

USDA Investigates Use of Combined Wildlife Repellent-Rodenticide Bait to Reduce Non-Target Hazards

Researchers with the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) have discovered a method to prevent harm to certain birds during rodent eradication efforts. APHIS found that adding an anthraquinone repellent to rodenticide baits successfully prevents the consumption of the baits by Canada geese (*Branta canadensis*) and ring-necked pheasants (*Phasianus colchicus*). The findings could aid in the development of new bait formulations that reduce the ingestion of rodenticides by these and other nontarget wildlife species. A related article titled, *Threshold Concentrations of an Anthraquinone-based Repellent for Canada Geese, Red-winged Blackbirds, and Ring-necked Pheasants*, was recently published in the December 2009 issue of *Applied Animal Behaviour Science* (volume 121, pages 190–196).

Anthraquinone, which occurs naturally in some plants, produces a laxative effect when eaten. Anthraquinone is registered as a pesticide by the U.S. Environmental Protection Agency for use as a goose repellent at or near airports, developed urban areas, golf courses and ornamental and conifer nurseries. Anthraquinone repellents currently are not registered for agricultural applications; however, during the 2009 growing season, the manufacturer (Arkion® Life Sciences, LLC; New Castle, Del.) was issued emergency exemption labels for corn seed treatments in eight states and rice seed treatments in three states.

In addition to having a laxative effect, anthraquinone also absorbs near-ultraviolet light that is visible to most birds. This color cue may facilitate the repellency effect in birds. "Since anthraquinone exhibits a visual cue and a post-ingestive consequence, it is a quintessential avoidance-conditioning agent for wild birds," notes Dr. Scott Werner, research wildlife biologist at the USDA-APHIS National Wildlife Research Center (NWRC).

In captive studies, NWRC researchers treated 2 percent zinc phosphide baits typically used in rodenticide applications with 2–2.5 percent anthraquinone (Arkion® Life Sciences). Although some geese and pheasants initially sampled treated baits, all birds subsequently avoided treated baits throughout the remainder of the study. No mortality or signs of zinc phosphide poisoning were observed among 10 geese and 40 pheasants offered the repellent-treated zinc phosphide baits.

Additional studies are underway to evaluate the efficacy of the new anthraquinone-zinc phosphide bait for target rodent species. NWRC researchers also plan to investigate possible uses to reduce nontarget hazards with other pesticides, compare costs relative to expected damage at unmanaged sites and assess environmental impacts.

During 2001, the National Agricultural Statistics Service estimated that wildlife caused \$944 million of damage to U.S. agriculture. Rodenticides, such as zinc phosphide, are used to control rodent populations that cause damage in cropland and rangeland environments.

The NWRC is the research arm of APHIS' wildlife services program, which is devoted to resolving human-wildlife conflicts. The center applies scientific expertise to develop practical methods to resolve these conflicts and maintain the quality of environments shared with wildlife. To learn more about NWRC, visit its Web site at http://www.aphis.usda.gov/wildlife_damage/nwrc/.

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