

Diversity and Relative Abundance of Spiders of Date Palm Groves

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ABSTRACT

In this article, an overview of the diversity and relative abundance of spider fauna inhabiting the date palm groves located in the experimental fruit garden at University of Agriculture Faisalabad was presented. Spiders are regarded as important predators throughout the world because they are considered as efficient agents of biological control and thus restrain the pest population in the fields. Spiders can be used in such perennial agricultural systems as orchards and date palm groves where the habitat structure, microclimate and beneficial fauna are least disturbed. Two habitats were covered by pit fall trapping and jarring each month for five consecutive days and for duration of one year. The seasonal changes in trapped and jarring spiders were identified. Species diversity and relative abundance of the spiders were studied. Information on how spiders have diversity in the agro-ecosystem have been collected to a quantitative assessment of the spiders, potential as a biological controlling agent in the date palm groves. Spiders in monthly sample decreased from June to November. The number of spiders started to increase from February. The population was highest in July then, it continuously decreased.

Key Words: Diversity; Abundance; Date palm; Spiders

INTRODUCTION

Spiders are abundant and ubiquitous predators in terrestrial ecosystem. The main part of the economy of Pakistan depends upon the agriculture. Insects cause serious damage to agricultural crops, vegetables, orchards and ornamental plants. The common practice for inhibiting the pest population in agro-ecosystem is the use of pesticides. To minimize the dependence on insecticides, scientists recommend conservation and use of natural forces to control the pest population and spiders are gaining importance throughout the world as successful agent for biological control in the integrated pest management programme. Spiders are present in large numbers everywhere. Spiders are among the dominant predators any terrestrial community (Gertsch, 1949). Bailey and Chada (1968) observed spider population in sorghum fields of Oklahoma throughout the growing season. They concluded that spiders predate upon insects available in crop plants. Mansoure *et al.* (1985) studied the spider fauna of a commercial avocado orchard in Western Galille, Israel, for a year with the view to identifying natural enemies of the leaf and fruit pest *Boarnia selenaria*. Theridion spp. represented 63% and Clubiona 20% of all spiders collected from the avocado foliage, while Lycosids represented 58% and Linyphids 195 of the total captured in the pitfall traps. Richert and Lockley (1984) concluded that the spider assemblages are very important in limiting insect pest densities in agro-ecosystem and exhibit the equilibrium point control of insects as they are highly influential predators of insect pest and may, therefore, stabilize certain insect population in meadows and in cereal

fields, but they can play a major role in limiting insects in orchards and fruit groves. Jones (1981) reported that Chinese used straw bundles as shelters for spiders to conserve their numbers during irrigation of rice and this approach was used in Human province of People's Republic of China. Bishop (1981) stated that the destruction of habitat is a major determination to spider community diversity, because with habitat destruction egg sacs lost and adult animals migrate so the number of spiders is suppressed. This paper documents the spider fauna inhabiting the date palm groves and their seasonal trends.

MATERIALS AND METHODS

For the present study, two date palm groves in the Experimental Fruit Garden, University of Agriculture, Faisalabad, were selected, each having an area of 178 m x 149 m, and 129 m x 88 m, respectively. One of the plots was used for random and the other for non-random sampling by pitfall traps and the date palm orchard trees were used for jarring. Sampling was done for one year; for the first six months ground spiders were collected from June to November, 1997 by two methods viz. Non-random (grid laid) and random sampling (Storefall). The foliage spiders were collected for six months from February to August, 1998 by jarring method.

The data obtained from the pitfall trapping and jarring was analyzed ecologically and statistically for the relative abundance of the number and monthly change along with species dominance as described by Magurran (1988). The collected spiders were brought to the laboratory and washed in xylene and preserved in a

mixture of ethyl alcohol and glycerine in 1:1 proportion in separated glass vials.

RESULTS AND DISCUSSION

In case of cursorial spiders, trapping lasted from June, to November 1997. A summary of the monthly trapping data by random method is given in table 1. A total of 610 specimens of adult and immature spiders were recorded from random field and 560 specimens from the non-random field. In random field, the average number of spiders per trap was 1.69 and average number of spiders per trap per night was 0.33. In non-random field these averages were 1.55 and 0.31, respectively.

Spiders in the monthly samples continually decreased from June to November in both the random and non-random fields. The number of spiders caught during November was minimum (Fig. 1).

Table I. Monthly trapping data from the date palm groves

(a) Random method

	June	July	Aug.	Sep.	Oct.	Nov.	Total
No. of spiders caught	179	138	125	74	67	27	610
No. of traps set	60	60	60	60	60	60	360
Length of trapping session (days)	5	5	5	5	5	5	30
Trapping nights	300	300	300	300	300	300	1800
No. of spiders/trap	2.98	2.30	2.08	1.23	1.23	0.45	1.69
Spiders/trap/night	0.59	0.46	0.41	0.24	0.22	0.09	0.33

(b) Non-random method

	June	July	Aug.	Sep.	Oct.	Nov.	Total
No. of spiders caught	170	139	104	73	46	28	560
No. of traps set	60	60	60	60	60	60	360
Length of trapping session (days)	5	5	5	5	5	5	30
Trapping nights	300	300	300	300	300	300	300
No. of spiders/trap	2.83	2.31	1.73	1.21	0.76	0.46	1.55
Spiders/trap/night	0.56	0.46	0.34	0.24	0.15	0.09	0.31

In all the six months from February to August 1998, a total of 603 specimens of adult and immature were recorded from random sampling of date palm groves by jarring method (Table II). In seasonal samples, the average number of spiders per tree per day was 0.33 (Table II). The number of spiders started to increase from February. The population was highest in July, then it continually decreased (Fig. 2).

Table II. Summary of the monthly trapping data from the date palm trees by Jarring

	Feb.	Mar.	Apr.	May.	Jul.	Aug.	Total
No. of spiders caught	64	88	116	117	124	94	603
No. of trees selected	60	60	60	60	60	60	60
Length of Jarring session (days)	5	5	5	5	5	5	5
No. of spiders/tree	1.06	1.46	1.93	1.95	2.06	1.56	1.67
No. of spiders/tree/day	0.21	0.29	0.38	0.39	0.41	0.31	0.33

Figure 1: Average number of spiders caught per trap per night by random and non-random methods in datepalm groves

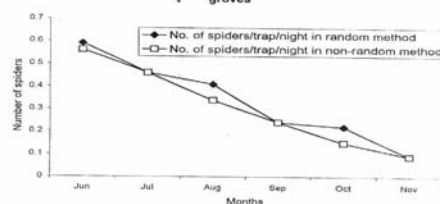
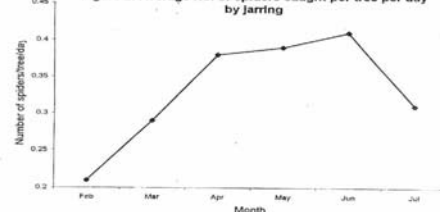


Figure 2: Average No. of spiders caught per tree per day by jarring



The number of spiders caught during February was minimum and they July sample was a quite larger than that of February and March samples. Table III and IV provides information about the taxa of ground surface and foliage spiders recorded by pitfall trapping and jarring, respectively.

Table III. Taxa of spiders recorded from date palm groves during different months by both random and non-random methods

	Feb.	Mar.	Apr.	May.	Jul.	Aug.	Total
No. of families	5	5	4	4	2	3	6
No. of genera	12	9	8	5	4	5	18
No. of species	20	20	16	11	10	8	39

Duncan's multiple range test shows that traps success in April and June was similar. In the present study, it was found that maximum number of cursorial spiders was recorded in the samples of July and June and

Table IV. Taxa of spiders recorded from date palm groves during different months by Jarring methods

	Feb.	Mar.	Apr.	May.	Jul.	Aug.	Total
No. of families	7	6	6	5	8	6	8
No. of genera	16	16	11	17	13	13	25
No. of species	23	25	21	26	24	20	50

least number in the sample of November. From the non-random field, 5 families 14 genera and 31 species and from the random field, 5 families 14 genera and 35 species were recorded.

Comparison of means by DMR test

Months	Ranked order
July	2.067A
May	1.950 AB
April	1.933 AB
August	1.567 BC
March	1.467 CD
February	1.067 D

Maximum number of foliage spider species were recorded in the monthly sample of March and May and least number in August sample and the August sample was large than the March sample. On the whole the foliage spider comprised of 8 families, 25 genera and 50 species. Overall 8 families 25 genera and 73 species of cursorial foliage spiders were captured from the date palm groves during the course of Thais study.

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