Australian Biocontrol Beats Rabbits, But Not Rules

MELBOURNE—In 1859, Thomas Austin, one of Victoria's landed gentry, introduced a few European rabbits onto his estate for sport—and Australians have been cursing him ever since. To stop millions of foliage-eating rabbits from turning huge tracts into desert, Australia has become the only nation to successfully use a biocontrol agent on a vertebrate. Officials released the myxomatosis virus in the 1950s, and then, as that virus's potency waned, followed it with the European rabbit calicivirus disease (RCD) in 1995. The new virus appears to be a stunning success: Rabbit numbers are way down and once barren deserts are blooming (*Science*, 10 January 1997, p. 154). Yet for biocontrol officials, the calicivirus experience has been a major embarrassment, a sobering lesson in the unpredictability of biocontrol agents.

The problem is that RCD escaped into the wild while it was still being tested on an island off the Australian coast. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) had already determined that the virus would not harm humans or Australia's unique native mammals. But before the CSIRO could complete field tests on how well the virus spread, flying insects are thought to have picked it up from two infected rabbits and carried it to the mainland. The escape left the CSIRO legally vulnerable and has eroded public trust in biocontrol. "We have a track record of an escape," says Bob Seamark, director of another biocontrol institute, the Pest Animal Control Cooperative Research Center in Canberra. "This is a problem for us," one that may come back to haunt Seamark's agency in a few years when it attempts to release a next-generation biocontrol agent, a myxoma virus that carries an antifertility gene.

Officials had planned to seek public approval for the release—after they finished field trials—as part of an act protecting CSIRO legally should anything go wrong. But because the escape happened before the public consultation was finished, CSIRO now faces a lawsuit from those in the wild rabbit trade, including the makers of Australia's famous icon, the rabbit-pelt Akubra hat.

Next generation. The old cypress pine trees in Murray-Sunset National Park, Australia, predate rabbits; new seedlings now have a chance, as rabbit numbers are down.

CREDIT: P. SANDELL/PARKS VICTORIA

The lesson, biocontrol researchers say, is that biocontrol agents are so likely to escape that agencies should seek public approval before starting field trials. "The question is at what point should the public be responsible for [permitting] the release," says Niall Byrne, a former PR officer for the Australian Animal Health Laboratories in Geelong, which did the testing. If CSIRO had gotten approval before the field trial, then RCD might be considered a complete success.

Indeed, Australia's farmers already count it as such. In the arid zones that make up two-thirds of the country, where rabbits have been most voracious, farmers are reporting near-total eradication and saving an estimated $3 million to $4 million per year in rabbit control. CSIRO ecologist Brian Cooke's studies show that the virus is retaining its punch, unlike the myxomatosis virus, whose effectiveness dropped from 99% to 70% after 4 years. "This is no flash in the pan," he says. And for the first time since the 1800s, there are signs of regeneration in Australia's fragile ecosystems. The vast Nullarbor plain that stretches across the southern coast is coming alive with knee-high acacia seedlings next to big old trees that predate the rabbits; similar scenes of young and old cypress pines can be seen in northern Victoria.

Next time, biocontrol officials say, they'll be as smart about politics as they were about the science. "We got a lot of understanding from the process going wrong," says CSIRO scientist Lyn Hinds. "It wasn't the steps we took but the order we took them in."

—ELIZABETH FINKEL

Elizabeth Finkel writes from Melbourne, Australia.

ian scale insect in southern India, where it successfully controlled prickly-pear cactus, a South American import. Since then, published surveys suggest that weed managers worldwide have introduced nearly 300 kinds of insects and pathogens in bids to control more than 50 plants, while pest scientists have loosed nearly 1000 predators, parasites, and pathogens against nearly 500 unwanted insect species.

Biocontrol has remained a hit-or-miss effort, however. Although statistics are scarce, researchers estimate that less than a third of the insects introduced to control other insects have taken hold, and just half of those imported to attack weeds have become established. Even fewer make a dent in target populations. The success rate may be lower still for many microbial, viral, and fungal biocontrols, which often can't stand the stress—differences in climate and sunlight, for example—of new settings. "There are a lot of things you let loose and never see again," says weed biocontrol specialist Ed Coombs of the Oregon Department of Agriculture in Salem.

As a result, some observers dismiss biocontrol as a long shot, especially compared to the seemingly sure bet of killer chemicals. But others argue that the statistics aren't really so gloomy. At a recent conference,* Australian weed scientist Rosalyn McFayden of the Queensland Department of Natural Resources in Sherwood argued that researchers have successfully tackled about 40 of the 50 weeds they have tried to hold in check worldwide, an 80% success rate—even though in many cases they had to try a number of insects or pathogens to find one that worked. "The number of unsuccessful releases is irrelevant," she argues, because it's unrealistic to expect that it will take just one try or one agent to control weeds. Researchers typically try four or more insects per weed, for instance, and U.S. Department of Agriculture (USDA) officials—who help research and must approve U.S. biocontrol agents—have already authorized the release of 13 insects against leafy spurge, with uneven results.

Although even some biocontrol advocates don't buy McFayden's rosy numbers, they agree there are spectacular success stories. Long-snouted weevils and other insects, for instance, have swept exotics such as water hyacinth and Eurasian milfoil from lakes and rivers around the world. The crawlers deliver a one-two punch: Some weaken the plant by gnawing on leaves, stems, or roots, while others devour seeds, eating into the next generation. From New Guinea to Florida, such teamwork has cleared massive mats of vegetation from

*10th International Symposium on Biological Control of Weeds, Bozeman, Montana, 4 to 14 July.