

Tiny Heroes and Friends vs. Spotted Knapweed

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Utah

2024

When you think of a hero, what comes to mind? Maybe Iron Man, Batman, or Superman? Maybe something like Mr. Webster's definition: 1.) a person who is admired or idealized for courage, outstanding achievements, or noble qualities. These are all reasonable answers, but there is one super hero that is often overlooked: bugs. More specifically, the Knapweed Root Weevil (*Cyphocleonus achates*) and Knapweed Seed Head Weevil (*Larinus minutus*).

Spotted Knapweed (*Centaurea stoebe*) is a "growing" problem in many western states. Spotted Knapweed originated in Central Europe, where it grows in fertile, well-drained and light soils in warm areas.¹ It is found in pastures, dry meadows, on roadsides, and other dry conditions, but also survives in higher moisture areas as well.¹ Because of these native conditions, Spotted Knapweed thrives in the U.S. This leads to an immense problem. These invasive plants can take over entire areas very quickly. Each plant is capable of producing 500 to 4,000 seeds per square foot, every year with 90% of those seeds being viable at the time of dispersal.² But that's not the only thing that allows Spotted Knapweed to gain control of an area. According to the United States Department of Agriculture, Spotted Knapweed "are aggressive weeds that rapidly invade...Knapweeds have high amounts of phytotoxins, and a high knapweed density at a site can make native plants appear to be sick and soils seem barren." This results in a knapweed monoculture, which can cause many problems. These include increased surface water runoff and soil sedimentation.² They also cause problems for wildlife and livestock, as Spotted Knapweed is unpalatable. Repin, a neurotoxin in Spotted Knapweed, can even damage the brain of a horse that grazes it.³

Luckily, there is a solution that can slow down this invasion. Enter, our tiny heroes. First, we'll start with our bottom dweller, the Knapweed Root Weevil. Beginning in the 1980's, the Knapweed Root Weevil has been wreaking havoc on Spotted Knapweed. These little heroes go straight for Spotted Knapweeds foundation. The females lay their eggs in the host plant's roots or root crown by digging a tunnel through it and chewing an attachment site for the egg in the soil.⁴ The resulting larvae hatch, burrowing and feeding on the root systems, killing or weakening the plants.

Meanwhile, on the top of the plant, the Knapweed Seed Head Weevil is hurting the reproductive side of things. Seedhead weevils deposit their eggs in the knapweeds flowers and the ensuing larvae eat the developing seeds that lie there.⁵ These weevils make a big difference in control of Spotted Knapweeds. Cornell University states that "*L. minutus* larvae destroy up to one hundred percent of the seed in an infested knapweed seed head. This weevil... will further reduce the seed that spotted...knapweed are dependent on for reproduction, dispersal, and survival." Working together, these two weevils are a key part in the biocontrol effort that is working against Spotted Knapweed.

A very positive thing in the use of these bugs is that they don't target native plants. They only have an appetite for Knapweeds. These weevils were tested extensively to ensure that they

1 <https://extension.colostate.edu/topic-areas/natural-resources/diffuse-and-spotted-knapweed>

2 <https://ag.colorado.gov/conservation/biocontrol/diffuse-spotted-knapweed>

3 <https://www.fs.usda.gov/detail/shoshone/learning/nature-science>

4 <https://fieldguide.mt.gov/speciesDetail.aspx?elcode=IICOLQD>

5 <https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/spottedknapweed/knapweed>

will feed only on the target weeds.⁵ This is important because they don't cause problems in the existing ecosystems. However, there is a negative side to these heroes. The management, monitoring, and collecting of these weevils is very laborious. The labor must be done by hand, making it very tedious, and the seasons where these insects can be collected are very short.

To combat the labor issue, volunteer help is needed. Here's where we introduce the friends part of our title. Local FFA chapters can be a consistent source of labor to help facilitate the collection and distribution of the insects, as well as monitoring the sites and collecting the data to determine if the biocontrol is effective. Not only does this help the Spotted Knapweed problem, it also helps introduce range to many people. FFA involvement also helps the chapters fulfill their POA's. Specifically, the FFA handbook has a building communities division that contains a quality standard for environmental activities. Under this section, it states "Activities conducted to preserve natural resources and develop more environmentally responsible individuals," creating a guideline for the chapter to follow when planning their POA activities. Including local FFA chapters can help get students into the field and teach them about the rangeland around them. Through this, students are given the opportunity to find a passion that they never knew existed.

It was this involvement that created my interest in this topic. I had an overview of rangelands through agricultural classes but had never had much of an interest in it. Then one day, I decided to compete in the Rangeland Management CDE (Career Development Event). While studying and learning about rangelands, I became fascinated with all of the many different things that went into them, and the many uses. Alongside that, I learned the many things that are harming the rangelands, such as Spotted Knapweed. So when the opportunity arose to help with local biocontrol for Spotted Knapweed, I took it. I was able to get in the field and learn about the weevils that were making a difference and help collect them and monitor a couple sites. Boy did it make a difference having my FFA chapter there! We were able to triple the amount of work that just our local specialists could have done on their own!

This impact can be made by local FFA chapters everywhere. Not only can they help with tedious tasks like monitoring and collecting these very important Knapweed Weevils, but they can also learn about and want to help rangelands. The youth are our future, and by targeting them we can spread awareness and gain a lot of help for problems such as Spotted Knapweed.

So while we might think of heroes as something of big proportions, they don't always have to be. They can be as small as little bugs that are making a world of difference on one of our most important natural resources. Plus, don't forget our friends who can help them.

⁵ <https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/spottedknapweed/knapweed>

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