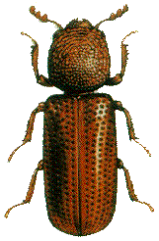
Evaluation of Methoprene Combined with Diatomaceous Earth to Control the Lesser Grain Borer (Coleoptera: Bostrichidae) in Stored Wheat



Frank H. Arthur, Manhattan, KS 66502, arthur@gmprc.ksu.edu

GMPRC
GRAIN MARKETING AND PRODUCTION RESEARCH CENTER
USDA-ARS

INTRODUCTION

Female lesser grain borers lay eggs on the exterior of wheat kernels, the larvae hatch and bore inside and complete the life cycle inside the kernel. Adults exit the kernel by boring a hole, resulting in an insect damaged kernel (IDK).

What is Methoprene?

Methoprene is an insect growth regulator (IGR) labeled for use in stored grains. Methoprene does not kill adult insects but prevents them from reproducing and is effective against the lesser grain borer. The 1st instars are exposed before entering the kernel.

What is Diatomaceous Earth?

Diatomaceous earth (DE) is an inert dust composed of fossilized diatoms. DE interferes with water transpiration through the lipid layer and the insect dies from desiccation. The lesser grain borer is more tolerant than other stored-grain beetles to DE.

OBJECTIVES

Assess efficacy of combinations of DE + methoprene.
Determine impacts of relative humidity (RH).
Assess reductions in F_1 progeny.

METHODS

Test were conducted at 27°C, 57 and 75% RH.

Rates of methoprene, 0, 0.25, 0.50, 0.75 and 1.0 ppm.

Rates of Protect-It DE, 0, 75, 150, 225 and 300 ppm. 20 adults were exposed for 3 weeks on treated wheat.

Mortality was assessed, insects were removed and the wheat was held for 8 weeks to collect F_1 adults.

RESULTS

Survival was significant with respect to concentration of DE and RH.

Survival decreased with increase in DE concentration and was greater at 75 than at 57% RH.

F_1 adults were found in the 0-ppm methoprene treatment and decreased with DE concentration.

Data for survival and F_1 adults were described by linear and non-linear regression.

SUMMARY

The combination of methoprene and DE produced additive effects.

Reduced rates of DE gave immediate mortality and reduced rates of methoprene prevented F_1 adults.

This method of application is a possible new control strategy on stored wheat.