

Title Can reduced concentrations of chlorpyrifos-methyl be combined with other products to effectively control stored grain pests?

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Abstract

The efficacy of different concentrations of chlorpyrifos-methyl and cyfluthrin, singly and in combination, against stored grain beetles and their progeny was evaluated (experiment 1). A new product, Storcide, containing both insecticides was also evaluated for residual activity in preventing infestations (experiment 2). In experiment 1, the insects were exposed to treated wheat at 1 day, or 4, 13 or 27 weeks after insecticide application. In experiment 2, treated wheat stored in drums were exposed to natural, fluctuating temperatures in a storage shed located in Stillwater, Oklahoma, USA, from 14 July 1999 to 12 July 2000. Grain samples were collected from the drums at 0, 4, 12, 24, 36 or 48 weeks after treatment. The beetles used were *Rhyzopertha dominica*, *Sitophilus oryzae* and *Tribolium castaneum*. Adult mortality was evaluated after a 7-day exposure. Progeny production was studied after seven weeks. All treatments that contained cyfluthrin effectively controlled *R. dominica*. *S. oryzae* was not controlled by either cyfluthrin or chlorpyrifos-methyl when used alone. When cyfluthrin at 2 ppm was combined with chlorpyrifos-methyl at 0.5-6 ppm, mortality of *S. oryzae* adults was more than 80%, and only a few progeny were produced at the lowest concentrations. *T. castaneum* adults were the most difficult to kill, even at the highest combinations. However, very few progeny were produced in any treatment. Treatment with Storcide (3 ppm chlorpyrifos-methyl and 2 ppm cyfluthrin) resulted in nearly 100% adult mortality for *R. dominica* and *S. oryzae* at all time periods. No *R. dominica* progenies were produced and there was only one *S. oryzae* adult produced at 48 weeks. Storcide effectiveness against adult *T. castaneum* decreased through time, but no progeny was produced with this treatment. Storage at warm temperatures did not appear to affect the residual activity of the insecticides. Combining insecticides at lower rates rather than applying singly may be an effective strategy for controlling stored grain insects.