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Diatomaceous Earth Wrecks Insects' Internal Water Balance

What's a natural way to kill insects in food processing plants? The answer has been around for 20 million years: diatomaceous earth (DE). But DE isn't earth — or even dirt. It's the broken-up shells of tiny plants, called diatoms, which lived in the sea roughly 20 million years ago. Today, these fossilized skeletons are being combined with heat treatment as an alternative to methyl bromide for controlling insects in flour mills and other food processing plants.

"Turning up the heat creates one big oven for the insect pests. The heat breaks down the waxy layers of their exoskeletons, and the DE absorbs the layers, disrupting their internal water balance. Without this delicate balance of water, insects can't survive," says Agricultural Research Service entomologist Alan K. Dowdy. He's at the agency's U.S. Grain Marketing and Production Research Center in Manhattan, Kansas.

In 1996 lab studies, Dowdy found that 98 percent of red flour beetles were killed when exposed to 122oF and DE. This insect is noted for tolerating heat under normal conditions. The study then became the springboard for a 1997 joint U.S.- Canadian field research project at Quaker Oats of Ontario, Canada. For the field test, the researchers placed confused flour beetles-one of the industry's worst insect invaders—in the processing facility. One hundred percent of the beetles died within a day after exposure to a temperature of 115ºF and DE. The payoff for the food industry: Cost of heat treatment may be lower, and insect control is better using DE and heat, compared to using heat alone. Both Canadian and U.S. food processing plants have used heat treatments, but a few processors are concerned about expensive installation of new heating systems in older buildings. The researchers showed that lower temperatures could be used with DE and still control insects.

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