A Survey of Wheat Stem Borer, *Oria musculosa* Hubner (Lepidoptera: Noctuidae), in Syria (1983 - 1987)

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Abstract

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Wheat stem borer, *Oria musculosa* Hubner (Lepidoptera: Noctuidae) was observed in Syria during the period 1983 - - 1987 in the provinces of Aleppo, Hama, Idlib, Homs, Sweda, Damascus and Der'aa. Infestations were heaviest in rocky fields and along field borders and roadsides. Adults oviposited on rocks within the fields in June. Eggs were found from June until the following March, suggesting an egg diapause. Larval infestations usually appeared in mid-March, with each larva killing from 0.5 to 3.4 plants. Maturing ears were attacked in April and May at a rate of 4.3 ears/larva. Larval mortality was due in part to fungi, bacteria and endo-and exo-parasitoids.

Key Words: fungi, population density, parasites, wheat, Syria.

Introduction

Wheat, an important cereal crop in Syria, is attacked by a number of insect pests, most of which cause minor yield losses over extended areas or occasional, localized heavy losses. Wheat stem borer, *Oria musculosa* Hubner, is not usually an economically important pest of wheat, though it has been reported as an economic pest in Iraq and Iran where it attacks wheat, barley, maize and oats (Miller 1987). Wheat stem borer (WSB) was found to be present in Syria by Hariri (1971), who reviewed the previous works of Hampson (1910), Osthelder and Pfeiffer (1933) and Ellison and Whiltshire (1939). Its presence in Syria has not be mentioned in print since Hariri (1971).

The purpose of this paper is to report relatively recent observations on WSB in Syria, touching upon WSB biology, distribution and density.

Materials and Methods

During an infestation of WSB on wheat in Hama Province in 1983, workers at Syria's Directorate of Agricultural Scientific Research (DASR) began studying the distribution and characteristics of WSB infestation in several regions of Syria. From 1983 to 1987, WSB infestations were recorded at Hilban (Hama Province), Syadeh (Hama Province), Izra (Der'aa Province), Najeh (Der'aa Province) and Sweda (Sweda Province). At each site, wheat samples were collected from three 5 m long rows located at the border of infested fields along roads, in rocky areas of the fields and in field interiors. Plant samples were assessed as to 1) height of infested plants and length of larval mines, 2) number and length of dead and living larvae per plant and 3) possible reason for larval mortality, classified as due to endoparasitoids, exo-parasitoids or unknown causes. Mean percent WSB infestation was computed by averaging the number of infested plants divided by the number of total plants from the three samples taken from each field region. In addition, the number of wheat plants killed per larva was determined by dividing the number of infested plants by the number of dead and living larvae collected. The number of ears attacked by a single larva was also estimated by dividing the total number of infested ears by the number of dead and living larvae collected.

Observations also were made in the provinces of Aleppo, Idlib, Damascus and Homs, but data were not analyzed in detail due to sampling inconsistencies.

Fungi and bacteria suspected to be associated with larval mortality were cultured from newly collected dead larvae, while parasitoid-caused death was determined by rearing the parasitoids from infested larvae. In addition, 290 larvae were placed on the stems and ears of living wheat plants to examine feeding habits and survivorship.

Results and Discussion

The first recent recorded incidence of WSB infestation in Syria on wheat was made in Hama Province at Hilban in late March, 1983. WSB was later found in the provinces of Aleppo, Damascus, Idlib, Homs, Sweda and Der'aa. Data from Aleppo, Homs, Idlib and Damascus provinces are not reported further in this paper. Damage at all sites was attributed to the larvae, which were frequently observed boring into the second internode of 5 to 10 cm tall wheat plants. Larvae were described as grey in color with a dark dorsal stripe and two green lateral stripes. Striping was less pronounced in more mature larvae. Larvae more than 2 cm long were observed boring into wheat ears shortly after the milk stage of kernel development. The maximum length of collected larvae was 3 cm, however, most larvae ranged in length from 0.8 to 1.5 cm at the time of sampling. Pupae were found in the soil and adults emerged in early June. Females laid eggs on rocks in mid-to late June. Adults had pale yellow forewings with dark stripes. The egg stage lasted from June until late February or early March, suggesting a possible egg diapause through the hot summer months and winter.

Percent infestation primarily depended on the location of the sample site in the field (Table 1). Heaviest WSB infestations consistently were located at field borders along roads, and in plants surrounding rocks in the midst of fields. Possibly, this edge effect was due to the oviposition preference of females who laid their eggs on small and large stones at the edge of, or within, a field. Infestations in field middles away from rocks or other objects usually were below 10%. Considerable variation in percent infestation also was observed between sites within a general collecting region and between years. Infestations were highest in 1983 at Hilban. In 1984 at Hilban, the proportion of infested plants along borders, as opposed to rocks and field interiors, was much higher than was observed in 1983. A similar though less apparent observation was made from samples collected at Izraa in 1985.

Table 1. Wheat infested in Syria by WSB in 1983, 1984, 1985.

جدول 1. القمح المصاب بحفار الساق في سورية في سنوات 1983، 1984، 1985.

Place[1] المكان (1)	Date[2] of sampling تاريخ جمع العينات [2]	No. Plants Sampled/5m عدد النباتات المجموعة/ 5 م	% النباتات المصابة في الحقل % Infested Plants in the Field[3] Border على الأطراف	Rocks على الصخور	Mid-field في وسط الحقل
Hilban 1	14 APR 83	160	15.6	21.9	7.5
	20 APR 83	160	46.8	20.0	10.0
	28 APR 83	160	28.1	21.3	3.1
		Mean	30.2	21.1	6.9
Hilban 2	14 APR 83	160	1.3	0.0	0.0
	20 APR 83	160	3.8	3.8	0.0
		Mean	2.6	1.9	0.0
Hilban 1	11 APR 84	200	23.5	3.5	1.5
	1 MAY 84	200	17.0	4.0	1.0
		Mean	20.3	3.8	1.3
Hilban 2	11 APR 84	200	7.5	7.5	1.0
	1 MAY 84	200	3.5	3.5	1.5
		Mean	5.5	5.5	1.3
Izraa 1	12 APR 85	85	15.4	1.5	0.0
Izraa 2	12 APR 85	84	10.7	2.4	2.4
Izraa 3	12 APR 85	94	18.1	5.3	0.0
		Mean	14.7	3.1	0.8
		Grand Mean	16.0	7.9	2.3

1. Numbers after place names indicate different fields sampled in a locality; 2. No observations made during 1986 and 1987; 3. Computed as (number of infested plants / number of dead and healthy plants) X 100.

1. الرقم الذي يلي اسم مكان الجمع يشير إلى عدد الحقول المفحوصة في ذلك الموقع.
2. عدد الملاحظات خلال عامي 1986 و 1987.
3. محسوبة على أساس (عدد النباتات المصابة/ عدد النباتات الميتة والسليمة) × 100 بوساطة الحاسوب.

WSB larvae were observed migrating from plant to plant, and a single larva was able to infest and kill several plants (Table 2). At the time of sampling plants measured 10 to 15 cm tall. Observations across years showed that individual larvae at Najeh killed more plants than at other sites. Larvae at Sayadeh on average killed the lowest number of plants. Between year differences also were observed, with individual larvae in 1985 killing the most plants and those in 1987 killing the fewest. In 1986, individual larvae at Najeh killed the most plants, while no infested plants were found at the other sites that year. This suggests that WSB infestations in the region sampled are highly sporadic, though occasionally severe locally.

Later WSB instars attacked wheat ears during the milk stage (Table 3). The larvae bored into the ears, causing the ear to dry out and thereby killing it. A single larva attacked an average of 4.3 ears with larvae in Hilban attacking the highest number of ears and those at Sayadeh attacking the lowest number. Between year differences were small and ranged from 3.4 ears attacked per larva in 1983 to 5.9 ears attacked per larva in 1985. Sayadeh, Izraa and Sweda all reported years in which no ears were observed to be attacked by WSB larvae.

Table 2. Number of wheat plants killed per larva[1] (sampled last week of March and first week of April).

جدول 2. عدد نباتات القمح الميتة لكل يرقة[1] (تم جمع العينات في الاسبوع الأخير من آذار/ مارس الاسبوع الأول من نيسان/ أبريل).

Year الأعوام	Hilban حلبان	Sayadeh سيدة	Izra ازرع	Sweda سويداء	Najeh ناجح	Mean المتوسط
1984	3.5	2.1	0.0	0.0	0.0	1.1
1985	1.5	0.0	1.8	7.7	5.0	3.2
1986	0.0	0.0	0.0	0.0	9.7	1.9
1987	0.0	0.0	0.0	0.0	2.5	0.5
Mean	1.3	0.5	0.5	1.9	3.4	11.7

1. Computed as (number infested plants/ number of dead and living larvae).

1. محسوبة على أساس (عدد النباتات المصابة/ عدد اليرقات الحية والميتة) بوساطة الحاسوب.

Table 3. Number of ears attacked per WSB larva[1] (last week of April and first week of May).

جدول 3. عدد السنابل المصابة لكل يرقة من حفار ساق القمح (الأسبوع الأخير من نيسان/ أبريل والأسبوع الأول من أيار/ مايو).

Year[2] الأعوام[2]	Hilban حلبان	Sayadeh سيده	Izraa ازرع	Sweda سويداء	Mean المتوسط
1983	6.3	0.0	0.0	7.0	3.4
1984	4.8	2.1	7.3	0.0	3.6
1985	15.0	0.0	8.6	0.0	5.9
Mean	8.7	0.7	5.3	2.3	4.3

1. Computed as total infested ears / number dead and living larvae;
2. Data not collected for 1986, 1987.

1) تم الحساب على أساس مجموع السنابل المصابة/ عدد اليرقات الميتة والحية.

2) البيانات غير مجموعة لعامي 1986 و 1987.

The site-specific mean percentage of dead larvae sampled from 1984 to 1987 ranged from a low of 10.4% at Sayadeh to 21.5% at Hilban with a grand mean for all sites of 24.8%. Mean mortality across sites was highest in 1984, measuring 48.6%, and lower in 1985 and 1987, which measured 24.4% and 26.1%, respectively. The highest mortality figures were obtained from Izraa in 1984, which measured 67.0%. No larvae were collected from any of the sites in 1986, although sampling was conducted in the same proximities using the same procedures previously described. This result may have been due to a number of factors including the use of fallow that reduced the amount of wheat in the sampling region, as well as various climatic factors across the wheat growing regions of Syria.

Table 4. Percent mortality of WSB larvae[1] in the field.

جدول 4. النسبة المئوية لموت يرقات حفار ساق القمح في الحقل 1.

Year الأعوام	Hilban حلبان	Sayadeh سيده	Izraa أزرع	Sweda السويد	Najeh ناجح	Mean المتوسط
1984	57.0	41.7	67.0	0.0	28.7	48.6
1985	5.6	0.0	10.6	57.1	0.0	24.0
1986	0.0	0.0	0.0	0.0	0.0	0.0
1987	23.4	0.0	0.0	0.0	28.7	26.1
Mean	21.5	10.4	19.4	14.3	14.4	24.8

1. Computed as (number of dead larvae / number of dead and living larvae) X 100.

1. محسوبة على أساس (عدد اليرقات الميتة/ عدد اليرقات الميتة والحيّة) × 100 بوساطة الحاسوب.

Mortality due to endo-parasitoids ranged from 11.1% to 22.2% with Hilban having the lowest incidence and Izraa the highest (Table 5). Exo-parasitoids were highest at Sayadeh in 1984, while Hilban and Izraa reported very few. Endo-parasitoids observed were all Ichneumonidae while exo-parasitoid populations were composed of unidentified Hymenoptera. No other orders of parasitoids were observed. The incidence of fungi and bacteria was greatest at Hilban in 1984, followed by Izraa. No fungi or bacteria were recovered from larvae collected at Sayadeh in 1984. In 1987, only samples from Hilban were infested with fungi and bacteria and no endo-or exo-parasitoids were found on larvae that year. Death due to unknown causes was highest in Hilban in 1984 and 1987, and with the exception of Sayadeh in 1984, constituted by far the largest mortality class.

Table 5. Percent of deaths due to endo-parasitoids, exoparasitoids, associated with fungi and bacteria (FB), and unknown causes.

جدول 5. النسبة المئوية لموت اليرقات والناتجة من الاصابة بالمتطفلات الداخلية والخارجية، والمرتبطة بالفطور والبكتريا (FB) وبأسباب مجهولة.

Year[1] العام	Place المكان	Endop. متطفلات داخلية	Exop. متطفلات خارجية	FB فطور وبكتريا	Unknown أسباب غير معروفة
1984	Hilban	11.1	2.2	35.6	51.1
1984	Sayadeh	20.0	80.0	0.0	0.0
1984	Izraa	22.2	0.0	11.1	66.7
1987	Hilban	0.0	0.0	27.3	72.7
Mean		13.3	20.6	18.5	47.6

1. Data not collected for 1985, 1986.

1. لم تجمع البيانات لعامي 1985 و 1986.

Out of the 290 larvae placed on wheat plants for rearing, only seven reached adulthood with most mortality occurring

among later instars.

Low population densities of WSB, with a concomitant low economic impact on wheat crops in Syria during the study period, probably were due to high larval mortality caused by several factors acting alone or in concert. Important among these was the effect on larvae of ichneumonid endo-parasitoids, miscellaneous hymenopteran exo-parasitoids and fungi and bacteria on WSB larvae. Infestations varied greatly within and among sample sites, and between years, probably in response to the above factors as well as differences in rainfall and temperature among seasons. Damage attributed to WSB was heaviest in rocky fields and along field borders and roadsides, which should be considered by agriculturalists when designing field sampling schemes for this pest.

الملخص

قطلبي، حسين وروس ميللر. 1990. حصر لحشرة حفّار ساق القمح *Oria musculosa* Hubner (Lepidoptera, Noctuidae) في سورية. مجلة وقاية النبات العربية 8 (2): 127-130.

لوحظت حشرة حفار ساق القمح في الفترة ما بين 1983 و 1987 في المحافظات السورية التالية: حلب، حماه، إدلب، حمص، السويداء، دمشق. كانت شدة الاصابة مرتفعة في الحقول المُحْجِرة، وعلى أطراف الحقول، وجوانب الطرقات. تضع البالغات البيض على الحجارة ضمن الحقول في حزيران/ يونيو، واستمر وضع البيض من حزيران/ يونيو وحتى آذار/ مارس التالي، مما يشير إلى وجود مرحلة سكون للبيض. تظهر الاصابة باليرقات في منتصف آذار/ مارس، وتقتل كل يرقة من 0.5 - 3.4 نبات، وهي تهاجم السنابل الناضجة في نيسان/ أبريل، وأيار/ مايو بمعدل 4.3 سنبلة/ يرقة. ويُعزى موت يرقات الحشرة في الطبيعة جزئياً إلى تطفل بعض الفطور والبكتريا، والطفيليات الداخلية والخارجية.

كلمات مفتاحية: فطريات، كثافة العشيرة، طفيليات، قمح، سوريا.

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