Chapter VI – CONCLUSION

Conclusion

- In the agroecosystems of Vadodara Social spider *Stegodyphus sarasinorum* Karsch is an important component of the natural enemy complex.
- Thorny shrubs like *Acacia*, *Prosopis* or even Cactus common in Arid and Semi-arid areas, along the field margins provide suitable habitats for the colonization of these spiders.
- They can form an integral part of several agroecosystems like Paddy, Wheat, Jowar, Pigeon pea, Cotton, Castor, Sugarcane, Cabbage, Cauliflower, Brinjal, Okra, Potato, Radish and Banana plantations.
- S. sarasinorum is effective in regulating the population of insect pests of several orders; for example, Hemiptera, Coleoptera, Diptera, Lepidoptera, Orthoptera.
- They are one of the key macro-invertebrate predators involved in regulating the population of large sized insect pests like grasshoppers, beetles and bugs which are usually not preyed upon by any other invertebrate predator. In this category we have wandering spiders of Family Salticidae (for example *Plexippus paykulli*), foliage hunting

spiders of Family Clubionidae (for example *Clubiona drassodes*) and some insect species like *Chilomenes sp., Chrysoperla carnea etc.*

- These spiders can sustain themselves throughout the year along the field margins of the agroecosystems, thus can play an important role in preventing build up of pest population like Aphids, Jassids, Thrips Whiteflies, Grasshoppers and Flea beetles.
- The spiders customarily stand a chance of getting exposed to pesticides like Organophosphates, Carbamates, Neonicotinoids, Synthetic Pyrethroids, Aldehydes, Amides, Sulphonylureas etc. during regular pest control operations by the farmer. Hence, the lethal and sublethal effects of few commonly used pesticides were observed by laboratory studies.
- Toxicity studies done using various chemical pesticides show that Azadirachtin (botanical) is relatively non toxic at ten times the recommended field rates whereas Methomyl (carbamate) is highly toxic at less than the recommended field rates to the spider.
- Web building activity of the social spiders is affected in varying degrees by the different classes of pesticide sprays.
- The survival mechanism of the spiders which includes pesticide exposure shows that these spiders have a very active detoxification

mechanism when exposed to pesticides at sublethal doses/ concentration. The spiders showed renewed web building activity after 48 hours of exposure to sublethal doses or very low doses (example one-tenth the dose of field recommended rates) of pesticides.

- Detoxification mechanism studied in laboratory by enzyme analysis; show that enzymes of Glutathione complex (GSH and GST) showed differential response to different pesticides and were least affected by Azadirachtin.
- Azadirachtin treatment was at par with Untreated Control for both the modes of exposure viz. (namely) Topical Application and Vial Coating. Imidacloprid Vial Coating was at par with Untreated Control while Imidacloprid Topical Application showed significant decrease in level of GSH at 235.033µmoles/mg protein.
- All the pesticides caused increased synthesis of Acetyl cholinesterase enzyme (AChE) in response to neurotoxic effect. The level of increase however varied for different chemicals as well as for different routes of exposure.
- Highest activity was seen in Endosulfan Treated spiders at 0.0356µmoles/min/ml of enzyme for Topical Application ($P < 0.001$)

and 0.0386 ($P < 0.01$)μmoles/min/ml of enzyme for Vial Coating method of exposure.

- Thus with judicious use of pesticides, which involves use of agrochemicals having low ecological toxicity profile, like botanicals, *Bacillus thuringiensis*, etc.; avoiding spray drift by proper application methods, frugal application of agrochemicals by observing the economic threshold of pest population, the cost of management of the crops can be reduced drastically.
- Conservation of colonies of the social spider S. *sarasinorum* can be an effective and low cost strategy to regulate the population of insect pests in an agroecosystem. Hence *S. sarasinorum* can form an important component of **Integrated Pest Management.**
- In future, factors affecting the dispersal of social spiders in agroecosystems and habitat requirement for colony propagation can be worked out in detail, for conservation of these spiders along field margins.
- Impact of chemical on the reproductive success of these spiders is an area which has not been worked out.