



Effect of different biopesticides on mortality and their synergistic effect on the fecundity of *Tribolium castaneum* (Herbst, 1797)

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Abstract : *Tribolium castaneum* is an important stored grain pest. *T. castaneum* not only caused heavy losses in stored grain products, but it also becomes resistant to many pesticides, which makes pests more important. Synergism is an important tool to reduce the risk of the development of resistance. This study was designed to investigate the toxicity, synergism effect, and effect of the combination of different biopesticides on the fecundity of *T. castaneum*. Results showed that among six biopesticides (Spinosad, Abamectin, Azadiractin, Rosemary oil, *Metarhizium anisopliae*, and *Verticillium lecanii*) the spinosad, rosemary oil, and *M. anisopliae* exerted maximum percent mortality. When these pesticides were mixed and used to assess the synergistic effect. Results revealed that spinosad + Rosemary oil was the most effective combination, and exerting caused more mortality as compared to spinosad + *M. anisopliae* and rosemary oil + *M. anisopliae*. Results also showed that the number of eggs laid per day was also recorded less in the insects which were exposed to spinosad + rosemary oil as compared to other treatments. The percent reproductive control was about 43% in spinosad + Rosemary oil combination as compared to other treatments. This study showed that the use of different pesticides with a different mode of action in small concentration can be more effective than a single pesticide with high concentration. This technique will effectively deal with pesticide resistance and also economical for the store owners.

Keywords : Bio-pesticides, Botanical pesticides, Entomopathogenic fungi, Fecundity, Percent Reproduction Control, *Tribolium castaneum*.