



DIVERSITY OF PREDATORY SPIDERS ON GROUNDNUT CROP

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ABSTRACT :

Spiders belong to the order Araneae of class Arachnida and phylum Arthropoda. Spiders play a great role in controlling the insect pests due to their keen sight and tactile organs. Several pests that attack on groundnut crop (*Arachis hypogaea* L.) have a wide range of natural enemies, which are used as food by predatory spiders as biological control. For this aspect, I selected different field areas of Jamnagar district such as Jamjodhpur, Kalavad, Lalpur and Khambhalia. During Identification of the particular species of spider I observed total 10 families, 27 genera and 39 species. They were classified into four groups mainly as hunting, ambushing, web building and miscellaneous spider based on their behavior.



KEYWORDS : Predatory spiders, Insect pest, Groundnut, Jamnagar district.

INTRODUCTION :

Groundnut (*Arachis hypogaea* L.) is a self pollinating, leguminous crop of Fabaceae family, sub-family Papilionaceae, genus *Arachis* and species *hypogaea*. In India, groundnut was grown in 4.94 m ha with production and yield of 6.69 m t and 1.35 t ha⁻¹ respectively (FAO 2018 <http://faostat.fao.org>). The Gujarat state was occupied highest percentage of acreage and production. Groundnut is a host of various microorganisms such as fungus, virus, bacteria, and nematode that are liable for lower yield which includes some severe diseases such as stem rot, bud necrosis, leaf spot, collar rot, etc.

At present yielding condition, the economic loss of groundnut are due to plant diseases and insect pests. Invented as a pesticide, it plays an important role in the prevention and control of plant diseases and insect pests, effectively controls the damage caused by plant diseases and insect pests, and improves crop yield. Yet the natural balance is disrupted and the ecosystem is damaged when pesticides are introduced in the long term and in large amounts. Therefore, the control and prevention of plant diseases and insect pests of crops must be comprehensive especially that of groundnut, because the plant diseases and insect pests of groundnut is extreme, and the dosage of pesticide is huge.

The predacious spiders live in various habitats because they adjust all types of favourable or unfavourable conditions. Since their rate of reproduction is very high so it is natural to find huge number of spiders of all families. As we know, broad-spectrum insecticides have caused natural enemies of pests to decrease.

Their primary objective is to minimize the population of insect pests in the fields of agriculture (Law et al 1963 and Dean et al 1982). In this aspect, to improve the effectiveness of natural population management, natural and agricultural processes have been exploited, but biological control is widely recommended in several agricultural practices. Since then, there has been a substantial decrease in predatory insects due to the continuous use of insecticides. There is a need for time to protect the natural predators, and this can only be recognized with biological control application. The role of spiders in managing and decrease the number of insect pests has been successfully observed in this regard.

MATERIALS AND METHODS

Study area

In this study on spiders, I selected the Jamjodhpur, Kalavad, Lalpur and Khambhalia areas of Jamnagar district with regard to their possible role in the biological control of insect pests in groundnut crop. For this purpose, four methods were used to collect the different types of predatory spiders. After observing their genitalia and further examining the keys to the family, genera and species, we can classify the specific species of spider.



Four different study area of Jamnagar district

(A) The Sweep net Method

This technique has been used for the collection of spiders in a simple way. The sweeping net was made of fabric, such as sailcloth or canvas. From this fabric net, the small size of the spider species was also collected. More sweeping times were necessary for the collection of good numbers of samples.

(B) Pitfall traps Method

This technique is very effective and recognized for the capture of terrestrial invertebrates. (Curtis 1980). Capture non-weavers that wonder on the ground and look for the prey using this technique. Plastic container with a diameter of 15 cm and a depth of 6.5 cm were used for pitfall trapping. The pitfall trap was placed within the ground with lip of the container level with the soil. Then, from the bottom up to 2 cm high, the ethylene glycol was poured as a preservative into the container, reducing the possibility of spider

escape. The pitfall container was covered by overlaying the roof with a thick sheet of paper. The pitfall was laid down in the night and collected in the morning.

(C) Hand Picking Method

For the picking of spiders, the hand picking technique has been commonly used. This technique has been used to capture web-weavers. The weavers were collected directly from their web in a 3.5×2.5 cm plastic bottle. Living specimens of spiders were stored in a laboratory with 70 % ethanol.

(D) Umbrella Method

In this method, the spider collection has the umbrella positioned below the plant in inverse position. Then a stick was beaten with the vegetation or vibrated by hand so that dislodging spiders on the umbrella. The painting brush was used to coax and correctly collect the spiders from the umbrella.

RESULTS AND DISCUSSIONS

The prevalence and quantity of groundnut crop predatory spider fauna was known (Tikader and Malhotra 1980), Jamjodhpur, Kalavad, Lalpur and Khambhalia in the Jamnagar region of Gujarat were selected for the study area. The total fauna collected from the respective crops was preserved and recognized in the laboratory as described in the material and methods.

In this study, I observed 10 Families, 27 Genera, 39 Species and 4 groups of spiders in selected area (Fig. 1). The maximum number of predatory spider species was observed in Jamjodhpur (36) and minimum in Khambhalia (31) (Fig.2). The spiders were classified in four groups according to their predatory behavior. However in Hunting spider group (43.60 %) occupied highest number of species while lowest in miscellaneous spider group (4.40 %) (Fig. 3). Moreover, total 10 spider families were found in groundnut crop. The highest and lowest class observed in Theridiidae family (21.75 %) and Amaurobiidae family (1.61 %) respectively (Fig. 4).

Biological control is a technique using other living species to control pests such as weeds, mites, insects and plant diseases. The maximum use of a pesticide to raise groundnut production is detrimental to the ecosystem. The predatory spiders use insect pests as food and reduce the population of insect pests and increase groundnut crop yields. In the recent development, the better use of biological agents such as spiders for pest control. In this sense, bio-control, therefore, is nothing but the use of spiders as the natural pest and pathogen control system.



Fig 1 Diversity of spiders in groundnut

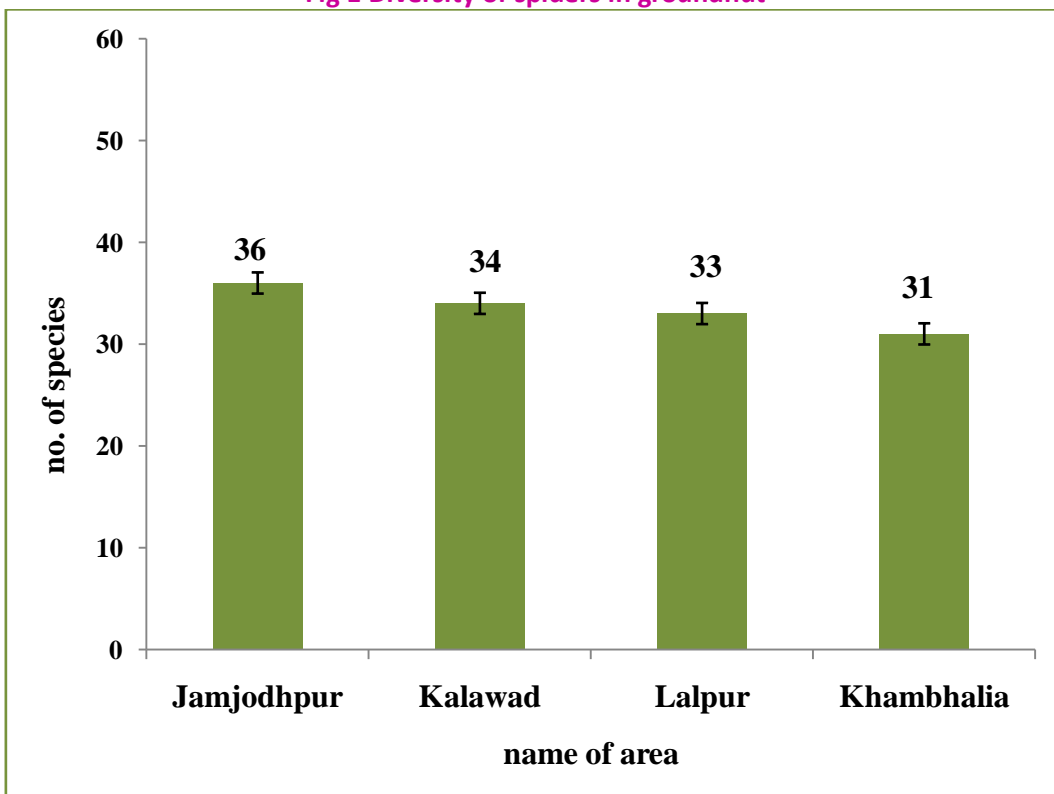


Fig 2 Number of species in different area

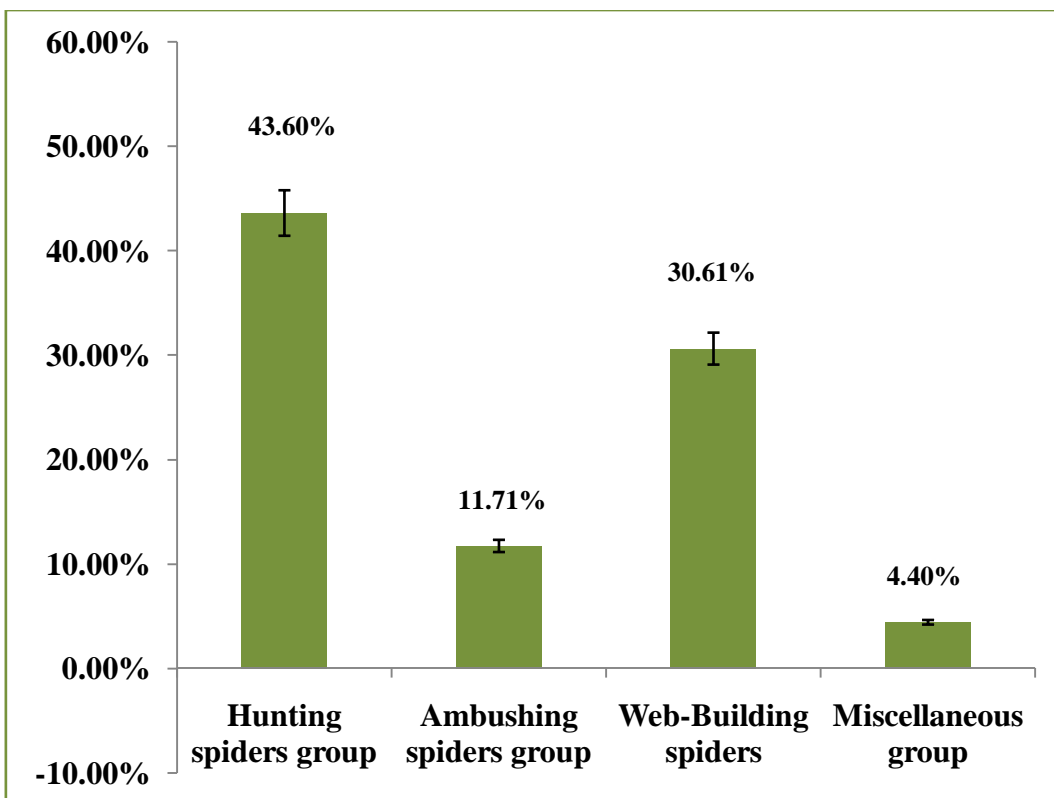


Fig 3 Distribution of spider groups in groundnut

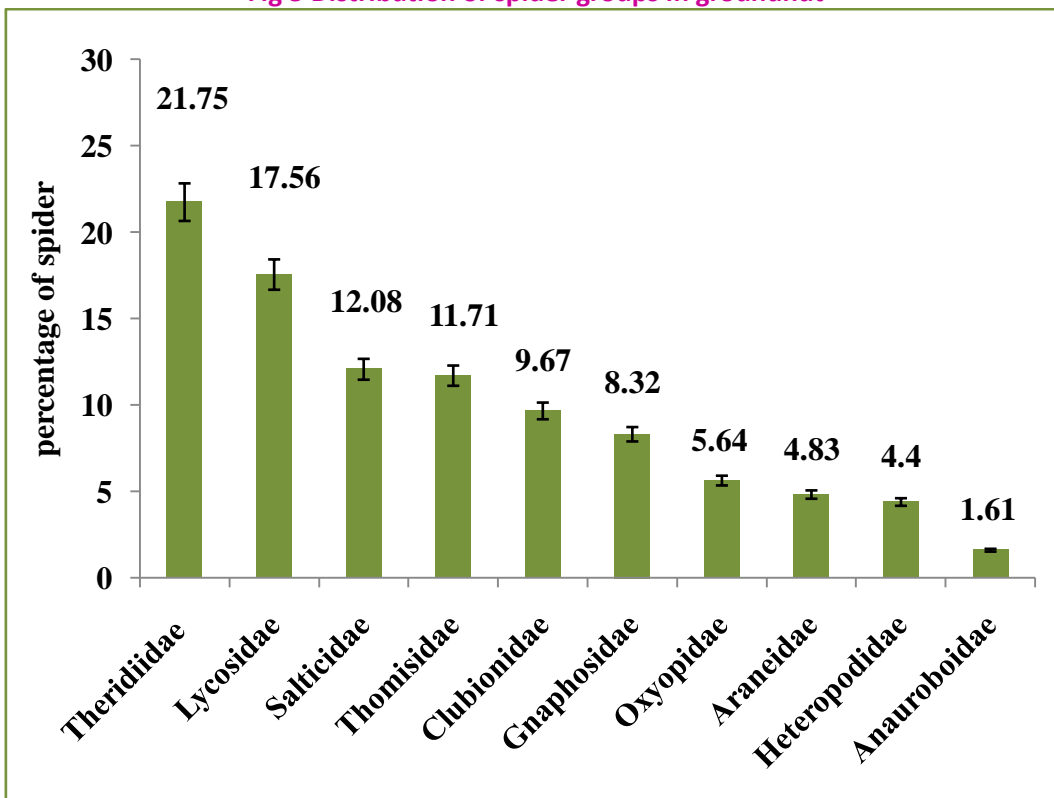


Fig 4 Percentage of spider families in groundnut

CONCLUSION

An application of such predatory spiders is immense and result oriented with respect to the control of insect pests. These predatory spiders were properly utilized, then the use of insecticides will be stopped throughout, because these can cause health risks to human beings and further produce harmful environmental effects. Advantages of biological control is that, there is no environmental populations, Inexpensive, ideal alternative to control pests, highly specific, long term control and safe to non target organisms.

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