

POPULATION DYNAMICS OF THE SAP BEETLE (NITIDULIDAE) ASSOCIATED WITH DATE PALM TREES IN COASTAL REGIONS OF LIBYA.

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Abstract

A study was conducted to determine population density for sap beetles of the family Nitidulidae, associated with date palm trees in two coastal locations, (Garaboli and Zawia) during the year 2002-2003. Food-bait traps made locally were used to attract beetles; four traps were hanged in each field.

Results showed that sap beetles are present all year round in date palm groves in the two regions studied. A total number 4531 beetles, were caught in Garaboli and 34234 beetles were caught in the two locations in Zawia region.

Study of population densities showed that the common beetle, were *Carpophilus hemipterus*, followed by *C. dimidiatus*, and *Urophorus humeralis*, and *Eपुरaea luteolus*, the last one was recorded for the first time in Libya .(New record)

Results also showed that *Carpophilus hemipterus* had three generations/year in Garaboli and two generations in Zawia region, while *Urophorus humeralis* had two generations in Zawia and Garaboli, *Eपुरaea luteolus* had four generations in Garaboli and three generations in Zawia.

Food-bait traps locally made was found to have a great effects on attraction and control of the sap beetles. Due to their positive effect on trapping .

INTRODUCTION

Recent advances in control of sap beetles were established by utilizing of non-traditional methods, among which were the use of plant extracts and pheromones. In

addition to that, food baits, and different traps were utilized to reduce their pest population (2,5).

Addition of pesticides was used in bait to control these pests, and different attempts were done to improve the efficacy of the traps (baits) used (7,8,9). In Libya there are eight million Date palm trees, their fruits are subjected to many insect pests among them, the fruit sap beetles that caused a loss of 52 million dinars in(1994) in the southern part of the country. (4)

Due to scarcity of research on control of these pests, this study was conducted to evaluate the seasonal fluctuations of sap beetles on two different regions in the coastal region of Libya.

MATERIALS AND METHODS

This study was conducted at two localities (Fig1), namely Garbulli (65Kms from Tripoli "east"), and Zawia (40Kms from Tripoli "west"), The first location was in a 10 hectares farm (1000 date palms), while the second has 216 date palms with area of 2 hectars. and a farm of four hectares with 1000 date palm .

The study was carried out for about one year starting from March 2003 to Feb. 2004.

Food bait trap was designed locally which was modified from California sap beetle trap (6). The modified trap was as follow, Plastic bucket 15cm height with a cover of 20cm and a handle (Fig.2). A hole on the lid (6cm diameter) in which a cone attached to a net. The trap was filled with water to 2/3 of its size with few drops of soap. Food bait was added to the trap, which constitute of banana puree's. wrapped in a net hanged from the lid. The trap was hanged on date palm trees at 1.5m heights from the ground. Four traps were randomly distributed in each field (Fig.3). Trapped beetles were collected and preserved in 70% alcohol tubes with glycerin for further identifications.

RESULTS AND DISCUSSIONS

1. Garaboli region:

Results indicated that four different species were found at Garabolli farm, which had been attracted to the bait (Table 1, Fig.4). First catch was obtained on March were *Carpophilus hemipterus* (179 beetles), and declined on April and May (Absence of food hosts) ,while the number increased up to 319 on June, declined on July, August, increased in September 741. *C.dimidiatus* reached the highest populations on June, 319 beetles, and October 463 beetles, while other months showed fluctuations.

The third sap beetle found was *Urophorus humeralis* with low population ranging from (22-17 beetles) on April and May respectively disappearing during June and July. then appeared during August and September (32, 169 beetles) respectively.

The fourth was *Epuraea luteolus* which recatched on May (24 beetles), and June (93 beetles) and later declined and disappeared during January, and started appearing again on Feb (12 beetles) seasonal distribution of sap beetles (Fig.5) indicated that the beetles were found during summer and fall-Although the beetles were found during spring and summer, but the most common was *C.hemepterus* with a frequencies of 56.6% and 45.51% respectively. *C.dimidiatus* frequencies were 33.6% and 39.08% during summer and winter respectively. *U.humeralis* was 5.1% and 2.82% respectively during spring and summer.

2. Population Density at Zawia region:

2.1 First location.

Results indicated that four different species had been attracted to the bait, were found at zawia in the (first farm) (Table 2, Fig6), Starting with *Carpophilus hemipterus*, First catch was obtained on March (52 beetles), the number increased in April and may reached the highest populations in June (2084 beetles) and declined in July and August then a second peak obtained in September (914 beetles), also the number increased to 943 beetles in November then start declining in January.

C.dimidiatus appeared on March with 39 beetles, the number increased in April and May, the first peak appeared on June (843 beetles), reached the highest populations on October (1603 beetles), then the numbers start decline on the following months. *Urophorus humeralis* appeared on march (11beetles) and their numbers started to increase until it reach the first peak on June (679 beetles), then the numbers start to decline during July, August and September. A second peak appeared on October (649 beetles), the numbers start decreasing until it disappeared in February. For *Epuraea luteolus* the first peak appeared on July than reached the highest populations on October (1505 beetles), then the numbers start decline on the following months. Table (2). Fig. 6.

Seasonal distribution of sap beetles (Fig7) indicated that the beetles were found during spring and summer, but the most common was *C.hemepterus* with a frequency of 49.3% and 25.03% respectively. *C.dimidiatus* frequencies was 36.8% and 23 % during summer and sprig respectively. *U.humeralis* was 8.8% and 17.7%

respectively during spring and summer. *Epuraea luteolus* appeared also on spring and summer with low frequencies of 4.7% and 5.4% respectively.

During fall and winter *C.hemipterus* reached a frequencies of 30.5% and 56.7% respectively. *C.dimidiatus* 29.7%, 22.5% while *Urophorus humeralis* showed a frequency of 17.6% in spring and 11.6% during Summer . *Epuraea luteolus* . Frequency was 21.01% and 8.3% respectively.

2.2. Second location:

In the second location of Zawia , results showed the presence of the sap beetles all year round in the field table (3) fig (8), the insect density of *Carpophilus hemipterus* reached a total of (9289 beetles). First catch was obtained on March where (546) beetles, declined in April to (296 beetles), then the first peak appeared in May with a (1486) beetles, then the numbers start decline on the following months of June, July and August .a second peak appeared on September (3311 beetles) and October (2799 beetles) during the ripening season of date fruits. Then a tremendous reduction of the insect population observed on the following months. *C.dimidiatus* showed tow peaks, the first one on May (289beetles) and the second was on October (1028beetles), then the number decreased and disappeared in January and February. *Urophorus humeralis* showed a first peak on May (621 beetles), a second peak on October (715 beetles), and start decline in November and December then disappeared in January and February. *Epuraea luteolus* first appeared on March (42beetles), decreased in numbers and disappeared In June, July and August (High Temp.) the highest density recorded in September (543 beetles).

The seasonal distribution of the sap beetles during spring and summer was as following: *C.hemipterus* was the dominant species showed a frequency of 65.9% in spring and 40.5% in summer, *C.dimidiatus* was 12.3% and 24.4% respectively, *U. humeralis* 19.5% in spring and 12.6% in summer, *E. luteolus* was 2.2% in spring and 0% in summer.

During fall and winter seasons the frequency of: *C.hemipterus* was 55.7% and 38.8% respectively, *C.dimidiatus* 21.7% and 17.1% respectively, while *U. humeralis* in fall was 12.2% and 1.1% in winter, *E. luteolus* 8.9% and 29.5% respectively .Fig (9)

CONCLUSION

Results indicated the presence of three different genera and four species of sap beetles all year round in date palm groves in the two regions studied. Total number

4531 beetles, were caught in Garaboli and 34234 beetles caught in the two locations in Zawia regions, This results disagree with the results obtained by Bataw et al (1995). Statistical analysis indicate a significant differences between the three locations of the study Fig (10). Population densities showed that the dominant beetle is, the *Carpophilus hemipterus*, followed by *C. dimidiatus*, *Urophorus humeralis*, and *Eपुरaea luteolus*.

Results also showed that *Carpophilus hemipterus* and *C. dimidiatus* had three generations/year in Garaboli and two generations in Zawia region, and this agree with Bartelt et al (1994) and Dowd & Nelson. (1994)

While *Urophorus humeralis* had two generations in Zawia and Garaboli, *Eपुरaea luteolus* had four generations in Garaboli and three generations in Zawia.

Presence of sap beetles all year round in the two regions could be due to the presence of fruit orchards near by the date palm groves and also may related to the mis-management of the farms (fallen fruits).

Mean Temperature in Garaboli was 12.7-30.2 c° and in Zawia was 12.7-29.2 c°

Food-bait traps locally made had a great effects on attraction and control of the sap beetles, which could be means to reduce the population of sap beetles damage.

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Fig (1) locations studies

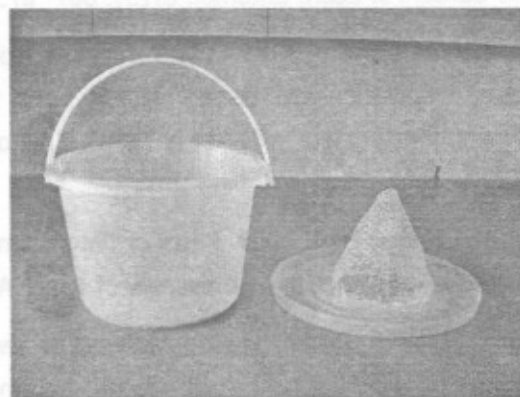


Fig (2) The bait trap



Fig (3) The trap was hanged on date palm trees

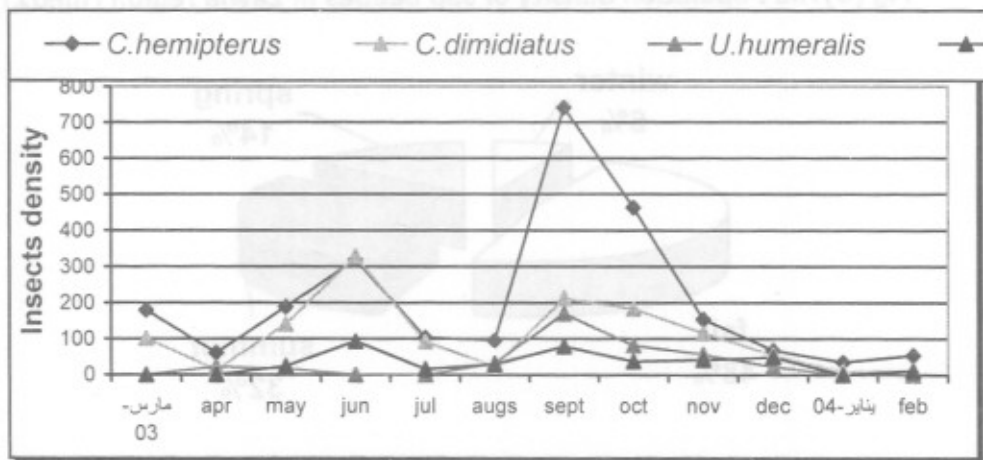


Fig (4)The Population density of sap beetles in Garaboli region

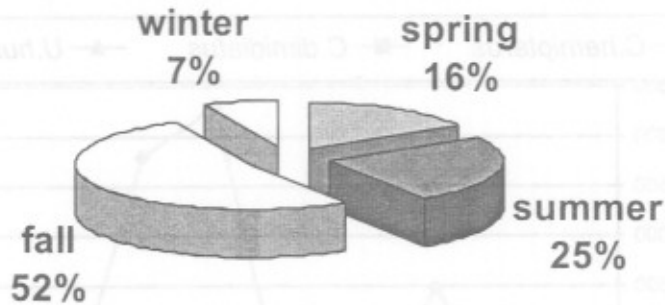


Fig (5)Seasonal distribution of sap beetles in Garaboli region

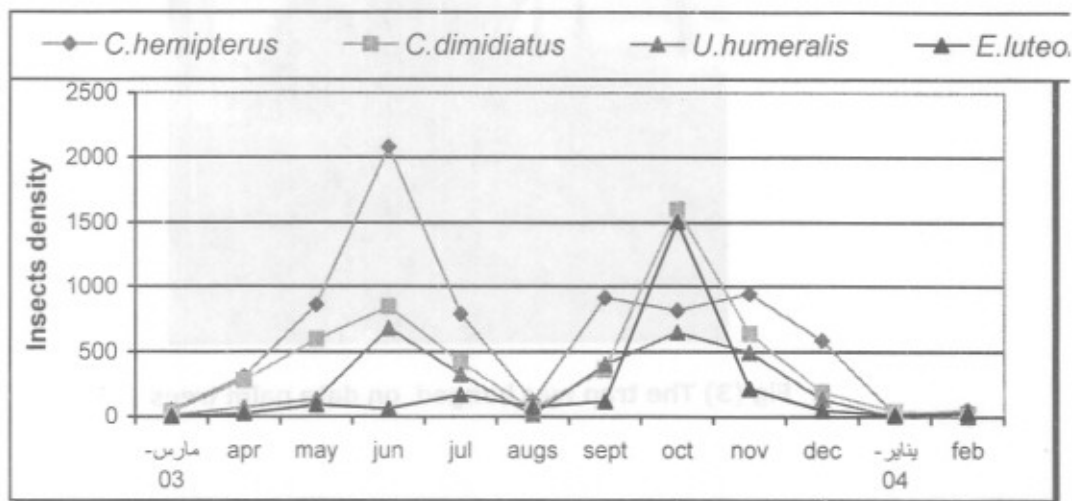


Fig (6)The Population density of sap beetles in Zawia region (filed1)

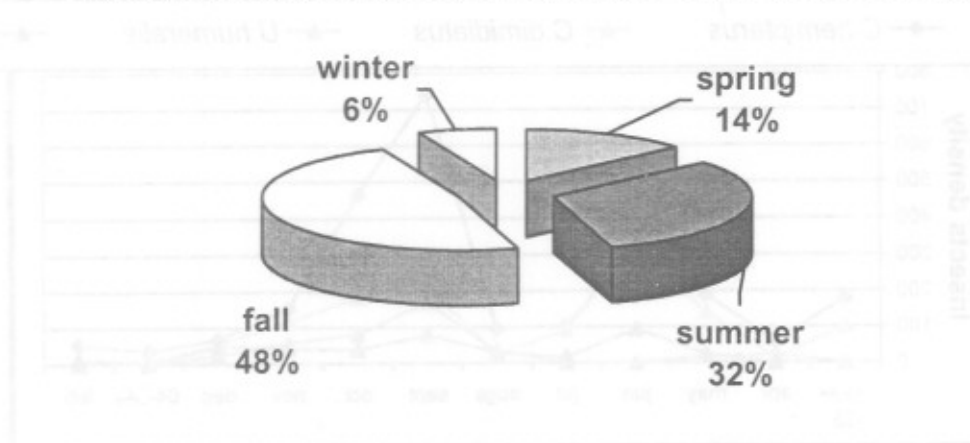


Fig (7)Seasonal distribution of sap beetles in Zawia region (filed1)

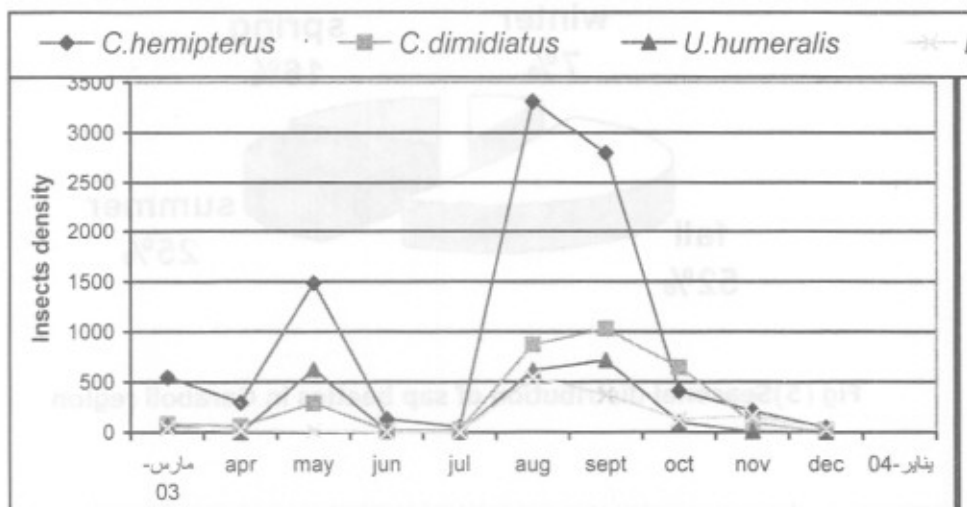


Fig (8)The Population density of sap beetles in Zawia region (filed2)

Table(1): Seasonal abundance in Zawia region (filed2)

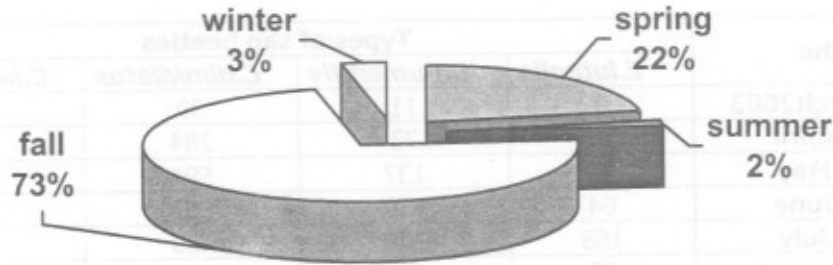


Fig (9) Seasonal distribution of sap beetles in Zawia region (filed2)

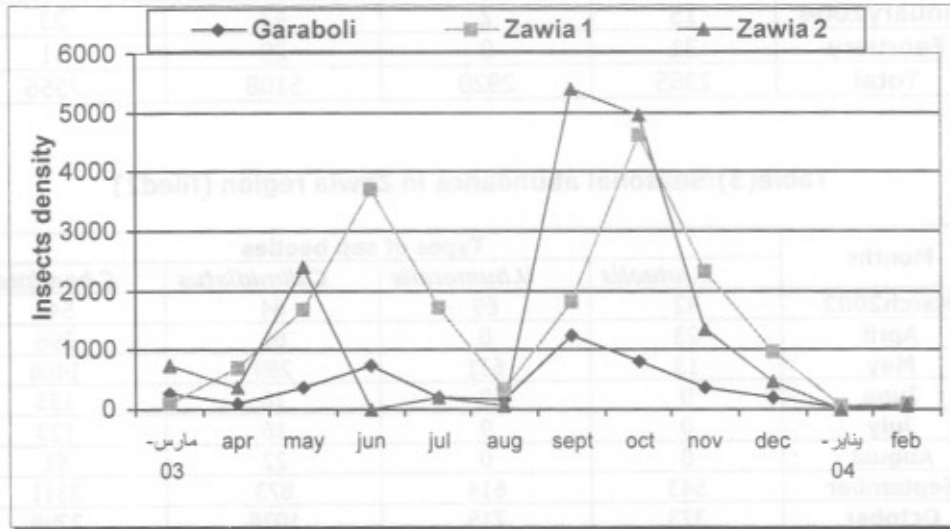


Fig (10) Comparison the Population density of sap beetles in the three locations

Table(1): Seasonal abundance in Garaboli Region

Months	Types of sap beetles			
	<i>E.luteolis</i>	<i>U.humeralis</i>	<i>C.dimidiatus</i>	<i>C.hemipterus</i>
March 2003	0	0	101	179
April	0	22	13	61
May	24	17	140	188
June	93	0	329	319
July	16	0	91	103
August	29	32	24	95
September	78	169	212	741
October	37	81	183	463
November	42	57	116	154
December	49	22	54	68
January 2004	0	0	10	36
February	12	0	13	54
Total	380	400	1286	2461

Table(2):Seasonal abundance in Zawia region (filed12)

Months	Types of sap beetles			
	<i>E.luteolis</i>	<i>U.humeralis</i>	<i>C.dimidiatus</i>	<i>C.hemipterus</i>
March2003	0	11	39	52
April	26	73	284	314
May	92	137	594	861
June	64	679	843	2084
July	168	326	420	790
August	78	16	63	122
September	120	401	362	914
October	1505	649	1603	817
November	216	493	638	943
December	50	133	191	585
January2004	15	2	42	23
February	31	0	29	51
Total	2365	2920	5108	7556

Table(3):Seasonal abundance in Zawia region (filed2)

Months	Types of sap beetles			
	<i>E.luteolis</i>	<i>U.humeralis</i>	<i>C.dimidiatus</i>	<i>C.hemipterus</i>
March2003	42	69	84	546
April	23	0	61	296
May	13	621	289	1486
June	0	9	16	133
July	0	9	16	133
August	0	0	22	51
September	543	614	873	3311
October	373	715	1028	2799
November	129	98	642	408
December	162	6	94	213
January2004	28	0	0	46
February	28	0	0	46
Total	1313	2132	3109	9289

دراسة الكثافة العددية لحشرات خنافس العصارة **Nitidulidae** على أشجار نخيل التمر في موقعين بالمناطق الساحلية الغربية من ليبيا.

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أجريت دراسة تحديد الكثافة العددية لحشرات خنافس العصارة Sap beetles فصيلة Nitidulidae المتلازمة مع أشجار نخيل التمر في موقعين هما منطقة القربولي ومنطقة الزاوية للعام ٢٠٠٣/٠٢م. استخدمت في هذه الدراسة مصائد طعوم مصنعة محلياً لجذب خنافس العصارة، استخدمت أربع مصائد لكل بستان. جمعت خنافس العصارة من المصائد وسجلت الكثافة العددية لأنواعها المختلفة. أظهرت النتائج انتشار خنافس العصارة خلال العام على أشجار النخيل بمنطقتي الدراسة، حيث بلغت الكثافة العددية للخنافس التي تم اصطيادها ٤٥٣١، و ٣٤٢٣٤ خنفساء بمنطقتي القربولي والزاوية على التوالي.

كما أوضحت دراسة الكثافة العددية لهذه الخنافس أن أكثر الأنواع المتحصل عليها هي خنفساء الثمار الجافة *Carpophilus hemipterus* في المرتبة الأولى تليها خنفساء عصير الذرة *Carpophilus dimidiatus* وخنفساء الأناناس *Urophorus humeralis*، كما سجلت *Epuraea luteoulus* لأول مرة في ليبيا.

كما بينت النتائج أن *C. dimidiatus* و *C. hemipterus* لهما ثلاث أجيال في السنة بمنطقة القربولي ولهما جيلين بمنطقة الزاوية، أما *U. humeralis* لها جيلين في منطقتي القربولي والزاوية، و *E. luteoulus* لها أربع أجيال في السنة بمنطقة القربولي وثلاث أجيال بمنطقة الزاوية. وبالتالي فإن استخدام مصائد الطعوم المصنعة محلياً في هذه الدراسة كان له كفاءة عالية في جذب خنافس العصارة وتقليل أعدادها.