

Title Efficacy of diatomaceous earth and methoprene, alone and in combination, against *Rhyzopertha dominica* (F.) (Coleoptera: Bostrichidae) in rough rice

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Abstract

Combination treatments of diatomaceous earth (DE) (Protect-It[®]) and the insect growth regulator (IGR) methoprene (Diacon[®] II) were evaluated against *Rhyzopertha dominica* (F.), the lesser grain borer, on stored rough rice. Application rates of DE and methoprene ranged from 0 to 500 ppm and 0 to 1 ppm, respectively, in 25 treatment combinations. Tests were conducted by exposing 20 adults for 2 weeks at 32 °C and 75% relative humidity on single varieties of long-, short-, and medium-grain rough rice, removing adults, and holding the rice for 8 weeks at the same conditions to collect F₁ progeny. In the absence of methoprene, mortality of exposed adults increased as the concentration of DE increased, but even at the highest rate of 500 ppm, mortality was only 57.5±12% and 58.8±9.7% in long and medium-grain rice, respectively, and 26.3±4.7% in short-grain rice. Mortality of *R. dominica* exposed on short-grain rice was lower than mortality on long- and medium-grain rice at several combinations with 375 and 500 ppm DE. There was also an unexpected increase in adult mortality with the addition of methoprene so that at 1 ppm methoprene and 500 ppm DE, mortality in long-, medium-, and short-grain rice was 77.5±9.0%, 77.5±10.0%, and 58.5±3.0%, respectively. In the absence of methoprene, progeny produced on long- and short-grain rice ranged from 48.0±21.2 to 87.2±9.0, compared to 16.5±5.5 to 33.5±8.6 progeny produced on medium-grain rice. With the inclusion of methoprene there were few progeny produced in any of the treatment combinations, and the overall average was 0.6±0.3. Similarly, with no methoprene the range of insect-damaged kernels (IDK) was 5.2±2.7 to 12.2±3.1%, but with methoprene the overall average was reduced to 1.8±0.2%. While control of *R. dominica* was somewhat limited with DE, the differences among rice varieties seems to indicate that the specific type and possibly variety of rough rice may influence mortality and reproduction of *R. dominica* exposed to DE. With methoprene, progeny production was greatly suppressed regardless of DE concentration, but combining DE with methoprene would give some measure of adult control.