

WYO-BIO

Biocontrol News and Views for Wyoming

Editor: Tim Collier, College of Agriculture, University of Wyoming

Volume 9, Number 2



Summer 2009

Special Bug Called on to Help County Control Weed

by Katie Roenigk, Staff Writer, The Ranger in Riverton

Since the middle of May, Fremont County has been home to a new insect that until recently had not found anywhere else in North America. The insect has also been released in Montana and possibly Colorado this year.

The Asian bug is called *Jaapiella ivannikovi* and its purpose is to control the spread of Russian knapweed, a plant found on more than 40,000 acres of land in Fremont County, said county weed and pest supervisor Lars Baker.

Baker doubles as chairman of the international Russian knapweed Biological Control Consortium, the group that has researched the plant for the past 10 years in an attempt to curb its growth. The consortium members have determined the *Jaapiella ivannikovi* may do the trick with Russian knapweed,

which has been recognized as a problem plant in Wyoming since the first half of the 20th century.

"It is a perennial plant that was introduced from Asia, probably as a contaminant with alfalfa seed," Baker said. "Russian knapweed is tough, with an extensive root system underground. ... No livestock (or native insects) will feed on it, and it's taking up space that something more useful could occupy. It's very aggressive."

With no animals or insects feeding on it in Wyoming, knapweed experiences no natural controls. Baker said the plant is a nuisance for farmers and can be deadly for horses.

"It doesn't taste good so usually they ignore it," Baker said. "But if it is all they have to eat, they will eat it."

If they consume too much knapweed, Baker said horses get "chewing disease," wherein a lesion forms in the area of the brain that controls chewing and swallowing.

The plant is not only a problem in Wyoming, where Baker said more than 250,000 acres of it thrive. Throughout the country - especially the



Jaapiella ivannikovi galls at time of release



Assembling the tent. Left to right Adrian Peterson, Brett Richardson, Josh Shorb, Tim Collier, Bruce Shambaugh

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West, communities struggle with the plant, which is why the international consortium was created in the mid-1990s to establish a method for its biological control.

After spending more than \$100,000 per year on research, the group this month released its first batch of *Jaapiella ivannikovi*, and several spots in Fremont County were chosen for the test.



Galled Russian knapweed plant fresh from quarantine lab in Bozeman

“These are little, tiny insects, one-sixteenth of an inch long,” Baker said.

The *Jaapiella* are shoot-tip gall midges that only eat Russian knapweed, Baker said. Larvae develop within a swelling in the shoot tip (the “gall”), which stunts the plant’s growth.

“The plants will be shorter and less competitive (and won’t produce flowers and seeds,” Baker said. “That gives an opportunity for something else to grow there.”

The bugs were delivered to Fremont County inside of galls on knapweed stems. After their release on May 19, Baker said he soon expects to see more galls form on the knapweed plants surrounding the imported insects. He said 10-50 adults should emerge from each gall, and one female can reproduce seven times each year.

“Every day the gall opens up a little more and some adults come out,” he said. “We put out several hundred galled stems with multiple galls on each stem. ... To have some impact you have to have literally billions of (insects).”

Once the adults emerge, Baker said they must find one another and mate, laying eggs that will form even more galls on the knapweed plants. The hope is that no predators will emerge to tamper with *J. ivannikovi* consumption of the knapweed, but Baker said it will take decades to determine if the biological control is successful.

Acknowledgements

The main article does not adequately reflect my deep appreciation to everyone who has worked so hard on the Russian knapweed Biological Control project over the years. Many weed districts have contributed faithfully every year in faith that something of significance might be found that would help control this weed. It has made my job as the money raiser easy. Thanks to the USDA/APHIS who has joined with us in this effort and played a leading role in designing a successful biological control campaign including Lloyd Wendel, Paul Parker, John Larson, Rich Hansen, Shaharra Usnick, Ron Lang and Bruce Shambaugh; the University of Wyoming, Bob Lavigne, Dave Kazmer, and Tim Collier; our friends at CABI in Switzerland who did the scientific work, Urs Schaffner and Harriet Hinz; Montana State University, Jeff Littlefield and Annie De Meij, who provide the stateside quarantine work and delivered the galls; the Bureau of Indian Affairs, Larry Beneker, Terry Henderson and Ernie Evans, and the Joint Business Council of the Shoshone and Northern Arapahoe Tribes for funding and a great place to study Russian knapweed and its biological control. There are so many people involved over the last fifteen years. Thanks to all, there is more to come.

Lars Baker, Chair Russian knapweed Consortium

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Photos courtesy of Nancy Webber, Fremont County Weed & Pest Assistant Supervisor - Bio Controls
Map courtesy of Kim Johnson, Fremont County Weed & Pest Assistant Supervisor - Mapping

“The insects have to feed on the plant and damage it year after year before it wears out the plant’s reserves in the root system to reduce the size of the plant,” he said. “Biological control isn’t anything that happens very fast.”

For example, in 1996 another agent - a nematode from Asia now called *Mesoanguina picridus* - was released on Russian knapweed plants in Wyoming and Montana in a similar attempt to control the weed’s growth. In 13 years, however, Baker said the nematode’s effect has not spread very far.

“There are a few places where it has knocked the knapweed down,” Baker said. “It controls the knapweed, but it is a nematode that is microscopic and can only crawl inches in its lifetime, so it doesn’t spread very well.”

He said the nematode may work if applied like a typical herbicide, but it is 10 times more expensive per acre.

“From a practical standpoint it is not much of an agent,” he said.

Another Asian bug is expected to reach Fremont County this summer to provide a third weapon against the growth of Russian knapweed. *Aulacidea acroptilonica* is a stem gall wasp that lays its eggs in the stems of knapweed plants. The eggs create a gall similar to the *J. ivannikovi*, he said, weakening the knapweed plant one stem at a time.



Galled plant in tent one month after release. A vile containing release material is visible to the left of the plant.



A perspective of the gall size

“It will be completely complementary to the (*J. ivannikovi*) we released,” Baker said. “But this insect may not turn out to be (successful).”

He said the wasp may be susceptible to parasites that live in North America which could kill the agent before

it is able to have an effect on the knapweed. But Baker said he feels optimistic about the gall, which only will fail if a predator emerges in North America or if the insect decides it does not like Wyoming’s climate.

“This is a pretty exciting insect with great potential (and it) is sort of the gift after 10 years of research,” Baker said on the Tuesday that he released the *J. ivannikovi*. “Today is a historic, red-letter day.”



The tent is complete and we’re ready for the release. Left to Right: Lars Baker, Brett Richardson, Josh Shorb, Nancy Webber, Tim Collier, Bruce Shambaugh

Jaapiella Spreading Across Release Site

by Nancy AP Webber, Assitant Suervisor, Fremont County Weed & Pest Control District

After many years of waiting we finally have an insect bio-control agent released on Russian Knapweed. Because of the continued support that Wyoming has given Russian Knapweed bio-control research and the pre-release data collected in Fremont County, we were fortunate to get the first field release of *Jaapiella* in North America.

Jaapiella is a gall midge that affects Russian knapweed shoot tips preventing flowering on galled stems. It is similar in both behavior and effect to one of our familiar and well established bio-agents, the Leafy Spurge gall midge, *Spurgia esula*.

The plant and insect material that made up the release came from Dr. Jeff Littlefield of the Montana State University (MSU) quarantine laboratory in Bozeman. The release was made on the afternoon of May 19, fortunately, just after the spring Bio-Steering committee meeting in Riverton. This allowed for many interested Wyoming Weed & Pest folks to take part in the release by helping set up the tent and putting out the gall material.

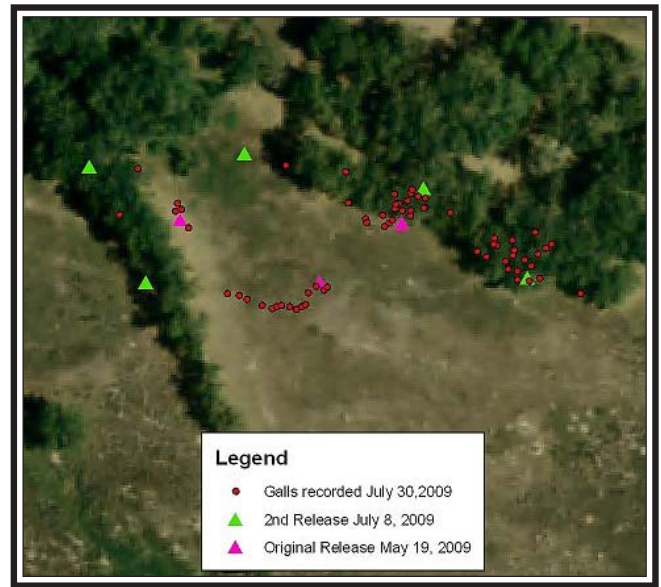
On May 28, eight days after release, no evidence of any galling was seen in the tent or around the open release sites.

Justin Gentle, of APHIS, and I visited the *Jaapiella* site on June 1, and were excited to find about ten galls in the tent. Most of the galls we saw at that time were relatively small and no galls were seen outside the tent on that date.

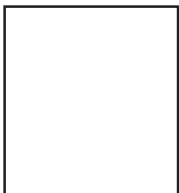
On June 16, three weeks after release, 112 galls were counted inside the tent, many of which were large, containing many *Jaapiella* larva and pupa. I was also excited to find a galled plant next to one of the open field releases. At this release a plastic five gallon bucket was placed over the galls and a number of Russian knapweed shoots for about 24 hours. This was done to help the tiny adult midges find each other after emergence from the galls.

We received more galled material from Bozeman on July 8, which was released in the same area. At that time Lars Baker and I saw numerous galls outside the tent and thought that flagging all the galls we found would be of interest. On July 30, I was joined by Kathleen Meyers, of APHIS, and we were able to find approximately 90 *Jaapiella* galls which we flagged and mapped (see map below).

It is exciting to see evidence of successful galling of this new insect so soon after release. *Jaapiella* is thought to produce as many as seven generations per year and we will be continuing to monitor the release site and surrounding area. Please contact Nancy Webber at Fremont County Weed and Pest for monitoring updates.



Map of releases & subsequent spread of *Jaapiella invannikovi* galls



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