Eastern Edition
TechLine
Information About Eastern Invasive/Exotic Plant Management
Winter 2002-2003

Sound Research, Integrated Methods, and Persistence Key These Successful Programs

Welcome again to the "eastern" edition of *TechLine* newsletter. This newsletter is a direct "line" to technical information for public land managers, fish and wildlife specialists, ecologists, botanists, rare plant specialists, range and resource specialists, land trust managers, and others who are charged with managing exotic invasive plants.

The goal of *TechLine* is to make it easier for you to obtain the necessary information to manage exotic invasive vegetation. *TechLine* publishes summaries of innovative research studies and integrated exotic plant management projects (at times, the limited space of the newsletter format prevents us from publishing complete papers). Through *TechLine's* toll-free number, you may obtain complete copies or additional information on every subject that appears in *TechLine*. All aspects of exotic invasive plant management are presented. For instance, this issue highlights integrated approaches to invasives management in Shenandoah National Park in Virginia, Cherokee National Forest in Tennessee, and the James Madison heritage site near Montpelier, VA.

We want to answer your technical questions, so *TechLine* solicits your input and feedback. If you have successful weed techniques or a program you would like to share with your colleagues, we welcome them. Please call us toll-free at 1-800-554-WEED (9333) with your suggestions, comments, and input or if you would like to be added to our free mailing list.

"Thus, finally you accomplish the most difficult and greatest results through the supreme, sustained efforts that desire and interest make possible. Natural phenomena interest and stimulate the mind in a thousand ways."

... Enos A. Mills

Inside TechLine

Park's Protocols Lead Others Toward Succeessful Management

Shenandoah National Park Managers Develop Effective Vegetation Control Program

By Charles Henry
TechLine Editor

The results from Shenandoah National Park's from a well-planned, yet aggressive exotic vegetation management program have produced a two-fold benefit. First, the Park is protecting their native biological resources. Second, park managers have developed a program that is now a model for other eastern parks, monuments, historical battlefields and sites, and other public land managers. Under the guidance of forest ecologist James Åkerson, based in Luray, VA, park managers are gradually returning infested areas to their natural, native state.

Invasives are still growing in the 197,000-acre park and there are always new threats since they have such a productive growing environment for many species of vegetation. "But we now have an effective plan for stopping these invaders. We found that 23% of our documented species were non-natives, but we think we can eradicate a few and begin to reduce their impact on the native vegetation in the park," Åkerson says.

Oriental or Asian bittersweet, Japanese knotweed, Garlic mustard, Tree-of-heaven (*pictured above*), and Princess tree or Paulownia are the priority invasive species targeted in the park's management plan.

Åkerson explains that their first steps were to inventory and map the infestations focusing on the Skyline Drive highway that runs the length of the park as well as on fire roads. They hope to survey old homesites, abandoned roads, and the park boundaries as time and funding allow. They were astounded at the tremendous negative impacts invasives created. Invasives' dominance was disturbing in some areas where they had achieved 300% canopy cover (100% each on three levels of native, forbs, shrubs, and trees). Average penetration of invasives from openings into the high forest was 225 feet. Most worrisome were species that can create their own openings or overcome existing vegetation.

Under the guidance of forest ecologist James Åkerson, based in Luray, VA, Shenandoah National Park managers are gradually returning infested areas to their natural, native state.

Oriental or Asian bittersweet (*Celastrus orbiculatus*), Japanese knotweed (*Polygonum cuspidatum*), Garlic mustard (*Alliaria petiolata*), and tree-of-heaven (*Ailanthus altissima*), princess tree or Paulownia (*Paulownia tomentosa*) are the priority invasive species targeted in Åkerson's management plan.

"We were an agency that did great science, but management is now required, too," he says. "And we will have to use all the integrated management tools available if we are to be successful."

Of course, funding was a critical issue initially, as was building public support for their management techniques that include herbicides. Åkerson says one key is to begin small and create successes. Then publicize the success to people who can influence Congress to support invasive management funding.

They built the program slowly, first tackling kudzu, then oriental bittersweet, then Paulownia and ailanthus. No acres were treated in 1997, when they began inventory work. Now, they annually treat 400 to 500 acres including retreatments.

Integrated control program:

The park's treatment programs include manual pulling of very small infestations of mullein (*Verbascum thapsus*) and mile-a-minute (*Polygonum perfoliatum*). Larger infestations of mullein are treated with Roundup or Accord® herbicides. They use weed whips to cut Japanese knotweed (*Polygonum cuspidatum*) and Japanese stiltgrass (*Microstegium vinineum*). The knotweed cutting is followed by applications of Roundup or Accord® herbicides. Johnson grass is treated with Roundup by wiping with a Roto-Wipe® farm implement or hand foliar spraying.

Park managers wanted to minimize the herbicide load in the park and also needed an economical treatment that worked for ailanthus, oriental bittersweet, and Paulownia. Basal bark application of herbicide is one of the easiest methods, does not require any cutting, and works well for them year around, according to Åkerson. They mix a solution of 20% concentration of oil-soluble Garlon* 4 herbicide (triclopyr) in 80% oil (refined oil; can also be fuel oil, diesel, kerosene, mineral oil or special vegetable oils).

Using a handheld or backpack type sprayer, they apply the mixture in a 12-inch wide band around the entire circumference of the tree base with no "skips". The basal bark method is generally used for trees that are less than 6 inches in diameter, though slightly larger stems may also be treated by thoroughly treating bark up to 18 inches in height.

Follow-up foliar sprays with Garlon 4 herbicide are applied when trees are in full leaf. This should be the method of choice where ailanthus size and distribution allow effective spray coverage of all foliage without unacceptable contact with nearby desirable vegetation.

"Where ailanthus is in association with other exotic weed species, as is often the case, foliar spray allows treatment of the entire area at one time. Limitations of the method are the seasonal time frame, the need to transport a larger, more diluted volume of spray material, and the fact that rapid growing ailanthus are often out of effective reach," Åkerson says. Garlon 4 herbicide is selective for broadleaf and woody plants and will not kill grasses contacted by the spray. Garlon 4 is a systemic herbicide, meaning that it is absorbed by plants and is carried to the root systems.

*Trademark of Dow AgroSciences, LLC

Park managers needed an economical treatment that worked for ailanthus, oriental bittersweet (*above*), and Paulownia. Basal bark application of herbicide is one of the easiest methods, does not require any cutting, and works well for them year around, they say.

Åkerson's crews mix Garlon 4 herbicide with water and a small amount (0.5% or as per label) of a non-ionic surfactant to help the spray penetrate the leaves. The mixture is applied to leaves and green stems, including sprouts and suckers, until thoroughly wet but not to the point of runoff. They apply concentrations of 2-5% of Garlon 4 with backpack sprayers.

A potential biological control for ailanthus may lie in several fungal pathogens (*Verticillium dahliae* and *Fusarium oxysporum*) that have been isolated from dead and dying ailanthus trees in New York and in southern and western Virginia. If effective and practical, these biological controls will be introduced to their program.

For mile-a-minute, Åkerson's crews apply an herbicidal soap. They have found the annual plant dies readily, but several applications to the site are needed to kill subsequent growth that comes from prolific seeding. "There are several plants that die readily with herbicide applications but we have to keep after an area due to its seed bank," says Åkerson. "Such plants include mile-a-minute, Oriental bittersweet, and stiltgrass."

Measuring success:

"Our first success is that compared to five years ago, our overall effectiveness is vastly refined and improved. We are protecting rare species where we have done control work. And by treating vectoring sites (wind gaps, streams, and rights-of-way) first, we are stopping seed spread caused by wind, vehicles, and human activity," Åkerson concludes. "In the treated areas, natural revegetation is very good which says our biodiversity is not being harmed by treatments; it's being enhanced."

Now Åkerson's program is being exported to other mid-Atlantic parks (*see "Controlling Invasive in Eight National Parks" on page 4*). His planning process is being used at other parks and sites, so they do not have to reinvent the wheel and can achieve success more quickly.

Controlling Invasive Nonnative Vegetation In Eight National Parks in Virginia

The Virginia Invasive Vegetation Management Cooperative (VIVMT)

(Now the Mid-Atlantic Exotic Plant Management Team)

The following parks have begun programs similar to the one created at Shenandoah National Park. Åkerson is coordinator for a team formed to aid these parks in fighting invasives. Originally targeted to just those parks in Virginia, the team has now expanded to include parks and sites in Maryland and Pennsylvania.

Park	Park Acres	F.Y.	Treated Acres*
Appomattox Court House National Historic Park	**1,680**	2000	5
Species treated: tree of heaven, princess tree,		2001	76
privet, Japanese honeysuckle, English ivy,		2002	20
multiflora rose, Japanese barberry, and Johnson grass.		Total	101
Booker T. Washington National Monument	**224**	2000	70
Species treated: kudzu, tree of heaven, gorse, privet,		2001	85
Johnson grass, Japanese stiltgrass, Japanese		2002	42
honeysuckle, mullein, and mimosa.		Total	117
Colonial National Historic Park	**9,271**	2000	6
Species treated: princess tree, tree of heaven, privet, kudzu,		2001	61
English ivy, Oriental bittersweet, Japanese barberry, Japanese		2002	78
honeysuckle, and multiflora rose.		Total	145
Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park	**6,461**	2000	13
Species treated: multiflora rose, tree of heaven, mimosa,		2001	41
privet, autumn olive, bamboo, Oriental bittersweet,		2002	56
periwinkle, English ivy, and Japanese honeysuckle.		Total	10
George Washington Birthplace Nat. Monument	**550**	2000	11
Species treated: autumn olive, phragmites, tree of heaven,		2001	46
privet, periwinkle, English ivy, and Japanese honeysuckle.		2002	20
		Total	77
Petersburg National Battlefield	**2,653**	2000	45
Species treated: tree of heaven, privet, Johnson grass, white		2001	176
poplar, autumn olive, multiflora rose, crowned vetch, Chinese		2002	52
wisteria, and Japanese honeysuckle.		Total	273
Richmond National Battlefield Park	**773**	2000	4
Species treated: tree of heaven, mimosa, privet, Oriental		2001	47
bittersweet, Japanese honeysuckle, princess tree, multiflora		2002	37
rose, autumn olive, English ivy, and mullein.		Total	88
Shenandoah National Park	**197,039**	2000	136
Species treated: Mile-a-minute, Oriental bittersweet,		2001	788
Japanese knotweed, kudzu, mullein, princess tree,		2002	594
tree of heaven, Johnson grass, and Japanese stiltgrass.		Total	1,518
Totals	**218,651**	2000	292
		2001	1,318
		2002	899
		Total	2,509

*Accomplished by VIVMT and local parks combined.
"Treated" includes both initial and re-treated acres.

Sound Research Aids Preservation Effort

Managing Invasives Preserves Old Growth Forest for Study and Public Enjoyment

By Charles Henry
TechLine Editor

"Protecting the Irreplaceable" is the slogan for the National Trust for Historic Preservation, owner of Montpelier, the 2,700 acres of the James Madison home site and plantation in Virginia. Of course, the slogan refers to James and Dolley Madison's home, and the stables, barns, gardens, and other historic sites occupying the estate, now being managed by The Montpelier Foundation. But the slogan also refers to the 200-acre old growth tulip-poplar forest located behind the mansion. This forest contains, untouched, the road traveled by not only Madison, but also Thomas Jefferson, James Monroe, George Rogers Clark, and their families as these prominent Virginians traveled to Washington, D.C. in the early years of our nation's formation.

"Akebia spreads by roots and spreading tendrils. It grows over 12 feet per year and can quickly smother younger trees and shrubs. Eventually, it covers everything (*left*) to the detriment of wildlife, birds, and, of course, all vegetation. Deer don't like it and it crowds out the vegetation the deer do need," explains Sandy Mudrinich, horticulturist for the Montpelier Foundation (*above*).

White oaks in the forest date from 1710 and red oaks exist from 1860. This vegetation frames the same time that the Madison family lived and worked this land. This vegetation is truly "irreplaceable" just as are the mansion and other buildings. The forest is under serious threat from invasive grasses, vines, and other non-native, exotic vegetation. The greatest threat exists from akebia vine (*Akebia quinata*), westeria (*Westeria sinense*), periwinkle (*Periwinkle vinca*), and Japanese stiltgrass (*microstegium virnineum*), according to Sandy Mudrinich, horticulturist for the Montpelier Foundation.

"These old growth forests are unique (*see "Old Growth Biological Values" on page 6*). There has not been a lot of human interference so they offer very special educational and research opportunities if they remain in a natural state of progression, free from invasives," Mudrinich explains. "If we can protect them, then research will begin to help us understand and predict what happens to these ecosystems."

Mudrinich says the invasives were most likely introduced from gardens of the past. Even Thomas Jefferson had a knack for planting exotic species in his gardens at nearby Monticello. Often these species escaped and established themselves without benefit of natural impediments to spread such as insects, disease, or climatic conditions found in their locations of origin.

"Akebia spreads by roots and spreading tendrils. It grows over 12 feet per year and can quickly smother younger trees and shrubs. Eventually, it covers everything to the detriment of wildlife, birds, and, of course, all vegetation. Deer don't like it and it crowds out the vegetation the deer do need," she states. "Three years ago we had four acres infested; today we have eight and it is accelerating."

Research First:

Mudrinich says the best method to control akebia was not known. There were no management guidelines

See "Akebia" on page 6

"Akebia"
Continued from page 5

from the universities and the vine did not appear on herbicide labels. So Mudrinich turned to Shep Zedaker at Virginia Tech in Blacksburg, VA for help (*see accompanying article on page 8*).

They found the best control resulted from early October treatments of Garlon* 4 herbicide applied at a 1-2 qt./acre rate after the wildflowers had receded, but before the leaves on trees had fallen. Akebia does not go fully dormant in this area so there was good herbicide uptake with the fall treatments. Treatments of Glypro* herbicide either alone or in combination with Garlon 4 were not as effective, according to the research.

Mudrinich took these results to Montpelier's natural resource committee with a recommendation to begin a full control program. Since Garlon 4 is absorbed by the plants and is carried to the root system, the committee agreed to an initial application of the herbicide over those areas liberally covered by the akebia foliage followed by spot spraying with Roundup over those areas where contact with soil is most likely. Mudrinich contracted with Invasive Plant Control, an application company from Tennessee.

"Our research was very thorough before we approached the resource committee. This is one key to convincing people to use herbicides. Do your homework first so you can answer potential objections before folks form negative opinions," Mudrinich says.

The spray program has been very successful, according to Mudrinich. The last applications were made this October, and the akebia is already dying back and turning. There have been no observable negative impacts on other vegetation. One potential problem is that Japanese stiltgrass does invade areas where the akebia vine is controlled. This plant was used as packing material for shipping porcelain and other fragile items. It has escaped into many areas of the south and east and is a strong competitor.

"We are now using our invasive vegetation management program to educate the public about all exotics," Mudrinich explains. "We have signs posted and have created several new trails that take people from infested areas to controlled areas so they can see the positive results of management. In addition, four public tours are conducted each season to show the public the difference between a natural and an infested ecosystem."

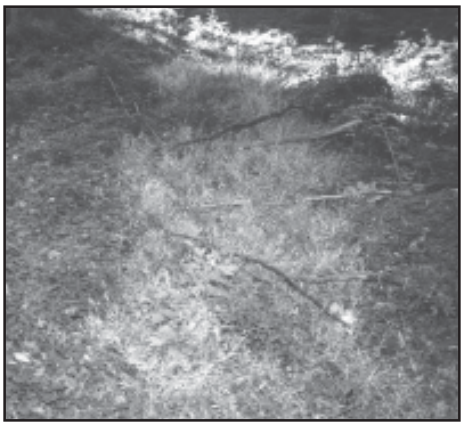
*Trademark of Dow AgroSciences, LLC

Old Growth Biological Values

The 2,700-acre Montpelier property 480 to 800 ft. in elevation and receives 42 inches of annual precipitation. James Madison grew crops, pasture, and even had an iron works on the property. Today the old growth forest contains more than 80 herbaceous and woody species including:

- **Tulip-poplars**
- **Oaks – red, white, black, and chestnut**
- **Hickory – mockernut and pignut**
- **Beech**
- **White ash**
- **Flowering dogwood**
- **Redbud**
- **Spice bush**

"This vine could become a problem in many areas of the East. It is still sold in nurseries and is a rapid spreader," Mudrinich concludes. "We're glad we found a solution before it replaced our 'irreplaceable' forest resources."



Montpelier managers found the best control resulted from early October treatments of Garlon* 4 herbicide applied at a 1-2 qt./acre rate after the wildflowers had receded, but before the leaves on trees had fallen (*above*). Akebia does not go fully dormant in this area so there was good herbicide uptake with the fall treatments.

Westeria damage (*left*) is another problem in the landmark forest. After the vine is controlled and dropped off the trees, damage to the tree can still be seen.

Managing *Akebia Quinata* at the James Madison Landmark Forest: An Evaluation of Herbicides and the Timing of Application

By S. M. Zedaker, VA Tech, Blacksburg, VA and
P. L. Burch, Dow AgroSciences, LLC, Christiansburg, VA

Akebia quinata, called chocolate vine or fiveleaf akebia, is a woody climbing vine in the *Lardizabalaceae* family. Akebia was brought to the U.S. in 1845 as an ornamental from northern Asia. The vine is very shade- and drought-tolerant, which has contributed to its establishment and persistence in 16 eastern states from Michigan and Connecticut to Georgia. Akebia spreads rapidly by vegetative means, with individual vines reported to grow 20 to 40 feet per year.

Akebia can retain its leaves year-round in warmer climates, and its purple-violet seed pods, with a whitish pulpy core and many tiny black seeds, are attractive to birds. Chocolate vine grows so rapidly that it can kill off existing ground-level vegetation and understory trees and shrubs by overtopping them. Canopy trees are not immune because of akebia's persistence, and once established, germination and growth of native plants are excluded.

In this case, akebia has invaded an old-growth stand of mostly tulip-poplar (*Liriodendron tulipifera*) in a culturally significant amenity forest. Where established, it has eliminated most plant species except other problematic exotic vines like Japanese honeysuckle and periwinkle (*Vinca minor* and *V. major*).

Due to its expanse of cover and rapid re-invasion, individual plants cannot be pulled or cut. There are no herbicides that can be broadcast-sprayed during the growing season to control akebia without injuring native plants. Quantitative herbicide trial data on this species are very limited. Akebia's persistent leaves in winter provide an opportunity to apply dormant season sprays of non-soil active herbicides to protect and preserve the native vegetation in the stand.

A series of trials were installed to determine (1) how

See "Akebia Research" on page 8

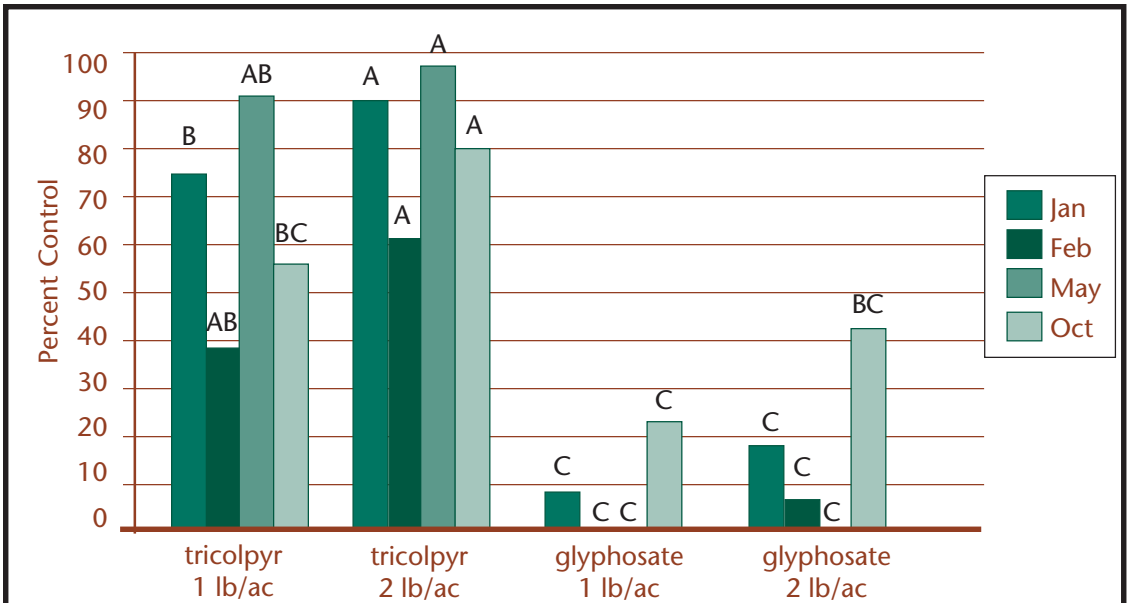


Figure 1: Percent control assessed on May 31, 2000 for Jan. and Feb. treatments (92 and 139 DAA respectively), assessed on Oct. 23, 2000 for the May treatment (145 DAA), and assessed on June 6, 2001 for the Oct. 23 treatment (226 DAA). Letters that are the same witin the same treatment date not significantly different at alpha = 0.05.

"Akebia Research"

Continued from page 7

Garlon* 4 herbicide compares to Glypro* herbicide when applied to akebia, and (2) how the control of akebia and the response of native plants are affected by the timing of application.

Methods and Materials:

Spray treatments were installed on 1/13/00, 2/29/00, 5/31/00, and 10/23/00 (Table 1).

Each herbicide treatment was mixed in water with 0.5% v/v of non-ionic surfactant. Treatments were applied using a CO_2-powered backpack sprayer. The nozzle used was an 8010E flat fan held at a height so as to apply a 6-foot band. Each plot was 6 x 70 feet in size, with a 3-foot untreated buffer between plots.

Each treatment was applied at a total volume of 40 gpa and replicated four times in a completely randomized design at each application date.

The line-intercept method was used to determine percent control, abundance and cover of native plants along the center of each treatment plot. Akebia vines and native vegetation were tallied for intercepts of the line at 25 one-foot intervals. Control and native plant assessments were made at 90 to 226 days after treatment, depending on the treatment date. Data within treatment date were analyzed using ANOVA with mean separation at the 0.05 alpha level (LSD).

Results and Discussion:

For all application times assayed, Garlon 4 herbicide provided better control than Glypro herbicide (Figure 1 on page 7). May, January, and October applications of Garlon 4 provided good to excellent control, but control from the February application was only fair. This lack of control was probably due to the significant freeze damage to akebia leaves that occurred just prior to the February application. There was a rate response with Garlon 4 only with the dormant applications.

Glypro herbicide may have performed better in May, had a rain shower within an hour after application not caused significant wash-off. The October applications of Glypro were slightly better than the other timings but were still not on par with Garlon 4 herbicide control. The narrow shape (6' wide) of the treatment plots precluded longer-term (several growing season) evaluations of Akebia control. After just a few weeks, vine invasion from the adjacent, untreated buffers, was beginning. Resprouting of treated vines and new seedling germination within the treated plots appeared to be limited.

Table 1: Herbicide Treatments and Application Dates.

Treatment Number	Herbicide	Rate/acre
1	Garlon 4	1 qt
2	Garlon 4	2 qt
3	Glypro	1 qt
4	Glypro	2 qt

Garlon 4 contains 4 lbs ae of triclopyr BEE per gallon
Glypro contains 4 lbs ae of glyphosate per gallon

Native plant populations also responded differently to the herbicide treatments and timing (Figures 2 and 3 on page 9). Native species richness and cover generally declined with poorer akebia control. It also declined significantly with May applications, since many of these species were actively growing at that time and have little resistance to Garlon 4 herbicide or Glypro herbicide.

Management Implications:

The best control of akebia can be expected during the spring/early summer application window. However, because the desirable plants are also actively growing and many are also susceptible to the herbicides, broadcast applications should be avoided during this timing to minimize damage to desirable species. To restore native vegetation as quickly as possible after removal of the akebia, employ a fall/dormant treatment followed by spot treatments during the growing season. Garlon 4 herbicide at 2 qts per acre should be applied in the dormant season. Growing season applications can be reduced to 1 qt/ac.

Summary and Conclusions:

Over the timings tested, Garlon 4 is more active than Glypro on akebia. Because it retains some of its foliage during Virginia's dormant season, akebia is sensitive to herbicide applications during the winter when native annual plants are not present and/or native perennials are dormant. Native plants are least adversely affected by the herbicide applications during the dormant season.

Control of akebia can be accomplished without significant damage to the Montpelier Landmark Forest's native vegetation by spraying Garlon 4 during the dormant season. As long as the akebia foliage has not been damaged by severe frosts, enough herbicide-foliage contact occurs even after deciduous species leaf fall.

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Date of Application	*Comments*
Jan 13, 2000	Mild winter conditions preceded this Jan. application. Akebia foliage was present at the ground level.
Feb 29, 2000	Two weeks following the Jan. application, the winter conditions became severely cold reducing the exposed akebia foliage.
May 31, 2000	Akebia was actively growing. An unexpected mild rain shower followed about 1 hour after the last treatment was applied.
Oct 23, 2000	Akebia foliage was unaffected by the fall conditions. Some coverage from the leaf litter (10 – 20%) was apparent. Most of the desirable plants were dormant.

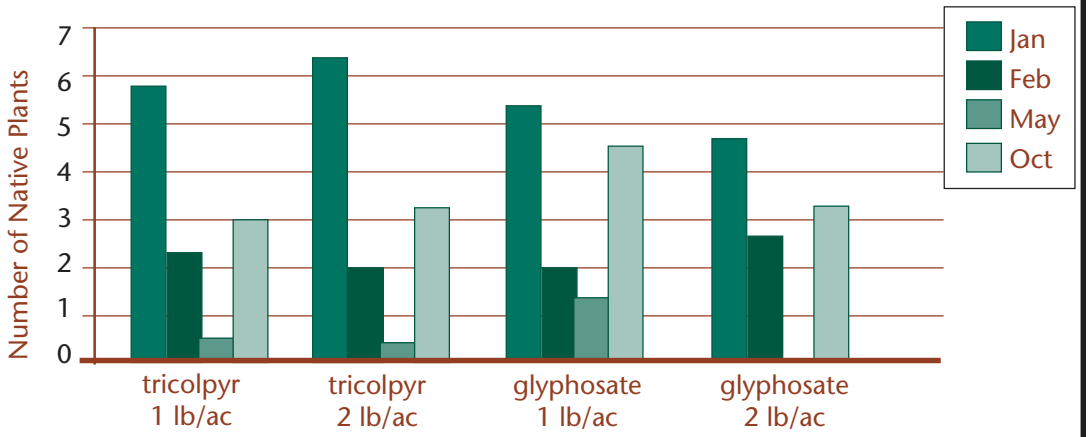

Figure 2: The number of native plant species present at the time of the control ratings as affected by the herbicide and the timing of application.

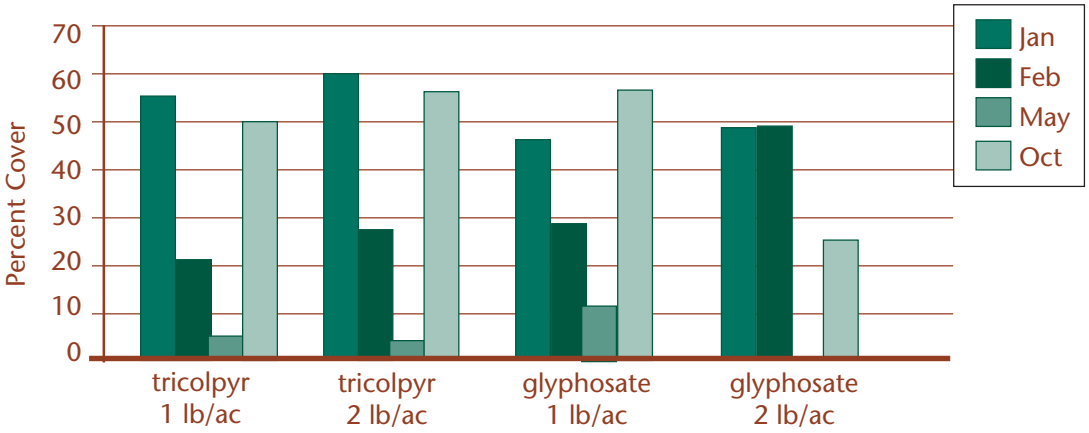

Figure 3: The percent cover of native plants present at the time of the control ratings as affected by the herbicide and the timing of application.

Cherokee National Forest Managers Convert Fescue Grasslands to Native Grasses

By Charles Henry
TechLine Editor

At first glance, 24 acres of open grassland amid thousands of acres in an eastern forest may not appear to warrant much management. However, in the Cherokee National Forest's Tellico Ranger District, the open acres have proven very valuable for wildlife and human recreation. And now that the area has been restored to a more native and natural state, it also serves as a barrier to invasive, exotic vegetation encroachment.

According to USFS wildlife biologist Mary Dodson, the U. S. Government purchased a tract of approximately 2,600 acres in 1966 in the Coker Creek area of Southeastern Tennessee. The area is located in the Blue Ridge Physiographic Province of Tennessee. Elevation is 1,600 ft. and average annual precipitation in nearby Knoxville, TN, is 47.14 inches. Twenty-four acres of the area had been maintained in old fields comprised mainly of fescue. This area is called the Doc Rogers fields. There are eight fields separated by trees and shrubs with white oak, chestnut oak, Northern red oak, Virginia pine, shortleaf pine, black gum, and sweet gum dominating the overstory. Many other common trees, shrubs, and herbaceous vegetation are in abundance. This area is known for a diversity of flora and fauna.

"We don't have many large, grassy openings in the forest. Most openings are only two to three acres in size and don't provide as much grassy habitat as larger openings," Dodson explains. "Wildlife need these openings, and smaller openings are not as easily converted to native grasses which are more beneficial than orchardgrass or fescue. Native warm season grasses need to be maintained by burning and small areas are difficult to burn without risking the surrounding forest, so we felt the Doc Rogers fields were worth extra effort to restore."

The process began by treating the fescue with glyphosate herbicide in June of 1997 and then burning the thatch cover in July. Next, five of the fields were planted with native warm season grasses including big bluestem, little bluestem, switchgrass, and Indian grass. Some trees and shrubs were also planted in and around the fields; crabapples, hazelnuts, and walnuts were planted to increase forage. Wildflowers were planted as well in some of the fields, including *Rudbeckia fulgida* (a coneflower), *Rudbeckia trilobia* (a coneflower), *Aster oblongifolius* (an aster), *Echinaceae purpurea* (purple coneflower), and *Helianthus tomentosus* (a sunflower).

"Wildlife need these openings. Native grasses are more beneficial than orchardgrass or fescue. Native warm season grasses need to be maintained by burning and small areas are difficult to burn without risking the surrounding forest, so we felt the Doc Rogers fields were worth extra effort to restore."

In 1998, Plateau® herbicide was applied in strips in some of the fields to reduce undesirable species. Two of the fields not treated in 1997 were treated in 1998 with glyphosate herbicide, burned and planted with the same species as the other fields.

The fields have been burned annually, usually in March or April. In 2001, some of the fields were again sprayed in some spots to eliminate undesirable species. Lime and 0-20-20 fertilizer were also applied in 2001 in some areas.

"Our goal is to cut back burning all the acres to burning only one-third or one-half the fields annually," Dodson explains. "The warm season native grasses have been slow to establish, but they do put down a long tap root early, so they have been fairly drought tolerant. It requires a couple of years for complete native grass establishment. And even in its present good condition, we still have to watch for invasion by exotics."

Japanese stiltgrass (*Microstegium vimineum*) is the most dominant exotic threat here, she says. Wildlife doesn't eat it and it quickly invades disturbed areas and along roads or trails. Dodson says there is hunting

in the area, but watchable wildlife may become the dominant use. The public has become heavily invested in seeing the fields restored since there is such an abundance of songbirds, Bobwhite quail, whitetail deer, black bear and other smaller species using the area. Currently a combination hiking/horseback riding trail adjoins the property. With the success of the grass restoration, plans are underway to build a better, more intimate hiking trail through the fields to enhance the bird and wildlife viewing.

"The local chapter of Quail Unlimited donated funding, labor and equipment to the project as did the Tennessee Wildlife Resources Agency under the direction of biologist Dick Conley," Dodson concludes. "Using partnerships and the right restoration methods, including herbicides, proved to be a very successful combination for protecting this valuable resource."

David Whitehead (*above*) , Tennessee Wildlife Resources Agency manager of the Tellico Wildlife Management Area, points to healthy native grass stands in one of the Doc Rogers fields.

(*Left*) Mary Dodson, Cherokee National Forest wildlife biologist and Dick Conley, Tennessee Wildlife Resources Agency biologist walk through waist-deep grasses after fescue grasses were eliminated with herbicides.

Large openings in the forest (*right*) benefit many wildlife species as well as are enjoyed by the public when native grasses replace fescue stands. Cherokee National Forest managers plan to upgrade trails in the area to enhance recreation and viewable wildlife opportunites now that native grasses are established in the Doc Rogers fields.

Need More Information?
Call *TechLine* at 1-800-554-WEED (9333)

This issue of *TechLine™* newsletter, Eastern Edition details research and innovative programs on managing exotic vines, trees, and other species in old growth forests, grasslands and national parks. More information from these articles and other resources mentioned in this issue may be obtained from *TechLine™* newsletter by calling toll-free 1-800-554-9333.

We want to answer your technical questions, so *TechLine* solicits your input and feedback. If you have successful weed techniques or a program you would like to share with your colleagues, we welcome them.

Please call us toll-free at 1-800-554-WEED (9333) with your suggestions, comments, and input.

If you would like to be added to our free mailing list, please send your name, agency, address, city, state, zip, phone, and email to Ag West Communications, PO Box 1910, Granby, CO 80446. You may email your request to be added to *TechLine's* mailing list to: agwest@rkymtnhi.com.

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