

Findings

- **Why do you think the beetles moved only either east or west and did not move north or south? (Hint: Reread the second paragraph in the “Method” section.)** The study site was a row of willow trees growing along a highway with agricultural land on either side. Therefore, the beetles were most likely to fly from tree to tree, which were lined up east to west.
- **Do you think this study completely answers the question of how far Asian long-horned beetles travel? Why or why not?** The study does not completely answer the question because its findings were different from other findings. It gives a clue about the relationship between distance traveled and air temperature. It also provides a clue as to the relationship between the sexual maturity of females and whether and how far they will travel.

Discussion

- **In what way could a few female beetles traveling 30 meters pose a threat to American trees?** If the females laid eggs, those eggs could hatch and the population of Asian long-horned beetles would increase. To control the beetle population, forest managers might have to cut down hundreds or thousands of trees.
- **From the results of this study, what might you conclude about the dispersal of Asian long-horned beetles?** You might conclude that higher air temperatures slow the dispersal of beetles. You might also conclude that after a beetle begins to move, he will most likely continue to move in the same direction. You might also conclude that female beetles that are ready to lay eggs will be less likely to travel than female beetles that are not yet ready to lay eggs.

Hurry Up and Wait

Introduction

- **What human actions caused the problem we now have with Oriental bitterweet? What actions might be taken today to help solve the problem?** On the surface, the answer would be that we imported Oriental bitterweet as an ornamental plant, and this action certainly started the problem. You can challenge your students, however, to consider other actions that have expanded the current problem. Other actions include gardeners being careless with the plant and allowing it to escape from gardens. They also include using the plants for indoor arrangements, then discarding the plants outdoors along with their seeds. Actions that might help solve the problem include educating people about the danger posed by Oriental bitterweet and helping people identify the plant. People could also learn how to remove or destroy the plant when they find it.
- **If you were the scientist, how would you set up an experiment to compare the amount of seed germination and growth under different amounts of shade and sunlight?** You could take the seeds and plant them in containers. Then you could place them under different amounts of sunlight and shade and compare their germination and growth. You can ask your students to be as specific as possible as they think about how they would do this experiment.

Method

- **What is the reason the scientists used shade cloth to cover the four groups of containers and a quantum sensor to measure the amount of sunlight reaching them?** By using shade cloth, the scientists could control the amount of sunlight reaching the containers. By using the quantum sensor,

they could know exactly what percentage of sunlight was reaching each group of containers.

- **Why did the scientists count the number of leaves and measure the roots and stems of each plant?** The scientists needed a way to compare the growth rate of the plants. By counting and measuring, the scientists could compare the plants' growth. Counting and measuring provided a way to compare the plants without introducing personal opinion or evaluation into the process.

Findings

- **Basing your answer on what you know about plant germination, does it surprise you that Oriental bittersweet germinated and grew at about the same rate, regardless of the amount of sunlight? Why or why not?** Students should know that most plants will germinate better either in more sunlight or in less sunlight, depending on the unique needs of the plant. It is unusual for a plant to germinate and grow almost equally regardless of the amount of sunlight it receives. Students should be able to back up their answers with their own evidence or knowledge.
- **Reread the second paragraph in the "Introduction." What do you think would happen to the plants in the five groups if the scientists had let the plants grow for another 100 days before measuring them?** The Oriental bittersweet plants growing in 100 percent and 70 percent sunlight should grow much faster and have more leaves than the plants in the more shaded conditions.

Discussion

- **Do you think Oriental bittersweet could become a bigger threat to native forests in the future? Why or why not?** Oriental bittersweet will likely become a bigger threat in the future. The reasons are that it can

germinate and grow in shaded conditions, and it can sit and wait until an area is open to sunlight before it grows quickly and further reproduces. Regardless of the answers your students give, they should be able to back up their answers with observations, knowledge, or logic.

Goll-ly! Don't Take a Knapweed!

Introduction

- **In your own words, state how spotted knapweed and gall flies have changed some things for deer mice living in the arid grassland in this study.** The spotted knapweed has reproduced so much that native grasses and other native plants are overtaken and choked out. The addition of gall flies has caused the feeding cycle of deer mice to change. They now can eat as much as they want from September to May. Then in the summer, their food source is reduced. This situation is the opposite of their natural cycle. This change may also be causing the population of deer mice to increase because of the wide availability of food for much of the year.
- **What question did the scientists want to answer?** Is the population of deer mice higher in areas where spotted knapweed has overtaken native plants and gall flies have been released to control it?

Method

- **Why did the scientists select two large areas to study—one ecosystem with nonnative knapweed and the other a native ecosystem without knapweed?** The question the scientists wanted to answer required them to compare a native ecosystem with a grassland area that had been overtaken by nonnative knapweed.
- **Why was each deer mouse given a different number?** Each deer mouse was