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A New Approach to Pesticide Management

Finding Safer Alternatives in Response to Effects on Birds

The Problem

The Lower Fraser River Valley is the most productive agricultural area in British Columbia, and one of the most important wintering habitats in Canada for thousands of birds that forage in farm fields during migration. Farmers are under great pressure to stay competitive and productive in the intensive $700-million local agricultural industry, but they also need tools to maintain the ecological integrity of the land they rely on for their livelihood.

Pesticides have long been used to improve crop yields in the Fraser River Valley, but non-target species are frequently exposed to toxic chemicals. Of the nearly 4000 waterbirds, passerines and raptors whose deaths were investigated in the Fraser Delta from 1963 to 1994, 76% were attributed to pesticide poisoning.

In the early 1990s, Environment Canada received several reports of bald eagles and other raptors displaying symptoms and behaviours previously not reported in the region; otherwise healthy-looking birds had clenched talons, foam around the bill, small pupils and appeared disoriented.

A local veterinarian, Environment Canada wildlife toxicologists and other wildlife researchers suspected pesticide poisoning, but the source was a mystery. Oddly, the poisonings occurred in winter, a time of minimal or no pesticide application. The strange timing, bizarre symptoms and large number of affected birds led researchers to investigate further.

Photo: Environment Canada

Bald eagle with clenched talon, a symptom of anti-cholinesterase pesticide exposure

Canada

Seeking Solutions through S&T

Photo: Environment Canada

Waterfowl that died after ingesting granules of anti-cholinesterase pesticide in Fraser River Valley fields

Photo: Environment Canada

Poisoned waterfowl were an easy and readily available food source for bald eagles in the region. As many as 30 raptors could be attracted to one carcass

Anti-cholinesterase insecticides have been an easy and affordable tool to kill pests including wireworm, a potato predator. Starting in the 1960s, farmers applied the granular form of these insecticides throughout their fields. In the next 30 years nearly 30% of the 12 600 reported bird mortalities in the province were attributed to these chemicals, with waterbirds and passerines accounting for the majority of species affected.

Working with local wildlife rehabilitators and the farming community in the 1990s, Environment Canada scientists collected and tested hundreds of dead and injured raptors from the Valley and determined that anti-cholinesterase poisoning was the leading cause of reported deaths in the first years of the study. Even as manufacturers further refined the selective toxicity of pesticides, and several toxic anti-cholinesterase pesticides were replaced with less harmful ones, the later generations of anti-cholinesterase insecticides were still able to harm or kill non-targeted wildlife even when applied according to directions on pesticide labels.

Researchers hypothesized that raptors were dying after ingesting waterfowl that foraged in fields treated with the newer and supposedly safer chemicals. They conservatively estimated that over 560 waterfowl were poisoned by anti-cholinesterase pesticides in each year of their study. At less than half of one percent of local population totals, this was not enough to threaten waterfowl population levels, but did present a significant risk for raptors. Up to 30 raptors can be attracted to one waterfowl carcass, and with raptor populations sensitive to the loss of breeding-age animals, raptor population levels could be affected.

Stomach contents and toxicology testing showed raptors consumed waterfowl with lethal levels of the insecticides phorate and, later, fonofos. These newer forms of less toxic anti-cholinesterase pesticides were introduced to replace the more toxic carbofuran and fensulfothion, which were withdrawn from local markets in the late 1980s for reportedly poisoning non-target wildlife. But Environment Canada research now revealed that replacement chemicals were proving to be more toxic than previously thought.

Researchers knew that poisoning in the winter months was an unusual occurrence, as chemicals should have broken down following springtime applications. Further studies, in partnership with Agriculture and Agri-Food Canada, found that the high acidity and frequent flooding of Valley soils contributed to slow chemical degradation rates. Chemicals could still be potent up to nine months after application, more than 50% longer than manufacturers' guidelines. Waterfowl feeding intensively in Delta fields were exposed and poisoned through the normal application of the chemical and quickly became a source of food for the large number of raptors in the area.

Transforming Knowledge into Action

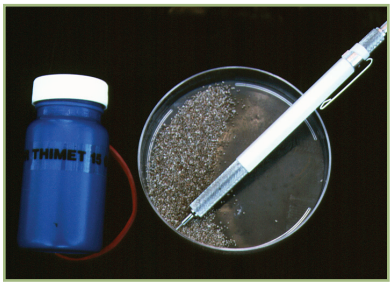

Photo: Environment Canada

The granular form of phorate was spread on fields to control pests but was easily ingested by waterfowl foraging in treated fields. Before these studies, phorate was thought to be a safer alternative to earlier anti-cholinesterase pesticides.

Who can use these results?

As a result of this research, the manufacturer voluntarily withdrew phorate from the local market in 1994, and a Canada-wide ban has been scheduled for 2012. This was the first time that pesticide instructions were changed in Canada solely because of risk to non-target wildlife. However, the only replacement for regional farmers seemed like a poor solution; fonofos was also found to kill birds and, as a result of corporate decision making, was no longer being manufactured.

With options disappearing and pest management problems persisting, the local agricultural industry needed a solution. With the help of Environment Canada wildlife researchers, Agriculture and Agri-Food Canada formed a committee in 1999 to discuss overall pesticide management issues in the Valley and to find a solution to break the problematic 40-year cycle of replacing harmful pesticides with other harmful pesticides.

The British Columbia Wireworm Task Force consists of non-governmental organizations, provincial and federal agencies, individual farmers, farmer organizations, and scientists. The Task Force assessed the science and recommended replacing fonofos with the less toxic chlorpyrifos, which has not been linked to raptor poisonings.

During the fonofos phase-out, Agriculture and Agri-Food Canada started an education program, reaching out to local farmers to voluntarily stop using the chemical. The province's pesticide disposal program, funded by government and industry groups, removed 33 000 kg of product from local sources.

Benefits to Canadians

Photo: Environment Canada

Bald eagle scavenging on waterfowl

The coordinated response of the Task Force, the first group of its kind in Canada established in an agricultural context, led to a full understanding of the issue and avoided decisions that could lead to pitfalls down the road. The unique collective efforts of the group helped secure the legal use of chlorpyrifos across Canada from the Pest Management Regulatory Agency and provided the farming community with a timely solution that maintained production and reduced negative effects on wildlife.

Since the formulation of the Task Force, participants have been better able to pool their mandates, resources and funding, securing an additional $1.2 million for research into wireworm control methods, with $200,000 dedicated to monitoring wildlife exposure and effects of insecticides, mainly wireworm control agents. Collectively, they have begun to consider additional pest issues facing the local farming community, and by analyzing scientific findings, have found ways to apply pesticides to improve effectiveness.

Engaging stakeholders in an advisory capacity allows for clear identification of problems and research needs from a more comprehensive perspective and helps formulate consensus for solutions to combat pest problems. Cooperation and identification of safer and more appropriate strategies and tools allows farmers to maintain ecological integrity and long-term productivity of their land by monitoring pest levels and responding with actions in proportion to the problem. This includes applying safer chemicals, and only when and where needed, thus reducing the risk of exposure for non-target wildlife and humans alike. All Canadians benefit from agricultural productivity, healthy wildlife, reductions in pesticide exposure and a safer environment.

For more information:

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