ABSTRACT

Orb-web spiders are believed to alter their web architecture under varying environmental conditions to maximize functional efficiency, while being as silk-efficient as possible. Therefore, the present study was carried out to investigate the variation in web architecture of four common orb-web spiders (*Neoscona theisi* (Walckenaer, 1841), *Tetragnatha javana* (Thorell, 1890), *Leucaga decorata* (Walckenaer, 1841) and *Larinia chloris* (Audouin, 1826)) of agroecosystems of Punjab, Pakistan in relation to abiotic and abiotic factors of the environment. In addition, relative abundance (%), biocontrol potential, fitness of these orb weavers in different vegetation type, relation between web architecture and body parameters, horizontal and vertical distribution of orb-webs was also recorded. For this purpose, weekly and fortnight surveys were carried throughout the growing season of rice, wheat, cotton and maize from three districts of Punjab (Lahore, Kasur and Okara). A total of 6,625 orb-web spiders were collected belonging to 2 families, 6 genera and 10 species of orb-web spiders. The maximum orb-web spiders were recorded from rice fields (n=1866), followed by wheat (n=1806) maize (1754) and cotton (n=1199). Over all, the abundance of orb-web spiders was significantly less during vegetative stage, followed by sharp increase in reproductive stage and decline in ripening stage. *Larinia chloris* and *Larinia directa* (Hentz, 1847) were reported for the first time in the fields of rice and wheat from Punjab, Pakistan. It has been found that *N. theisi* showed remarkable plasticity in web architecture (capture area, capture thread length and average mesh height) in response to seasonal dynamics, vegetation type and prey availability. Significant variation in web architecture of *T. javana* was also recorded between different crops and in relation to varying prey availability.

There was significant alteration in various web parameters of *L. decorata* (capture area, average mesh height and vertical diameter) in response to prey availability during three growth stages in rice ecosystem. However, only capture area of *L. decorata* was found to be altered significantly between different vegetation. Prey availability have been reflected as the proximal cues inducing web architectural plasticity in *L. chloris*. Variation in moon light did not found to affect the web design significantly. Only vertical and horizontal diameter of *N. theisi* and horizontal diameter of *T. javana* was recorded to be varied by presence and absence of moon light. In rice ecosystem, the abundance of orb-webs was recorded to be maximum near the margin within the confines of 0-5meter. The abundance of orb-webs constructed by *N. theisi* and *T. javana* was correlated negatively with increasing distance from field margin. Majority of orb-web spiders recorded during study were found to weave webs at the top or near the top of rice plant. There was positive correlation between plant height and webs of *L. chloris* and *T. javana*. In current study, significantly heavier and larger *N. theisi* females were recorded from maize fields. Similarly, wet weight of female *T. javana* recorded from respective crops was also found to be varied significantly. The majority of the preys collected from webs belonged to order Diptera, Lepidoptera, Hemiptera, Coleoptera, and Hymenoptera. The overall prey consumption by these four orb weavers was recorded to be 24.54% in rice ecosystem. From this study, it is concluded that variations in web architecture of orb-web spiders in relation to various factors under study may be useful to estimate their biocontrol potential in different agroecosystems.