

## LESSON 5: MOST TROUBLESOME EXOTIC INVASIVE PLANT SPECIES WEB QUEST

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**Duration:** Two 45-minute class periods

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**Background information:**

“Introduction and Spread of Nonnative Species: As many as 50,000 nonnative species are estimated to have been introduced [into the United States]; of these, at least 4,500 are established. Approximately 675 species in the United States cause severe economic or environmental harm. On National Forest System rangelands, 6 to 7 million acres are infested with noxious weeds and invasive plants. Infestations are increasing at an estimated rate of 8% to 14% per year. Estimates of the economic losses due to nonnative invasive species are as high as \$125 billion per year.”

“The unintentional introduction of nonnative invasive species into the United States is a byproduct of travel, immigration, and global commerce. Invasive species may enter:

- In timber, produce seeds or nursery stock
- In wood used for packing crates
- In freight via railway cars, tractors, aircraft, automobiles, bicycles, ships, and other vehicles
- In ballast water dumped from ships
- On hiking boots, camping equipment, and lawn furniture
- In or on soil”

“Non-native (exotic) plants can invade woodlands and out-compete native plants, resulting in:

- slower tree growth
- loss of biological diversity
- threats to native plant populations
- degraded wildlife habitat
- poor hiking conditions”

*Sources:*

*Forest Encyclopedia Network, Southern Appalachian Forest Ecosystems/ Forest Health/ Non-native Invasive Species, online at < <http://www.forestryencyclopedia.net/Encyclopedia/>>*

*Rural Action, Forest Sustainability Program/ Invasive Exotic Plants, online at < [http://www.ruralaction.org/forestry\\_invasive\\_plants.html](http://www.ruralaction.org/forestry_invasive_plants.html)>*

**Objectives:**

Identify (by sight) exotic invasive plant species found Southern Appalachian Region ecosystems.

**Day One—Online Research** (one – 45-minute class period)**Prepare in advance:**

Make copies of Handout 1 (Student Instructions for Exotic Invasive Plant Species Web Quest) and Handout 2 (Sample Exotic Invasive Species Notebook Entry) for each student

**Materials:**

- one computer connected to the Internet for every two students
- lab/field notebooks
- colored pencils

**Description:**

Students visit several Web sites and identify common exotic invasive species of the Southern Appalachian Region.

**Instructional sequence:**

(35 – 40 minutes)

- **Distribute** Handout 1 and Handout 2.
- **Direct** students to use the Web Sites listed to find the ten threatening exotic invasives in the Southern Appalachian Region listed on the “Instruction” handout.
- **Instruct** students to list the plants by the common name shown on the “Instruction” handout and then find the scientific name and put it in parentheses, for example, Chinese Yam (*Dioscorea batatas*).

**Teacher’s Key:**

Name	Description
Coltsfoot ( <i>Tussilago farfara</i> L.)	Flowers and leaves can grow directly from the roots. Coltsfoot reproduces from both separated plant parts and seeds. The roots can remain dormant underground for long periods. Coltsfoot has been known to grow back after soil disturbance, and very small fragments of roots can produce new plants. Usually found in moist areas.

<p>English Ivy <i>Hedera helix</i> L.</p>	<p>Is toxic and can cause intestinal problems. This helps guarantee spread of the seeds by many native songbirds that are attracted to the black berries in spring when other food sources are limited. English ivy is an aggressive invader that threatens all vegetation. The leaves form a thick canopy just above the ground, preventing sunlight from reaching other plants. Generally this ivy only produces seeds when it climbs trees.</p>
<p>Japanese Honeysuckle <i>Lonicera japonica</i> Thunb.)</p>	<p>A woody vine originally used to control erosion, protect wildlife, and decorate landscapes. It can out-compete native ground cover and smother shrubs and small trees. Its green leaves thrive through winter, increasing its ability to take over areas. It is the widest occurring invasive plant in the southeastern U.S.</p>
<p>Japanese Knotweed <i>Polygonum cuspidatum</i> (Sieb. &amp; Zucc.)</p>	<p>Has bamboo-like stems that form dense thickets and crowd native plants. It can tolerate poor growing conditions and quickly spread in natural areas. Japanese Knotweed threatens areas around moving water, rapidly colonizing weathered shores and islands. It spreads by plant parts and growth, but not by seeds.</p>
<p>Japanese Spirea <i>Spiraea japonica</i> L.)</p>	<p>Can rapidly take over disturbed areas. Spirea grows rapidly and forms dense stands that out-compete existing native herbs and shrubs. Seeds of Japanese spirea last for many years in the soil, making its control and the return of native plants especially difficult.</p>
<p>Kudzu <i>Pueraria montana</i> (Lour.) Merr.)</p>	<p>Is a fast-growing vine originally from Asia. Before 1953, it was grown as livestock forage and erosion control. Park crews have largely contained the spread of kudzu in the Smokies; however they still check over a hundred sites and treat them as needed.</p>
<p>Multiflora Rose <i>Rosa multiflora</i> (Thunb. ex Murr.)</p>	<p>Spreads rapidly and can form thickets, which displace native species. Multiflora rose is native to China and Japan, introduced over 40 years ago for wildlife cover, living fences, and windbreaks. Birds and other wildlife spread its prolific seeds (up to 1 million per plant).</p>

<p>Oriental Bittersweet (<i>Celastrus orbiculatus</i> Thunb.)</p>	<p>Native to Japan, Korea, and China, it is a serious threat to native plant communities due to its ability to reproduce and grow rapidly. As a climbing vine, it damages or kills native plants by choking and shading. It can also cross-pollinate with American bittersweet, leading to the native's loss of genetic integrity. Its seeds are spread by birds and by people selling wreaths made from vines that have the bright red seeds on them.</p>
<p>Privet (<i>Ligustrum</i> spp.)</p>	<p>Is native to Europe, Asia, and North Africa, but still planted widely in this region as a hedge. Birds and other wildlife spread the seeds everywhere. Once sprouted, privet can form dense thickets that displace native plants. Privet is the fastest spreading of all species in the southeastern U.S.</p>
<p>Tree of Heaven (<i>Ailanthus altissima</i> (Mill.) Swingle)</p>	<p>Is most common along open areas and forest edges, at lower to middle elevations. This native of China is a prolific seed producer (possibly 325,000 seeds per year) and grows thickly, preventing native species from growing. Roots give off chemicals that push out native plants, and are destructive enough to cause damage to sewers and foundations.</p>
<p>Sources: Southeast Exotic Pest Council, online at &lt;<a href="http://www.se-eppc.org/manual/TUFA.html">http://www.se-eppc.org/manual/TUFA.html</a>&gt; National Park Service Fact Sheets, online at &lt;<a href="http://www.nps.gov/plants/alien/fact/">http://www.nps.gov/plants/alien/fact/</a>&gt; Southern Appalachian Man and Biosphere, online at &lt;<a href="http://samab.org/Focus/Invasive/">http://samab.org/Focus/Invasive/</a>&gt;</p>	

(5 – 10 minutes)

- **Instruct** students to select one of the top 10 exotic invasives to research in depth.

**Day Two—Field Notebook Entries** (one – 45-minute class period)

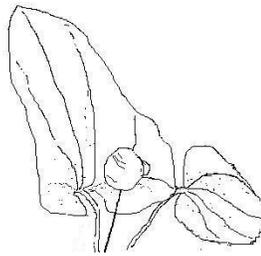
**Description:**

Students name, describe, and draw each exotic invasive plant species in general terms in their lab/field notebooks for the purpose of plant identification.

**Instructional sequence:**

(35 – 40 minutes)

- **Direct** students to visit the Southeast Exotic Pest Council Invasive Plant Manual Web site <<http://www.invasive.org/eastern/eppc/>> to learn about exotic invasive plants.
- **Assign** students to make a notebook entry for five exotic plants. Notebook entries should include:
  - (a) The common and scientific names of each exotic invasive plant; for example: Chinese Yam (*Dioscorea batatas*)
  - (b) A general description of the plant, flower, and any berries or fruit; for example: “Chinese Yam is a long-climbing vine with 2- to 3-inch wide shiny heart-shaped leaves having arc-shaped veins. Leaves may vary in shape to arrowhead-like with lobes at the leaf base. Pea-to marble-sized bulbils like small potatoes occur at leaf nodes in late summer. These may become potato-sized in other regions. Ripe bulbils drop readily at slightest touch.”
  - (c) The origin of the exotic invasive plant; for example: “Chinese Yam is originally from Asia.”
  - (d) Threats to native plants; for example: “The vine is fast-growing (up to 1 inch/day at its peak). It covers trees, shrubs, ground vegetation, and structures. Reproduces fast starting in late June, and can spread rapidly along forest edges and openings.”
  - (e) A sketch of the plant (no print outs, tracing is acceptable); For example:

**Optional assessment task:**

**Prepare in advance:** Teacher tags exotic invasive plant species on the school grounds.

**Lead** the students outside and **direct** them to identify tagged exotic invasives using their lab/field notebooks.

**Sources:**

Forestry Encyclopedia Network/ Southern Appalachian Forest Ecosystems/ Forest Health/Non-native Invasive Species, online at <<http://www.forestryencyclopedia.net/Encyclopedia/>>

Southern Appalachian Man and the Biosphere, online at

<<http://samab.org/Focus/Invasive/about.html>>, accessed 10/12/05

Southeast Exotic Pest Plant Council Invasive Plant Manual drawing adapted by Leslie Marra from a photo by Jack Ranney, online at <<http://www.invasive.org/eastern/eppc/DIOP.html>>, accessed 10/12/05

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## Handout 1: Student Instructions for Exotic Invasive Plant Species Web Quest

1. **Name and describe** each exotic invasive species listed below in general terms in your lab/field notebook (All 10 exotic invasives must be included in your lab/field notebook.) List each plant by common name first and scientific name in parentheses (for example, Chinese Yam (*Dioscorea batatas*)).

**Coltsfoot**

**Japanese Honeysuckle**

**Japanese Spirea**

**Multiflora Rose**

**Privet**

**English Ivy**

**Japanese Knotweed**

**Kudzu**

**Oriental Bittersweet**

**Tree of Heaven**

2. You may use the following Web sites for your Web Quest:

Forest Encyclopedia Network	<a href="http://www.forestryencyclopedia.net/Encyclopedia">http://www.forestryencyclopedia.net/Encyclopedia</a>
Southeast Exotic Pest Council—"Invasive Plant Manual"	<a href="http://www.invasive.org/eastern/eppc">http://www.invasive.org/eastern/eppc</a>
North Carolina Botanical Garden—Invasive Exotic Plants	<a href="http://www.ncbg.unc.edu/exotic.htm">http://www.ncbg.unc.edu/exotic.htm</a>
National Park Service Fact Sheets	<a href="http://www.nps.gov/plants/alien/factmain.htm">http://www.nps.gov/plants/alien/factmain.htm</a>
Southern Appalachian Man and the Biosphere—Invasive Species Focus Area	<a href="http://samab.org/Focus/Invasive/about.html">http://samab.org/Focus/Invasive/about.html</a>
Tennessee Exotic Pest Plant Council—"Invasive Exotic Plants in Tennessee"	<a href="http://www.tneppc.org/Invasive_Exotic_Plant_List/The_List.htm">http://www.tneppc.org/Invasive_Exotic_Plant_List/The_List.htm</a>

3. **Select** one of the top 10 exotic invasives to research in depth. **Give a general description** of the *plant* and *flower*. Include information about the plant's *habitat* and *growing season*. Include a *line drawing* (also available on the USDA/NRCS Plants Database Web site at < <http://plants.usda.gov/> > . (See Handout 2 for a Sample Exotic Invasive Plant Species Notebook Entry.)

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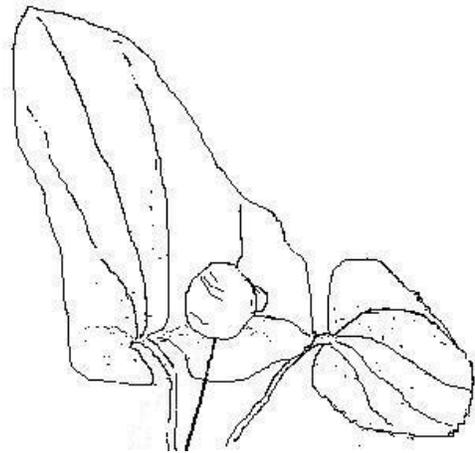
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## ***Handout 2: Sample Exotic Invasive Plant Species Notebook Entry***

### ***Chinese Yam (Dioscorea batatas)***

“Chinese Yam is a creeping and long-climbing vine that may reach up to 5 meters in height given support from trees and shrubs. The vines twine from left to right with 2- to 3-inch wide shiny heart-shaped leaves having arc-shaped veins.

- Leaves may vary from heart-shaped to arrowhead-like with lobes at the leaf base. The stems are purplish to red.
- The small yellowish-white flowers arise from base of the leaves. They are bell-shaped and may have a spicy fragrance like cinnamon.
- Pea-to marble-sized bulbils like small potatoes occur at leaf nodes in late summer. These may become potato-sized in other regions.
- Ripe bulbils drop readily at slightest touch.
- The seeds are in a triangle shaped capsule.



Chinese Yam is originally from Asia.  
Chinese Yam is a threat because:

- The vine is fast-growing (up to 1 inch/day at peak).
- It covers trees, shrubs, ground vegetation, and structures.
- It reproduces fast starting in late June, and can spread rapidly along forest edges and openings.”

*Source: Southeast Exotic Pest Plant Council Invasive Plant Manual drawing adapted by Leslie Marra from a photo by Jack Ranney, online at <<http://www.invasive.org/eastern/eppc/DIOP.html>>, accessed 10/11/05*

*Source: Southern Appalachian Man and the Biosphere, online at <<http://samab.org/Focus/Invasive/about.html>>, accessed 10/12/05*