

**SURVEY AND POPULATION DYNAMICS OF COMMON
TRUE SPIDERS IN EGYPTIAN COTTON FIELDS
BY**

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ABSTRACT

Survey and population dynamics of common true spiders in untreated cotton fields in Egypt were studied at Sakha and Mallawi research stations in the three successive seasons, 1991-93. Visual counts and collections of true spiders associated with cotton pests were taken weekly in the two locations. Field observations on the efficiency of the true spiders were recorded. The survey revealed about 17 genera belong to 10 families prey on cotton pests in the two areas. Specimens were identified by the specialists at the universities of New Mexico and Texas A&M, USA. Population of the true spiders started and ended the seasons higher at Sakha, while it was higher in the mid-months at Mallawi. August represented the highest numbers counted in the two working sites. Lynx group species predominated the other groups, represented by 48.7%, while the others: Webbing, Jumping and Crab were represented by 21, 13.7 and 16.5 %, respectively.

Key Words: Cotton, True Spiders, Survey, Population Dynamics, Egypt.

INTRODUCTION

Few studies have been implemented on the spiders in Egypt. Many species of true spiders may be considered as promising biological control agents for a wide group of pests.

Systematically, the true spiders belong to order Araneae which contains about 50,000 identified species. Most of the true spiders are carnivorous. The true spiders are characterized under four groups; Lynx, Jumping, Webbing and Crab. (Ellington 1994)

In Egypt, many authors have reported true spiders in cotton and maize fields as efficient insect predators feed on different stages of the cotton leaf-worm, boll-worms, white flies and corn borers. (El Heneidy *et al.*, 1978, Ibrahim and Fayad 1981) and they are the least group of predators affected by the insecticides (Fayad and Ibrahim, 1981 and 1986; Fayad *et al.*, 1990).

The present study was conducted as an Egyptian - American collaborative Research Program on cotton IPM Under the National Agricultural Research Project (NARP) financed by USAID. The main objective of the study is to survey the true spiders in cotton fields in Egypt and their population dynamics with a preliminary attempt for their identification. This could be the first step leads interested researchers to continue and come out with more advanced classifications for this group..

METHODS AND TECHNIQUE

One experimental plot of 12 feddan at Sakha Research Station (Kafr El-Sheik governorate) north Egypt and another of 4 feddans at Mallawi Research Station (Minia governorate) middle south Egypt planted with cotton were chosen for three successive cotton growing seasons, 1991-93. These two research stations are considered as two different distinct agro-ecosystems (EL-Heneidy *et al.*, 1995). Experimental plots were purposely surrounded by clover and wheat during winter seasons prior to cotton and maize planting to enhance native levels of biocontrol species. During the three seasons, cotton was planted annually around early April. Regular cultural practices were applied. In order to survey and study the population dynamics of common species and/or groups of true spiders, no insecticides were applied in the experimental fields during the three considered seasons.

Specimens of both immature and adult stages of the true spiders associated with pests on the cotton plants and/or on the ground in the two locations were collected and mounted in alcohol 70%. Specimens were sent to the cooperating scientist in New Mexico State University, USA for identifications. Starting few days after seed germination, weekly direct counts of the major characteristic four groups of the true spiders were taken regularly on cotton plants throughout the three growing seasons. The count was continued until harvesting in the two working sites. A stratified sampling technique was used in this study (Legaspi *et al.*, 1989 and Ellington, 1994).

Field observations on the efficiency and behavior of the true spiders against the cotton pests were recorded.

RESULTS AND DISCUSSION

Survey and Identification:

Systematic is a rather subjective exercise and, at each stage of classification, there will always be some organisms which do not fit easily into any particular scheme. The long evolution of spiders, and the scarcity of fossil remains, make them a difficult group to classify, and there have been not less than eighteen different classification systems proposed. For the moment,

spiders belong to the Animal Kingdom, sub -Kingdom Metazoa, class Arachnida. Many insects are phytophagous but most arachnids are predatory. (Jones, D. 1983).

The following list consists of preliminary identification of the true spiders collected from the experimental cotton fields at Sakha and Mallawi Research Stations during 1991 and 1992 seasons. These identifications are in most cases to the Family and Generic levels because of the lack of literature. More precise identifications are still needed, when more literature becomes available. Identification made by the specialists; David B. Richman, New Mexico State University, or D. Allen Dean, Texas A&M University of the USA.

Fam.: Araneidae	
<i>Singa</i> sp.	(recorded 5 times in the two sites)
Fam.: Clubionidae	
<i>Chiracanthium</i> spp.	(recorded 15 times in the two sites)
Fam.: Dictynidae	(Web spinners)
<i>Dictyna</i> spp.	(recorded 14 times in the two sites)
Fam.: Gnaphosidae	
Unknown genus	(recorded once at Mallawi)
Fam.: Linyphiidae	
Unknown genera	(recorded 5 times in the two sites)
Fam.: Lycosidae (Wolf spiders)	
<i>Paradosa</i> sp.	(recorded 7 times in the two sites)
Unknown genus	(recorded 3 times in the two sites)
Fam.: Philodromidae (Crab spiders)	
<i>Thanatus vulgaris</i>	(recorded 15 times in the two sites)
Fam.: Salticidae	
<i>Neutha oculata</i>	(recorded once at Mallawi)
<i>Salticus</i> sp.	(recorded once at Sakha)
Unknown spp.	(recorded twice in the two sites)
Fam.: Theridiidae	
<i>Steatoda</i> sp.	(recorded once at Mallawi)
<i>Theridion</i> spp.	(recorded once at Mallawi)
Unknown genera	(recorded 3 times in the two sites)
Fam.: Thomisidae	(Crab spiders)
<i>Runcinia</i> sp.	(recorded 4 times in the two sites)
<i>Thomisus citrinellus</i>	(recorded 4 times in the two sites)
<i>Thomisus</i> sp.	(recorded once at Mallawi)
Unknown families	recorded 6 times in the two sites (partly damaged specimens).

This may be especially important for members of the genera; *Chiracanthium*, *Dictyna*, *Runcinia*, *Paradosa* and several species of Linyphiidae and Theridiidae. The two species of the genus *Chiracanthium* represented the largest and the smallest species in the collection. Both are

relatively common in the collected samples and may be as important in Egyptian cotton as their close relative, *C. inclusum*, in the United States, where it was found in eight of nine cropping systems so far examined (Young and Edwards, 1990). The Egyptian form bares some resemblance to that found in cropping systems in Yuma County, Arizona, in that it contains *Pardosa*, *Singa* or *Hypsosinga*, flower-dwelling thomisids, several sulticid genera, linyphiids and species in the genus *Dictyna*. However, in the collection so far seen, the Egyptian cotton fauna seems to lack species in the families Oxyopidae and Tetragnathidae, although species were listed from Egypt (EL-Hennawy, 1990).

Population Dynamics:

Obtained data showed that the true spiders were recorded throughout the three cotton growing seasons in the two areas. Their population varied from one week to another during the seasons and it seems that it has been affected by the cotton growth stages and associated preys. Weekly direct counts of the predators' groups associated with cotton pests during the successive three seasons 1991-93 in both research stations were summarized in Table (1) and Figures 1 and 2. As shown in the table and the figures, the highest total population of the true spider groups was recorded in 1991 season, while the lowest was recorded in 1993 season. Population trend apparently increased almost around mid-season except that of season 1991, when it built up by the end of the season to reach their maximum in August and September. It was also indicated from the table and the figures that the true spiders population was relatively high at the beginning and ending of the season at Sakha, while it was higher during the mid-months at Mallawi. Generally, August represented the highest population means; 27.6 and 26.2 individuals/100 hills at Sakha and Mallawi, respectively.

Highest actual numbers of the spiders (85 and 66 individuals/ 100 hills) were recorded once in the second week of May and August of the first season, 1991 at Sakha and Mallawi, respectively. Lowest number (4 spiders/ 100 hills) was recorded in the second week of June, 1992 at Sakha and the third week of September, 1993 at Mallawi.

Regarding the population dynamics and abundance of the four groups of the true spiders; Lynx, Jumping, Webbing, and Crab, figure (3) illustrates the percentages of representation of each group in the three seasons and in the two locations of the study. Obtained data showed that:

- Lynx group species apparently predominated the other three groups throughout the period of the study. It was represented by 48.7% of the total population. On the contrary the Jumping group was represented by 13.7%.
- Except the 1993 season, Lynx and Jumping groups populations were mostly higher at Sakha, while the other two groups; Webbing and Crab were higher at Mallawi.
- Jumping species population was always higher at Sakha in correspondence to the Webbing at Mallawi during all seasons.

Table (1): Monthly mean numbers of true spiders / 100 hills associated with cotton pests in untreated cotton fields at Sakha and Mallawi Research Stations in the three successive seasons 1991 - 93

Season	May			June			July			August			September		
	Sak.	MAL.		Sak.	MAL.		Sak.	MAL.		Sak.	MAL.		Sak.	MAL.	
1991	40.5 (8-85)	26.8 (4-51)		23.7 (17-31)	33.7 (15-46)		26.2 (16-37)	34.5 (17-41)		47.5 (31-65)	48.8 (23-66)		50.3 (31-67)	33.5 (26-47)	
1992	8.0 (5-11)	14.8 (13-18)		14.4 (4-30)	15.3 (11-20)		22.4 (16-31)	19.1 (13-24)		25.1 (21-31)	21.3 (11-29)		14.6 (11-19)	16.5 (11-26)	
1993	12.9 (7-20)	9.8 (7-12)		14.9 (12-19)	16.3 (9-22)		12.9 (10-21)	13.1 (11-15)		10.1 (5-13)	8.5 (6-12)		7.9 (5-12)	6.9 (4-11)	
Gen. Mean	20.5	17.1		17.7	21.8		20.5	22.2		27.6	26.2		24.3	19.0	

Fig. (1): Monthly mean numbers of true spiders / 100 hills on untreated cotton plants at Sakha Research Station in the three successive seasons 1991 - 93

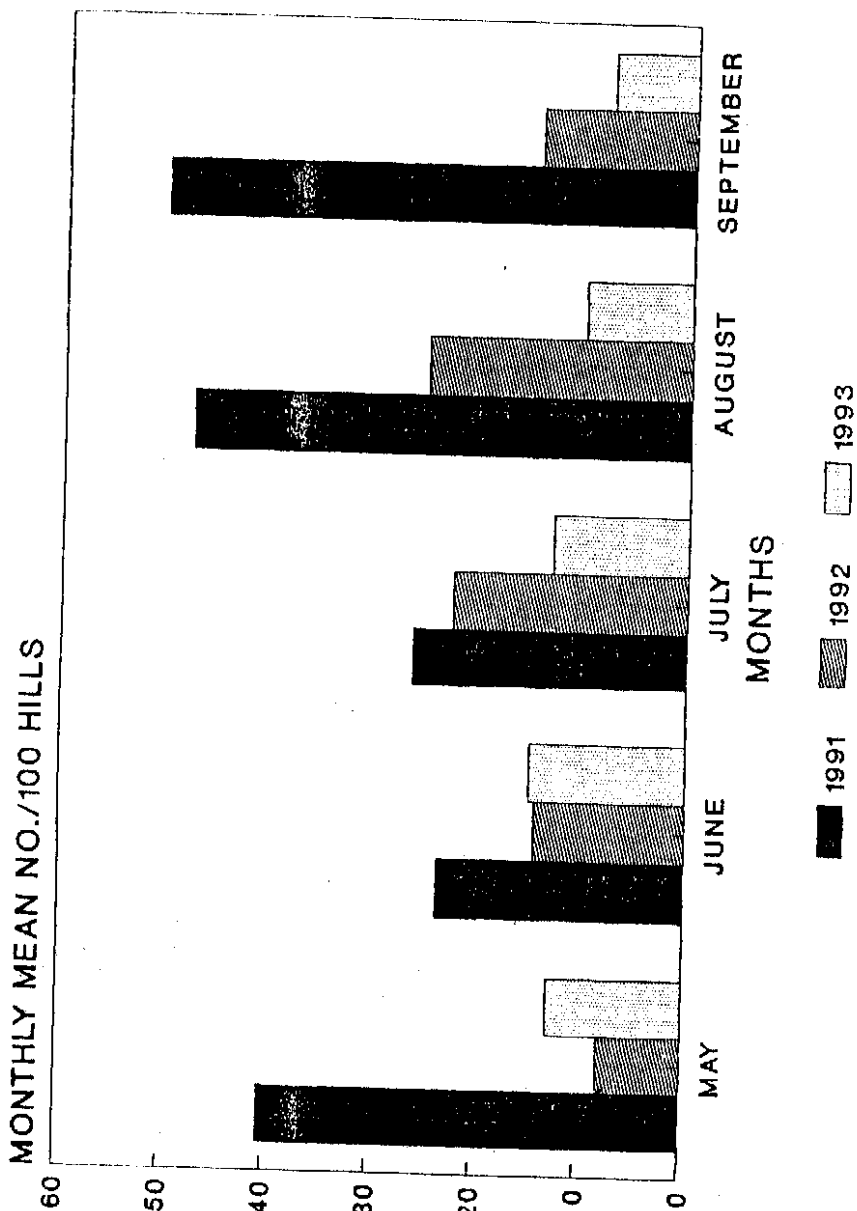


Fig. (2): Monthly mean numbers of true spiders / 100 hills on untreated cotton plants at Mallawi Research Station in the three successive seasons 1991 - 93

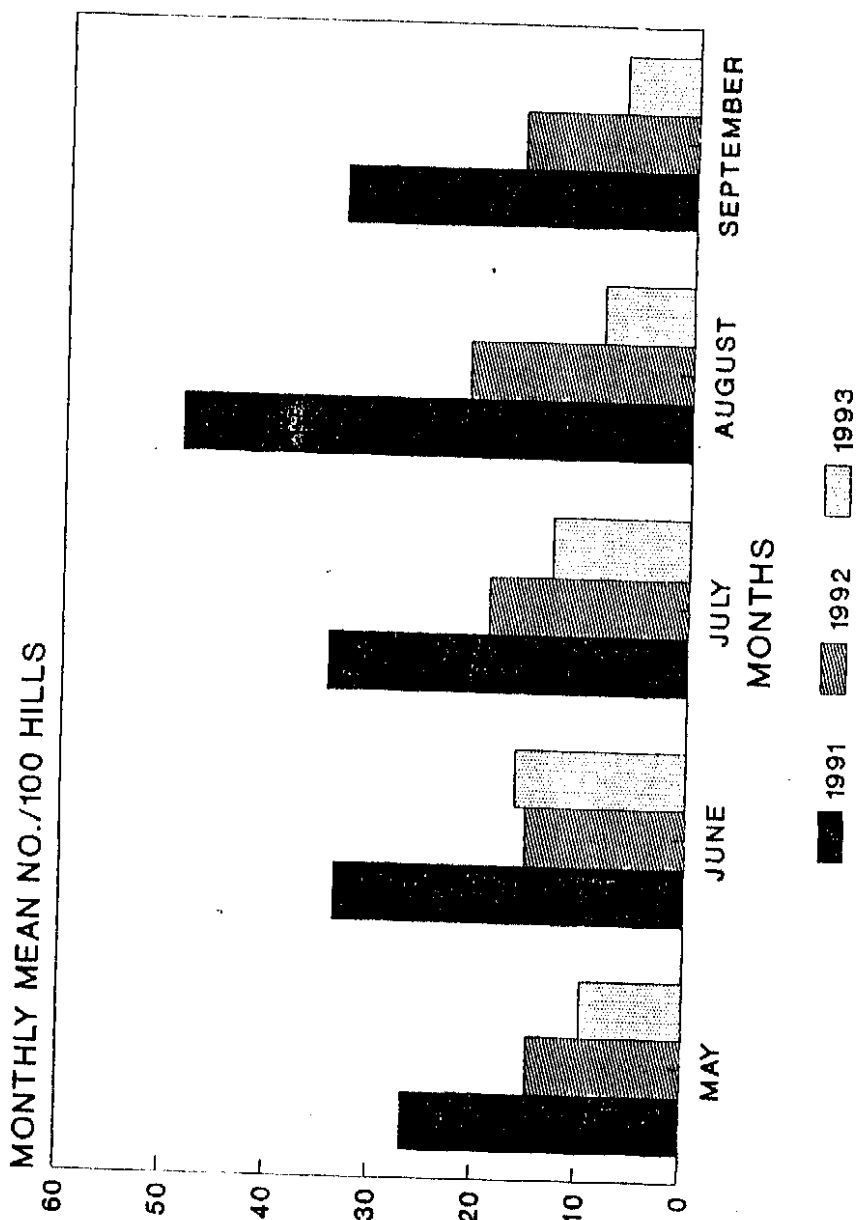
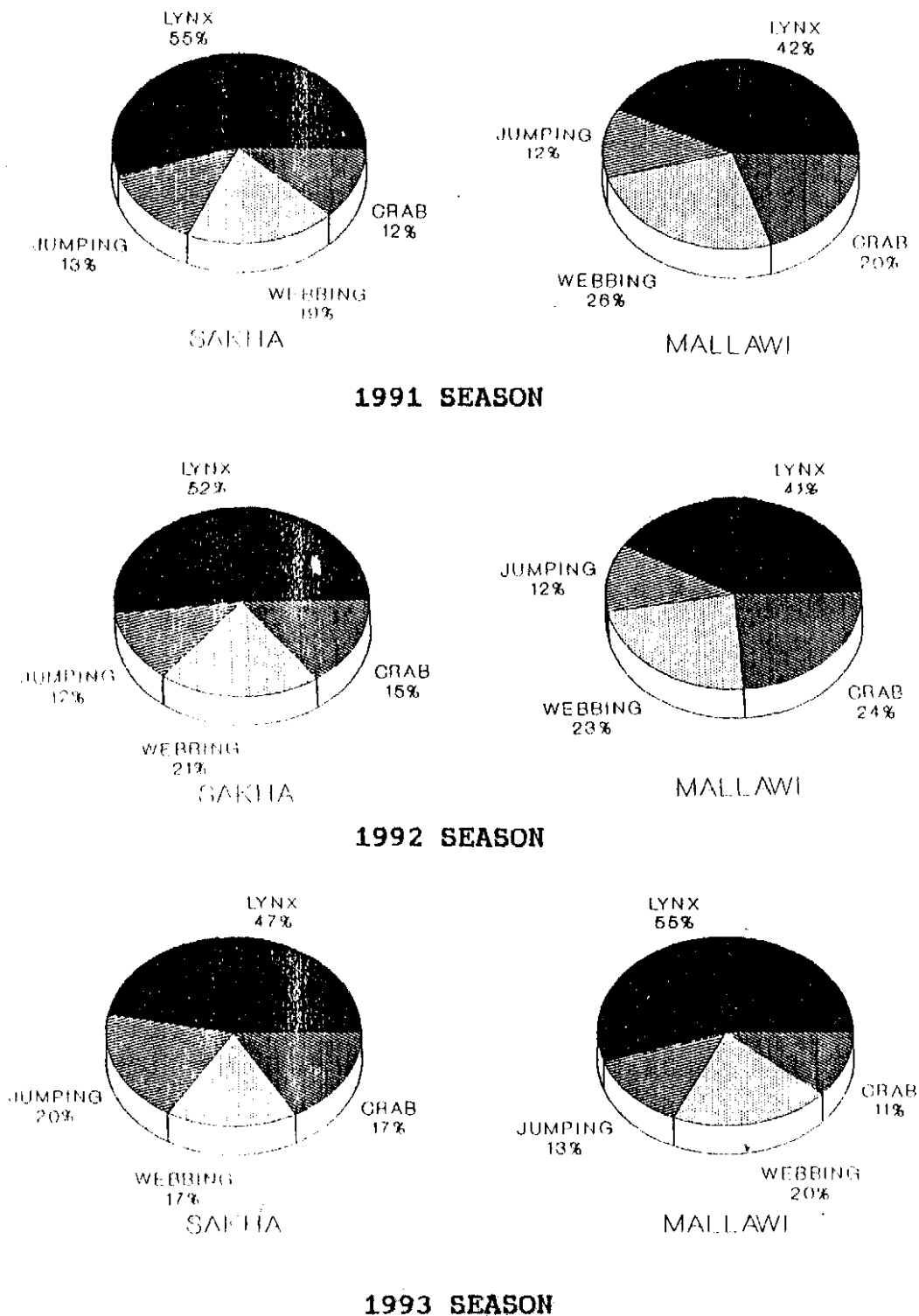


fig. (3): Relative abundance of true spider groups on untreated cotton plants at Sakha and Mallawi Research Stations in the three successive seasons 1991 - 93



- Lynx population started the seasons always relatively high, declined in the middle and then risen up again by the end of the season. Highest numbers of Lynx species were recorded in May and August at the two sites.
- Jumping' population means ranged between 1 - 7 individuals/ 100 hills throughout the seasons at the two locations.
- Webbing' population was always higher in the second half of the season at the two locations.
- Crabs' population was mostly higher at the end of the season, particularly during 1991 and 92, but not in the 1993 cotton season.

Field Observations:

Field observations on the activity and feeding behavior of the true spider groups on cotton plants were recorded on both sites to evaluate their predacious efficiency. The observations showed that, true spiders preyed efficiently so far on most of the cotton insect pests such as; immature and adult stages of aphids, white flies, jassids, egg-masses and newly hatched larvae of the cotton leaf worms as well as bollworms larvae inside the opened bolls. However, they were also found preying on the wandering insect predatory species such as; eggs, nymphs and small larvae of *Orius*, *Scymnus*, *Chrysoperla* and *Coccinella* spp.

Webbing species were the most efficient group recorded during the observations because they used easily their spinning web-nets to catch their victims, particularly the flying moths. In this concern, EL-Heneidy *et al.*, 1995 reported highly significant interactions between the true spiders and most of the cotton pests throughout the cotton growth stages.

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حصر ودراسة تعداد العناكب الحقيقية فى حقول القطن المصريه

أحمد حسين الهندي ، أميرة عبدالحميد ابراهيم ، يحيى حسين فياض ،
جلال محمود معوض
مركز البحوث الزراعيه - معهد بحوث وقاية النباتات - الدقى - الجيزة - مصر

درس تعداد العناكب الحقيقية بحقول القطن غير المعاملة بالمبيدات بمصر
فى محطتى بحوث سخا وملوى لمدة ثلاثة مواسم متتاليه ١٩٩١-١٩٩٣ .

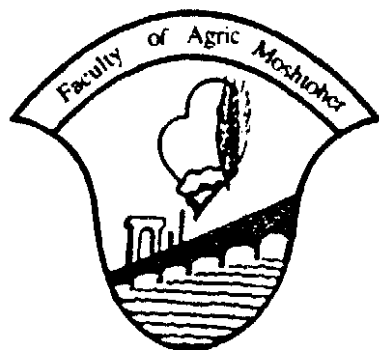
وقد تم العد وجمع العينات وتسجيل الملاحظات للعناكب الحقيقية المصاحبة
لآفات القطن أسبوعيا بالمحطتين. وقد أوضحت النتائج وجود ١٧ جنسا تنتمى الى
١٠ عائلات للعناكب الحقيقيه على آفات القطن. كما تم تعريف العناكب بواسطة
المختصين بجامعة نيو ميكسيكو وجامعة تكساس بالولايات المتحدة الأمريكيه والذين
قسمة العناكب الحقيقيه الى أربعة مجموعات رئيسيه هى مجموعة *Lynx* ومجموعة
العناكب الغازلة ومجموعة العناكب القافزة ومجموعة العناكب السرطانية.

وقد كان تعداد العناكب عموما عاليا فى سخا خلال الموسم بينما كان مرتفعا
فى الشهور المتوسطه فى ملوى. وقد سجل شهر أغسطس أعلى تعداد فى المحطتين
كما اتضح أن مجموعة *Lynx* تسود عن بقية المجموعات مسجلة متوسطا قدره
٤٨٧٪، بينما كان متوسط التعداد فى العناكب الغازلة والقافزة والسرطانية هو
٢١٪ و ١٣٪ و ١٦٪ على التوالى.

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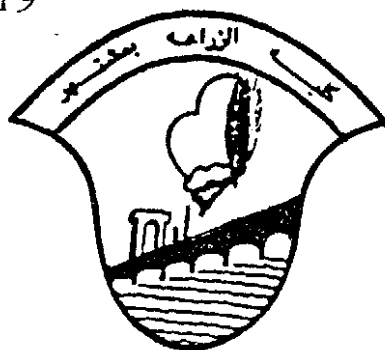
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سبتمبر ١٩٩٦م

المجلد الرابع والثلاثون . العدد الثالث