

# CHAPTER-2

## REVIEW OF LITERATURE

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Spiders are ubiquitous in nature and important biological control agents. They are worldwide distributed but poorly studied group of class Arachnida. The study on spider diversity has drawn the attention of Arachnologists in different parts of the world. Few works on spider diversity and ecology have been popularized but detailed information about their importance in the ecosystem needs to be studied.

The study on the diversity and distribution of spiders has been conducted by many scientists in different parts of the world since the eighteenth century. A general description of spider fauna has been collected in the international context which provides supportive ideas during the study.

### 2.1 International studies on Spiders

The pioneering work on spider diversity was done by Cambridge (1892, 1897), and Simon (1887) from the early published taxonomic record on spiders. Thorell (1895) published a descriptive catalogue of the spider with two hundred species of Burma which includes 150 new species. Lehtinen (1967) published a comparative and phylogenetic system of classification. Davies and Zabka (1989) provided illustrated keys and notes on the genera of jumping spiders (Araneae: Salticidae) in Australia. Spiders of Tokyo was published by Shinkai (1969); spiders of Korea by Namkung (2002); spiders of Bangladesh, Manipur by Biswas (2004). Roberts (1995) published a field guide of spiders of Britain and North Europe. The distribution of spiders in the rice field of South Asia has been well recorded and illustrated by Barrion and Litsinger (1995). Song and Zhu (1997) worked on the families Thomisidae and Philodromidae from China.

According to the World Spider Catalog, version 20.0 (2019), the updated lists documented 42,473 species of spider belonging to 3849 genera and 120 families from the world. Spiders are one of the widely distributed groups of predators in the animal kingdom (Riechert and Lockley, 1984). They play an important role in controlling insect pests in agriculture fields

(Nyffeler and Benz, 1987; Nyffeler *et al.*, 1994; Sunderland, 1999). The studies on spiders may provide an effective means for measuring the impact of habitat degradation or land-use change on biodiversity. Wise (1993) worked on the importance of spiders in ecological webs.

Coddington and Levi (1991) have studied the evolution of the spider web. Denny (1976) has established the remarkable mechanical properties of spider silk fibers and compared other structural materials with their properties. Riechert (1999) and Symondson *et al.* (2002) have studied that the web builder spiders are making their webs to catch insects, predators, and act as biological control agents. Vollrath *et al.*, (1996) reported that spider silks are mechanically greater than any other insect silk which is known to date. They increase the diameters of their threads in orb webs in comparison to increase their body weight, which increases the ability of webs to support the spiders (Vollrath and Kohler, 1996). Few spider species make seven different types of silks (Candelas and Cintron, 1981). Gosline *et al.* (1999) reported that dragline silk is one of the toughest materials known to man. Thus, the spider silk is an interesting material to use for commercial purposes. Spider silks have remarkable mechanical properties (Sirichaisit *et al.*, 2001) with dragline silks in some species of orb-web

## **2.2 National Studies on Spiders**

Diversity and distribution of spider study in India are sparse as compared to another region of the world. The Indian spider study has been done by numerous European Arachnologists and later by Indian Arachnologists. From the literature review it was revealed that the pioneer works on Indian spiders was done by Simon (1887); Thorell (1895) and Pocock (1900). The earlier detailed account of Indian spiders was done by Pocock in 1900 which lists 216 spider species under 17 different families. A prominent portion of spider study in Indian Arachnology has been done by Tikader at the beginning of 1960. This study gave solid knowledge of Indian Arachnology and inspired many other researchers into this field. His work provided a detailed description which enriches our knowledge about the spiders of India. The most comprehensive description of Indian spiders was done by Tikader (1987) has listed 1066 species under 43 families. Each of the family viz. Lycosidae,

Salticidae, Gnaphosidae, Thomisidae, and Araneidae were the most dominant spiders reported by Tikader in 1987.

Few other works of Tikader which became important for Indian Arachnologists are Spider fauna of Maharashtra (1963a); South Indian crab-spiders (1963b); Spider fauna of Sikkim (1970); key to Indian spiders (1976), Spider fauna of Andaman and Nicobar Islands (1977) spider fauna of Calcutta (1981) 15 families, 47 genera and 99 species; Araneidae fauna of India 1982a; Gnaphosidae, fauna of India (Araneae) (1982b); Thomisidae fauna of India (1980a) comprising of 2 subfamilies, 25 genera and 115 species. Of these, 23 species were new to science; Lycosidae, the fauna of India (Araneae), (1980); All these books are important field manuals for spider taxonomist or Arachnologist. More than two hundred species of spiders were reported by Pocock (1895-1901) from India.

Sebastian and Peter in 2009 have published a handbook of Indian spider which gives detailed information of spiders and described some common spider species observed in the fields. He also gave details about six different types of webs; their structure and patterns. Majumder and Tikader (1991) studies on Clubionidae spiders from India.

Tikader in (1980 & 1982) have reported spiders from Central Indian Region Madhya Pradesh, Jabalpur, Maharashtra and many others. Gajbe (1987-1999) studied the spiders of Madhya Pradesh and reported many new species and families. Spider study of protected areas in India has established very little attention and few references are listed below. From the protected area in India in Indravati Tiger Reserve, Madhya Pradesh, Gajbe (1995a) studied and reported 13 species of spiders. Gajbe (1995b) worked on spider diversity from Kanha Tiger Reserve forest, Madhya Pradesh & reported 14 species of spiders. Rane and Singh (1977) reported five species from Kanha Tiger Reserve forest. Uniyal in 2006 worked on spiders from Indian-Trans Himalayan region and reported a total of 19 species belonging to 10 families. Quasin and Uniyal (2010) studied spider diversity from Kedarnath Wildlife Sanctuary, Uttarakhand has compiled 244 species belonging to 108 genera and 33 families. Uniyal *et al.*, (2011) studied the diversity of spiders in Nanda Devi Biosphere & reported 244 species belonging to 108 genus and 33 families. The most dominant family reported was Araneidae and Salticidae. Quasin & Uniyal (2011) has published spider diversity along an slope and linked the changes in microclimate to spider

diversity in Nanda Devi Biosphere reserve, Uttarakhand, India and collected 244 species belonging to 108 genera and 33 families.

Patel and Vyas (2001) studied biodiversity in Hingolgarh Nature Education Sanctuary from Gujarat and reported 56 species of spiders belonging to 34 genera distributed in 18 families. A compiled checklist of spiders from Madhya Pradesh and Chhattisgarh has been published by Gajbe in 2003 and reported 186 species of spiders belonging to 69 genera under 24 families. Patel (2003) reported 91 species belonging to 53 genera and 16 families from Parabikulam Wildlife Sanctuary, Kerala. Siliwal *et al.* (2005) published a checklist of Indian spiders' compiled 1442 species belonging to 361 genera of 59 families and provided a taxonomic re-description of previously described species. Sudhi Kumar *et al.* (2005) studied the web-building spiders in Kuttanad and also gave detailed information of resident spider population and seasonal variations in their diversity in the rice agroecosystem of Kuttanad, Kerala.

## **2.3 Spider Studies in Gujarat**

Dr. B. H. Patel was a pioneer to study spider fauna in Gujarat. He described 56 new species of 18 families from Gujarat. He popularized spider studies in Gujarat. Recently, interests in arachnology have revived, hence, many more new species and new records are expected from Gujarat. Patel & Patel (1973) reported three new species of spiders belonging to 3 different genera. Patel (1988) reported a new species of spider *Neoscona bihumpi* belonging to family Aranidae from Bhal and Coastal area, Bhavnagar of Gujarat. Siliwal (2000) recorded 114 species of spider belonging to 62 genera distributed in 20 families of Vadodara district. Patel & Vyas (2001) reported 56 species of spider belonging to 34 genera and 18 families from Hingoldh Natural Education. Siliwal & Kumar (2001) recorded *Latrodectus hasselti* of the family Theridiidae from a cotton field of Baroda district in Gujarat. Siliwal *et al.* (2003) reported 116 species of spider belonging to 66 genera and 25 families from the Purna Wildlife Sanctuary. Patel (2003) reported 124 species of spiders belonging to 67 genera and 22 families from Vansda National Park. Kumar & Kumar (2004) reported 33 species of spiders belonging to 10 families from rice agro-ecosystem of Vadodara. Kumar & Kumar (2006) reported 21 species belonging to 9 families of spiders in rice agro-ecosystem of Vadodara. Kumar (2007) reported 11 species of spiders belonging

to 10 genera and 9 families from the agricultural fields of Vadodara. Kumar & Kumar (2010) reported and listed the insect species that is being preyed upon by *Oxyopes shweta* (Araenidae: Oxyopidae) Vadodara. Trivedi (2009) reported 37 species of spiders belonging to 22 genera and 10 families from groundnut crop fields of Rajkot. Kumar & Yashkamal (2011) reported 42 species of spiders belonging to 12 families from the agriculture fields of Vadodara. Parasharya *et al.* (2011) reported the first record of Regal Parachute spider *Poecilotherie regalis* from the family Theraphosidae, from South Gujarat. Patel *et al.* (2012) reported 42 species belonging to 28 genera and 15 different families of spider from Ratanmahal Sloth bear Sanctuary. Vachhani *et al.* (2012) reported 76 species of spiders belonging to 48 genera and 14 families from Junagadh district. Parmar *et al.* (2014) reported the first record of *Plesiophrictus millardi* from Gujarat. Bhatt (2014) enlisted 40 species of spider belonging to 26 different genera and 16 families from major wetlands of Anand - Kheda. Solanki & Kumar (2015a) worked on spiders from five major agroecosystems of Jambughoda Village, Panchmahal district and reported 67 species belonging to 43 genera and 17 different families. Araneidae and Salticidae were the dominant families of spiders. Solanki and Kumar (2015b) studied web structure and efficiency of prey capture in *Neoscona vigilant*. Prajapati & Patel (2018) worked on the study of agrobiont spiders of Navsari Agricultural University (NAU) campus in relation to their diversity and morphological characteristics and reported 48 species of agrobiont spiders belonging to 34 genera from 12 families.

However the information from Champaner- Pavagadh Archaeological Park on diversity and ecology study of spiders is still unknown. Keeping this in mind the present study has been proposed. The aim of the present work is to make an inventory of the spider species in different habitats with a slope of Pavagadh hill.