LESSON 25

The Knapweed Hitchhikers

Grade level: 5-8
Subject Areas: Math, science
Duration: 30 minutes
Setting: Classroom and field site (optional)
Season: Spring, Summer or Fall if visiting field site
Conceptual Framework Topics: Seed dispersal, plant invasion in disturbed sites

OBJECTIVES

Students will be able to predict the spread of spotted knapweed over time based on seed germination rates.

METHOD

Students calculate the rate of weed spread from a recreational activity presented in a story, and discuss how weeds are spread and the role individuals can play in reducing weed spread.

MATERIALS

- ✎ Calculators
- ✎ Pictures of trails and roadside areas showing knapweed/noxious weeds
- ✎ **Knapweed Seed Production Chart**
- ✎ Optional: *Montana Noxious Weeds* booklet (see ***Resources*** section) or other field guides to the identification of Montana weeds.

BACKGROUND

Unintentional introduction of weeds has led to widespread infestations of invasive plants across Montana, with new invaders making their way into the state every year. See the ***Resources*** section of this guide for how to find more information on the history of plant introductions and the spread of noxious weeds in Montana.

PROCEDURE

1. Read aloud the following story, *The Knapweed Hitchhikers*

Jason loved to ride bikes. He especially loved to ride bikes over fast and bumpy terrain. He had saved all of his paper route money for two years in order to buy a new mountain bike. On the day that he went to pick up his brand new black bicycle with 24 speeds, he was already making plans for spending the rest of the day exploring the hills around his home.

Jason filled his water bottle and slid it into the holder, grabbed a couple of granola bars, and headed off on his shiny new bicycle. He had explored the surrounding area many times in previous years, but this was the first time that he had managed to get out on a bicycle this spring. As he rode up the narrow, winding road, he noticed that the plants in the ditches were just starting to sprout. He enjoyed riding down into the ditches and back up the other side, back and forth, up and down, like his own personal roller coaster. Later in the summer these roadside ditches would have tall, rough knapweed plants growing thickly along their sides, making this kind of riding

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uncomfortable and dangerous. So he was glad for the unexpected opportunity. He couldn't help but yell now and then for the fun of it. YEEEEEESSSSSS!

As Jason rounded the bend in the road, he was surprised to notice freshly plowed ground cutting into the hillside. He had no idea anyone was going to build a road in this area. He quickly turned his bicycle and started up the soft dirt track. This was just he kind of riding he liked most. Of course, going uphill wasn't as fun, although his new gears did help, but the ride down would be AWESOME. What Jason didn't realize when he started up the dirt track, was that some of the mud off his tires from riding the ditches was dripping off onto the newly plowed road. Jason's knobby tires held knapweed seeds mixed into the mud. By the next year, most of those seeds would sprout and grow, giving knapweed a foothold in a new area.

2. Explain the following to students: A knapweed plant can produce 1000 seeds or more in one year, and a seed can remain viable for up to 7 years, waiting for just the right conditions in order to germinate and become established. The number of seeds that germinate, or sprout, and become mature plants to reproduce can vary widely depending on the environment in which they are found.

Now develop a strategy with the class for calculating how many knapweed plants Jason "planted" over an eight year period if in the first year only one seed sprouted and grew to maturity, and if each mature plant then produced five more plants per year. The following chart can be used to record the results (this can be done as a class, in small groups, or individually). Make a guess as to how many places the answer will have before you calculate.

3. Discuss the results, and follow with a discussion on the conditions that are favorable for the spread of knapweed, and what conditions might slow down the spread of knapweed. What can you do personally so that you are not contributing to the spread of weeds?

4. Take a look at pictures or take a walk as a class to a disturbed roadside or trail and make note of any knapweed or other weeds and observe the conditions of the area. Take along the *Montana Noxious Weeds* booklet (see ***Resources*** section of this guide) or other field identification guide that include weeds found in Montana. Do you see anything that may have made this location susceptible to weeds? What can be done to manage areas like this in order to reduce the spread of weeds?

Name _____

KNAPWEED SEED PRODUCTION CHART

Year	# of Plants Bearing Seeds	# of Seeds/Plant that Germinate	# of Seeds that Germinate
1	1	5	
2		5	
3		5	
4		5	
5		5	
6		5	
7		5	
8		5	

TEACHER KEY KNAPWEED SEED PRODUCTION CHART

Year	# of Plants Bearing Seeds	# of Seeds/Plant that Germinate	# of Seeds that Germinate
1	1	5	5
2	1+5= 6	5	30
3	1+5+30= 36	5	180
4	1+5+30+180= 216	5	1,080
5	216+1,080= 1,296	5	6,480
6	1,296+6,480= 7,776	5	38,880
7	7,776+38,880= 46,656	5	233,280
8	46,656+233,280= 279,936	5	1,399,680