

**LARVAE OCCURRENCE AND MOTHS EMERGENCE OF THE LEAF
MIDRIB MINER, *COSMOPTERIX PARARUFELLA* RIEDL,
(LEPIDOPTERA : COSMOPTERIGIDAE),
ON SUGARCANE IN EGYPT**

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Abstract

Occurrence of larvae and moth emergence of the leaf midrib miner, *Cosmopterix pararufella* Riedl (Lepidoptera: Cosmopterigidae), were studied. Mined leaves were collected weekly from pesticides - free sugarcane fields, *Saccharum officinarum* L., in Al-Aiat region at Giza governorate from September to October 2000 and from February 2001 till October 2003. Larvae inhabit in mined tunnels of midrib on infested plant leaves were found varied in growth stages in the different years. It was generally increased by the ovipositional activity of emerged females whilst decreased gradually by developing the full- grown larvae to pupae. Such increases were observed by mid and late May in 2001 and 2002 as well as 2003, mid- August and late October, in all years. It declined to low numbers by early August and October in all years, also, by late April (2001 and 2002) and early May in 2003. The full- grown larvae (about 6%) were undeveloped to pupae and lived until a range between (63- 173 days) during the different years. Emerged moths accounting for 75%, 89.2%, 74.3% and 90.6% of the total number of failed and emerged moths in 2000, 2001, 2002 and 2003, respectively. Moths, overwintering as larvae emerged from late March, early and mid-April in 2002, 2001 and 2003 which continued till late May and early June in the first two years and the third one. It peaked by mid and late April as well as early May in the three successive years. It considered the main source of the new infestation. The second emergence occurred from early July to late August in all years, but they continued a week later in 2003. A peak was attained by mid and late July in 2002 and 2001 or 2003. However, the last emergence observed by mid-September and a week later in the first and the last two years. The emergence period prolonged to early and mid-November and the moth peak was found by mid-October and late September in 2001 and 2002 as well as 2000 and 2003. The duration period from the newly hatched larvae to adult lasted means of 180, 76 and 77 days during early November- late May, late May- mid-August and early August- late October in 2002-2003. Under both field and laboratory conditions, moths emerged in spring, summer and autumn generations in a year. It can thus

be recommended that the harvesting of the infested sugarcane fields would be before March and employment of crop rotation can be used as cultural practices to control this pest.

INTRODUCTION

Cosmopterix pararufella Riedl (Lepidoptera: Cosmopterigidae), the midrib leaf miner, is a new recorded pest species attacking sugarcane, *Saccharum officinarum* L., at Al-Aiat and Atfieh in Giza governorate, Middle Egypt. This moth overwintering as larvae in mined tunnels of the leaf midrib whilst infestation started on the new growth ratoons in the old infested fields by early May which continued till late December and reach its maximum about 19% during the first three weeks of June (El-Serwy, 2004).

The purpose of this study was to throw light on some biological and ecological aspects of the midrib leaf miner to promote and approach towards the control of this pest in sugarcane fields in Egypt.

MATERIALS AND METHODS

Untreated free pesticides sugarcane fields were selected at AL-Aiat, Giza governorate, Middle Egypt. Infested leaves were collected weekly from September 5 to October 24, 2000 and resumed by February 20, 2001 till October 24, 2003, collections of September 5, 2001 and October 3, 2002 were unrecorded. The characteristics of infestation were mining tunnels with red- brown color on the upper surface of the leaf midrib and appear of longitudinal dried slits on the other side midrib vein. On every collection date, leaves were examined by dissection microscope and numbers of live and dead larvae as well as pupae and empty pupal cuticle were recorded. Alive larvae or pupae were placed into plastic bags with the infested leaf pieces. Daily inspection was made and the emerged moths were sexed and counted. After the end of emergencies, the dried leaf pieces were examined and alive full- grown larvae, dead pupae and failed emerged moths were recorded. Undeveloped larvae were inspected daily until death.

To assess the duration period from larvae to adult in the field, 20 leaves indicating to red fine mine of the newly hatched larvae were weekly labeled from November 4 to December 2, 2002 and during May 21- June 11 as well as July 30- August 12, 2003 in three untreated sugarcane fields at Al-Aiat. Leaves of each field were collected in separated plastic bags on February 27, July 7 and September 24, in 2003. A dissection microscope was used to determine the different stages. Dead and

parasitized larvae were excluded, however, larvae and pupae were placed into new plastic bags to allow the emergence of moths. Daily inspection was made until emergence of moths.

RESULTS AND DISCUSSION

1- Occurrence of Larvae

Data in Tables 1- 4 clearly indicate that live larvae were accounted for 65.3%, 86.1%, 92.4% and 90.3% of the total number of live and dead larvae collected in 2000, 2001, 2002 and 2003, respectively. Alive larvae were generally increased by the ovipositional activities of the emerged female moths, whilst decreased by developing the full- grown larvae to pupae in the different years.

Data in Table 1 showed that the number of live larvae were decreased gradually by developing the full- grown larvae to pupae as well as moth emergence (=empty pupal cuticle) during early September – late October in 2000. In 2001, the overwintering larvae were appeared by late February and the full- grown larval instars were pupated a week later and continued till early May Table 2. However, moth emergence was observed by early April till mid-May. A peak of pupae and moths was attained by late April and early May which characterized by an obvious decrease in number of the full- grown larvae and increase of the newly hatched one by early and mid- May. Then after, larvae were increased gradually and reach its maximum by late June, whilst the full- grown larvae were decreased by pupation. Pupae peaked by late July, while the great decline of larva population occurred by early August. However, moths emerged from early July to late August reached it peak by early August and resulting in new larvae a week later. Pupation occurred by early September till late October and peaked by late September which occupied with the lowest number of full-grown larvae in early October.

Emerged female moths were observed from mid-September to mid-November and during early-late October in 2001 and 2002 resulting in the overwintering larvae in 2002 and 2003 (Tables 2, 3 and 4). In both years, the full-grown larvae developed to pupae by late February till late May, but declined to reach low numbers by early May. However, moth emergencies observed by mid- April and early May in 2002 and 2003 which continued till late May, in both years. Then, larvae increased by early and late May which decreased gradually by pupation to reach the lowest numbers by early August. In this respect, moths emerged at the same time by

mid-July in both years, but continued till mid and late August in 2002 and 2003. Such activities harbored high numbers of larvae in the third week of August in both years. Numbers were decreased gradually by developing the full-grown larvae to pupae and reach the lowest level by early and late October in 2003 and 2002.

Majority of the full- grown larvae developed to pupae, but few numbers were still alive. Undeveloped larvae accounting for 1.6%, 4.4%, 7.8% and 6.2% of the total number of developed and undeveloped larvae to pupae found in 2000, 2001, 2002 and 2003, respectively, Tables 1, 2, 3 and 4. The total number of undeveloped overwintering larvae 10, 30 and 54 were recorded during late February- mid-April and from early January- early May in 2001 and the two next years, respectively, Tables 2, 3 and 4. It decreased to 4, 14 and 10 during early- late July, late June- mid-August and early July- late August which declined to 3, 1 and 1 during September in 2001, 2002 and 2003, respectively. One larva was recorded in late October in 2000 Table 1. The undeveloped overwintering full-grown larvae were still alive until the end of May, which decreased gradually by death until early August. The same behavior was observed during summer and autumn seasons, which lived until late November and early July. The survival period ranged between (82- 173 days), (63- 99 days) and (63- 111 days), respectively.

2- Emergence of Moths

Alive pupae accounting for 65.6%, 80.5%, 80.3% and 84.7% of the total number of live and dead pupae recorded in 2000, 2001, 2002 and 2003, respectively (Tables 1, 2, 3 and 4). However, emerged moths representing 75%, 89.2%, 74.3% and 90.6% of the total number of moths were found, respectively. Pupae developed from overwintering full- grown larvae harbored the highest numbers of moth emergencies during late February- early May in 2001 as well as from mid-December, 2001 and late November, 2002 to late May in 2002 or 2003. It peaked by the 1st, the 2nd and the 3rd weeks of March in 2003, 2001 and 2002, respectively. In all years, no developed larvae were found during the next three weeks, but occurred by early June in 2001 and two weeks later in the two next years till late October, in all years. Two peaks were attained by late June, early and mid- July in 2002, 2001 and 2003 and late September, in all years.

The total number 728 females and 662 males were emerged in a mean sex ratio of about 1 : 1, in all years. Out of 549, 80 and 99 females as well as 547, 62 and 53 males were recorded and emerged in spring, summer and autumn seasons in sex

ratios about 1 : 1, 1 : 1 and 2 : 1, respectively. Generally, the emergence period was prolonged from late March to mid- November and moths peaked by early May, late July and mid- October. Distribution number of emerged moths in 2000, 2001, 2002 and 2003 are illustrated in Figures 1 and 2. Moths of spring generation were emerged by late March, early and mid- April in 2002, 2001 and 2003, respectively (Fig. 1). It continued till late May and early June in the first two years and the third one, but a peak was attained mid and late April as well as early May in the three successive years. In the summer generation, moths emerged from early July to late August in all years, but the emergence period prolonged a week later in 2003 (Fig. 2). It peaked by mid and late July in 2002 and the two other years. However in the autumn generation, emergencies occurred by mid- September and a week later in the first and the last two years. It prolonged till early and mid- November which moths peaked by mid- October and late September and mid- October in 2001 and 2002 as well as in 2000 and 2003.

3- Duration period (the newly hatched larva – adult) in the field

The duration periods of the newly hatched larvae to adult lasted means of 180, 76 and 77 days at means of 17.9, 28 and 27.6 °C with 49.9%, 49.4% and 54.6% R. H. during November 4, 2002- May 28, 2003; May 21- August 14 and August 5- October 24 in 2003, respectively. Twelve females and one male were obtained. The developmental period lasted 191 and 161days from November 4 and December 2, 2002 to May 13 and 12, 2003. However, durations lasted 190 and 178 in days from November 18, 2002 and two weeks later till May 26 and 28, 2003. It shortened to 75 days from May 21 to August 3, 2003, but ranged between (72- 79 days) by May 28 till August 7 and 14. The duration period of four females ranged between (74- 81 days) from August 5 to October 17 and 24, 2003. However, the shortest period lasted 67 days for the only emerged male from August 12 to October 17, 2003.

Reviewing the above mentioned results it could be concluded that larvae of the leaf midrib miner, *C. pararufella*, occurred in mined tunnels of midrib on infested leaves of sugarcane plants varied in growth stages in the different years. It was generally decreased gradually by developing the full- grown larvae to pupae, whilst increased by the ovipositional activity of emerged females. The overwintering full- grown larvae developed to pupae and empty pupal cuticle, as indicator to moth emergence, were observed by late February and early April which were continued till late May. It reach a peak by late April and early May which occupied with the sharp

decline and the obvious increase of larvae in the next week. Moths of *Cosmopterix phyllostachysae* Kurko, followed the same behavior and has one generation a year on (*Phyllostachysae heterocyla* (Carr.) Mitf.) in Japan (Togashi, 1974). On the other hand, pupae observed from mid-June to late October and peaked by mid-July and late September whilst larvae declined in early August and October. However, moths emerged from early July till mid-November and peaked by early August and late September resulting in an obvious increase of larvae by mid-August and October. Generally, the full-grown larvae declined to a few numbers in three cyclic periods by early May, August and October whilst the newly hatched larvae increased in the next week in a year. El-Serwy (2004) reported that infestation by this leaf midrib miner started by early May till late December and reach a maximum of 28.5% and 24.6% in the first and the third weeks of June in 2002 and 2001. Majority of the full-grown larvae developed to pupae whilst (about 6%) were undeveloped and lived until a range between (63- 173 days). On the other hand, pupae (about 82%) were developed to moths of these (about 86%) were emerged during late March – mid-November and peaked by early May, late July and mid- October. Sinev (1997) reported notes on flight periods, host plants and geographical distribution of 40 species of the genus *Cosmopterix* Hb. Of these, *C. crassicervicella* Chrét. emerged in spring and autumn on (*Cyperus* spp.) in Egypt, *C. Salahinella* Chrét. emerged from late February to late June on (*Phragmites australis* (Cav.)) in Tunisia, Libia and Palestine and *C. zieglereella* (Hb.) emerged in late May- July on (*Humulus lupulus* L., *H. japonicus* Sieb et Zucc. and *Boehmeria nipponivea* Koidz) in many European and east far countries. The duration period from the newly hatched larvae to adult lasted means of 180, 76 and 77 days during early November- late May, late May- mid-August and early August- late October in 2002- 2003. Under field and laboratory conditions, moths emerged in spring, summer and autumn generations in a year. In conclusion moth overwintering as larvae are considered the main source of new infestation. It can thus be recommended that the harvesting of the infested sugarcane fields before March and employment of crop rotation can be used as cultural practices to control this pest.

REFERENCES

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Table 1. Total no. of collected larvae, pupae, empty pupal cuticle and emerged moths of *C. pararufella* during September- October in 2000.

Month	Day	No. of collected				No. of full-grown larvae				No. of moths	
		Larvae		Pupae	Empty pupal cuticle	Developed to pupae		Undeveloped	Failed	Emerged	
		Dead	Live			Dead	Live				
September	5	0	45	5	1	1	6	0	1	5	
	12	0	44	5	0	2	10	0	2	8	
	19	9	45	6	0	4	4	0	2	2	
	26	24	14	4	1	1	7	0	3	4	
October	3	27	19	1	1	2	1	0	0	1	
	10	16	10	9	0	5	6	0	1	5	
	17	13	26	1	1	3	5	0	1	4	
	24	19	17	0	3	2	1	1	0	1	
	31	11	4	0	1	1	0	0	0	0	
Total		119	224	31	8	21	40	1	10	30	

Table 2. Total no. of collected larvae, pupae, empty pupal cuticle and emerged moths of *C. pararfella* during February- December in 2001.

Collection date		No. of collected				No. of full- grown larvae			No. of moths	
Month	Da y	Larvae		Pupae	Empty pupal cuticie	Developed to pupae		Undeveloped	Failed	Emerged
		Dead	Live			Dead	Live			
February	20	1	37	0	0	4	2	0	0	2
	27	3	88	0	0	4	11	3	0	11
March	7	4	94	4	0	4	47	3	3	44
	14	5	140	1	0	2	55	0	2	53
	21	15	138	6	0	6	37	2	6	31
	28	1	57	1	0	2	15	0	5	10
April	4	5	68	6	0	11	21	1	4	17
	11	9	19	17	5	4	17	0	1	16
	18	11	28	12	4	5	16	1	3	13
	25	1	4	20	10	1	20	0	5	15
May	2	0	14	6	10	4	9	0	2	7
	9	3	4	7	6	5	2	0	1	1
	16	15	44	0	2	0	0	0	0	0
	23	26	85	0	0	0	0	0	0	0
	30	44	120	0	0	0	0	0	0	0
June	6	2	136	0	0	0	1	0	0	1
	13	12	95	0	0	0	2	0	0	2
	20	12	143	0	0	0	0	0	0	0
	27	6	146	10	0	0	2	0	0	2
July	4	10	92	13	0	0	14	0	0	14
	11	17	66	16	2	0	5	1	0	5
	18	21	46	17	7	0	6	0	0	6
	25	25	21	15	8	0	7	3	0	7
August	1	12	19	10	10	0	6	0	0	6
	8	12	16	8	16	1	5	0	2	3
	15	18	60	2	10	0	4	0	0	4
	22	18	71	1	1	0	1	0	0	1
September	29	10	48	0	0	0	2	0	0	2
	5	Uncollected								
	12	12	30	8	2	4	5	2	0	5
	19	8	20	15	6	8	5	1	2	3
	26	2	8	14	12	7	7	0	0	7
October	3	5	4	8	5	6	3	0	0	3
	10	8	47	5	19	3	3	0	0	3
	17	10	29	4	7	0	0	0	0	0
	24	6	49	1	2	0	1	0	0	1
November	31	9	53	1	3	0	0	0	0	0
	7	9	52	0	0	0	0	0	0	0
	14	7	55	0	2	0	0	0	0	0
	21	7	40	0	0	0	0	0	0	0
	28	6	61	0	0	0	0	0	0	0
December	5	1	63	0	0	0	0	0	0	0
	12	2	63	0	0	0	0	1	0	0
	19	11	79	0	0	0	2	1	0	2
	26	10	114	0	0	0	1	0	0	1
Total		431	2666	228	149	81	334	90	36	298

Table 3. Total no. of collected larvae, pupae, empty pupal cuticle and emerged moths of *C. pararufella* during January- December in 2002.

Collection date		No. of collected			No. of full- grown larvae			No. of moths			
Month	Day	Dead	Live	Pupae	Empty pupal cuticle	Developed to pupae	Undeveloped	Failed	Emerged		
January	2	6	90			0	2	1	0	2	
	9	2	99			0	2	3	1	1	
	16	6	100			1	5	0	0	5	
	23	3	90			0	13	0	0	13	
	30	3	115			0	11	0	0	11	
February	6	4	106			3	13	1	0	13	
	13	6	99			0	16	2	5	11	
	20	2	121			1	27	0	7	20	
	27	3	111	1		1	16	2	0	16	
	March	7	1	146	1		7	23	0	2	21
	14	4	119	7		8	34	1	13	21	
	21	3	122	11		7	37	1	6	31	
	28	0	108	18		21	10	0	3	7	
April	4	1	78	6		4	20	6	7	13	
	11	0	26	9		2	18	1	8	10	
	18	0	26	17	1		7	13	2	7	6
	25	1	25	15	2		1	18	3	4	14
	May	2	1	33	13	2		3	11	4	5
	9	4	44	15	7		3	13	1	4	9
	16	1	136	12	9		0	11	0	4	7
	23	6	55	1	3		0	1	0	0	1
	30	8	89	0	0		0	0	0	0	0
June	6	11	89	0	0		0	0	0	0	0
	13	5	42	1	0		2	0	0	0	0
	20	13	126	0	0		0	4	1	1	3
	27	16	138	6	0		4	15	1	6	9
	July	4	9	68	3		1	3	1	0	3
	11	9	122	11		5	10	7	2	8	
	18	14	73	9	1		4	8	1	5	3
	25	7	72	4	3		1	8	2	6	2
August	1	10	43	0	0		1	0	0	0	0
	8	8	24	3	1		2	1	0	0	1
	15	17	25	1	1		0	2	1	1	1
	22	21	36	0	0		0	0	0	0	0
	29	14	20	0	0		0	2	0	2	0
September	5	14	62	1	0		0	1	0	1	0
	12	7	61	1	0		1	3	1	2	1
	19	2	29	2	0		2	1	0	0	1
	26	15	42	8	0		2	9	0	0	9
	October	3	Uncollected								
	10	4	15	10	1		1	9	0	0	9
	17	5	10	8	5		0	6	0	1	5
	24	3	3	4	4		0	4	0	0	4
	31	1	34	0	0		0	0	0	0	0
November	7	5	53	0	0		0	0	0	0	0
	14	1	48	0	0		0	0	0	0	0
	21	4	63	0	0		0	1	0	0	1
	28	3	93	0	0		0	0	0	0	0
	December	5	1	41	0	0		0	2	0	0
	12	4	71	0	0		1	1	0	1	0
	19	2	58	0	0		0	0	0	0	0
	26	4	62	0	0		4	4	0	1	3
Total		294	3561	198	40		100	408	43	105	303

Table 4. Total no. of collected larvae, pupae, empty pupal cuticle and emerged moths of *C. pararufella* during January- October in 2003.

Collection date		No. of collected			No. of full- grown larvae			No. of moths		
Month	Day	Larvae		Pupae	Empty pupal cuticle	Developed to pupae		Undeveloped	Failed	Emerged
		Dead	Live			Dead	Live			
January	2	4	57			0	0	0	0	0
	9	5	67			1	3	1	0	3
	16	22	193			1	4	0	0	4
February	23	9	152			7	30	6	6	24
	30	10	131			1	30	3	3	27
	6	8	98			0	29	4	2	27
	13	5	129			1	41	11	1	40
March	20	4	128			0	53	6	0	53
	27	3	112	1		3	46	2	3	43
	7	2	129	0		7	69	6	4	65
	14	3	93	1		3	48	1	3	45
	21	3	109	2		7	57	4	2	55
April	28	4	116	3		3	69	5	5	64
	4	3	74	2		15	40	4	3	37
	11	0	62	24		4	55	0	5	50
	18	1	32	15		6	26	0	3	23
	25	1	39	29		10	29	0	6	23
May	2	1	19	27		5	27	1	5	22
	9	2	3	26	8	3	24	0	5	19
	16	0	0	5	9	1	4	0	0	4
	23	0	20	1	5	0	1	0	0	1
June	30	5	62	0	0	0	0	0	0	0
	6	31	182	0	0	0	0	0	0	0
	13	9	107	0	0	0	0	0	0	0
	20	19	169	0	0	0	4	0	0	4
July	27	59	144	3	0	2	2	0	0	2
	4	21	98	6	0	3	11	0	2	9
	11	24	114	6	0	5	9	3	2	7
	18	20	113	18	6	7	19	0	2	17
August	25	8	83	12	2	7	10	2	1	9
	1	11	67	9	7	8	8	2	2	6
	8	11	50	4	8	2	7	1	3	4
	15	15	72	3	3	1	5	1	1	4
September	22	6	104	2	1	0	2	0	0	2
	29	6	83	2	1	3	3	1	2	1
	5	4	73	5	0	4	9	0	1	8
	12	7	67	5	2	6	10	0	2	8
October	19	7	41	10	1	2	13	0	2	11
	26	10	61	25	12	9	21	1	0	21
	3	5	21	17	4	8	8	0	2	6
	10	2	8	6	2	2	3	0	0	3
Total	17	2	19	6	1	2	8	0	1	7
	24	5	19	2	6	2	1	0	0	1
Total		377	3520	277	81	151	838	65	79	759

LARVAE OCCURRENCE AND MOTHS EMERGENCE OF THE LEAF MIDRIB MINER,
COSMopterix pararufella RIEDL, (LEPIDOPTERA : COSMopterigidae),
 ON SUGARCANE IN EGYPT

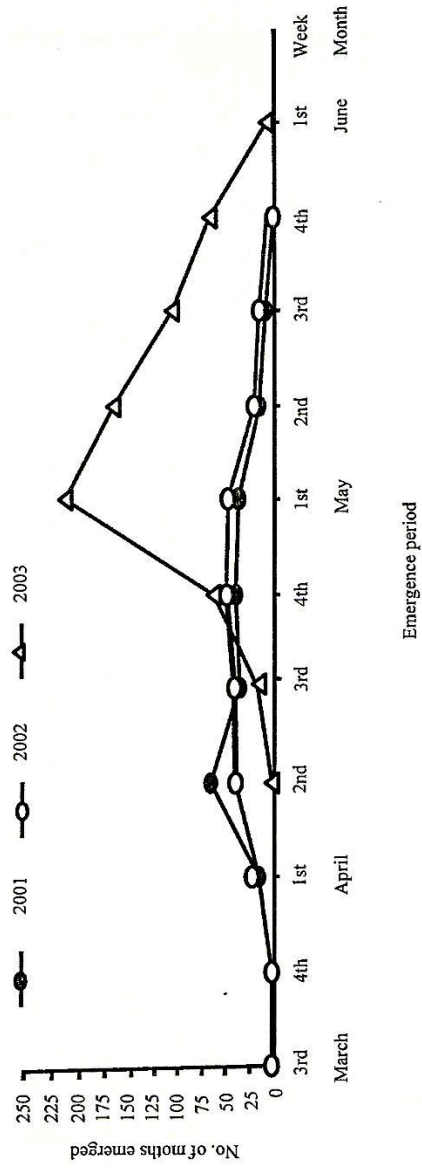


Fig. 1. Distribution emergences of moth *C. pararufella* during March- June in 2001, 2002 and 2003.

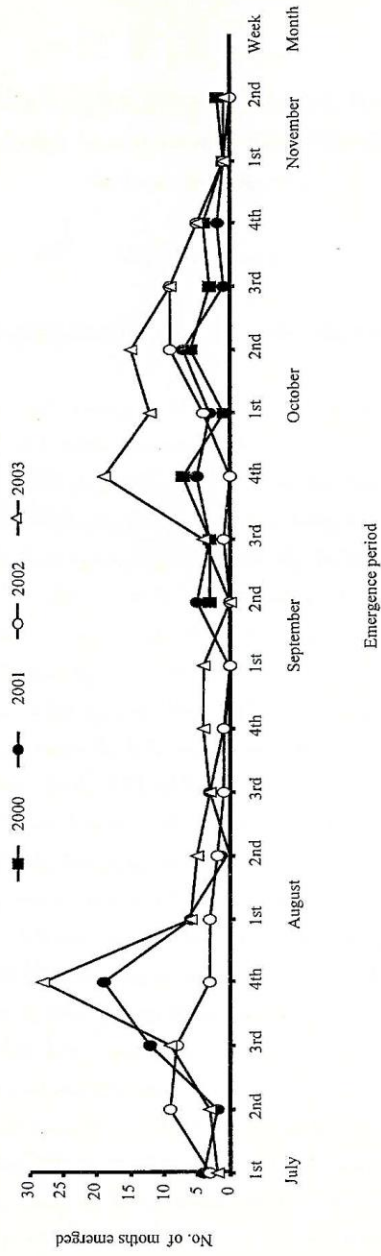


Fig. 2. Distribution emergences of moth *C. pararufella* during July- November in 2000, 2001, 2002 and 2003.

تواجد يرقات وخروج فراشات صانعة أنفاق العرق الوسطى للأوراق

COSMopterix PARARUFELLA RIEDL

على قصب السكر في مصر.

سمير عوض السروي

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة - مصر.

درس تواجد يرقات وخروج فراشات صانعة أنفاق العرق الوسطى *Cosmopterix pararufella* Riedl من عائلة *Cosmopterigidae* ورتبة حرشفية الأجنحة. جمعت أوراق مصابة من حقول قصب سكر غير معاملة بالمبيدات في منطقة العياط بمحافظة الجيزة من سبتمبر إلى أكتوبر ٢٠٠٠ وكذلك من فبراير ٢٠٠١ وحتى ديسمبر ٢٠٠٣. تشير النتائج المتحصل عليها إلى أن اليرقات تتواجد في أنفاق بداخل العرق الوسطى للأوراق المصابة على المراحل المختلفة لنمو النبات وفي السنوات المختلفة. وتزداد أعدادها تبعاً لنشاط الإثاث الخارجة لوضع البيض بينما تتخفف تدريجياً بتحول اليرقات التامة النمو إلى عذارى. سجلت تلك الارتفاعات في منتصف وأواخر مايو في كلا من عامي ٢٠٠١، ٢٠٠٢، وأيضاً في عام ٢٠٠٣ ثم في منتصف أغسطس وأوائل أكتوبر في جميع الأعوام. بينما انخفضت أعدادها في أواخر أغسطس وأكتوبر في جميع الأعوام وكذلك في أواخر أبريل في العامين الأولين وتأخرت إلى أوائل مايو في العام الأخير. لقد تحولت أغلبية اليرقات التامة النمو إلى عذارى بينما تظل (حوالي ٦%) حية لفترة تراوحت ما بين ٦٣-١٧٣ يوماً خلال السنوات المختلفة. بلغت نسبة الفراشات الخارجة ٧٥%، ٨٩.٤٢%، ٧٤.٤٣% و ٩٠.٤٦% من مجموع أعداد الخارجة وتلك التي فشلت في الخروج في أعوام ٢٠٠٠، ٢٠٠١، ٢٠٠٢ و ٢٠٠٣، على التوالي. خرجت الفراشات التي مضت يرقاتها فترة الشتاء في أواخر مارس وأوائل ومنتصف أبريل في ٢٠٠٢، ٢٠٠١ و ٢٠٠٣ وقد استمرت حتى أواخر مايو و أوائل يونيو في كلا من العامين الأولين والعام الثالث، بنفس الترتيب. وبلغت ذروتها في منتصف وأواخر أبريل وأوائل مايو في الثلاث السنوات المتعاقبة. تعتبر فراشات هذا الجيل المصدر الرئيسي للإصابة الجديدة. أما فراشات الجيل الثاني فقد خرجت في أوائل يوليو واستمرت حتى أواخر أغسطس في جميع الأعوام، باستثناء العام الأخير حيث استمر خروجها حتى أوائل سبتمبر. ووصلت ذروة أعدادها في منتصف وأواخر يوليو في عام ٢٠٠٢ وكلا من عامي ٢٠٠١ و ٢٠٠٣. أما فراشات الجيل الأخير فخرجت في منتصف سبتمبر في كلا من العامين الأولين وتأخرت أسبوعاً في العامين الأخيرين بينما استمر خروجها حتى أوائل ومنتصف نوفمبر وتصل ذروتها في منتصف أكتوبر وأواخر سبتمبر في كلا من عامي (٢٠٠١، ٢٠٠٢) و (٢٠٠٠، ٢٠٠٣). وجد أن متوسط فترة التطور (اليرقة الحديثة الفقس - الحشرة

الكاملة) تستغرق ١٨٠، ٧٦ و ٧٧ يوما خلال أوائل نوفمبر- أواخر مايو، أواخر مايو- منتصف أغسطس و أوائل أغسطس - أواخر أكتوبر في ٢٠٠٢-٢٠٠٣. وتحت كلا من الظروف الحقلية والمختبرية فإن الفراشات تخرج في ثلاثة أجيال في الربيع، الصيف والخريف في كل عام. يمكن التوصية باتباع بعض العمليات الزراعية كقطع المحصول في مارس واستخدام دورة زراعية كطرق آمنة لمكافحة تلك الحشرة على القصب.