Paradise lost

Alien plant invaders compromising productive, rich state forests

By Nancy J. Loewenstein, Ph.D., James H. Miller, Ph.D., and Erwin Chambliss

KUDZU AND CHINESE PRIVET along Alabama roadways are a familiar sight and Japanese honeysuckle is so commonplace it has practically become a part of Southern culture. But are these and other invasive plants really having a negative impact on forests? Just how bad is the invasive plant problem? What are the most effective ways to combat invasive plants?

A picture of the severity of the invasive plant problem throughout the Southeast is beginning to emerge from USDA Forest Service Forest Inventory Analysis (FIA) data.

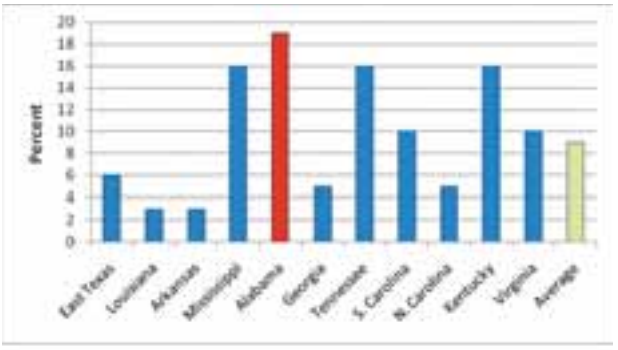
The Forest Service, in partnership with state forestry agencies, began collecting FIA data in the 1930s from plots on all forest ownerships. Each state surveyed timber and growing stock every 10 years – like the population census. In the 1990s, state forestry leaders realized that invasive plants were having an increasingly negative impact on forest use and productivity… and that more timely information was critically needed.

They requested the Southern Research Station's FIA start adding to their inventory invasive plants and other forest health threats and to also shorten the cycle of survey. In 2001, FIA state and federal surveyors were trained to identify 40 invasive plants shown in "Nonnative Invasive Plants of Southern Forests" and they began collecting data on the presence and cover of these species along with the usual FIA timber and disturbance data.

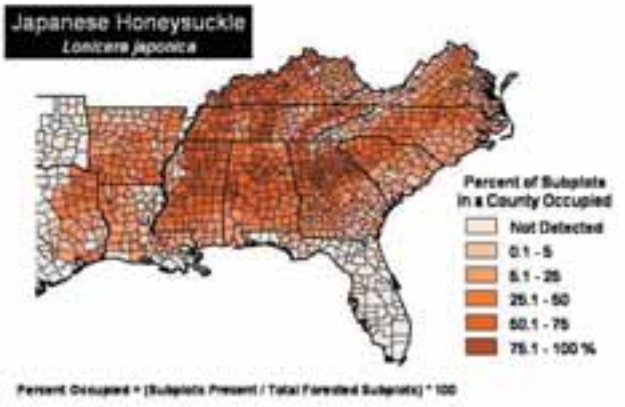
To shorten the cycle, one-fifth of all plots are now being surveyed on an annual basis – barring critical demands like wildfires – which means it takes about five years to complete a state. Alabama is now in its second cycle of FIA data collection. Data analysis from the first cycle is under way, and the results are disturbing.

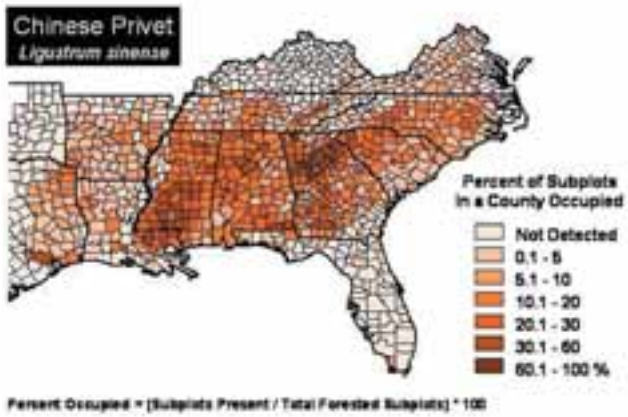
It's hard to imagine, but the FIA data indicate that more than 4 million acres of Alabama's 22.7 million acres of forest lands are covered by one or more invasive plant species. That is to say that 19 percent, or nearly one fifth, of our forests are occupied and impacted in multiple ways by invasive plants. According to the current preliminary data summaries, more forest acres are infested in Alabama than in any other southern state. Tennessee, Mississippi and Kentucky are not far behind, with 16 percent (2 to 3 million acres) infested; while, 5 percent of Georgia forests are covered by invasive plants. The average across all southern states is 9 percent.

These summaries are preliminary because not all states have finished their first complete cycle and extensive data checks are still under way. Also, survey crews vary by state and even with continued training, the identification of invasive plants is new to them so accuracy may vary. In Alabama alone, 15,500 subplots were surveyed – a heroic effort by the Alabama Forestry Commission associates in partnership with the Forest Service FIA. However, even with this number of plots, the sample is too small to give an accurate picture of



Nineteen percent of Alabama's forest land is occupied by invasive species, more than any other state in the South.





species densities for individual counties or for invasive species that are widely scattered.

Species of concern

Japanese honeysuckle (Lonicera japonica) is the most widespread and pervasive invasive plant in Southeastern forests.

In Alabama alone, nearly 3 million acres of forest lands have this vine as part of the stand or on edges. Fortunately, it rarely forms exclusive infestations and then only temporarily. It is also an important year-round browse for white-tailed deer and eastern cottontails and is also eaten by wild turkey, northern bobwhite and song birds. Thus, it has positive wildlife values unlike most of the other invasive plants. If it were not a preferred winter browse for white-tailed deer, we might very well be up to our ears in honeysuckle!

Chinese privet (Ligustrum sinense) and the closely related Japanese and glossy privets (L. japonicum and L. lucidum, respectively) occupy more than 1 million acres of Alabama's forests.

They both do provide fruit and cover for some song birds and turkey and limited browse for white-tail deer, but at the high cost of the loss of much of our bottomland hardwood and upland forests. Kudzu (Pueraria montana), which typically is confined to forest edges, can be found on more than 60,000 acres of forest edges and openings and along forest roads. This acreage does not include the countless acres of kudzu along highways, abandoned fields and city lots and edges.

Cogongrass (Imperata cylindrica) is an extremely aggressive grass which has quickly become one of the most threatening invasive species in the state because it forms dense and exclusive infestations very difficult to control.

It has consumed more than 43,000 acres of forest land and continues to spread rapidly – reducing forest productivity, destroying wildlife habitat, presenting a fire danger and affecting right-of-ways. Based on preliminary data, it is estimated that the spread north from its introduction point near Mobile is at a rate of 2,000 acres a year. This is a conservative estimate of the actual rate of spread of this species, given that these acreage values do not include those along highway right-of-ways and pastures where cogongrass is often found.

Japanese climbing fern (Lygodium japonicum), found on 43,000 acres of Alabama forestland, is another species spreading northward.

This perennial fern vine, with distinctive frilly fronds, grows along stream banks and road sides, and often in open woods and pine plantations. An unfortunate result of Japanese climbing fern infestations in pine plantations is that the

spores of this plant are often transported in pine straw to homeowners far and wide. Now Japanese climbing fern is becoming common in urban flower beds where the wind-blown spores can easily spread to nearby forests.

Other species of concern in Alabama forests are Chinese tallowtree (popcorn tree), bush honeysuckles, Japanese stiltgrass, Chinese and Japanese wisterias, Chinese and shrubby lespedezas, mimosa and chinaberry.

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Impacts, prevention and control of invasive species

The invasion of our forests is of concern because many non-native invasive plants can literally overrun native species, reducing numbers and biodiversity of native plants and the insects, birds and animals that depend on them. Infestations of many invaders can also change the way ecosystems work – altering fire regimes, water and nutrient cycles, soil characteristics and the regeneration of forests and other natural areas. The economic costs resulting from the loss of forest productivity, wildlife habitat, recreational opportunities and aesthetic appeal are difficult to estimate, but the final bottom line will certainly be large and the damage rapidly compounding.

For example, a simple estimate of reforestation costs for the lands now infested with tallowtree, privets, kudzu, wisterias and cogongrass, assuming a conservative $250 per acre for control and planting, would be a staggering quarter of a billion dollars. Furthermore, this economic evaluation does not begin to consider the losses in wildlife habitat and recreational opportunities and other impacts on ecosystem services and the environment.

Given the high costs associated with invasive plants, the best long-term and cost-effective control strategy is to prevent the introduction and establishment of invasive plants in the first place. The initial step in this process is to learn which species are invasive and how to identify them. A list of invasive plants in Alabama can be found on the Alabama Invasive Plant Council Web page (www.se-eppc.org/alabama).

Armed with knowledge of which species are invasive, strive to avoid the introduction and establishment of these species on your property. Invasive plants can be introduced in several ways. Many invasive species are escaped ornamentals, so be mindful of this when introducing plants to yards and wildlife plantings. The more rapid invaders arrive by windblown seeds or spores. Some are widely scattered by bird- and animal-dispersed seeds.

Many invasive plants also migrate along right-of-ways and stream margins. Arrival on infested clothing, equipment and vehicles is also common. We will have to change our habits to be aware of seeds and roots that might lodge on our vehicles, equipment, dogs and ourselves, and clean up before leaving infested areas. A number of invasive species continue to be planted by landowners and land managers, as some of these alien plants are still heavily relied upon for cattle forages, hay crops, wildlife plantings and roadside stabilization. It is important that we begin to use and develop additional non-invasive alternatives for use in these situations.

The first line of defense against infestations is constant surveillance of right-of-ways, stream banks, internal roads and trails and other disturbed areas for any new arrivals. With the first sign of an unwelcome plant, effective control measures should be started or spread is inevitable. Early detection and treatment on your forestlands will minimize the effort and cost that comes with treating well-established plants or full-blown infestations.

Most exotic invasive plants are perennials, having extensive tough roots and runners. This means that effective herbicide applications offer the best means of containment or eradication, because herbicides can kill roots and do so without exposing the soil to erosion.

To be successful, the most effective herbicide for the species should be used, applied using a correct method and applied during an optimum time period.

Read and thoroughly understand the herbicide label and its prohibitions before and during use. Many herbicides and some target plants require the addition of a non-ionic surfactant to the spray tank to be effective. Other important points are to always use clean water and mix spray solution thoroughly before applying. If possible, forgo applications during periods of severe drought as herbicide effectiveness can be greatly reduced during these times. And, always wear the personal protective equipment prescribed on the label or in supplementary materials.

Mechanical treatments and prescribed burning can assist eradication measures, but are limited in effectiveness. Intensive grazing is one way to

reduce the vigor of palatable alien plants like kudzu, but this rarely yields eradication and may spread seeds (now occurring with tropical soda apple). Prescribed burning does not control roots or runners and usually only kills the small shoots, providing only temporary aboveground control.

Mechanical root raking and disking can actually spread or aggravate a problem when dealing with plants having runners by chopping these into re-sprouting segments. However, root raking, piling and burning may be the only way to start controlling dense infestations of multiple woody invasive species. Small infestations may be handled by hand pulling, grubbing with a stout hoe or by using the newly introduced weed wrenches.

Although generally ineffective by themselves, both mechanical and burning treatments have a place in integrated pest-management programs. Invasive shrubs and vines that are top-killed by burning will re-grow and can be more easily reached by herbicide foliar sprays, the most cost-effective way to use herbicides. It is critical, however, that herbicide applications following burning or disking be delayed to permit adequate re-sprouting of target plants for maximum herbicide uptake and effectiveness.

Prescribed burning can also stimulate seed germination of troublesome plants permitting effective herbicide control of germinants. Burning can be used to prepare the site for effective herbicide applications by clearing debris and revealing application hazards, such as old wells and pits. Mechanical and burning treatments also can boost the effectiveness of herbicide treatments by killing herbicide-weakened plants. Disking and root raking can dislodge herbicide-damaged woody roots and large runners, leaving them to dry and rot.

When using mechanical and burning treatments it is important to take steps to prevent erosion. For example, burning in late winter or during spring leaf-out minimizes the period of bare soil. It should also be recognized that because prescribed burning can expose soils, burning can actually facilitate establishment and spread of some invasive species like cogongrass and Japanese climbing fern.

An eradication program for infestations of troublesome plants usually takes several years followed by years of surveillance to watch for re-growth or new invasions – a potentially daunting task. However, through a combination of prevention, regular monitoring and persistent control efforts, you can protect your lands and the lands you manage from being choked out by alien plants. In this way, forest productivity, wildlife habitat, native plants and Alabama's natural heritage can be safeguarded from the threat of invasive plants and our children will not inherit a legacy of degraded lands and forests. ■

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