

Role of Spiders in Agriculture

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Biological control is a control of pest, particularly in agro-ecosystems with minimum environmental degradation; the traditional biological control method has been applied with greater importance across the tropical and sub tropical countries. Biological control organisms have more impact to keep the insect population below economic damage. Research experiments showed that, this is the most successful strategy for viable agriculture practices [1]. Consequently, natural predator plays a vital role integrated pest management program in agro-ecosystems and using of biological control agents are safe to the environment [2-4]. However, in agricultural ecosystem, the characteristic of low diversity of plants and the formation of temporary systems, whereas in annual crops ecosystems this could be unfavorable for this stability. Once this equilibrium is disturbed, phytophagous insects tend to reach maximum population density, causing losses to the farmers.

In the case of agriculture pest control, the major natural enemies are other insects including spiders. Spiders are most abundant group and inhabit every terrestrial ecosystem on earth and belong to phylum Arthropoda, class Arachnida and order Araneae. Over 46967 spider species belonging to 112 families and 4078 genera are known currently [5]. Spiders play key role as buffers that suppress the exponential growth of prey populations. The predatory spider fauna have potential attributes like number of insects killed per unit time, effective searching ability, wide host range, adaptation under different conditions like food limitation, low metabolic rate, high reproductive capacity, mechanism of energy conservation and polyphagous nature make them an effective predator model for in biological pest control [6]. Spiders primarily feed on soft bodied insects and very rarely feed on non-arthropods [7-10]. Spiders are one of the key taxa of generalist predators, due to their high density, availability, mainly insectivorous feeding habits, and spiders are expected to play a significant predatory role in terrestrial ecosystems [11]. Several workers are reported about role of spiders in natural ecosystem and agriculture [12-19]. Spiders are positive predators that have been reported to prey on a wide spectrum of insect pests in agro-ecosystems including caterpillars, aphids, beetles and forming a key component of pest control [20,21].

Greenstone [22] and Jeyaparvathi [23] conducted experiments on impact of spider fauna on such as aphids, leafhoppers, plant hoppers, flea hoppers and Lepidopterous larvae and provided some distinctively practical approaches and useful data regarding to "biological control potential". The Araned fauna could be used as an efficient predator of sucking pest for the suppression of insect pests [24]. Spiders feed on a large number of preys, and do not damage crops and plants. They can achieve stability in population of pest, after which their own abundance is inhibited by their unique nature of territoriality and cannibalism [25-27]. In particular, spider communities in different regions with a temperate climate achieve stability in the control of harmful insect population or pests [6]. Research reports have revealed that spider fauna can reduce the population of planthoppers and leafhoppers with greater extent [28-30]. The increased awareness of the negative impact of insecticides, use of the predators in insect pest management has been increased attention for pest control in agro-ecosystems [31]. In other hand, in agro-ecosystems, the distribution pattern, occurrence and diversity of spider fauna is typically negatively affected by high external input chemical fertilizer and other activities [32].

Although spiders have been around 250 to 300 million years, most of the species are at threat of extinction due to degradation of habitat and fragmentation, severe reductions in natural vegetation. Spiders serve as natural pest control, and this phenomena or an ecological concept known as "community stability". Spiders occupy a high trophic level in food chain and they have not been treated as most important biological components for biological control agents, because much information is not available on the ecological significance of spiders in pest control [33]. Additionally, Spiders are comparatively resistant to starvation and dehydration, but they become active as soon as expose to favorable condition, and they are among the first predators able to limit the abundance of pests.

For many decades, the continuous use of a broad spectrum of chemical pesticides has damaged natural ecosystems in all aspects including loss of biodiversity and the spider diversity is no exception. Since diversity of spider fauna is inhabit in all ecosystems and are serve as predators at all stages of their development. Due to global warming, global dimming and unstable seasons, depletion of water sources and other factors are affecting the diversity of spiders. The environmentalists and arachnologists have to find solutions for conserving the depleting populations of spiders in the light of climate change. The most important reason for conserving spiders is they are the only fauna, which keep ecosystem in balance, providing free ecosystem services, serving as food sources for birds, other organisms, and provide spider silk and venom.

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