

Natural History along the Natchez Trace Parkway



On-Site Lesson:

Alien Invasion (code PAIA)

➤ **Grade Level:**

6th

➤ **Subject Areas:**

Science

➤ **Setting:**

One period on a trail.
One period in classroom.

➤ **Duration:**

Two class periods.

➤ **Skills:**

Observation, explanation, research and evaluate, graphing data, prediction, summarization

➤ **MS Objectives:**

3a

➤ **Vocabulary:**

Invasive, non-native, diversity, population, community, competition.

Summary: On a National Scenic Trail, students will investigate how privet, a non-native plant species, out-competes and affects native plant species diversity.



Materials Needed: For each group of students: For each group of students: 4 plot corner markers. Labeled toothpick markers, approximately 26 with extra blanks (see attached instructions for suggestions on how to make small markers). A meter stick or meter-long piece of string. Data Collection Sheet, results and conclusion. Pencil. Appropriate Scenic Trail map.

Instructional Information

Mississippi Objectives: 3 a. Describe and predict interactions (among and within populations) and the effects of these interactions on population growth to include the effects on available resources. How cooperation, competition and predation affect population growth. Understand how the effects of overpopulation within an ecosystem impact resources available. How natural selection acts on a population of organisms in a particular environment via enhanced reproductive success

Teacher Set: The students will be visiting a National Scenic Trail and investigating the impact of non-native privet shrub on the native plant populations on the trail.

Teacher Overview: Invasive non-native plants are spreading across our country. Without the natural checks that exist in their indigenous areas, they often spread and out-compete native plants, reducing diversity and

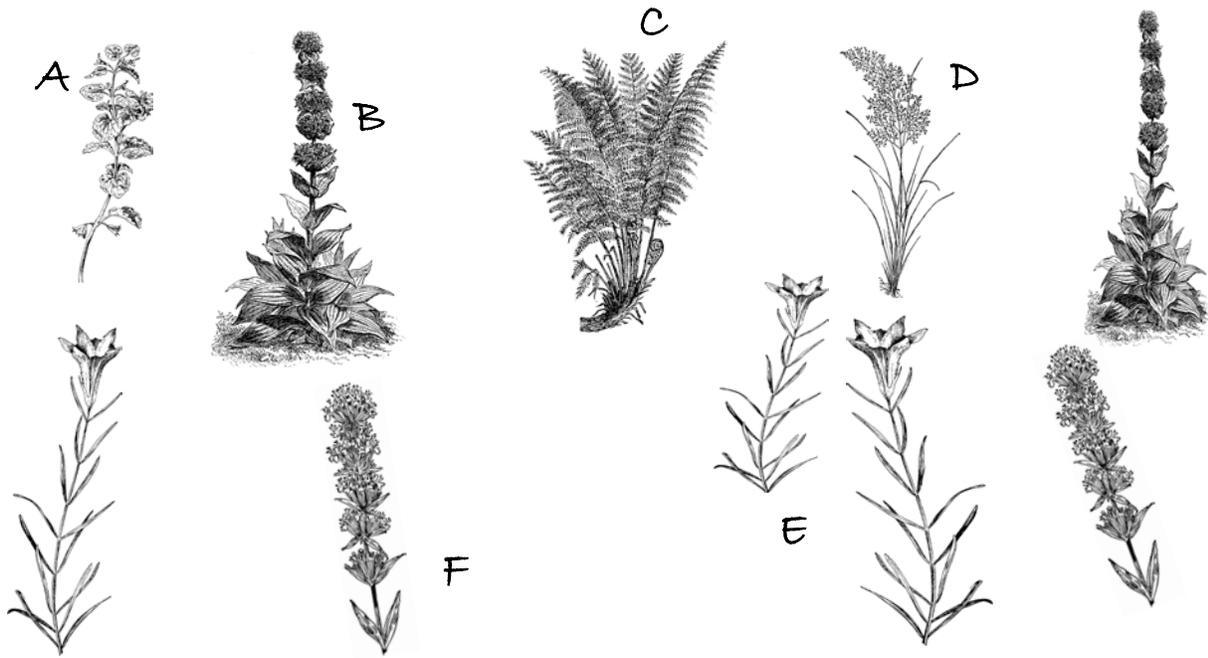
sometimes creating a virtual monoculture. In the southeast, one of the most invasive and difficult to control non-native plants is privet. See the attached USDA handout for more information.

What is an invasive plant? According to the Alabama Invasive Plant Council (AIPC) an invasive plant species is one that displays rapid growth and spread, establishes over large areas, and persists. Invasiveness is characterized by robust vegetative growth, high reproductive rate, and longevity. Even some native plants can become invasive under the right conditions.

Student Instruction: The students will need to be able to identify Chinese privet plants. An example should be brought into the classroom as well as handing out the USDA brochure to each student.

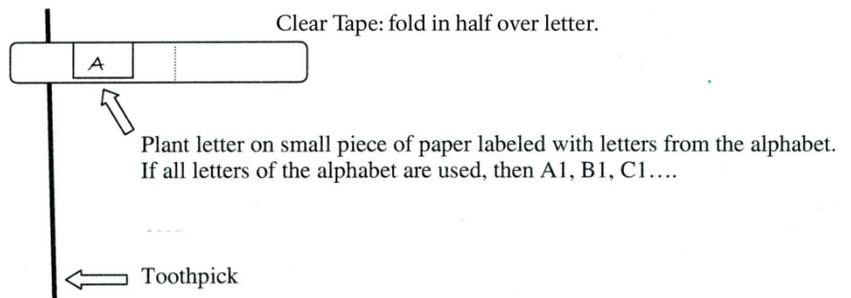
The students will be collecting data on a plot they establish along a National Scenic Trail. They will be counting the number of different plant species within each plot. They will count the population of each species in their plot. They need only recognize one plant species by sight, Chinese Privet.

Example of different ways to count and enter plant data from a plot.



Plant Number	How Many
A	1
B	2
C	1
D	3
E	1
F	2
Privet	0

Suggestion for plant markers:



Student Task: See experiment procedure.

Teacher Closure: Explain to the students that Chinese privet is only one kind of invasive non-native plant. Plants are imported into different areas in many different ways. Modes of introduction may range from seeds stuck on shipping boxes from other continents to seeds stuck to a bumper traveling from Canada to Mexico. In the right (wrong) place, without competition, a non-native species may take over.

The students may be interested in engaging in a class debate about what should be considered non-native and what should be done about non-natives. See the Discussion Stimulator sheet.

Student Assessment: Participation in the activities, accuracy and completion of data sheets and report.

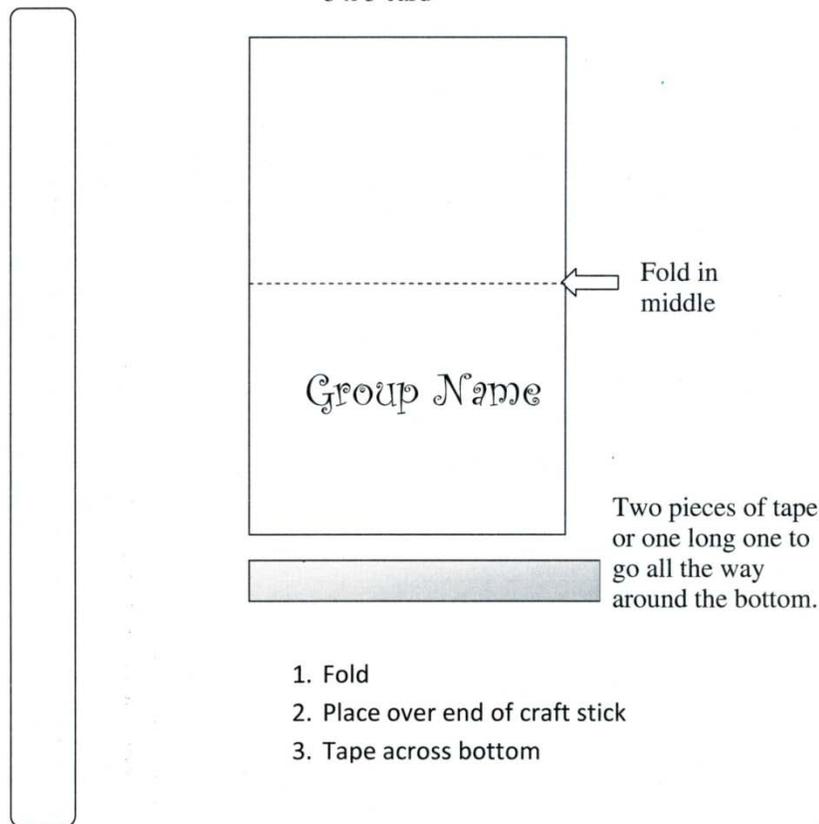
Suggestions for re-teaching: Relate this study to other topics when lessons include subjects such as species distribution, competition and populations.

Extension: The students could research other non-native plants and develop reports or displays. The students might investigate the “Saltcedar Study” in the American Southwest.
<http://www.usgs.gov/newsroom/article.asp?ID=2451>

Plot Marker Suggestion:

Craft Stick

3 x 5 card



Even easier alternative :

The Effects of Privet on Diversity in a Plant Community

Hypothesis: _____

Materials: Four plot markers, toothpick markers, data collection sheet, pencil, measuring stick

Procedure: On a Scenic Trail _____ (trail name), walk for 3 minutes and stop. Each group should select an area to study.

Not disturbing any plants, AVOIDING poison ivy and looking CAREFULLY where you put your feet and hands, put one corner marker in the ground. Using that marker as one corner, measure a one meter square marking the corners with the other plot markers. If you include large trees, make them at the edge of your plot. Plants overhanging the plot may be included as being in the plot.

Look carefully to differentiate between different types of plants. Usually leaves will be the most commonly seen but unique characteristic that species shares. All plants of the same species will have leaves that are the same shape and about the same size. Sometimes the plant may have fruit or flowers that can help you determine if they are in the same species. Determine if you have Chinese Privet on your plot. Count the number of privet plants on your plot and enter the number in your data table. Determine one species of plant and use the “A” markers to mark one of those plants. This will help to keep the plants from getting mixed up. Count the number of “A” species and mark it on your data sheet. Then select a “B” plant and count the number of “B”s and enter the data do this for all of the different types of plants in your plot.

If you know the name of the plants, that is great, write them on the data sheet.

Photo Option: If you do not know the names of the plant, take a picture of the whole plant and a close-up. Write the photo numbers next to the appropriate letter on the data collection sheet.



Chinese Privet
Ligustrum sinense



Leaves are opposite and usually less than 1” long. Stem is woody. Shrub can grow about 30’ tall.

Name _____ Group Number _____

Results: DATA COLLECTION TABLE (use the reverse side for notes)

Plant Letter	How Many?	Adaptations of this plant (Circle)
Privet		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
A		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
B		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
C		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
D		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
E		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
F		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
G		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
H		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
I		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
J		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
K		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
L		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
M		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
N		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
O		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
P		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
Q		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
R		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
S		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
T		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
U		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
V		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
W		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
X		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
Y		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant
Z		green leaves - long stem - bark - fruit - flowers - tall height - vine - shade tolerant - water tolerant

Adaptation Table

How many species had the adaptation listed below?

Green leaves	Long stem	Bark	Fruit	Flowers	Tall height	Vine	Shade tolerant	Water tolerant

Conclusion: Answer the following questions.

1. Did your plot have privet?
2. How many other different species did you plot contain?
3. How many different types of plants did you have in your plot?
4. How many total plants did you have in your plot?
5. Rank the plants in order of their populations. You can place a number beside the letter on your data sheet.
6. Was one plant a lot more common than the other plants? If so, which one.
7. Do you think your plot represents a diverse community? Why or why not?
8. Develop a bar graph that represents the number of plants of each species. Compare your group's results with the rest of the class. Compare and contrast the plots that had privet with plots that did not have privet.
9. What happen to the diversity of the community when privet was present?

10. Why do you think the privet out-competes native plants?

11. Do you think the native community will change permanently? Why or why not?

Do you think there are any inherent problems with having non-native invasive plants growing on a National Scenic Trail? Why or why not?

12. How much responsibility do you think ordinary citizens of this country should take in dealing with non-native invasive plants or animals?

Discussion Stimulators... answers are not necessarily right or wrong.

1. If an animal carries a seed from one place to another it is considered expansion of the plant or natural transportation. If people carry seeds from one continent to another, we consider the resulting plants as non-native. What do you think about these designations?
Consider:
 - a. Transportation of imports and exports
 - b. Agricultural materials
 - c. Vehicles
2. Is it a good idea to use non-natives (plants/insects) to combat “problem” species? (Like fighting fire with fire?)
 - a. What dangers might this pose?
 - b. What benefits?
3. If you are landscaping your property, is it a good thing to use only native plants even though they may not be as pretty as non-native plants?
4. How damaging can a non-native species be to the environment?
 - a. Could it actually change the habitat?
 - b. Could any changes be good?
5. Counting the Cost:
Consider:
 - a. Is it worth it to try to get rid of a non-native invasive?
 - b. Labor/Supplies? How much is “worth it?”
 - c. Lost recreational value?
 - d. Effects on other species, plant and animal.
 - e. Other costs?
 - i. Emotional
 - ii. Educational loss
6. Assuming the same capacity for “carrying”, would a non-native plant have a better chance at establishing itself in a new area if it was moved by a migrating arctic bird or a migrating human traveling east and west? Why? What geographical features need to be considered?
7. Which species of plants or animals have the best chances of establishing themselves worldwide? Specialist plants like cactus/ tropical vines or polar bears/orangutans OR species that can survive in a wide variety of habitats like armadillos or Chinese privet?
8. Brain storm all of the different ways plants and/or animals can be transported long distances.