



Noxious and Troublesome Roadside Weeds

Many different labels are applied to weeds. Some of those labels are unprintable. A common label is *noxious*, from the Latin 'noxa', for harm. 'Noxious' is one of the few labels for weeds that has regulatory meaning. In this module we will describe problem weeds on Pennsylvania roadsides, covering the regulated weeds, as well as examples of weeds that are not regulated, but clearly problematic. We'll refer to these non-regulated, problems weeds as simply 'troublesome'.

Pennsylvania Noxious Weeds

A 'noxious weed' is a plant that is determined to be injurious to public health, crops, livestock, agricultural land or other property. The Noxious Weed Control Law of 1982 established the Noxious Weed Control Committee, which determines which species will be on the Noxious Weed List. The committee can add or remove weeds from the list after conducting public hearings. Table 1 is a list of the plants currently on the Pennsylvania Noxious Weed List.

Weeds are placed on the Noxious list for different reasons. Marijuana is a controlled substance, regulated by U.S. Federal drug laws. Canada thistle has plagued U.S. agriculture since colonial times. Johnsongrass, shattercane, multiflora rose, and musk and bull thistles

Table 1. Plants on the Pennsylvania noxious weed list

Common Name	Scientific Name
1. marijuana	<i>Cannabis sativa</i>
2. Canada thistle	<i>Cirsium arvense</i>
3. multiflora rose	<i>Rosa multiflora</i>
4. johnsongrass	<i>Sorghum halepense</i>
5. mile-a-minute	<i>Polygonum perfoliatum</i>
6. kudzu	<i>Pueraria lobata</i>
7. bull thistle	<i>Cirsium vulgare</i>
8. musk thistle	<i>Carduus nutans</i>
9. shattercane	<i>Sorghum bicolor</i>
10. jimsonweed	<i>Datura stramonium</i>
11. purple loosestrife (includes all cultivars)	<i>Lythrum salicaria</i>
12. giant hogweed	<i>Heracleum mantegazzianum</i>
13. goatsrue	<i>Galega officinalis</i>

are very problematic to Pennsylvania crops and pastures. Jimsonweed is toxic to people and livestock.

Another issue is how widespread a weed is. Placing a species on the list gives the Department of Agriculture more latitude to compel landowners to manage certain weeds. Mile-a-minute and purple loosestrife were once weeds of limited distribution in Pennsylvania, while kudzu still is, and the Noxious Weed Law provides a means to try to keep them that way. Giant hogweed and goatsrue are Federal Noxious Weeds, and occur in Pennsylvania. By adding these species to the Noxious Weed List, Pennsylvania receives federal assistance in controlling these species.

Are All Noxious Weeds Roadside Problems?

Only a few of the plants on the PA Noxious Weed list interfere with roadside maintenance, but all should be managed because of the impact these weeds can have on adjacent property. Weeds rapidly spread along roadsides in a number of ways. Seed is spread down the right-of-way (ROW) by the wind created by passing vehicles. It can wash down drainage ditches to wetlands, streams and rivers. And it can move on mowers or other maintenance equipment, and through any type of soil disturbance. After spreading along roadsides, the noxious weeds can move onto adjoining property.

The most frequent complaint regarding PennDOT's ROW from adjacent landowners has been related to the growth of Canada thistle next to agricultural lands.

Other PA Noxious Weeds that are common (within their own range) to roadsides include multiflora rose, mile-a-minute, bull and musk thistle, purple loosestrife, and giant hogweed.

Troublesome Roadside Weeds

Weeds including trees, shrubs, vines, and herbaceous plants become troublesome along roadsides for a number of reasons.

- They are on the Noxious Weed List and must be controlled before spreading to adjacent properties.

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- They interfere with visibility of guiderails, signs, or traffic around curves or at intersections.
- Trees may become targets for collisions with vehicles that leave the highway, or drop branches or fall onto the roadway.
- Trees shade the road surface causing the road to stay wet longer after rain or snow, or result in icy conditions in the winter.
- Some plants are resistant to standard vegetation management practices and are 'released' to become denser and more troublesome following the management practice.
- Some plants are poisonous to people or animals. The poison can be an internal problem (ex. poison hemlock) or it may cause serious skin irritations (ex. poison ivy or giant hogweed).
- Plants able to thrive on poor sites get established and spread along roadsides because fewer species can compete with them.
- Plants that produce large amounts of viable seed and/or produce stems from root suckers spread faster and are more likely to dominate an area by crowding out desirable plants.

There are many troublesome roadside weeds. The species in Table 2 provide an example of the types of

*Table 2. Examples of troublesome roadside weeds. Those marked with an * are on the PA Noxious Weed List.*

Common Name	Scientific Name
Trees	
tree-of-heaven	<i>Ailanthus altissima</i>
boxelder maple	<i>Acer negundo</i>
black locust	<i>Robinia pseudoacacia</i>
Shrubs	
autumn olive	<i>Elaeagnus umbellata</i>
multiflora rose*	<i>Rosa multiflora</i>
exotic bush honeysuckles	<i>Lonicera</i> spp.
Woody Vines	
poison ivy	<i>Toxicodendron radicans</i>
Oriental bittersweet	<i>Celastrus orbiculatus</i>
Herbaceous Perennials	
Japanese knotweed	<i>Polygonum cuspidatum</i>
Canada thistle*	<i>Cirsium arvense</i>
purple loosestrife*	<i>Lythrum salicaria</i>
Biennials	
poison hemlock	<i>Conium maculatum</i>
wild parsnip	<i>Pastinaca sativa</i>
bull thistle*	<i>Cirsium vulgare</i>
musk thistle*	<i>Carduus nutans</i>
plumeless thistle	<i>Carduus acanthoides</i>
Annuals	
mile-a-minute*	<i>Polygonum perfoliatum</i>
kochia	<i>Kochia scoparia</i>

weeds that plague roadsides.

Pennsylvania's Most Unwanted Plants

All common plant life cycles are represented in the list of troublesome weeds. For a review of plant life cycles, see Module 3 - *Weed Biology*. What follows is a brief description of each of these weeds and why they cause so many problems. Very brief descriptions of control methods are also provided. Other modules in this series describe in detail the methods and materials touched on here.

Many of the species listed here are not difficult to control. The issue confronting all land management agencies is that the management ethic of the 1950's - protect the soil and let nature take its course - doesn't work anymore. The last fifty years has seen a dramatic increase in the amount of landscape disturbed by development and in the number of exotic, weedy plants that thrive in settings we used to regard as 'no maintenance'.

Tree-of-heaven (*Ailanthus altissima*)

Tree-of-heaven, or ailanthus, is the 'tree-from-hell' for roadside vegetation managers. It is a fast growing, weak-wooded tree that can easily reach heights of 60 feet (Figure 1). It is prone to wind and ice damage and poses an acute hazard when it is close to the roadway. It grows in good soils or the worst that are created during road construction. It survives in the most highly salted areas. Air pollution has no negative effects on it. The only thing it apparently does not tolerate well is shade. Ailanthus has spread from urban areas to the



Figure 1: Tree-of-heaven, or ailanthus, forms patches of hundreds of stems that originate from a shared root system. This weak-wooded tree grows fast enough to impede sight distance, become a collision target or falling-tree hazard between maintenance cycles.

countryside, and is most common along the highways in more urbanized areas.

Ailanthus is a threat to the environment because of its invasiveness in cultivated fields and natural habitats. It is a prolific seeder that grows vigorously and establishes dense stands that crowd out desirable plants. It is also *allelopathic*, meaning it produces chemicals that inhibit other plants from growing near it. New colonies of the trees are easy to identify. They have large 'mother' trees in the center of many smaller stems that have sprouted from the root system. The age of the colony can be estimated by the size of the mother tree. Even on poor sites, ailanthus stems will increase in diameter by an inch per year.

Ailanthus has soft wood, and resprouts are readily mowed. However, mowing is an ineffective means of control because it re-grows about 10 feet within a year. It is an excellent example of why herbicides are often the most practical approach to control roadside vegetation.

To effectively control ailanthus, you need to control the root system. This is best accomplished through late season herbicide applications, and persistence. Where infestations are well established, two treatments are necessary to bring it under control. One approach is to treat the foliage with a handgun-based application in July, and follow this four to six weeks later with a basal bark application. These areas should be treated again the following summer. After the ailanthus has been reduced to a manageable level, the areas should be treated every four to five years to prevent re-infestation.

Where ailanthus needs to be removed, treat it first. Cutting and treating the stumps will result in a dense stand of vigorous root sprouts. Treat the stems in the late summer, and remove them after leaf drop before the following spring.

A detailed description of ailanthus and control options is contained in "Factsheet 3: Managing Tree-of-Heaven (*Ailanthus altissima*) on Roadsides" located at <http://vm.cas.psu.edu>.

Boxelder Maple (*Acer negundo*)

Boxelder maple is a medium size (30-50') native tree common to bottomlands and stream corridors, but also adapted to drier sites and a wide range of soil pH. It produces large amounts of winged seeds that can travel long distances with wind (Figure 2).

Boxelder started becoming a problem in the 1980's with increasing use of the herbicide *fosamine* ('Krenite S'). Boxelder is not controlled by *fosamine*, and filled in along roadsides as other brush was suppressed.

There are two reasons that *fosamine* is widely used by PennDOT. The first reason is that injury from *fosamine* to trees is limited to the branches that are treated. This allows treatment of brush encroaching from off the ROW without causing off-target injury. Second, foliar symptoms from *fosamine* are slow to develop and blend in with fall color, providing a 'low-



Figure 2: Boxelder maple (*Acer negundo*) could be thought of as a 'created' weed. Boxelder is resistant to the herbicide *fosamine*, the active ingredient in 'Krenite S'. Repeated 'Krenite' applications can eliminate other tree species and release boxelder.

profile' treatment that does not attract negative attention due to foliar 'brown-out'.

To control boxelder, herbicide mixtures that cause foliar 'brown-out' or are more likely to translocate beyond the contacted branches need to be used.

Black Locust (*Robinia pseudoacacia*)

Black Locust is a large (over 50 ft), spiny tree-whose native range includes the southern Appalachian region of PA-that forms spreading colonies from root suckers (Figure 3). It is a *legume*, which means it can fix atmospheric nitrogen, so it can grow vigorously even in poor soils. Black locust provides a scenario similar to that of ailanthus - a suckering tree that grows quickly in poor soils and becomes common on disturbed roadsides. Like ailanthus, if locust is not managed properly, it responds with numerous, vigorous root sprouts.



Figure 3. Black locust resprouts grow aggressively and have stout spines that can easily injure workers.

The sprouts of black locust have long spines that can easily puncture most fabric and skin. Workers who have to clear locust or work amongst it are clearly at risk.

As with ailanthus, the key to locust control is targeting the root system. This is accomplished by late-season treatment with systemic herbicides that are translocated to the roots.

Ailanthus is a weed wherever it occurs on the ROW. Black locust is a species that can be left alone as long as it is not close to the road or interfering with roadway function or maintenance.

Autumn Olive (*Elaeagnus umbellata*)

Autumn olive (Figure 4) grows from Maine to Georgia and west to Wisconsin. It was spread throughout Pennsylvania by resource agencies promoting it for use as wildlife food and cover. Each plant produces many clusters of small, round fruits that are spread widely by birds. Like windborne seed, birds often move in the flyways formed by highways, spreading the seed along the road and from there, onto surrounding properties. Autumn olive is very tolerant of poor soils and high levels of salt. It forms dense, thorny thickets that expand with time and can cover hundreds of acres.

Autumn olive is undesirable along roadsides for a number of reasons. The dense thickets limit visibility and allow large animals, like deer, to get close to the road without being seen. If mowed, they vigorously resprout. After mowing, the regrowth produces branch spurs stout enough to puncture tractor tires. By limiting access to the ROW, these shrubs present obstacles for maintenance personnel. Finally, autumn olive is an exceptionally invasive plant that crowds out desirable plants.

This plant must be controlled along roadsides to prevent it from moving onto adjacent properties. Autumn



Figure 4: The shrub autumn olive was introduced as a conservation plant offering both a food source and cover for wildlife. It grows vigorously on poor sites and abandoned fields.



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Figure 5: Multiflora rose is a thorny, spreading shrub, and PA Noxious Weed. It is extremely prolific and can form impenetrable thickets that exclude desirable plant species and make passage nearly impossible.

olive is easy to control with foliar sprays, basal bark applications, or cut stump treatments when individual plants or small groups of plants are present. Large thickets are difficult to work in and require a combination of mechanical methods to remove the existing top growth, and chemical methods to treat the stumps or foliar applications to treat the regrowth while it is still small and manageable.

Multiflora Rose (*Rosa multiflora*)

Like autumn olive, multiflora rose was propagated and spread throughout Pennsylvania during the middle of the 20th century by government resource agencies for soil stabilization, wildlife habitat, and as a 'living fence'. It produces large amounts of seed in fleshy, bright red 'hips' that are eaten by birds and animals. A large plant with a heavy seed crop can produce hundreds of thousands of seeds, which remain viable in the soil for up to 20 years. The plant also expands the area it occupies by layering – drooping branches contact the ground, root, and form new stems. Its potential to spread along roadsides, and then onto adjoining properties; and its dense, thorny stems make this plant unsuitable for anywhere, especially roadsides.

Multiflora rose is susceptible to a number of herbicide treatments, particularly *metsulfuron* ('Escort XP'). However, mechanical removal of the top growth is often necessary for control to be useful. An impassable thicket of herbicide-killed multiflora rose is about as problematic as an impassable thicket of living multiflora rose.

Exotic Shrub Honeysuckles (*Lonicera* spp.)

Exotic shrub honeysuckles are deciduous shrubs with opposite leaves that typically range from 6 to 15 feet in height, and are adapted to a wide range of soil and light conditions. There are at least seven species of exotic shrub *Lonicera* in PA. Common examples include Amur honeysuckle (*Lonicera maackii*), Morrow's honeysuckle (*Lonicera morrowii*), and Tartarian



Figure 6: Exotic bush honeysuckles are adapted to a wide range of site and light conditions. They form dense stands that crowd out desirable vegetation, and spread readily into forests and fields.

honeysuckle (*Lonicera tatarica*). The honeysuckles produce heavy crops of red to orange berries, and are lightly browsed by deer. Due to their adaptability, and elimination of their native competition by deer, honeysuckles form dense stands in open settings and forest understories.

Established honeysuckle is injured but usually not killed by the mix of 'Garlon 3A' (*triclopyr*) plus 'Escort XP' that is commonly used during the weed and brush program. To achieve effective control, honeysuckle needs to be aggressively targeted during the sidetrim program with 'Krenite S' applications, or specifically targeted with a tank mix that includes the herbicide



Figure 7: Poison ivy is a native, woody vine featuring compound leaves with three leaflets. The terminal (middle) leaflet has a long stalk, while the lateral leaflets have very short stalks or attach directly to the central leaf stalk. All parts of poison ivy contain the compound *urushiol*, which causes an itchy skin rash in many people.

glyphosate. Where honeysuckle infestations are dense, the top growth may need to be removed to improve access to the area.

Poison Ivy (*Toxicodendron radicans*)

Poison ivy is a native vine that can grow as a groundcover, a small shrub, or a climbing vine on almost any type of support, from trees to fences (Figure 7). It is a plant that would not be a problem except for the fact that it produces *urushiol*, a chemical that causes an itching rash on most people if they come in contact with it. It grows exceptionally well in open areas and thrives in the roadside environment. Trees, fences, and guiderails all support its growth. It can overgrow guiderails, but the biggest concern regarding its growth along roadsides relates to its ability to cause serious rashes in people that come in contact with it. This



Figure 8. Oriental bittersweet is a woody vine native to Asia. It smothers small trees and shrubs, and adds extra weight to mature trees, contributing to tree fall and branch drop. It spreads by root suckering and dispersal of its colorful fruit, which is often used in floral arrangements.

makes it a serious problem for maintenance workers and emergency personnel working around it. When found close to the road it should be controlled. The mixture of 'Garlon 3A' and 'Escort XP' that is commonly used during the summer weed and brush program is effective. If you are spot treating poison ivy in a safety rest area or similar location, a *glyphosate* product or 'Garlon 3A' will provide good control.

Oriental bittersweet (*Celastrus orbiculatus*)

Oriental bittersweet is a deciduous, woody, twining vine. Its seed is dispersed by birds and people who sometimes use the plant to make wreaths (Figure 8). It can also spread vegetatively by root suckers. An environmental concern is that it is displacing our native climbing bittersweet (*Celastrus scandens*) through competition and hybridization. A potential problem can develop when they grow up trees. Their added weight can make trees more susceptible to being uprooted in

wind, snow, or ice storms. Since many trees have most of their weight on the side facing the road, this can create a serious hazard.

Oriental bittersweet is often seen after a roadside area is cleared of brush. The trees that used to support it are gone, and the bittersweet grows like a groundcover until it finds something to climb on. At this stage it is relatively easy to control with the herbicides used during the weed and brush program. Where bittersweet is climbing into desirable trees, individual stems need to be treated with cut surface or basal bark treatments.

Japanese Knotweed (*Polygonum cuspidatum*)
Giant Knotweed (*Polygonum sachalinense*)

Japanese and giant knotweed are herbaceous perennials, native to East Asia that grow in large, rhizomatous colonies up to 10 feet tall (Figure 9). Knotweed has hollow, jointed stems, and is often called 'bamboo'. Knotweed will grow almost anywhere - from acidic strip mine spoil to shaded stream banks. It spreads quickly to form dense thickets that crowd out native vegetation and disrupt existing ecosystems. Along highways, knotweed growing close to the road reduces sight distance, and the shoots will emerge through the asphalt at the edge of the shoulder.

Knotweed is difficult to control because of its imposing size, and because it is usually treated too early in the season. For best results, knotweed should be treated late in the summer, when applied herbicides move with the plant sugars into the rhizomes. However, knotweed interferes with roadway function early in the season, sometimes reaching full height by May 1. Unfortunately, spring treatments have little long-term effect on knotweed. An effective control program requires a combination of cutting and herbicide treatment, or multiple herbicide treatments in a growing



Figure 9: Japanese and giant knotweed are herbaceous perennials that can quickly grow to over 10 feet in height. The foliage can obscure visibility and emerging shoots penetrate asphalt when growing close to the road.



Figure 10: Canada thistle is a creeping herbaceous perennial that reproduces from vegetative buds in its root system and from windborne seed. It often co-exists with crownvetch on the roadside, making selective control difficult.

season.

Canada Thistle (*Cirsium arvense*)

Canada thistle is a creeping, herbaceous perennial that causes serious problems in crops and pastures. It is a Noxious Weed in Pennsylvania, and has been a regulated weed in the U.S. since the 1700's. Canada thistle produces large quantities of wind-blown seed, and its root system spreads aggressively, expanding 6 to 10 feet each year (Figure 10). A complicating factor in the management of roadside Canada thistle is that it usually occurs in crownvetch plantings. Both thistle and crownvetch are perennial broadleaf plants. There is no simple approach to selectively removing Canada thistle from crownvetch.

Another issue complicating Canada thistle management is that the most alarming phase of its yearly growth is when it's releasing seed, but the best time to control it is in the fall. Mowing at flower bud stage or treating with the herbicide *hexazinone* ('Velpar') will prevent seed set and preserve crownvetch. This treatment by itself will not eliminate the thistle, and would need to be repeated every year.

To eliminate the thistle and provide an easier to maintain groundcover, treat the Canada thistle/crownvetch mixture in September or October with *aminopyralid* ('Milestone VM') and seed the area to a grass mix. Once the grass is established, occasional fall treatments of *aminopyralid* will prevent significant reinfestation of Canada thistle or crownvetch.

Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife is an herbaceous perennial, native to Eurasia, which thrives in wetlands. It produces striking, long lasting blooms in the summer (Figure 11) that produce thousands of seeds per plant. Loosestrife has been in the horticulture trade since the 1800's. However, it has been declared a Noxious Weed in Pennsylvania because it invades wetlands and forms

dense stands that crowd out other vegetation. Purple loosestrife is common in roadside ditches and wetlands created for road construction mitigation.

There are sites in PA where a biological control agent, a *Galerucella* beetle, has been released. *Galerucella* feeds only on purple loosestrife. Where the beetle successfully establishes, there will be a decrease in loosestrife. Effectiveness is variable, but there are sites where the beetle has almost eliminated loosestrife.

If purple loosestrife is growing in water, you must have a permit from the PA Fish & Boat Commission and be a certified applicator in the Aquatics category to treat it with herbicides. A simpler approach is to wait for dry



Figure 11: The PA Noxious Weed purple loosestrife produces a showy display of magenta-colored flower spikes throughout much of the summer. These plants can form near-monocultures, and significantly degrade the habitat value of emergent wetlands throughout the U.S. and southern Canada.

periods when no surface water is present.

Foliar treatments using *glyphosate* or *triclopyr* ('Garlon 3A') will control loosestrife. *Glyphosate* is non-selective and all contacted vegetation will be injured. *Triclopyr* will not injure grasses and sedges.

Poison Hemlock (*Conium maculatum*)

The toxicity of poison hemlock has been known for thousands of years. It was the juice of the hemlock plant that was used to poison Socrates. It is also toxic to grazing animals. It is established throughout most of North America and southern Canada.

Poison hemlock is a biennial weed. It is a member of the carrot family, grows to 8 feet tall, and produces white, flat-topped flower clusters much like wild carrot (Figure 12). Poison hemlock has smooth, hollow, purple-spotted stems, while wild carrot has hairy stems without spots, and usually does not grow taller than 3 feet. Poison hemlock is best controlled with herbicides in the fall after brush treatments are completed. At this stage it is still actively growing and easy to spot. It



Figure 12. A stand of 8-foot tall poison hemlock towers over the crownvetch it is invading. All parts of poison hemlock are acutely toxic to humans and livestock, and it continues to spread along roadside corridors.

usually occurs in crownvetch plantings or other non-maintained areas. It is most obvious in the late spring during flowering and seed set, but waiting until this stage to treat with herbicides will likely result in production of viable seed.

Wild Parsnip (*Pastinaca sativa*)

Wild parsnip is another common member of the carrot family. It commonly grows in guiderail and shoulder areas, to heights of 3 to 6 feet. It is characterized by grooved stems and flowers similar to Queen Anne's lace (wild carrot) that are yellow (Figure 13). The reason wild parsnip is such a concern is that it produces chemicals (*furocoumarins*) that cause severe blistering and discoloration on contact with the skin if followed by exposure to sunlight. Solar ultraviolet light is required to activate the chemical after the skin absorbs it. Wild parsnip is usually regarded as a biennial, and only



Figure 13. Wild parsnip is readily identified by its smooth, grooved stem, pinnately compound leaves, and yellow 'Queen Anne's lace' flowers. Wild parsnip is very common in guiderail and shoulder areas. The sap can cause painful rashes on the skin when exposed to sunlight.

reproduces by seed. There are accounts in the botanical literature of parsnip being a monocarpic perennial, which means it may live for several years before flowering and dying.

Wherever wild parsnip is close to the road or poses a risk to maintenance workers or residents, it should be controlled. As with poison hemlock, the best opportunities for control are in the fall after brush control applications, or in the spring before it bolts and flowers.

Biennial Thistles

Bull thistle (*Cirsium vulgare*)

Musk thistle (*Carduus nutans*)

Plumeless thistle (*Carduus acanthoides*)

There are three common, weedy biennial thistles in PA. Bull thistle and musk thistle are PA Noxious Weeds, and plumeless thistle is equally as weedy. The biennial thistles typically grow in crownvetch plantings or other unmowed areas. Their windborne seed fills the air in July, and these species are especially troublesome in low-maintenance pastures, where livestock avoid them and overgraze the remaining vegetation

The biennial thistles do not grow in spreading patches like the perennial Canada thistle, but instead have a strong taproot. Like other biennials, these thistles overwinter aboveground as rosettes, while Canada thistle overwinters as roots and does not emerge until spring.

As with poison hemlock and wild parsnip, treatment with postemergence broadleaf herbicides in the fall, or spring before flowering is an effective control tactic.

Mile-a-minute (*Polygonum perfoliatum*)

Mile-a-minute is also known as Devil's tear-thumb because the stems are armed with downward pointing



Figure 14. Plumeless thistle has the showy purplish flower and spiny foliage common to the three weedy biennial thistles in Pennsylvania. The biennial thistles typically grow in crownvetch plantings, and are severe pests of pastures and other less-maintained agricultural sites.



Figure 15: Mile-a-minute is an annual vine that can grow 20 feet long. It has distinctive triangular leaves, blue fleshy fruit, and stout spines that give it names like 'tear thumb'. Mile-a-minute is a PA Noxious Weed, and can easily grow over and smother shrubs and small trees.

spines. Anyone that ever tried hand-pulling it without gloves discovered this immediately. Mile-a-minute is an annual vine that can grow to 20 feet in a season. It is a PA Noxious Weed, and was introduced into PA in the late 1940's as seed contaminant in the soil of imported plant material. On roadsides it can grow over guiderails and signs, but the major reason for controlling it is to prevent its spread onto adjacent property. Because it can smother seedlings of other plants, mile-a-minute must be controlled in nurseries, Christmas tree farms, reforestation areas, and many other crops that are not regularly tilled. It is also a serious weed in landscape plantings.

It is important to control mile-a-minute early in the season. It begins flowering in June, and continues to flower and set seed until frost. It is important to kill it before it sets seed. Treating it in September when it is already laden with seed does not accomplish anything.

Because it is an annual, mile-a-minute is not hard to control. New infestations of mile-a-minute can be controlled with hand pulling (with good leather gloves). Established infestations are most efficiently controlled with herbicides. There are several options for preemergence and postemergence control, allowing you to prescribe an effective treatment for almost any setting.

Kochia (*Kochia scoparia*)

Kochia is a recent entry to the list of troublesome weeds. Native to Asia and introduced from Europe as an ornamental, kochia has historically been a weed of the western U.S. in agricultural and non-crop settings. It is adapted to drier sites such as guiderail and shoulder areas. Kochia is in the same family as lambsquarters and spinach, grows up to 6 feet tall, and spreads its seeds during the winter by breaking off at the ground and becoming a 'tumbleweed' (Figure 16).



Figure 16. Kochia is an annual adapted to dry sites such as guidrails and shoulders. It is becoming increasingly common because it is resistant to several herbicides used to maintain bareground at the edge of the roadway. During the winter the stem breaks and kochia becomes a tumbleweed, dropping its seed as it's blown across the landscape.

Kochia is becoming increasingly common because it is *resistant* to many of the herbicides used to maintain bare ground at the edge of the roadway. The resistant kochia flourishes as the other species are eliminated by the herbicide. In the last 10 years, kochia has increased from an occasional weed of roadsides to being common on almost every limited access highway in the southern half of Pennsylvania. It is necessary to make changes to the maintenance program to achieve better control of this species. If kochia spreads into agricultural areas, it could have significant impact.

Kochia is commonly resistant to 'Oust XP' (*sulfometuron*), but to date has been controlled by 'Karmex XP' (*diuron*). However, there are biotypes of kochia resistant to *diuron*. A comprehensive plan including rotation to newer bareground herbicides such as 'Throttle XP' (contains *sulfentrazone*) or 'Payload' (*flumioxazin*), and follow-up foliar treatments where kochia has escaped will be necessary to keep kochia in check.

Summary

This module addressed just a few weed species that cause problems on roadsides. Problem weeds can be native or exotic, and every plant life cycle is represented. The most acute vegetation management need in Pennsylvania is to keep brush away from the road to maintain sight distance and safety clear zones. The next priority then is to be a good neighbor. If brush is being effectively managed, most weeds are an issue because of the negative impact they have on adjacent property.

Any plant can be a weed (Figure 17). The species described in this module just happen to be weedy more often than other species in the roadside setting. A key aspect of roadside vegetation management is being aware of the land use on the other side of the ROW fence and making sure that plants along the roadway don't spread off the ROW and cause harm.



Figure 17. Crownvetch has been used since the 1940's to stabilize soil and reduce erosion. It has been designated by the PA Legislature as the State Conservation Plant. However, the qualities that make crownvetch useful for soil conservation also make it very weedy if it gets off the right-of-way. Crownvetch is increasingly described as an invasive species by conservation agencies.

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