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**Yogesh Kumar Sidar**  
Department of Entomology,  
College of Agriculture, Indira  
Gandhi Krishi Vishwavidyalaya,  
Raipur, Chhattisgarh, India

**Sonali Deole**  
Assistant Professor, Department  
of Entomology, College of  
Agriculture, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Akash Nirmal**  
Department of Entomology,  
College of Agriculture, Indira  
Gandhi Krishi Vishwavidyalaya,  
Raipur, Chhattisgarh, India

**Rupesh Kumar Gajbhiye**  
Department of Entomology,  
College of Agriculture, Indira  
Gandhi Krishi Vishwavidyalaya,  
Raipur, Chhattisgarh, India

**Manmohan Singh Bisen**  
Department of Entomology,  
College of Agriculture, Indira  
Gandhi Krishi Vishwavidyalaya,  
Raipur, Chhattisgarh, India

**Correspondence**  
**Yogesh Kumar Sidar**  
Department of Entomology,  
College of Agriculture, Indira  
Gandhi Krishi Vishwavidyalaya,  
Raipur, Chhattisgarh, India

## A study on the seasonal distribution of spider fauna in the maize field at Raipur, Chhattisgarh region

**Yogesh Kumar Sidar, Sonali Deole, Akash Nirmal, Rupesh Kumar Gajbhiye and Manmohan Singh Bisen**

### Abstract

Experiment was conducted at Entomology Block of agriculture research cum instructional farm, I.G.K.V., Raipur, Chhattisgarh in year 2014-2015 to study the seasonal incidence of spider of maize crop pests under Chhattisgarh plains. The study revealed that, the incidence of spider spp. The peak activity of spider spp (*Oxyopidae* sp., *Araneidae* sp., *Amphinectidae* sp. and *Agelenidae* sp.) was observed during the fourth week of September which was associated with 33.4 °C maximum temperature, 24.0 °C minimum temperature, 93% morning R.H., 57% evening R.H., 2.1Km/h wind velocity and Sunshine hours of 8.3 lux. The spider population showed non-significant positive correlation with maximum temperature ( $r = 0.074$ ), minimum temperature ( $r = 0.28$ ) morning relative humidity ( $r = 0.27$ ) and evening relative humidity ( $r = 0.15$ ). However, rain fall ( $r = - 0.20$ ), wind velocity ( $r = - 0.39$ ) and sun shine hours ( $r = - 0.14$ ) showed non-significant negative correlation with spider population.

**Keywords:** Zea mays, maize, weather parameter, spider

### 1. Introduction

Maize (*Zea mays* L.) being the highest yielding cereal crop in the world is of significant importance for countries like India, where rapidly increasing population already out stripped the available food supplies. Maize crop possesses great genetic diversity and can be grown across varied agro ecological zones [1]. In India, maize is emerging as third most important crop after rice and wheat. Its importance lies in the fact that it is not only used as human food and animal feed but at the same time it is also widely used in corn starch industry, corn oil production, and as baby corn in different recipes [2].

In India, maize production is greatly affected by the infestation of two insect pests, spotted stem borer *Chilo partellus* (Swinhoe) and pink borer *Sesamia inferens* (Walker). Spotted stem borer is restricted to the northern part of the country during rainy season, pink borer causes extensive damage to the crop in the peninsular India throughout the year and across the country [3], pink stem borer, *Sesamia inferens* (Walker) is one of the major borer pests recorded mainly during *Rabi* season [4]. Larvae are found feeding on immature cobs, silks and tassel and severe infestation result in stunted plant growth and appearance of cob and tassel at one place [5].

Spiders are among the most abundant invertebrate predators in terrestrial ecosystems [6]. Most spiders feed primarily on insects. Because of their high abundance and predominantly insectivorous feeding habits, spiders are suspected to play an important predatory role in agro-ecosystems, woodlands, and other terrestrial ecosystems [7]. They are one of the major groups of generalist predators that are needed in the development of efficient, sustainable, low-input agricultural systems [8]. In this manuscript we report the spider diversity in maize field at Raipur, Chhattisgarh region.

### 2. Material and Methods

The study was carried out at maize fields at Indira Gandhi Krishi Vishwavidyalaya, Raipur. A periodical survey and a systemic study of Spider fauna were under taken for a period of four months from August 2014 to November 2014 in entomology fields of College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya; Raipur, (C.G). Field observations were conducted one day in each week. In total, 5-10 specimens were collected from the study area during the period. The relative abundance of spider families in the maize ecosystem was recorded.

### 3. Results and Discussion

A periodical observation on the incidence of spider was observed to feed on nymphs/adults of aphids. The natural enemies revealed that the adult of spider appeared in fourth week of September (39<sup>th</sup> SMW). Initially the population of spider was 0.8plant<sup>-1</sup>. The highest population (4.4plant<sup>-1</sup>) was noticed during fourth week of September. During the prevailed weather parameters viz., maximum (33.4 °C) and minimum (24.0 °C) temperature, morning (93%) and evening (57%) relative humidity, wind velocity (2.1km/h) and bright sunshine hours (8.3 hours/day) prevailed.

Thereafter, the spider population gradually decreased reaching 0.3adult plant<sup>-1</sup> during fourth week of October onwards. The

adult population ranged from 0.3 to 4.4 per plant during August to October months (Table 1).

The spider species found to be dominant in entomology fields of Raipur belong to the families *Araneidae sp.*, *Agelenidae sp.*, *Amphinectidae sp.*, *Oxyopidae sp.* (Plate 1).

These findings confirmed by Wilson *et al.* [9] who reported that the spider population was high in maize field during 50 and 60 days of plants as compared to other remaining days of plants. At this stage, the plants were healthy with more pest attack so, the spider population was high. Similarly, Sardana [10] also reported predatory spiders were present throughout the crop growth during September to mid- March.

**Table 1:** Weekly population of spider on maize during *Kharif* 2014-15

S. No	SMW	Months and date	Population of Spider
1	32	06 Aug-12Aug	0.8
2	33	13 Aug -19 Aug	1.3
3	34	20 Aug -26 Aug	1.4
4	35	27 Aug -02 Sep	2.4
5	36	03 Sep -09 Sep	3.0
6	37	10 Sep -16 Sep	3.8
7	38	17 Sep -23 Sep	4.1
8	39	24 Sep -30 Sep	4.4
9	40	01 Oct -07 Oct	2.0
10	41	08 Oct -14 Oct	1.2
11	42	15 Oct -21 Oct	0.6
12	43	22 Oct -28 Oct	0.5
13	44	29 Oct -04 Nov	0.3
14	45	05 Nov -11 Nov	0.0
Seasonal mean			1.84

#### 3.1 Correlation between weather parameters and spider

The maximum activity of spider was recorded during fourth week of September. The spider population showed non-significant positive correlation with maximum temperature (r = 0.074), minimum temperature (r = 0.28) morning relative humidity (r = 0.27) and evening relative humidity (r = 0.15). However, rain fall (r = - 0.20), wind velocity (r = - 0.39) and sun shine hours (r = - 0.14) showed non-significant negative correlation with spider population (Table 2).

These findings confirmed by Kumar [11] who reported that the maximum activity of spider was recorded during first week of September. The spider population showed significant positive correlation with minimum temperature (r = 0.624\*) morning (r = 0.590\*) and evening relative humidity (r = 0.580\*), respectively while non- significant positive correlation with rainfall (r = 0.235). However, maximum temperature (r = -

0.305), wind velocity (r = - 0.059) and sun shine hours (r = - 0.399) showed non-significant negative correlation with spider population.

**Table 2:** Correlation coefficients among spider on maize insect pests and weather parameters

S.N	Weather parameter	Population of Spider
1	Maximum Temperature (°C)	0.074
2	Minimum Temperature (°C)	0.28
3	Rain fall (mm)	-0.20
4	Morning Relative humidity (%)	0.27
5	Evening Relative humidity (%)	0.15
6	Wind velocity (km/h)	-0.39
7	Sunshine hours (hours)	-0.14

\*: Significant (5%)

\*\* : Highly significant (1%)



**Plate 1:** Species of spiders recorded in Chhattisgarh plains on maize crop

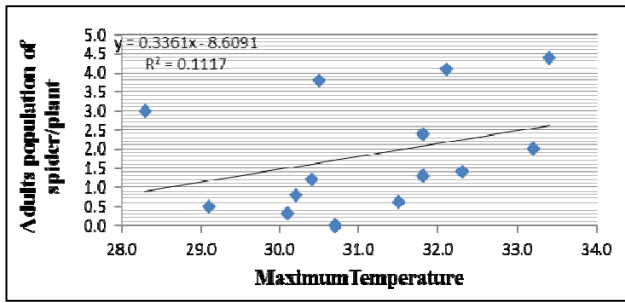


Fig 1: Regression of spider population on Maximum temperature

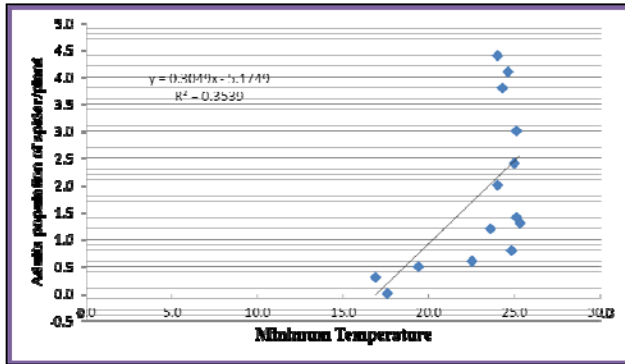


Fig 2: Regression of spider population on Minimum temperature

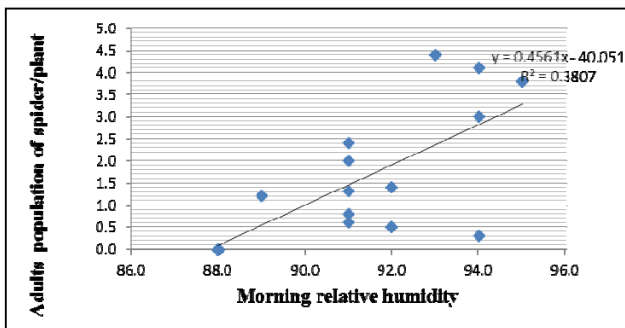


Fig 3: Regression of spider population on Morning relative humidity

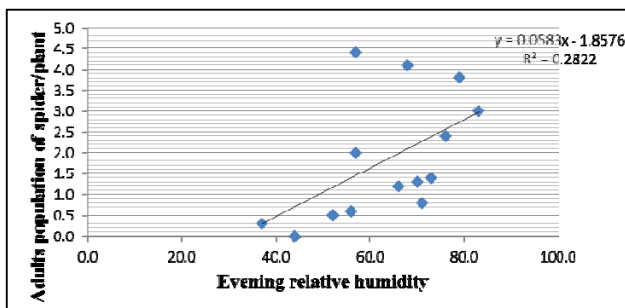


Fig 4: Regression of spider population on Evening relative humidity

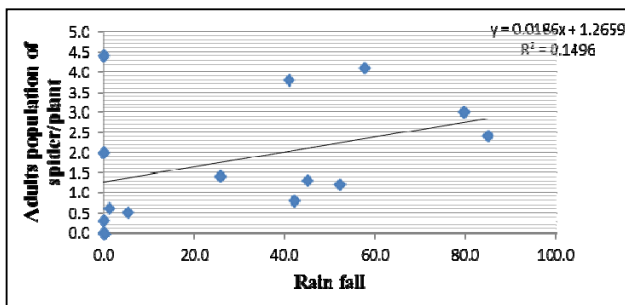


Fig 5: Regression of spider population on Rain fall

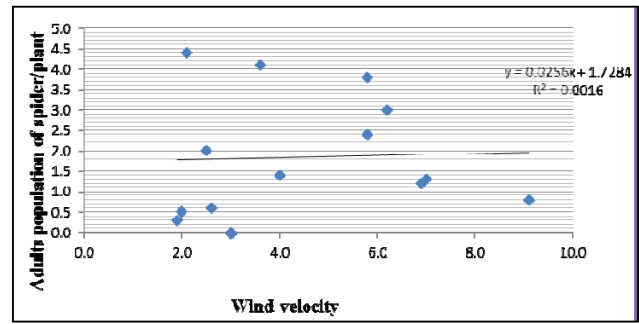


Fig 6: Regression of spider population on wind velocity

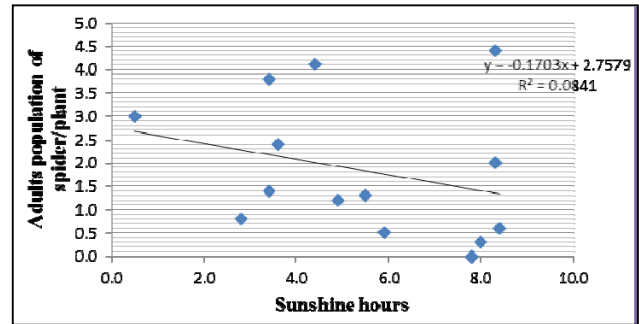


Fig 7: Regression of spider population on sunshine hours

#### 4. Conclusion

We observed the intensity of spider increased gradually with peak population of spider was 0.8 per plant. The highest adult population 4.4 plant<sup>-1</sup> was noticed during fourth week of September with seasonal mean of 1.84 plant<sup>-1</sup>. The spider population showed non-significant positive correlation with maximum temperature ( $r = 0.074$ ), minimum temperature ( $r = 0.28$ ) morning relative humidity ( $r = 0.27$ ) and evening relative humidity ( $r = 0.15$ ). Whereas rain fall ( $r = -0.20$ ) wind velocity ( $r = -0.39$ ) and sun shine hours ( $r = -0.14$ ) showed non-significant negative correlation with spider population.

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