The microbial diversity of groundnut phyllosphere reveals that the microbial population as well as composition shows variation with respect to kind of leaves, season and pesticide application. In summer bacteria was found to be maximum where as fungi and yeast during khariff season respectively. But irrespective of season, aphids infested leaves and diseased leaves recorded highest and least microflora except actinomycetes respectively. Pesticides could also changed microbial population and composition. The pests recorded highest microbial population than the predators and the hydrolytic activities belonging to bacterial isolates was also maximum. Unsterilized dead animals of Coccinella septempunctata and Rhynocoris fuscipes recorded Mucor sp. and Menochilus sexmaculatus sp. recorded Aspergillus sp. respectively. All the life stages of Spodoptera litura was highly susceptible to Beauveria bassiana followed by Paecilomyces fumosoroseus and Verticillium lecanii respectively. In general the concentration, duration and life stage dependent mortality could be observed prolonged pupal period and pupal mortality was higher in B. bassiana followed by P. fumosoroseus and V. lecanii respectively. V. lecanii recorded highest mortality in Aphis craccivora Koch recorded of spore concentration and adjuvants in both pot and microplot assay. The fungal pathogens of other two with neem oil cause distinct mortality followed by castor oil. Among the various grains, wheat and rice recorded highest spore count and biomass with regardless of temperature. Sorghum supports maximum spore count in P. fumosoroseus and V. lecanii but the temperature influences the spore count and biomass in P. fumosoroseus. Sabouracid maltose yeast extract broth and coconut water recorded highest spore and biomass
in all tested pathogens. Carrot and ladies finger were best for *B. bassiana*, *P. fumosoroseus* and *V. lecanii* respectively. All the plant based pesticides were well tolerated by all the fungal pathogens except methanol extract of *Annona squomosa*. The fungicide carbendazim highly inhibited the all the tested pathogens. *Menochilus sexmaculatus*, *Coccinella septempunctata* and *Rhynocoris fuscipes* were highly susceptible to *B. bassiana*, *P. fumosoroseus* and *V. lecanii* did not cause any distinct mortality to all the tested predators. The nymphal development time and weight of the predators reduced when the predators fed with fungal pathogens treated *S. litura*. Survival rate was not affected. The field study reveals that all the pests population were treated control plot. Similarly the yield and cost benefit ratio and maximum in *B. bassiana*, *P. fumosoroseus* and *V. lecanii* treated plot respectively. The persistence of fungal pathogens was found to be higher in soil than the phyllosphere.