennis* L. were found in relatively low numbers. *H. trionum* acted as a source of infestation with some economic cotton pests, particularly *O. hyalineipennes*, *A. gossypii*, *B. tabaci*, and *E. insulana* when grown in cotton fields. The pests occurred on the weed earlier than on the cotton plants. Accordingly, it is recommended to get rid of the weed as early as possible whenever it occurs.

INTRODUCTION

Weeds are one of the major groups of pests that threaten crop production in all agricultural areas in the world. In addition to the yield reduction by weed plants, they usually act as dwelling for many insect species, either for their nutritional purposes or as sites during diapauses (Shalaby 1974). Weeds may also represent a source of infestation of certain economic pests as a shelter for insect protection from adverse environmental conditions and/or as alternative hosts for these pests when their hosts become defoliated or totally absent from the fields (Tawfik *et al.*, 1976; Abdel Fattah *et al.*, 1985).

Way and Cammell (1981) sum up four ways in which weeds may influence invertebrate pests of crops: a) by acting as alternate or alternative hosts of pests, b) by af-

fecting the visual responses of flying (insect) colonists, c) by affecting the behavior of pests once they contacted the weed, d) by influencing pest mortality, notably that due to natural enemies which themselves may be affected directly by weeds, as in (b and c) above, as well as indirectly by hosts or prey feeding on the weeds. Mesbah (1999) surveyed seven weed species in cotton fields at Kafr El-Sheikh Governorate and reported that the blader hibiscus weed, *Hibiscus trionum* L. was the only weed species found infested with the whitefly, *Bemesia tabaci* (Genn.) immature stages. The infestation occurred on the weed about one month earlier than on the cotton plants at the same field.

This study aimed to throw a light on the role and importance of the weed plant, *H. trionum* as a source for certain economic pests in cotton fields.

MATERIALS AND METHODS

The study was carried out at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate during the two successive cotton growing seasons; 1999 and 2000. An area of about one feddan of cotton was chosen for sampling. The experimental cotton field was kept insecticide-free throughout the two seasons of the study. The blader hibiscus weed, *H. trionum*, which grows naturally in cotton fields, was left for sampling.

Sampling was undertaken weekly by examining randomly 10 *H. trionum* plants starting early June and continued until mid-September in both seasons. Visual count of different insect pest species as well as associated predators was the technique used in this study. Besides, 10 leaves and/or 25 fruits from the weed plants (dry fruits of the weed were found acting as stores for the cotton seed bug) were also collected weekly and transferred to the laboratory for inspection and counting existing insect species.

RESULTS AND DISCUSSION

Survey of certain insect species: The survey revealed the presence of 9 insect species on the weed plant; *H. trionum* which grew naturally in the experimental cotton field. Insect species, developmental stages and occurrence periods were presented in Table 1. As shown in the table, the surveyed species belonged to 6 orders and 8 families. Seven and two were insect pest and predatory species, respectively.

Mesbah (1999) recorded 4 predatory species; *Scymnus interruptus* (Goez.), *Paederus affieri* Koch, *Syrphus* sp. and *Orius* sp. associated with *B. tabaci* (Genn.) on the same weed species *H. trionum* at Kafr El-Sheikh Governorate.

Seasonal occurrence of the surveyed insect species: As shown in Tables 2 and 3, the insect species; *O. hyalinipennes*, *B. tabaci*, *E. insulana* and *A. gossypii* occurred almost throughout the sampling period (June – September), while the other species; *T. tabaci*, *S. littoralis*, *E. lybica* and the two predatory species; *S. interruptus* and *O. albidipennis* were recorded only more or less irregularly for some weeks. Obtained data revealed that the blader hibiscus weed species, *H. trionum* grew in the experimental cotton fields at Kafr El-Sheikh Governorate in seasons 1999 and 2000 harbored the three species; *O. hyalinipennes*, *B. tabaci* and *A. gossypii* in obviously high numbers in the two seasons of the study compared to the other species; *E. insulana*, *T. tabaci*, *S. littoralis*, *E. lybica* as well as the two predatory species; *S. interruptus* and *O. albidipennis* which were found in relatively scattered low numbers. Generally, the total number of insect species counted from the experimental cotton fields in season 1999 (18311 individuals) was about two folds of season 2000 (9238 individuals).

Highest mean numbers of the surveyed species were recorded mostly during July except *A. gossypii* and *B. tabaci* which peaked during August in the two seasons. Some species such as; *T. tabaci*, *S. littoralis*, *E. lybica* and the two predatory species; *S. interruptus* and *O. albidipennis* were found only during June and/or July and then disappeared, Tables 2 and 3.

As presented also in the tables, peak numbers of each of the counted species attained 3018 (July 27), 2200 (July 27), 598 (August 21), 157 (June 5), 154 (June 19), 36 (July 13), 25 (August 21), 10 (July 24) and 4 (June 12) per 10 plants or leaves for *O. hyalinipennes*, *A. gossypii*, *B. tabaci*, *T. tabaci*, *S. littoralis*, *E. insulana*, *S. interruptus*, *E. lybica* and *O. albidipennis*, respectively.

Total percentages of abundance of each of the insect species counted in the study were calculated as; 59.6 and 66.1 % for *O. hyalinipennes*, 34.3 and 16.3 % for *A. gossypii*, 4 and 10.8 % for *B. tabaci*, 0.3 and 2.3 % for *T. tabaci*, 0.2 and 1.8 % for *S. littoralis*, 1 and 1.6 % for *E. insulana*, 0.7 and 0.6 % for *S. interruptus*, 0.03 and 0.3 % for *E. lybica* and 0.2 and 0.1 % for *O. albidipennis*, in season 1999 and 2000, re-

Table 1. List of insect species recorded on the weed plant *H. trionum* grown in cotton fields at Kafr El-Sheikh Governorate during 1999 and 2000 growing seasons.

Insect Species	Stage	Occurrence Periods
1- Pest species		
Order: Hemiptera Fam.: Lygaeidae <i>Oxycarenus hyalinipennis</i> (Costa)	N and A	June – September
Order: Homoptera Fam.: Aleyrodidae <i>Bemesia tabaci</i> (Genn.)	N and P	June – September
Fam.: Aphididae <i>Aphis gossypii</i> (Glov.)	N and A	July – September
Fam.: Cicadellidae <i>Empoasca lybica</i> (de Berg.)	N and P	June – July
Order: Lepidoptera Fam.: Noctuidae <i>Earias insulana</i> (Boisd.)	L	June – September
<i>Spodoptera littoralis</i> (Boisd.)	L	June – September
Order: Thysanoptera Fam.: Thripidae <i>Thrips tabaci</i> Lind.	N and A	June
2- Predator species		
Order: Coleoptera Fam.: Coccinellidae <i>Scymnus interruptus</i> (Goez.)	L and A	July – August
Order: Hemiptera Fam.: Anthocoridae <i>Orius albidipennis</i> L.	N and A	June – July

N= Nymph L= Larva P= Pupa A= Adult

Table 2. Total weekly numbers of common insect species found on the blader hibiscus weed *Hibiscus trionum* grew in cotton fields at Kafr El-Sheikh Governorate, season 1999.

Inspection	Total Number of Insect Species														
	/ 10 Plants					/ 10 Leaves					/ 100 Fruits				
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Date	N&A	N&A	N&A	N&A	N&P	N&P	N&P	N&P	N&P	N&P	N&P	N&P	N&P	N&P	N&P
Stage	1.40	0	0	1	0	8	20	20	20	20	20	20	20	20	20
Jun-08	20	0	0	0	0	12	12	12	12	12	12	12	12	12	12
15	4	0	0	36	1	13	8	8	8	8	8	8	8	8	8
22	0	1	2	0	0	7	12	12	12	12	12	12	12	12	12
29	41	0.3	0.5	9	0.3	10	13	13	13	13	13	13	13	13	13
Mean	0	0	0	552	0	14	12	12	12	12	12	12	12	12	12
Jul-06	0	0	0	205	0	14	36	36	36	36	36	36	36	36	36
13	0	760	4	920	0	17	8	8	8	8	8	8	8	8	8
20	0	2200	0	3018	0	25	16	16	16	16	16	16	16	16	16
27	0	740	1	1173.8	0	17.5	18	18	18	18	18	18	18	18	18
Mean	0	2040	0	954	0	75	24	24	24	24	24	24	24	24	24
Aug-03	0	800	0	1500	0	16	8	8	8	8	8	8	8	8	8
10	0	250	0	2000	0	462	8	8	8	8	8	8	8	8	8
17	0	60	0	354	0	47	4	4	4	4	4	4	4	4	4
24	0	104	0	464	2	17	8	8	8	8	8	8	8	8	8
31	0	650.8	0	1054.4	0.4	123.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
Mean	0	40	0	90	2	0	4	4	4	4	4	4	4	4	4
Sep-07	0	20	0	822	0	2	0	0	0	0	0	0	0	0	0
14	0	30	0	456	1	1	2	2	2	2	2	2	2	2	2
Mean	0	418.3	0.4	727.7	0.3	48.6	12	12	12	12	12	12	12	12	12
General Mean	4.3	418.3	0.4	727.7	0.3	48.6	12	12	12	12	12	12	12	12	12

A = *Trips tabaci* B = *Aphis gossypii* C = *Empoasca lybica* D = *Oxycaenus hyalipennis*
 E = *Spodoptera littoralis* F = *Bemisia tabaci* G = *Earias insulana*
 X = *Scymnus interruptus* Y = *Orius albidipennis*

Table 3. Total weekly numbers of common insect species found on the blader hibiscus weed *Hibiscus trionum* grew in cotton fields at Kafr El-Sheikh Governorate, season 2000.

Inspection	Total Number of Insect Species									
	/ 10 Plants			/ 10 Leaves			/ 100 Fruits			/ 10 Plants
Date	A	B	C	D	E	F	G	X	Y	
Stage	N&A	N&A	N&A	N&A	L	N&P	L	L&A	L&A	
Jun-05	157	1	0	0	0	20	12	0	1	
12	37	0	0	106	0	12	8	0	4	
19	20	0	0	6	154	47	8	0	2	
26	5	0	0	106	2	5	4	0	1	
Mean	54.8	0.3	0	54.5	39	21	8	0	2	
Jul-03	0	0	8	1500	0	3	12	0	1	
10	0	0	0	570	2	18	20	0	0	
17	0	0	8	2000	3	58	8	0	0	
24	0	0	10	290	2	46	8	0	0	
31	0	50	0	200	2	27	4	0	0	
Mean	0	10	5.2	912	1.8	30.4	10.4	0	0.2	
Aug-07	0	15	0	350	2	17	0	3	0	
14	0	590	0	122	0	43	0	2	0	
21	0	342	0	205	0	598	24	25	0	
28	0	230	0	228	0	78	8	10	0	
Mean	0	294.3	0	226.3	1.5	184	8	10	0	
Sep-04	0	210	0	190	0	22	24	12	0	
11	0	70	0	50	0	7	4	6	0	
Mean	0	140	0	120	0	14.9	14	9	0	
General Mean	14.9	100.5	1.7	407.1	11.1	66.7	9.6	3.9	0.6	

A = *Thrips tabaci* B = *Aphis gossypii* C = *Empoasca lybica* D = *Oxycaenus hyalinipennis*
 E = *Spodoptera littoralis* F = *Bemisia tabaci* G = *Earias insulana*
 X = *Scymnus interruptus* Y = *Orius albipennis*

spectively.

Obtained results are in agreement with the findings of Shalaby (1974) who recorded *T. tabaci* nymphs and adults on the weed species, *Convolvulus arvensis* in Giza region. Habib (1975) stated that the later-instar larvae and pupae of *B. tabaci* overwintered on the under surface of weed leaves that remain green during winter. Abdel Fattah *et al.*, (1985) mentioned that the perennial and summer weeds constituted the most suitable alternative hosts in build up of *B. tabaci* population and acted as immediate and direct sources of infestations for tomato pests. Mesbah (1999) recorded the blader hibiscus weed, *H. trionum* L. as the only weed species found infested with the whitefly, *B. tabaci* immature stages in cotton fields because the weed plants grow faster than the cotton plants.

Tawfik *et al.*, (1976) recorded *S. littoralis* on the weed species; *C. arvensis*, *Portulaca oleraceae*, *Amaranthus caudatus*, *Euphorbia peplus*, *Beta vulgaris* and *Xanthium spinosum* during August and September. They also found that as the temperature increased, *T. tabaci* gradually decreased or disappeared from the cotton plants, however, inconsiderable numbers were recorded hidden inside the flowers of *C. arvensis* weed during May – September.

Way and Cammell (1981) reported that cotton may be heavily colonized with aphids during June and July, but the aphids survive mainly on weeds during the critical August – September period.

Regarding the natural enemies, Way and Cammell (1981) stated that the weeds may influence beneficial insects by acting as alternative hosts or as visual responses of flying insects. They also added that the natural enemies with free-living stages usually feed on pollens and nectar of wild plants and with predatory/parasitic stages that feed on preys or hosts on the wild plants. Therefore, there is much circumstantial and some more definitive evidence that weeds, or wild plants can be important food sources for alternative hosts of natural enemies of pests.

From available literature, this study seems to be the first record in Egypt of the spiny bollworm, *E. insulana* on the blader hibiscus weed, *H. trionum* when grew in cotton fields. Mesbah *et al.*, (2003) found that the infestation with *E. insulana* in the fallen

cotton flower buds and/or squares at Kafr El-Sheik Governorate began always during the second half of July, about one month of recording the pest species on the weed at the same field.

As conclusion, the blader hibiscus weed species, *H. trionum*, when grows in cotton fields, it acts as a source of infestation with some economic serious cotton pests, particularly *O. hyalinipennis*, *A. gossypii*, *B. tabaci*, and *E. insulana* and the pests usually occur in considerable high numbers on the weed plants about few weeks earlier than on cotton (Mesbah 1999). On the other hand, the weed species did not show up to harbor considered numbers of predatory species.

Through the authors' field observations, the weed species *H. trionum* was recorded also in some other crops beside cotton such as, maize, sugar beet and vegetables. Accordingly, it is recommended to get rid of the *H. trionum* as early as possible when it occurs in the cotton fields anywhere.

REFERENCES

1. Abdel-Fattah, M.I., A. Hendi and A.M. El-Said. 1985. Abundance of *Bemesia tabaci* (Genn.) associated with common weeds in tomato fields at Shebin El-Kohm region, Egypt (Homoptera: Aleyrodidae). Bull. Ent. Soc. Egypt, 65: 109-117
2. Habib, J. 1975. The cotton whitefly, *Bemesia tabaci* (Genn.), bioecology and methods of control. Entomologie et Phytopathologie Appliques, 38: 13-36.
3. Mesbah, A.H. 1999. Studies on certain natural enemies of whiteflies. Ph.D. Thesis, Faculty of Agric., Kafr El-Sheikh, Tanta University, 133 pp.
4. Mesbah, A.H., M. A. Shoeb and A.H. El-Heneidy. 2003. Preliminary approach towards the use of the egg parasitoid, *Trichogramma* spp. against the cotton bollworms in Egyptian cotton fields. Egypt. J. Agric. Res. (in press)
5. Shalaby, F.F. 1974. Studies on insects associated with weeds. Ph.D. Thesis, Faculty of Agric., Cairo University, 278 pp.
6. Tawfik, M.F.S., K.T. Awadallah and F.F. Shalaby. 1976. Survey of insects found on common weeds in Giza region, Egypt. Bull. Soc. ent. Egypte, 60, : 7-14.
7. Way, M.J. and M.E. Cammell. 1981. Effects of weeds and weed control on invertebrate pest ecology. In Pests, Pathogens and Vegetation, : 443-458.

أهمية حشيشة عين البقر *HIBISCUS TRIONUM* L. كمصدر للآفات الحشرية التي تصيب نباتات القطن في محافظة كفر الشيخ

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أجريت دراسة عن أهمية حشيشة عين البقر *Hibiscus trionum* L. كمصدر للأصباية بآفات القطن الحشرية الهامة بمحطة بحوث سخا - محافظة كفر الشيخ وذلك لمدة موسمين متتاليين ١٩٩٩، ٢٠٠٠ سجلت تسعة أنواع حشرية على الحشيشة، ٧ آفات و ٢ مفترسات. ظهرت أنواع الآفات بأعداد كبيرة، بينما ظهرت الأنواع *Oxycarenus hyalineipenne* (Costa) و *Bemesi tabaci* (Genn.) و *Aphis gossypii* (Glov.) و *Thrips tabaci* Lind. و *Earias insulana* (Boisd.) و *Scymnus* و *Spodoptera littoralis* (Boisd.) و *Empoasca lybica* (de Berg.) وكذلك المفترسان *Orius albidipennis* L. و *interruptus* (Goez.) بأعداد قليلة نسبياً. أوضحت النتائج أن حشيشة عين البقر تعتبر مصدر لبعض آفات القطن الاقتصادية، خاصة الأنواع بق بذرة القطن والمن والذبابة البيضاء وودة اللوز الشوكية عندما تنمو في حقول القطن. تظهر الإصابة بالآفات مبكرة على الحشيشة عنها على نباتات القطن. وبذلك يمكن التوصية بضرورة التخلص من الحشيشة مبكراً بمجرد ظهورها.