# Could 1980 be the year of the grasshopper?

TO STOP A GRASSHOPPER:

SOMEWHERE IN THE WEST — The air is still and cool at dawn. Newly grown grasses and weeds in multi-shades of green cover a vast, silent range.

The soil is uniformally moist and the temperature perfect: hordes of newly-hatched grasshoppers — called nymphs — sluggishly emerge from their buried egg capsules. Already hungry, they stretch their legs and climb the nearest blade of grass to begin feeding.

This scene will be repeated countless times across hundreds of millions of acres of western rangeland this Spring and Summer.

Grasshoppers compete with humans for food, fiber and forage. During some years, when grasshopper populations are low and grass is plentiful, humans and grasshoppers coexist peacefully.

"Grasshopper populations tend to be cyclic," said L.C. Keenan, newly selected staff officer for the U.S. Department of Agriculture's Animal and Plant Health Inspection Service. "Grasshoppers are usually present in economically damaging numbers in relatively small localized outbreaks somewhere in the west every year."

USDA defines economically damaging as 8 or more grasshoppers per square yard — that's 38,720 per acre.

One female can lay up to 200 eggs — only two need to hatch and survive to become adults for the population to remain the same as the year before. One grasshopper per square yard over an entire acre — 4,840 grasshoppers — together will eat 12 pounds of dry grass a year.

Every few years or so," Keenan said, "conditions are perfect for a widespread outbreak like the one in 1979. We had them during the dust bowl years of the 1930's and again in the late 1950's Populations are usually high for 3 to 5 years — the middle years are the worst — then populations decline drastically. The decline is usually due to natural controls, principally unfaorable weather, but also due to predators, parasites and diseases."

If the weather is dry and warm, more grasshoppers hatch. Cool, wet weather deters the hatch. The ideal conditions for a grasshopper outbreak are a cool, moist early Spring, followed by a hot Summer and a late Fall, Keenan said.

After drought and grasshoppers hit the great plains in the early 1930's, Congress granted funds for organized grasshopper control on both range and cropland. The insecticides used then were mostly arsenical compounds. Aerial application began generally in the late 1940's using chlorinated hydrocarbons like aldrin and dialdrin.

In 1952, a federal-state task force recommended the federal government drop its cropland treatments because newly developed chemicals and improved application equipment made it possible for growers to control cropland grasshoppers on their own.

Cooperative grasshopper control was developed in the 1940's. Under the program Keenan said, the rancher or farmer pays a third of the cost, the federal government pays another third and the states that participate pay the final third. If a state does not participate, the rancher or farmer must pay two-thirds

"We expect a major outbreak again this year in 17 western states," Keenan said "And we estimate the total program costs per acre to be $1.70 — that's about 57 cents per acre from each rancher."

The timing in applying insecticide is critical, Keenan said Carbaryl and malathion are most effective when the grasshoppers are immature. Toxicity for carbaryl is 10 to 20 days and 2 to 5 days for malathion. Neither is harmful to animals or humans when properly applied, but bee hives must be removed from areas that will be sprayed.

During the 1979 outbreak, 7 million acres were treated at a cost of $5.6 million to the federal government During the outbreak, some areas recorded 60, 100 and even 200 grasshoppers per square yard.

We'd like to control grasshoppers without chemicals," Keenan said "However, we find there's a gap between the public's concept of where they think we are in developing biological controls and where we really are."

One pathogen USDA is currently studying is Nosema locustas, which is Latin for "grasshopper sickness."

"Nosema is a grasshopper disease, "Keenan said, "that occurs naturally in 2 to 3 percent of all grasshoppers The disease affects different species differently. As far as we know, Nosema only affects grasshoppers. When conditions are right, Nosema controls the pests naturally. We're trying to develop the technique to artificially rear Nosema, then put it in a bait.

"Actually, we're in the trial and error stage with Nosema," Keenen said. "Nosema is not yet in commercial production. The only Nosema we have is that produced by USDA scientists. Even if a firm began commercial production tomorrow; they could produce only enough to treat 100,000 out of several million acres this year.

"And Nosema is very fragile," Keenan said. "In its present form it's not something you're going to be able to buy and store from year to year or season to season. It has to be produced and used almost immediately. And it's expensive to produce."

"Nosema is an exciting approach to grasshopper control and it may have possibilities," Keenan said. "But it has a long way to go before it can be produced commercially and used routinely for control "

Keenan said scientists are also working on Entomophthora grylli — a fungal disease of grasshoppers. "This is a 10-year program," Keenan said. "It's a long way down the road."

Keenan added this year USDA will compare Nosema with malathion on a test plot in Arizona. "We'll run the test on a 40,000-acre plot notoriously infested with grasshoppers. This will help us evaluate how effective Nosema is."

Research for more effective and ecologically acceptable alternatives for controlling grasshoppers will continue, Keenan said. "For now, we've got to manage grasshoppers with what we've got."