A scientist in search of tiny insects

Jensen is on the hunt for aphids

By MATTHEW WEAVER
Capital Press

Gina Rone

Andy Jensen collects aphids as a hobby and passion.

Andy Jensen just might be the only person in North America with his particular hobby.

By day, Jensen is the go-between for farmers and researchers as manager of the Northwest Potato Research Consortium, funded by the Idaho, Oregon and Washington potato commissions.

After work, Jensen devotes about 10 hours a week to aphids, the insects best known to farmers as pests.

He searches for them through mountains, valleys and farm fields.

Jensen estimates he's traveled 120,000 miles, including two trips to Europe and 8,000 driving miles each year for the past 12 years, in pursuit of his passion.

"My aphid work is an all-consuming hobby," he said.

But it is also serious science.

Some aphids are well-known to farmers and researchers for the role they play in spreading plant diseases, but many are a beneficial part of the insect food chain. What's remarkable is that so little is known about some of them.

From the discovery of a new aphid species to publication in a scientific journal can take seven to 10 years. Jensen has participated in scientifically describing 26 new species of aphids over the last two decades.

None of the new aphids Jensen has described are agricultural pests. They tend to be found in natural habitats, not agricultural fields.

His exuberance for the tiny insects shines through his reserved demeanor. He'll enthusiastically describe the complexity of puzzling through aphid species descriptions from the 1800s — and how many people can actually say they have a favorite aphid?

"A lot of the species I've described, no one else has seen before until I've discovered them," he said.

Huge collection

Jensen's aphid collection consists of more than 12,400 slides and at least 35,000 specimens of 623 species. He pays for all of his aphid expeditions, according to his website, AphidTrek.org.

Describing aphids is a specialized area of entomology. Other aphid specialists around the region are focused on molecular biology and evolutionary patterns. The researchers describing new insects are mostly in eastern Europe and the Middle East.

Other people might have known about some of the aphids Jensen has described, but perhaps didn't have enough material beyond one sample in a museum.

When a new aphid is discovered, researchers turn to him.

"Certainly in our region, there's nobody like Dr. Jensen," said Sanford Eigenbrode, a University of Idaho entomology professor who oversees the aphid monitoring system for the Legume Virus Project. "He doesn't do the work on aphids professionally, even though he's a high-caliber scientist."

Farmers are unlikely to come across an undiscovered aphid in their fields.

"You've got to do a lot of hiking to find something that's new," Jensen said.

Jensen is most intrigued by the aphids that migrate from one host plant or habitat to another. One species lives in the forest on a snowberry bush during the winter, then moves to the high mountains on a knotweed plant among granite boulders during the summer.

"Discovering that kind of thing is really, really fun," he said.

He's particularly interested in atypical aphids — those found only in small numbers.

Many aphids completely cover the stems of plants — "you just can't miss them," Jensen said — but researchers have to look pretty hard to see a lot of other aphids.

For example, poverty weed, which tends to grow on roadsides and in abandoned fields, appears to host two unique previously undescribed aphids.

"Nobody in the world apparently is aware of these," Jensen said. "There are hardly any specimens on these plants and you have to tap on the plants with a board or a sheet to find them. But it's a super-common weed across most of the western half of the continent."

Managing aphids

Neither Jensen nor Eigenbrode have an estimate for the total cost of aphid-transmitted viruses to farm production, but "it would be a very large number," Jensen said.

Generally, Jensen advises farmers who find aphids on the fields to wait several weeks and see if they go away on their own. Aphids often decline naturally in the heat of summer.

But it's a different story for seed potato producers, who must limit seedborne pathogens, especially viruses. As vectors of viruses, aphids should be "aggressively managed," Jensen said.

But he warned that controlling aphids can be vexing.

"Trying to control aphids with a lot of different pesticides will just lead to more aphids, because you've killed some of the aphids and you've killed almost all of everything else, and you just end up with more aphids than you had to begin with," Jensen said.

"Aphids are considered the corn flakes of the insect world, or whatever your favorite food is," Jensen said with a laugh. "If you picture your favorite food, aphids are that favorite food for the insect world."

Aphids support a huge diversity of beneficial predators and parasites, particularly lady beetles, or ladybugs.

Aphids transmit viruses, which is generally considered a negative. But not all viruses are bad, Jensen said. They can introduce new genetic material into whatever they're infecting, which can sometimes be a positive.

Aphids are a crucial part of an extremely complex ecosystem, in their interactions with plants, insects, microbes and predators up to birds and mammals, he said.

"Ultimately, we're all a part of the food chain, and we're important because of that," Jensen said.

Much to discover

Aphids are most diverse in northern temperate climates, Jensen said. Only a couple hundred species are native to the Southern Hemisphere, and the other 5,000-plus species are in the Northern Hemisphere.

With most aphid taxonomy researchers based in Colorado, Utah and New Mexico, the Rockies were well-explored, but the Northwest was less studied until the early 1990s, Jensen said.

"For most people who don't spend a lot of time hiking and camping, almost all my aphids are in unusual places," Jensen said.

The aphid that lives in the most extreme habitat is probably Acyrthosiphon rockspirea, he said. It lives many places, but especially likes high-elevation rocky slopes and boulder fields.

"The diversity is very great," Jensen said. "There is so much to discover for the first time."

Gary Reed, the superintendent of Oregon State University's Hermiston research station, handed Jensen aphid samples, traps, a book and a microscope on his first day at his summer job as a college student.

Reed was studying potato leafroll virus and potato virus Y and needed to know which aphids were in the traps and which were on the plants.

It was a test, Jensen said.

"'If you can figure this out, you'll be useful to me and if you can't, you won't be so useful to me and maybe you'll do something else,'" he recalled. "And I just happened to be good at it."

Within a few years, Reed offered to support Jensen through graduate school, while he worked at the station during the summers.

Jensen has a doctorate in aphid systematics. He hoped to pursue aphid studies professionally, but couldn't find a job at a university, state agency or the U.S. Department of Agriculture.

"Aphids became a hobby at that point," he said.

While working for Reed, Jensen noticed that aphids on the plants cascara and bracken fern, thought to be separate species, looked quite similar.

"A little concerted effort showed they were the same," Jensen said. "I was hooked on problem-solving aphids."

When Reed died in 2015, Jensen named an aphid species, Macrosiphum garyreed, after him.

By any other name

Describing a newfound aphid also involves naming it.

"You have to come up with a new name, it has to have never been used before, the genus and species combination, and be something sort of unique that probably other people won't be tempted to use in the future," Jensen said.

At first, Jensen named aphids after the plant host they used, or after the habitat.

More recently, he's begun naming aphids after other things. "I name them after people, plants and places," Jensen said.

Jensen's partner, Gina Rone, works for the U.S. Forest Service. She is a huge supporter of his hobby, serving as navigator and scout for good sites, sharing cooking and campsite chores, and patiently waiting for Jensen on the trail when he stops to collect aphids.