

**EFFECTS OF AGGREGATION PHEROMONES AND SPINOSAD
ON *Tribolium castaneum* (HERBST) (COLEOPTERA:
TENEBRIONIDAE) AND *Rhyzopertha dominica* (F.)
(COLEOPTERA: BOSTRYCHIDAE) ADULTS**

By

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ABSTRACT

Quantitative and qualitative losses occur throughout the post-harvest distribution channel of harvested crop yield. The red flour beetle *Tribolium castaneum* and lesser grain borer *Rhyzopertha dominica* are devastating insect species infesting stored grains. Indiscriminate use of insecticides in the protection of stored crop yield has imposed numerous complications on the biotic and abiotic environment. To resolve this issue, the scientists reiterate the indispensable role of biorational methods of stored-product protection. Pheromones and reduced-risk insecticides bear the unique characteristics as safer insect pest management alternatives. Series of experiments were conducted to determine the influence of two closely-related bacterial formulations (spinosad and spinetoram) on selected physiological and behavioural activities supported by the aggregation pheromones of *Tribolium castaneum* (4,8 Dimethyldecanal or 4,8 DMD) and *Rhyzopertha dominica* (Dominicalure-1 and Dominicalure-2). The attraction of *T. castaneum* adults decreased in response to the increased distance from the trap having its aggregation pheromone 4,8 DMD. Low concentrations of 4,8 DMD better attracted *T. castaneum* adults than high concentrations whereas pheromone+kairomone combination further improved attraction of *T. castaneum* adults compared to the traps with the pheromone alone. Higher populations of *T. castaneum* adults are better attracted to the traps than their lower population sizes. The attraction of *T. castaneum* adults to pheromone traps was further increased by their pre-exposure to spinosad while such exposure reduced progeny development; female and male adults exposed showed different levels of sensitivity. In *R. dominica*, the operating distance of Dominicalure-1/Dominicalure-2 varied with the distance from the insect location and concentration of Dominicalure-1/Dominicalure-2; the maximum trapping occurs at 60-70 cm from the trap and at 50 and 100 μ L. Pheromone concentrations higher than 100 μ L decreased the trapping of *R. dominica*. The concurrent use of pheromones of *T. castaneum* and *R. dominica* enhanced trapping distance of *T. castaneum* adults than the use of 4,8 DMD alone while the opposite effect was true in *R. dominica*. Flying *R. dominica* are best caught at 3-10 cm above the ground level (insect-release-point). Both spinosad and spinetoram sprayed on rice protected the commodity from insect infestation over five months indicating the presence of pesticide residues on rice. Spinetoram had better residual efficacy than spinosad. The study concludes that

pheromones and spinosad are promising biorational agents for protecting stored grains from infestations of *T. castaneum* and *R. dominica*. Further studies are required to investigate if similar physiological alterations occur in other stored-product insects as well.

Keywords: Stored-product insect infestation, stored crop yield, pheromone, spinosad, spinetoram

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