

Chemical come-on successfully lures lovesick lampreys to traps

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Invasive sea lampreys, subject of research at Michigan State University. Credit: Daymon J. Hartley

A synthetic chemical version of what male sea lampreys use to attract spawning females can lure them into traps and foil the mating process of the destructive invasive species, according to Michigan State University scientists.

Pheromones, chemical scents used to attract a mate, are well-

documented in the insect world. Weiming Li, MSU professor of fisheries and wildlife, has focused much of his career on the well-developed sense of smell of the sea lamprey. In 2002, after four years of painstaking research, Li and his team published results detailing their isolation and identification of the chemical that male lampreys use to attract females.

Li, doctoral student Nicholas Johnson and their team used the same techniques to develop a synthetic version of the pheromone and test one of its components as a lamprey control. Tiny concentrations of the synthetic pheromone component, called 3kPZS, was as effective as the pheromone release by males in attracting females over hundreds of meters, and wasn't affected by habitat conditions.

"The pheromone is expensive to synthesize," Li said, "but only a very small amount is needed for it to work successfully. It's very potent. Only a few hundred grams, less than a pound, would be used each year."

The research is published in the current issue of the *Proceedings of the National Academy of Sciences*.

By luring fertile females to traps baited with synthetic pheromone, fishery managers could prevent them from mating and reduce lamprey populations. The synthetic pheromone also could be used to attract females for harvesting as a food fish. In France and Portugal, sea lamprey is considered a delicacy.

"The Great Lakes Fisheries Commission would like to deploy one new integrated pest management control method by 2010 as a milestone for its sea lamprey management program," Li said. "The commission considers regulating spawning and migrating behavior with pheromones the most promising control method for implementation. So we're excited about the possibilities."

Currently, lampreys are controlled mainly by adding TFN, a compound that kills the larval stage, to freshwater streams where lampreys spawn. But there are environmental concerns about adding the chemical to streams, as well as the possibility that lampreys could develop resistance to TFN.

Sea lampreys, which resemble 18-inch eels, can live in both salt and fresh water and likely found their way into the Great Lakes via shipping channels. They have no natural predators in the Great Lakes. Parasitic lampreys attach themselves to other fish, such as salmon, trout and whitefish, and suck out the fish's body fluids. The lamprey's sucking disk and sharp teeth scar the host fish, killing many of them. Under some conditions, only one of seven fish attacked by a sea lamprey will survive.

A sea lamprey can kill 40 or more pounds of fish, and they've caused the extinction of three species of whitefish in the Great Lakes. The U.S. and Canadian governments together spend about \$10 million to \$15 million per year on lamprey control.

"It made sense for us to focus on the sea lamprey," Li said. "It's a poster animal for invasive species - very destructive, very expensive to control effectively."

Source: Michigan State University

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