STUDIES ON TRUE SPIDERS

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SUMMARY

True spiders are arachnids that predate mainly on other arthropods especially insects. In agriculture, spiders may play an important role in biocontrol of pests. The present study was designed to reveal some ecological and biological aspects of some field spiders in Fayoum governorate for better understanding of this role.

Survey and seasonal abundance of spiders in Maize, clover and sugarbeet was carried out. Laboratory rearing of the two predominant species found in this survey namely; Thanatusformicinus (Clerck) and Chericanthiumjovium (Denis) was also carried out. Also the starvation tolerance of adults and subsequent effect on longevity and fecundity were investigated. **The results could be summarized as follows:**

1- **Survey throughout May, 1999- June. 2001,** using 10 pitfall traps per crop, 50 double strock with a sweeping net (maize and clover) and direct count on 20 randomly chosen plants (maize and sugerbeet) revealed the existence of 58 species that belong to 39 genera in 14 families. These are: 1- Agelenidae Koch, 1837; CicurinabrevisEmerton. 2-Araneidae Simon, 1895; *Acanthepeira stellate* (Marx), *Drexelia directa* Hentz, *Mangora sp*., *Mecynogea lemniscata* (Walckenear), *Metazygia wittfeldae* (Mc Cook), *Micrathena sagittata* (Walckenear) and *Zygiella montana* (Koch). 3-Dictynidae Cambridge, 1871; *Dictyna segregate* Gertsch &Mulaik. 4-Gnaphosiade Pocock; *Drassyllus depressus* (Emerton).5- Linyphidae Blackwall, 1859; *Meioneta micaria* Emerton. 6- Lycosidae Sundeval, 1833; *Arctosa rubicunda* Keyserling, *Lycosa avida* Walckenear, *L. carolinensis* Walckenear, *L. frondicola* Emerton, *L. gulosa* Walckenear, *L. helluo* Walckenear, L. rabida Walckenear, *L. punclutata* Hentz, *Pardosa milvina* Hentiz, *Pirata minutus* Emerton and *Trabbea aurantiaca* Emerton. 7- Miturgidae; *Cheiracanthium jovium* (Denis). 8- Nesticidae; *Eidmannella pallida* Emerton. 9- Philodromidae Thorell 1870; *Philodromus pernix* Blackwall. Ph. Rufus Walckenaer, *Thanatus formicinus* (Clerck) and *Tibellus oblongus* Walckenaer. 10-Pisauridae Semone, 1890; *Dolomedes*

sexpunctatus Hentz. 11- Salticidae Blackwall, 1841; *Hbrocestum pulex* Hentz, *Metaphidippus exiguous* (Banks), *M galatha* Walckenaer, *M. protervus* Walckenaer, *Paraphidippus aurantius* (Lucas), *P. marginatus* Walckenaer, *Phidippus audax* Hentz, *Ph. Remator* Walckenaer, *Plexippus paykulli* Audouin, *Sarinda hentzi* Banks, *Sassacus papenhoei* Peckham and *Siticus polustrist* (Peckham). 12- Tetrangnathidae Menge, 1866; *Pachygnata tristriata* Koch. 13- TheridiidaeSundevall, 1833; Anelosimusaulicus (Koch), A. studiosusHentz, A. textrix Walckenaer, Dpoenanigra (Emerton), *Steatoda triangulosa*Walckenaer, *Theridion s*p., *Th. murarium* Emerton, *Th. Rupicola* Emerton and *Th. tepidarorium* Koch. 14- Thomisidae Sundevall, 1833; *Misumenops* sp., *Misumenta asperatus* Hentz, *M. vatia* (Clerck) *Synemapa rvula* Keyserling, *X. tumefactus* Walckenaer and *X. funestus* Keyserling.

Taxonomic keys and distinctive morphological characters of species collected were given.

2- Population densities of spiders varied with crops and season and could be discussed as follows:-

In maize during 1999Summer season, 23 spider species (18 genera in 11 families) were found. The dominant spiders were those of Lycosidae (171.0 individuals/season), Philodromidae (146.0) and Miturgidae (131.0). Member of Thomisidae (9.0), Pisauridae (6.0), Salticidae (4.0), Lyniphidae (3.0), Dictynidae (2.0) and Nesticidae (1.0) were rare. Three species namely; *C. jovium, T. formicinus* and *P. milvina* were predominant. During 2000 season, only 17 species (17 genera In 8 families) were found. The dominant spiders were also those of the three families in previous season in addition to Theridiidae (79.0). Dictynid spiders only were rare. *T. formicinus, P. milvina, C. jovium* remained predominant in addition to L. avida.

In maize during 1999 Nili season, 17 species (17 genera in 8 families) were found. The dominant spiders were those found in summer season 2000. Spiders of family Thomisidae (2.0), were rare. *C. jovium, P. milvina, T. formicinus* were still predominant in addition to S. triangulosa. During 2000 season, the least number of

species (14 was found (13 genera in 8 families). Spiders of Pisauridae were dominant together with the four families previously mentioned. Six species namely; *T. formicinus, P. milvina, C. jovium, L. avida, S. triangulosa and D. sexpunctatus* were predominant.

In clover during 1999/2000 season, 19 species (16 genera of 8 families) were found. The dominant spiders were those of Lycosidae (338.0), Thomisidae (142.0), Philodromidae (139.0) and Salticidae (64.0). Member of Gnaphosidae (9.0) were rare. Four species namely; *L. avida, T. formicinus, P. milvina and S. parvula* were predominant. In the second season (2000/2001), 19 species (16 genera of 9 families) were found. The dominant spiders were those of the previous season except Salticidae. Four species *T. formicinus, S. parvula, L. avida and L. helluo* were predominant.

In sugerbeet during 1999/2000 season, 17 species (13 genera of 7 families) were found. The dominant spiders were those of Lycosidae (303.0), Plilodromidae (70.0) and Theridiidae (57.5). Only one species P. milvina was predominant. In the second season (2000/2001), 18 species (16 genera of 9 families were found. The dominant spiders were those in the previous season. Member of Miturgidae (7.0) were rare. The two species, P. milvina and T. formicinus were predominant.

In general, the seasonal fluctuations of populations were more dependent on crop growth period. The correlation with weather conditions was inconsistent and less pronomed .however, in Summer plantation of maize, insignificant positive correlation was found between population and each of temperature (r=0.84) and relative humidity (r=0.71). inNili plantation insignificant negative correlation was found with temp. (r=-0.44), but a highly positive significant correlation was evident with R.H (r= 0.91**).

In clover the correlation with temp.was insignificant positive (r= 0.21), but was insignificant negative with R.H (r= -0.67)

IN sugerbeet, insignificant negative correlation between population and each of temp. (r=-0.4) and R.H (r=-0.25) were evident.

The relation during the second season of study slightly varied where relative humidity correlated significantly positive with population in Summer maize and

insignificantly in Nilli maize. Also, in sugerbeet, temperature relation was insignificantly positive instead of being for past season.

3- **Lab. Rearing of *T. formicinus*revealed the following*:***

a- The developmental period and number of spiderlingsvary with sex , prey type and between siblings. Females passed through 7-8 instars with feeding on *T. urticae*nymphs, *Empoasca spp.*Nymphs and*M. domestica*larvae and through 6-8 instars with feeding on *T. confusum*larvae and *S. littoralis*larvae. Meanwhile, males passed through 6-7 instars with feeding on *T. urticae*, *Empoasca spp.* , *T. confusum*and *M. domestica*and passed through 5-7 instars with feeding on *S. littoralis*. For females , the mean period of development from egg hatching to adulthood was 63.6 , 54.7 , 51.9 , 54.3 and 53.2 with feeding on *T. urticae*, *Empoasca spp.* , *T. confusum*, *M. domestica*and *S. littoralis*, respectively, while for males this period was , 49.3 , 43.7 , 45.9 , 41.4 and 41.9 , respectively.

b- Longevity of males averaged 125.6, 112.4, 96.6, 91.7, and 76.6 days and of females averaged 171.0 , 141.6, 127.0, 107.9 and 94.2 days with feeding on *, S. littoralis, M. domestica , T. confusum , Empoascaspp*and *T. urticae,* respectively. A significant difference was evident in these periods except between males fed on nymphs of *Empoascaspp*and these fed on larvae of *T. confusum*. Significant difference was evident in these averages.

c- Fecundity of females was significantly affected by prey type. The highest was that for *S. littoralis*Larvae (most favorable) followed by *M. domestica*larvae, *, T. confusum*larvae*, Empoascaspp*nymphsand *T. urticae*nymphs. Eggs hatched after 7.1 – 8.2 days. The highest rate of hatching was 93% (with feeding on *S. littoralis*Larvae) and the lowest was 68 % (with feeding on *T. urticae*nymphs).

d- The life span of females was longer than that of males regardless of prey types. An average female lived for 157.8 , 162.6, 178.9, 195.9 and 224.2 and an average , male lived for 125.5, 135.4, 142.5, 153.8 and 167.5 days with feeding on nymphs of *T. urticae , Empoasca spp.*and larvae of *T.*

confusum, M. domestica , and *S. littoralis ,* respectively. The sex ratios (♀:♂) varied being 1:1 , 1:1.3 , 1:1.4, 1:1.1 or 1:1 respectively.

e- Spiders predation potential, estimated as food consumption, varied with stage of development and type of food. Spiderlings of females (from emergence to adulthood) consumed 399.8, 176.7, 126.5, 142.6 and 306.9 prey with feeding on nymphs of *T. urticae*, *Empoasca spp.* and larvae of *T. confusum, M. domestica* and *S. littoralis*respectively , while spiderlings of males consumed 253.7, 107.3, 99.3, 102.2 and 132.7 prey, respectively. Adult females consumed 2994.3, 1763.3 , 1039.0, 998.0 and 984.2 of *S. littoralis*larvae, *T. urticae*nymphs , *Empoasca spp*. Nymphs , *T. confusum* larvae and *M. domestica* larvae . The total consumption of spiders was 3301.2 , 2163.1 , 1215.7 , 1124.5 and 1126.8 , respectively. Adult males consumed 1075.0, 1277.5, 753.0, 685.9 and 462.0 of *S. littoralis*larvae ,*T. urticae*nymphs , *Empoasca spp.* Nymphs, *T. confusum* larvae and *M. domestica* larvae. The total consumption of spiders was 1207.7, 1531.2, 860.3, 785.2and 564.2 , respectively.

4- Lab. Rearing of *C. jovium*revealed the following*:*

a.The developmental period of and number spiderlings vary with sex , prey type and siblings. Females passed through 7-8 instars with feeding on *T. urticae*nymphs and *S. littoralis*Larvae and through 6-7 with feeding on *Empoasca spp*. Nymphs. Meanwhile, males passed through 6-7 instars with feeding on *S. littoralis*Larvae and passed through 5-6 instars with feeding on nymphs of *T. urticae*and *Empoasca spp*. . For females, the mean period of development, from egg hatching to adulthood was, 89.7 , 57.8 and 55.2 days with feeding on *T. urticae , Empoasca spp.* and *S. littoralis ,* respectively , while for males this period was 77.6 , 43.2 and 46.2 days, respectively.

b. Longevity of males averaged 85.8, 95.9 and 54.7 days and of females averaged 105.9 , 168.8 and 65.4 days with feeding on *Empoascaspp, S. littoralis*and *T. urticae,* respectively. Significant difference were evident in these periods.

c. Fecundity of females was significantly affected prey type. *S. littoralis*Larvae (most favorable) followed by *Empoasca spp*. Nymphs and *T. urticae*nymphs. Egg hatched

after 7.6 – 9.0 days. The highest rate of hatching was 90 % (with feeding on *S. littoralis*Larvae) and the lowest was 61 % (with feeding on *T. urticae*nymphs).

d. The life span of females was longer than that of males regardless of prey types. An average female lived for 155.1 , 163.7 and 224.0 and an average male lived for 119.3, 129.0 and 142.1 days with feeding on nymphs of *T. urticae , Empoasca spp.*and larvae of *S. littoralis ,* respectively. The sex ratios (♀:♂) varied being 1:1 , 1:1.2 or 1:1, respectively.

e. Spiders predation potential, estimated as food consumption, varied with stage of development and type of food. Spiderlings of females (from emergence to adulthood) consumed 888.6 , 716.6 and 200.3 of *T. urticae*nymphs , *Empoasca spp.* nymphs and *S. littoralis*larvae while spiderlings of males consumed 230.9 , 164.3 and 139.2 respectively. Significant difference was evident between three prey types. Adult females consumed 1946.1 , 1075.7 or 969.4 of *S. littoralis*larvae, *T. urticae*nymphs , *Empoasca spp.* Nymphs , respectively. The total consumption of spiders was 2146.4 , 1964.3 and 1686.0 , respectively. Adult males consumed 648.1 , 428.1 and 348.0 of *T. urticae*nymphs , *Empoasca spp.* Nymphs and larvae of *S. littoralis ,* respectively. The total consumption of spiders was 879.0 , 592.4 and 487.2 , respectively.

5- Starvation tolerance tests indicated that *T. formicinus*females tolerated the lack of food for 27.6 days and males for 19.7 days.

Meanwhile, *C. jovium*females and males tolerated the lack of food for 23.6 and 21.6 days , respectively. Insufficient feeding significantly reduced the number of oothecae laid in both species and , therefore , fecundity was drastically affected.