

ontrolling Invasive Plants

INTRODUCTION

One of the most serious problems encountered in the management of open space in southeastern Pennsylvania is the presence of exotic, invasive vegetation. Woodlands and hedgerows smothered by vines and fields invaded by exotic shrubs may offer food and fortified shelter for birds and other wildlife, but they eventually create an unsightly landscape and restrict human transit. Most importantly, if left unchecked, invasives can rapidly destroy the native flora and stall ecological succession in natural areas. Through their displacement of native vegetation they homogenize the structural and food resources of a site, thereby reducing its habitat value for native fauna, particularly songbirds.

An historical land use dominated by agriculture and logging, coupled with recent development, has effectively disturbed native vegetation in the region and, through its division and clearing of land parcels, added countless miles of edge condition that is highly favorable to the proliferation of invasives. The misguided promotion of several exotic species for erosion and livestock control, and nearby horticultural plantings have provided enough seed sources for regional dispersal of numerous invasive exotic species.

The control of invasive plants will be a long-lasting concern of land managers in southeastern Pennsylvania. The extensive edge areas and seed sources within the region and the prolific nature of these plants guarantee that even with complete eradication on a given property, invasives can quickly reestablish themselves as a serious management problem. A strategy for coexisting with these plants is needed—one which will minimize their effect on the aesthetics and ecological stability of a property, with a minimum of management effort.

MANAGEMENT OPTIONS

In natural areas management the most efficient and effective strategy usually results from a thorough understanding of the environmental forces in the area and the management goals that work with and not against these forces. This is true in developing a strategy for minimizing the impact of invasive plants. Any attempt to alter the vegetation of a site will succeed or fail according to its effects on the major forces (light, water, inorganic nutrients, atmospheric gases, collectively known as the “growing space”) that support plant growth in that area. Given that growing space in any area is finite, successful management will consist of those practices which make more growing space available to desirable species and less to non-desirable species—in this case, invasives. Listed below are management options, utilizing this principal, for controlling invasive plants.



Oriental bittersweet (*Celastrus orbiculatus*): A woody vine that aggressively grows along any forest edge or in open meadows. Its seeds are dispersed by birds and human collectors (the bright orange seed capsules are used for fall decorations). By growing into the tree canopy, the vine raises the center of gravity of the tree making it vulnerable to windthrow.

PHYSICAL REMOVAL

One of the most effective practices is the selective removal of invasives without disturbing the surrounding desirable vegetation. The invasive plant is denied any growing space and the surrounding desirable vegetation is well-positioned to occupy the vacated growing space. This approach is preferable whenever possible, although it is limited as a practical alternative by the available manpower and equipment relative to the size, quantity, and type of invasive(s) present.

Relatively small quantities of invasives can be effectively removed through manual pulling, digging with hand tools (shovel or spade) or pulling with a heavy duty truck or tractor. One specialized hand tool that works well on small single-stemmed plants is called a weedwrench. It is designed to clamp to the base of a tree or shrub and leverage the entire plant out of the ground. A tractor-mounted front end loader is ideal for removing larger trees or shrubs by several methods. One method entails elevating the lower branches with the bucket while a chain (a logging slip chain is best) is attached to the base of the plant and then, by raising the bucket, the plant can be removed from the ground. A second, easier tractor method is to use a single fork attachment on the front end loader to pop the shrub out by positioning the fork under the crown (the swollen area from which the roots and stem emerge) and raising the bucket. The third, and most efficient, method requires replacing the loader bucket



Autumn olive (*Eleagnus umbellata*): Along with its relative, Russian-olive (*Eleagnus angustifolia*), this shrub can rapidly invade abandoned fields and open canopy forests to the exclusion of all other plants. Until recently it was promoted as a wildlife food although its fruits have limited nutritional value.

with a new tool called a Brush Brute—a 4–6 foot steel frame with 18 inch “teeth”. With this tool you simply drive into the unwanted shrub or small tree until the base of the plant is impaled between the teeth and then lift the entire plant out of the ground.

Regardless of which means is employed, it is generally desirable to remove as much of the root system as possible (to prevent resprouting), although removal of the crown is usually sufficient to prevent rapid reestablishment of the plant. The degree of success through this method will depend upon the thoroughness with which the plant is removed and the speed at which desirable vegetation can occupy newly available growing space.

CUTTING

Removing some or all of the photosynthetic (food producing) area of the plant without disturbing the surrounding vegetation is another way to redistribute the available growing space and control invasives. It is less effective, but also less labor intensive, than physical removal. Cutting the plant with a pruner, handsaw, or lightweight chainsaw reduces its above-ground growing space without disturbing surrounding vegetation. However, the entire root system and any uncut stems can resprout and reoccupy the growing space. For this reason, it is best to cut the plant as low as possible to the ground and to combine it with an herbicide application (Refer to *Herbicides* section for further details on use).

This option is most appropriate for controlling invasives in wooded areas. In this situation, the surrounding vegetation (trees) is usually situated above the residual live plant material. Because the surrounding trees limit sunlight needed for food production, the cut plant is forced to rely on stored root reserves to feed the remaining plant material and for refoliation. Although invasives are usually able to survive, they are weakened sufficiently to prevent them from achieving problem status for an extended period.

Cutting is less effective in open areas. In this case, their prolific nature allows invasives to quickly resprout and occupy the available growing space. The problem is alleviated only temporarily—cutting will be required within a few years. This is particularly true at edge sites (where open fields meet woodlands) and hedgerows. There the vines gain the added benefit of tree support



Japanese honeysuckle (*Lonicera japonica*):
A perennial vine initially used for erosion control, its greatest impact is on forest tree seedlings and shrubs.

which they can utilize to occupy greater growing space to the detriment of the trees. The practice of pruning the lower limbs of edge trees and cutting vines as high as possible maximizes the delay in vine movement back into the tree canopy.

Late fall and winter are the most efficient and least painful times to perform cutting operations. Problem areas are more easily traversed and cool weather clothing gives added protection to the work crew. Following initial treatment, an annual or biennial inspection and control schedule should be adopted to prevent initial conditions from recurring. Frequent treatments are more effective in preserving the native integrity and aesthetic quality of the site.

MOWING

Mowing removes most of the photosynthetic material from both desirable and undesirable plants. It effectively puts all plants on an equal basis in regards to the availability of above-ground growing space. This is, however, only a temporary situation. Because species vary greatly in their response to mowing, a mowing treatment will favor those species that can re-leaf (occupy the available growing space) faster. Repeated mowings favor grass species (which grow from the base of the stem) and non-grass species which grow close enough to the ground to escape severe defoliation. Given the vigor of invasive plants, repeated treatments are usually necessary to make this method an effective control strategy.

Mowing is effective in the control of invasives in large open areas where physical removal is beyond the

manpower available. The initial treatment may require the physical removal of plants (especially multiflora rose) too large to mow, which would interfere with future mowing operations and act as a seed bank from which the species could spread. For this same reason, it is advisable to remove any obstructions, such as fallen trees or rocks, around which invasives can become established and spread.

In most cases it is sufficient to combine invasive control with annual meadow mowing. Areas heavily infested with vines may require more frequent mowing for several years to weaken the invasives and encourage competitive grass species. Meadow areas heavily impacted by invasives may warrant herbicide application (see *Herbicides*).

PLANTING

Another option to remove growing space from invasives is through the planting of desirable species. This includes planting trees and shrubs to increase the density of wooded areas (to shade out invasives) and over-seeding meadows with grasses and wildflowers to increase competition for above and below ground growing space.

Planting should occur in early spring or fall to optimize plant survival. Because they must compete with invasives, only species highly adapted to a site's condition (particularly light and soil water availability) should be planted. Since most native grasses and wildflowers require minimum soil fertility to survive, it is usually not necessary to fertilize meadow planting sites.

It is particularly important to plant trees and shrubs in wooded areas where invasives have been removed. Killing or removing the invasives often disturbs the area and opens up the growing space. Invasives will quickly reoccupy the available growing space unless they are suppressed by other plantings.

Evergreen trees are especially effective in shading invasives. They grow quickly and produce heavy shade throughout the year. Evergreens also increase diversity of wildlife habitat. They are particularly helpful along south and west-facing forest edges where invasives are most prolific. The area around planted trees should be mowed for several years until they become established and start to shade out invasives. This technique is also useful along trails and other areas that are frequently mowed and maintained.



Japanese stiltgrass (*Microstegium vimineum*): A warm-season grass dispersed by deer and human walkers that quickly spreads to the detriment of native herbs.

HERBICIDES

In most cases the exclusive use of herbicides is not an effective long-term solution for controlling invasives. Difficulties in delivering an adequate amount of the chemical only to the target plants at the correct time in their growth cycle, and the potential health risks to workers and the environment are all legitimate drawbacks to their use. In addition, inherent in the sole reliance on herbicides is a “once and done” attitude that is not conducive to the long-term control of invasives. Used appropriately, however, herbicides can be an important tool for land managers in certain situations. Herbicides should only be applied by personnel properly trained in both the safe use of each herbicide and the identification of desirable versus undesirable species.

To safely administer herbicides to the target plant it is best to minimize the above ground volume of the plant prior to herbicide application. To control small trees, shrubs (multiflora rose, autumn olive, bush honeysuckle) or vines, apply an herbicide with glyphosphate (such as *Roundup*) to the fresh sprouts two weeks after cutting. Larger plants can be most effectively controlled by applying *Garlon* or *Roundup* directly to the freshly cut stump. This second method works best in fall and winter when sap flow is into the roots.

Another appropriate use of herbicides is in the establishment or restoration of meadows overrun with invasives. Meadows with moderate infestation can be sprayed with a broadleaf herbicide (most invasives are broadleaf plants) such as *Banvel* or *2-4-D*. In combination with mowing this should give an advantage to the remaining grass species. Severely impacted meadows may warrant starting from scratch using the following

procedure. After mowing, spray the area with a broad-range herbicide, such as *Roundup* or *Banvel*, to remove all the existing vegetation. Allow the herbicide to work for approximately two weeks, then plow and disc the site. After another two weeks, reapply herbicide to kill any surviving or newly established vegetation. Wait another two weeks and disc and plant the area with preferred species. The quick establishment of desirable species through planting is important to prevent the re-establishment of the invasive plants.

FIRE

Fire has been a major influence in the evolution of the herbaceous flora of this area. Deliberate fires set by Native Americans and colonists, and accidental lightning fires gave a strong edge to fire tolerant species in some areas. The use of fire to control invasives by giving an advantage to desirable native species is an exciting new application for an old management tool. The difficulty in utilizing this tool is the obvious destructive power that can arise from its misuse. Local governments and fire companies are often not receptive to the use of fire. Some fire companies, however, use controlled burns as training exercises. In certain circumstances, the potential benefits for the control of invasives may be sufficient to face the bureaucratic challenge.

As with herbicides only properly trained individuals should utilize fire as a management tool. To be effective and safe, weather and fuel conditions must meet exacting standards. It is usually best to burn in early spring since invasives usually sprout before native species.

SUMMARY

There are many techniques available for controlling invasive vegetation. These options are not mutually exclusive. Usually the control of invasives on any given site requires a combination of two or more methods. The exact mixture and timing will be unique to each site. What will be common to all sites is the fact that the prolific nature of invasive plants mandates periodic monitoring and control to prevent a major disruption to the aesthetics and ecology of the impacted site.

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