Cat fleas' journey into the vacuum is a 'one-way trip'

17 December 2007

Homeowners dogged by household fleas need look no farther than the broom closet to solve their problem. Scientists have determined that vacuuming kills fleas in all stages of their lives, with an average of 96 percent success in adult fleas and 100 percent destruction of younger fleas.

In fact, the results were so surprisingly definitive that the lead scientist, an Ohio State University insect specialist, repeated the experiments several times to be sure the findings were correct. The studies were conducted on the cat flea, or Ctenocephalides felis, the most common type of flea plaguing companion animals and humans.

The lead researcher also examined vacuum bags for toxicity and exposed fleas to churning air in separate tests to further explore potential causes of flea death. He and a colleague believed that the damaging effects of the brushes, fans and powerful air currents in vacuum cleaners combine to kill the fleas. The study used a single model of an upright vacuum, but researchers don't think the vacuum design has much bearing on the results.

“No matter what vacuum a flea gets sucked into, it's probably a one-way trip,” said Glen Needham, associate professor of entomology at Ohio State and a co-author of the study.

The results are published in a recent issue of the journal *Entomologia Experimentalis et Applicata*.

Needham theorized that the vacuum brushes wear away the cuticle, a waxy outer later on fleas and most insects that allows the bugs to stay hydrated. Without the waxy protection, the adult fleas. larvae and pupae probably dry up and die, he said.

“We didn't do a post-mortem, so we don't know for sure. But it appears that the physical abuse they took caused them to perish,” he said.

Conventional wisdom has suggested for years that homeowners should vacuum carpeted areas to physically remove fleas, and some recommendations went so far as to say the contents of the bags should be emptied, burned or frozen.

Lead study author W. Fred Hink, professor emeritus of entomology at Ohio State and a longtime researcher in nontoxic controls of fleas on dogs, sought to test the effects of vacuuming on all flea life stages and whether any extra disposal steps or additional chemical controls are necessary.

Fleas have multiple life stages. Adult fleas eat blood meals and mate while living on a host animal. Females lay eggs, which roll off of the animal and onto the floor, furniture or pet bedding. After hatching from the eggs two to 14 days later, the insects go through three larval stages, the last of which spins a cocoon to protect the pupa stage. New adults typically emerge within a week or two.

The study involved groups of 100 adult fleas at a time, as well as groups of 50 pupae and 50 larvae, by vacuuming them up from a tightly woven kitchen-type of carpet. Six tests of vacuuming the adult fleas yielded an average of 96 percent of fleas killed; three tests of vacuumed pupae and one test of vacuumed larvae (in their third stage of development) resulted in 100 percent killed.

In comparison, an average of only 5 percent of adult fleas died after being held in paper vacuum bags to test for toxicity, and an average of only 3 percent died when circulated in moving air.

“I did not include eggs in the vacuum study, but I'm sure they would not have survived,” Hink said.

Flea survival in general is on the wane these days, Needham noted, because of numerous effective chemical treatments on the market that kill fleas on companion animals.

“For awhile, fleas owned us. But now they're on the run,” Needham said. “There are all kinds of ways to manage the problem, but how people feel about insecticides and how much money they want to spend factors into what they're going to do for flea control. Vacuuming is a great strategy because it involves no chemicals and physically removes the problem.”

He also said the effectiveness of some insecticides is likely to decrease as fleas inevitably develop resistance to the currently available compounds. Because of that, Needham is among researchers seeking other nontoxic ways to kill fleas and other household pests, including studying the use of ultraviolet light.

“We're hoping to find that exposure to UV light could knock the flea population down even further. It appears to be a pretty powerful technology for this purpose,” he said.

Source: Ohio State University