Healthy Forests

Invasive Plants and Your Forests

A plant species is considered invasive because it spreads outside its area of origin, reproduces without cultivation, and causes harm in a new area. Common examples from the Southeast include kudzu (Figure 1), cogongrass (Figure 2), and honeysuckle. They are present in nearly one-tenth of southern forest acres, covering a total of 19 million acres. Invasive plants will likely continue to spread under any conditions but may expand more rapidly as the climate becomes more variable, potentially doubling their extent in the next 50 years. Invasive plants are referred to by many names: nonnative, exotic, nonindigenous, alien, or even noxious weeds. They come in all forms, including trees, shrubs, vines, grasses, and ferns. Invasive plants are aggressive survivalists and exhibit distinct adaptive strategies and characteristics:

- Grow vigorously
- Survive in a range of conditions
- Reproduce quickly
- Difficult to eradicate

Figure 1. A severe infestation of kudzu *(Pueraria montana),* a deciduous woody vine that grows densely along road and forest. Image courtesy of Kerry Britton, USDA Forest Service, Bugwood.org.

Figure 2. An infestation of cogongrass *(Imperata cylindrical),* an invasive perennial grass, in a Mississippi pine plantation. Image courtesy of Charles T. Bryson, USDA Agricultural Research Service, Bugwood.org.

Invasive Plant Concerns

Southern forests are unique and diverse—they provide critical wildlife habitat, preserve our cultural heritage, and supply the globe with timber and fiber products. Invasive plants degrade and threaten the integrity and native composition of forest ecosystems. They increase seedling mortality, inhibit natural regeneration, reduce tree growth in timber plantations, and disturb native forests.

Invasive plants reduce wildlife habitat diversity and quality even at low densities. Some increase wildfire risk and change soil chemistry. Invasive plant species also negatively impact forest productivity, biodiversity, ecosystem services, and potential use, currently costing $2 billion in economic losses each year in the United States alone.

What Makes a Plant Invasive?

Not all nonnative plants are invasive—some, like barley and wheat, are valued crops. Nonnative species become

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Figure 3. Crownvetch *(Securicaria varia)* is an invasive perennial forb. Image courtesy of James H. Miller, USDA Forest Service, Bugwood.org.

Invasive plants:

- Limit or stop productive land management or regeneration
- Reduce biodiversity
- Degrade wildlife habitat
- Impact pollination of native species
- May poison livestock
- Harbor plant diseases
- Alter soil chemistry

invasive when they out-compete natives, partly due to the absence of predators, parasites, and diseases from their original environment. Many invasives tolerate a broader range of temperature, light, and precipitation levels than the plants they displace. Most grow very rapidly, especially on disturbed sites. Typically, they produce and disperse large quantities of seeds that remain viable for long periods, or use vegetative reproduction to multiply. Invasive plants can exclude native species by shading them, outcompeting them for resources, or overwhelming them with sheer numbers.

Many invasive plants can alter chemical and nutrient cycles in the soil or produce plant compounds that suppress the germination and growth of other plants. Certain species limit or halt crop and timber production or increase land management costs. Some grasses and vines invade pine plantings, reducing early survival and growth. For example, cogongrass and kudzu may completely prevent forest regeneration or overlap or kill growing plants.

The Invasive Plant Problem: Spread and Disturbance

Each year in the South, invasive plants spread to another 145,000 acres of forest. Disturbed sites, such as abandoned croplands, forest edges, stream banks, and forest road rights-of-way, are particularly susceptible to invasive plants. Because invasives succeed in disturbed areas where the habitat can no longer support native vegetation, habitat fragmentation and urban development allow them to spread and colonize new areas. Currently, almost 400 recognized nonnative plants live and grow in southern forests and grasslands. Some intentionally introduced plants, such as crownvetch (Figure 3) and autumn olive, have escaped into the forest. Many were intended for soil stabilization, wildlife enhancement, or livestock forage, while others arrived accidentally.

Planning Effective Management

Prevention is the most effective means of reducing populations of invasive plant species. Successful prevention begins with a plan for identifying, monitoring, and addressing an infestation and clear, measurable goals for treatment, as shown in Figure 4. Since infestations don't respect property lines, coordination and cooperation among landowners make a response more effective, while not doing so often results in wasted resources and failure.

When prevention fails, three main options remain: eradicate, control, and mitigate (see Table 1). Cost and other constraints can make eradication—total removal—difficult or impossible. Control and containment reduce long-term invasive plant density and population size to a manageable level. Mitigation lessens the impact of an invasion on other parts of the ecosystem, should it prove to be uncontrollable.

Integrate Your Vegetation Management

Integrated vegetation management (IVM) combines all effective methods to combat invasive plant infestations. IVM incorporates frequent monitoring to adapt the strategy

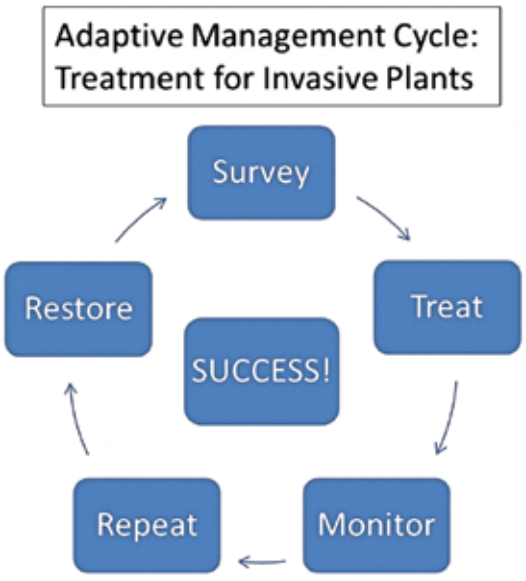

Figure 4. Adaptive management cycle. Image adapted from *Non-Native Invasive Plants of Southern Forests.*

Table 1. Eradication, Control, and Mitigation Options

	Benefits	Drawbacks
Eradicate	· Full environmental recovery · Few long-term costs	· High short-term costs · Risk of failure, wasted resources · Only effective with small, low-density populations
Control and Contain	· Protects habitats, natives · Limits infestation scope · Lower short-term costs	· Continued investment, cost · Long-term monitoring, control · Difficult, labor intensive
Mitigate	· Usable with other strategies · Reduces collateral damage · Lower short-term costs	· Requires continued investment, can be costly · May be labor intensive

and accomplish treatment goals. When using IVM, always consider the timing of any intervention relative to the target plant's life cycle.

Prevention relies on extensive monitoring and proactive cleaning of all clothing and equipment to avoid spreading seeds. When prevention fails, promptly map the invasive population's distribution to facilitate containment and response plan development. When using **herbicide**, select the chemical and application method best suited for the targeted invasive plant. **Manually remove** small, young populations by hand, or use mechanical equipment for large or established infestations. Proceed with caution when disturbing soil to avoid dispersing runners, as some invasive plants spread by resprouting from a system of interconnected roots.

Prescribed burning (see Figure 5) uses planned, low-density fires to control invasive populations. It requires training and carries such risks as fire escape, crew endangerment, or invasive germination or resprouting. In aquatic or wetland areas, **water level manipulation** can kill invasive plants susceptible to drought or submergence. This practice, however, can spread seeds or increase habitat vulnerability to invasive establishment. **Biological control** uses pathogens from an invasive plant's home range to control the target species. This requires strict government oversight due to its potential to harm native species.

Tools for fighting invasives:
- Prevention
- Herbicide
- Manual removal
- Prescribed burning
- Water level manipulation
- Biological control
- Prescribed grazing
- Mulching
- Solarization

Prescribed grazing relies on cattle, sheep, goats, and horses to ingest edible, non-toxic invasives. Grazing typically rotates during spring and summer for multiple years and is used in conjunction with **restoration** methods. Most commonly utilized for weed control, **mulching** covers the soil surface with material to block an invasive plant's access to light. **Solarization** uses a polyethylene sheet, usually black, to trap solar energy and heat the soil, killing low-growing, chopped, or mowed plants.

Rehabilitation, Restoration, and Reclamation

Promoting the reestablishment of desired native vegetation is crucial once invasives are controlled. Rehabilitation, restoration, and reclamation are all options, depending on the extent of damage to the natural environment. Each strategy needs to ensure revegetation as the best long-term solution for preventing invasive species resurgence. Fast-growing

Figure 5. Prescribed burning is one way to control invasive forest plants. Image coutesy of Chris Evans, Illinois Wildlife Action Plan, Bugwood.org.

Figure 6. Japanese honeysuckle *(Lonicera japonica)* is an invasive, woody vine. Image coutesy of Chris Evans, Illinois Wildlife Action Plan, Bugwood.org.

native plants can outcompete non-natives while stabilizing and protecting soil and water. Maintaining the native vegetation may require IVM to control any resurgent invasive plant species, like the honeysuckle shown in Figure 6.

Climate Impacts on Invasive Plants

While native species have adapted to specific local environmental conditions, invasive species are typically generalists. So native species are more sensitive to abnormal weather or climate conditions, such as below-average summer precipitation, than invasives. Increasing winter temperatures will cause invasive plants to spread to higher elevations and northern latitudes. Also, increased atmospheric CO_2 levels can disproportionately increase the growth rates, size, and seed production of invasive plants as compared to natives. Other climate-related impacts may also hinder proposed management actions and drive future infestations in unpredictable ways. Prevention and early action to reduce invasive plant infestations is becoming increasingly important to protect your forests now and into the future.

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Miller et al. (above) provides more specific information on controlling invasive plants: www.srs.fs.usda.gov/pubs/36915

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Published by
North Carolina Cooperative Extension

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PINEMAP

USDA United States Department of Agriculture National Institute of Food and Agriculture

The Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture.