

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The overall composition is clean and modern, with a focus on natural colors.

Your Yard Matters!
Helping Homeowners
Eliminate Invasive Shrubs

- ▶ To eradicate invasive woody plants from your yard you must first develop a plan.
- ▶ To that end, you should begin at the beginning.
- ▶ Non-native invasive plants crowd out natives and provide a sterile environment where native organisms cannot thrive.
- ▶ Step one is to identify the invaders.

AMUR HONEYSUCKLE



AMUR HONEYSUCKLE (*LONICERA MAACKII*)

FAMILY: Caprifoliaceae (Honeysuckle Family)

FLOWERING PERIOD: Late April to June

FRUITING PERIOD: September - February

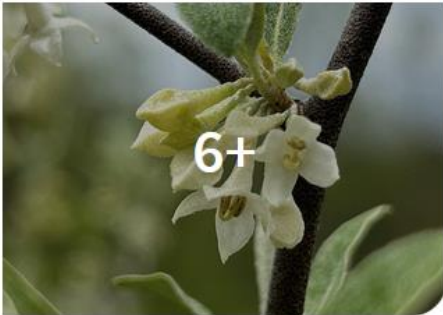
DESCRIPTION: Deciduous shrub growing up to 20 feet tall. Paired flowers white and zygomorphic; nearly sessile with peduncles shorter than 5 mm. Leaves ovate with sharp taper, growing up to 8 cm long. Fruit small, red, and borne in clusters of four.

DISTRIBUTION: Likely occurs in every county.

HABITAT: Full sun to shade on old fields, roadsides, prairies, savannas, fencerows, forest edges, forests of all age classes, cliffs, floodplains, alvars, and disturbed areas.

NOTES: Amur honeysuckle causes negative impacts a number of wildlife species.

AUTUMN-OLIVE



AUTUMN-OLIVE (*ELAEAGNUS UMBELLATA*)

FAMILY: Oleaster (Elaeagnaceae)

FLOWERING PERIOD: Late March to early May

FRUITING PERIOD: June to September

DESCRIPTION: Shrub to shrubby tree growing up to 20 feet tall; thorns found on dark, speckled bark. Leaves are wavy and ovate, distinctively green on top and silver on underside. Flowers are cream to yellow with four petals in clusters of four to six. Fruits are drupes, ripening to red with silver flecks.

DISTRIBUTION: Likely present in every county.

HABITAT: Grasslands, forest edges, and disturbed places; often found in barren areas due to its nitrogen-fixing nodules.

NOTES: Russian-olive has long been confused with this species.

TREE-OF-HEAVEN



Tree-of-heaven (*Ailanthus altissima*) is highly invasive and should not be planted in Ohio. Tree-of-Heaven is a highly invasive tree that is native to China. It was brought to this country in the early 1800s as a source of food for silkworms, which were simultaneously imported from the Orient. Although raising silkworms was a failure, the Tree-of-Heaven remained. This tree is often found in urban areas and thrives in disturbed and neglected sites where polluted conditions and poor, rocky soils prohibit anything but weeds to grow. Tree-of-Heaven is fast growing, and mature trees can produce in excess of 300,000 wind-dispersed seeds per year. Tree-of-Heaven frequently colonizes disturbed sites in Ohio woodlands and suppresses the growth of native trees. Trees found in the open may reach 80 feet tall by 40 feet wide and have a bold year-round texture. Its common name refers to its ability to reach even greater heights under optimum conditions in the Orient, not to any aesthetic or horticultural qualities.

As a member of the quassia family, it is related to other genera in the family which mostly reside in tropical locations, some members of which provide substances used in medicines, insecticides, and dyes. Tree-of-Heaven may suffer from verticillium wilt, especially in wet springs in poorly drained soils, and a few other minor diseases and pests, none of which are significant. It is often eventually cut down or severely pruned because it gets too big for the site from where it sprang, or the property is bulldozed for a new construction project. Tree-of-Heaven has the largest pinnately compound leaves of any tree found in Ohio. Kentucky coffeetree has bipinnately compound leaves, and the walnuts' are not as long. The alternate leaves emerge bronzed in spring and quickly transition from medium to dark green as they expand to about two feet in length, with an even number of leaflets. Crushed leaves and stems emit an unpleasant odor. Fall color is essentially non-existent in Tree-of-Heaven. Tree-of-Heaven has relatively long, green-white flowers in late spring, which often go unnoticed because of their ultra-thin character and the fact that they are often lost amongst the overpowering foliage. Male flowers have a vile scent, while female flowers have no odor. Male and female flowers usually occur on different trees making this species primarily dioecious, which becomes evident by mid-summer when the huge clusters of fruits dot the canopy of female trees. Composed of many individual samaras or winged seeds, the fruits stand out in the Tree-of-Heaven canopy because they have a light green, yellow, orange, or red color in summer, then change to a beige color by early winter and remain on the female trees until early spring.

The stout twigs of Tree-of-Heaven have an olive-tan color in winter, with huge leaf scars and very small buds, with no true terminal bud. When the twigs or leaves of Tree-of-Heaven are crushed, they emit a slightly foul odor. The bark of Tree-of-Heaven remains fairly smooth as the twigs become branches, taking on a subtle checkered appearance. Even as this species attains great heights and trunk diameters, hints of ridges and furrows are slow to appear on the light gray, mature bark.

GLOSSY BUCKTHORN



GLOSSY BUCKTHORN (*FRANGULA ALNUS*)

FAMILY: Rhamnaceae (Buckthorn Family)

FLOWERING PERIOD: June to early August

FRUITING PERIOD: September to November

DESCRIPTION: Deciduous shrub or tree growing up to 20 feet tall. Leaves are shiny and simple with entire to undulate margins; features several deep, parallel veins. Clusters of green-white flowers form on axils of new growth. Fruit is small and red, ripening to black. Lacks thorns or other armature despite name.

DISTRIBUTION: Abundant in northeast Ohio, scattered to locally common south.

HABITAT: Full sun to full shade; bogs, fens, wet meadows, marshes, swamps, old fields, successional woodlands, ditches and other disturbed areas.

NOTES: One of the most common invasive shrubs in northeast Ohio.

MULTIFLORA ROSE



MULTIFLORA ROSE (*ROSA MULTIFLORA*)

FAMILY: Rosaceae (Rose Family)

FLOWERING PERIOD: May to June

FRUITING PERIOD: July to October

DESCRIPTION: Deciduous shrub growing up to 14 ft tall and 15 ft wide. Stems are branched, arching; may have recurved prickles. Leaves are alternate, pinnately compound with fringed stipules and 7 to 9 1/2-inch-long toothed leaflets. Flowers with white petals and 1 1/2 inches across, growing in a long panicle. Fruits are small, red-orange, and globular to ovoid.

DISTRIBUTION: Found in all 88 counties.

HABITAT: Prefers partial to full sun; found in forest edges, old fields, prairies, roadsides, as well as riparian corridors and various aged forests.

NOTES: This is likely Ohio's most widespread and common invasive species.

WINGED WAHOO



WINGED WAHOO (*EUONYMUS ALATUS*)

FAMILY: Celastraceae (Bittersweet Family)

FLOWERING PERIOD: May to June

FRUITING PERIOD: September to November

DESCRIPTION: Deciduous shrub growing up to 20 feet tall with notable red to purple foliage in fall. Leaves are opposite, rounded with a tapered tip, and 2 inches long. Young stems are often winged. Fruit is small and purple until ripe, when skin splits and a red-orange fruit is revealed.

DISTRIBUTION: Found throughout Ohio, most common in glaciated Ohio.

HABITAT: Forests of various age classes, fencerows, edges of woods, and roadsides.

NOTES: This species has not been determined by Ohio Invasive Plants Council as an invasive species nor on the Ohio Department of Agriculture's invasive plant list.

JAPANESE BARBERRY



JAPANESE BARBERRY (*BERBERIS THUNBERGII*)

FAMILY: Berberidaceae (Barberry Family)

FLOWERING PERIOD: Late April to May

FRUITING PERIOD: August to November

DESCRIPTION: Spiny deciduous shrub growing 3 feet tall and up to 9 feet wide. Leaves are up to 2 cm, alternate, and generally ovular with smooth margins. but is typically red to purple in fall with undersides lighter. Flowers are typically yellow and clustered in small umbels. Fruit is about 1 cm long, shiny and egg-shaped.

DISTRIBUTION: Recorded from all parts of Ohio and is likely naturalized in all 88 counties.

HABITAT: Forests, both upland and in riparian corridors; can tolerate a wide range of soil and moisture conditions.

NOTES: Ohio Department of Agriculture does not list this species as invasive. Original species or genotype is the commonly escaped variety. The only other variation seen escaped in Ohio is variety *atropurpurea*. There are few documented individuals of this variety from different parts of Ohio.

Step two: determine the extent of the infestation.

How many species?

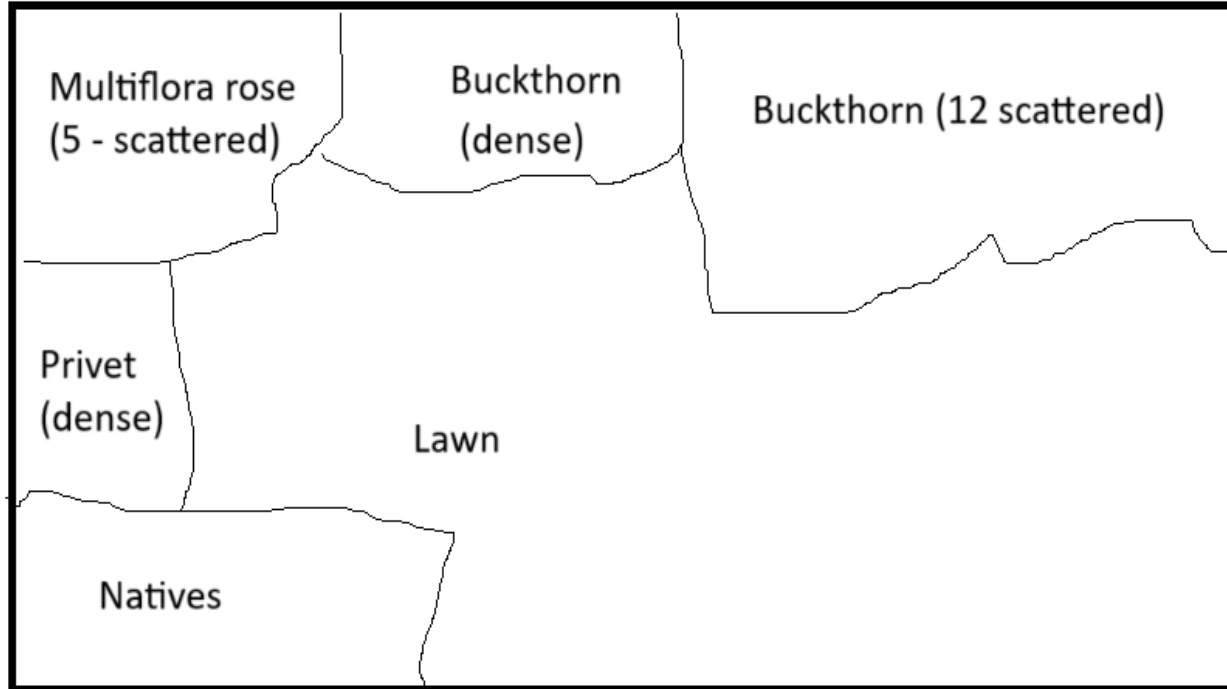
Scattered individuals or dense thickets?

Small or large stems?

Current stage of development?

(Seeding, flowering, in leaf, dormant?)

Make a sketch.



Step three:

Removal options - bio-control
repeated cutting
burning
girdling
herbicide

Bio-control - the use of grazing, insects, disease pathogens, or fungi to selectively eliminate target plants.

Insects and pathogens have to be carefully tested and approved by government agencies to confirm specificity.

Grazing is great if you have hungry goats!

Cutting methods - machine

- Brush cutter
- Chainsaw
- Brush hog

- hand

- Pruners
- Loppers
- Saws

Machine cuts are fast but indiscriminate.

Hand cutting is slow and labor intensive, doesn't require expensive equipment, and is precise.

Repeated cutting - effective but can take years of repeat treatment.

Burning - dangerous, requires licensing?, or torch.

Girdling - slow, labor intensive, works.

Herbicide - cost, hazardous, effective.

Focus on herbicides.

Natural types: salts can be effective but contaminate the soil.

Vinegar also works but lowers the pH.

Soaps and oils are useful for foliar treatments for insects but are also used as surfactants with herbicides.

Synthetic herbicides.

Two of the safer ones.

- Glyphosate (original Roundup)
- Triclopyr (Garlon 4)

Cardinal rule - The label is the law.

Find the label online, if necessary,
and **READ IT!**

Wear long sleeves, pants, and shoes.

Wear rubber gloves while handling.

Roundup - once upon a time, glyphosate was the sole herbicide in Roundup. Now, watch out! Several of the Roundup products I investigated were based on diquat and dicamba. Beware of bio-chemistry by lawsuit! I won't use diquat and dicamba TERRIFIES me!

Health Effects

- **Diquat dibromide exhibits** low acute toxicity via the oral and inhalation routes of exposure, but exhibits **moderate to severe acute toxicity via the dermal route of exposure.** Diquat dibromide is not an acute skin irritant, nor a dermal sensitizer, but **it is considered a moderate to severe eye irritant.**
- The mutagenicity database for diquat dibromide indicates that this chemical has no mutagenic or genotoxicity activity and it is not a carcinogen.
- There is no evidence of endocrine disruption upon exposure to diquat dibromide.

Signs of Toxicity - Humans

Following ingestion of dicamba, symptoms of poisoning may include vomiting, shortness of breath, slowed heart rate, loss of appetite, cyanosis and muscle spasms.¹ Gastrointestinal bleeding may occur occasionally.⁹ In very severe poisoning cases, vomiting, diarrhea and abdominal pain may be followed by coma.⁹

Other reported health effects following dicamba ingestion include hyperthermia, metabolic acidosis, renal failure and increases in certain liver enzymes.⁹

Extended inhalation exposures may cause dizziness, irritation of the nose, pharynx and chest, resulting in coughing.² Additionally, peripheral neuromuscular and gastrointestinal symptoms have been reported following inhalation exposures.

Compare to glyphosate:

Between 1 January 1980, and 30 September 1989, 93 cases of exposure to herbicides containing glyphosphate and surfactant ('Roundup') were treated at Changhua Christian Hospital. The average amount of the 41% solution of glyphosate herbicide ingested by non-survivors was 184 +/- 70 ml (range 85-200 ml), but much larger amounts (500 ml) were reported to have been ingested by some patients and only resulted in mild to moderate symptomatology.

Accidental exposure was asymptomatic after dermal contact with spray (six cases), while mild oral discomfort occurred after accidental ingestion (13 cases). **Intentional ingestion (80 cases)** resulted in erosion of the gastrointestinal tract (66%), seen as sore throat (43%), dysphagia (31%), and gastrointestinal haemorrhage (8%). Other organs were affected less often (non-specific leucocytosis 65%, lung 23%, liver 19%, cardiovascular 18%, kidney 14%, and CNS 12%). **There were seven deaths, all of which occurred within hours of ingestion, two before the patient arrived at the hospital.** Deaths following ingestion of 'Roundup' alone were due to a syndrome that involved hypotension, unresponsive to intravenous fluids or vasopressor drugs, and sometimes pulmonary oedema, in the presence of normal central venous pressure.

And triclopyr:

Triclopyr, including its **ester** and amine salt forms, is rapidly converted to the triclopyr acid form in the environment. The acid form is largely water-soluble, while the ester form exhibits lower solubility. Triclopyr has a low **vapor pressure**, indicating a limited tendency to volatilize into the atmosphere. In aquatic environments, triclopyr degradation is accelerated by light, with **a reported half-life of approximately 1 day under light conditions**. Without light, it is more persistent in water, with a half-life of around 142 days.^[7]

Triclopyr undergoes relatively rapid breakdown in soil, primarily through microbial activity. Soil half-lives typically range from 8 to 46 days, with longer persistence observed in deeper, less oxygenated soils. Although triclopyr is considered mobile in soil, studies have indicated limited movement below depths of 15 to 90 centimeters. Its movement in soil is influenced by factors such as organic matter content and rainfall. As a systemic herbicide, triclopyr is absorbed by plants through both leaves and roots and tends to accumulate in active growth regions. The rate of breakdown within plants varies widely depending on the species; reported half-lives in plants range from 3 to 24 days, with some plants like barley and wheat showing more rapid degradation.^[7]

The compound is slightly toxic to ducks ($LD_{50} = 1698$ mg/kg) and quail ($LD_{50} = 3000$ mg/kg).^[8] It has been found nontoxic to bees^[7] and marginally toxic to fish (rainbow trout LC_{50} (96 hr) = 117 ppm).^[9]

Garlon's fact sheet for their triclopyr ester product indicates that **triclopyr is highly toxic to fish, aquatic plants, and aquatic invertebrates, and should never be used in waterways, wetlands, or other sensitive habitats.**^[10] This is only for the triclopyr ester product, not for the triclopyr amine product.

So, let's get started!

Glyphosate works by blocking the formation of 4 essential amino acids that aren't created by animals but are created by plants. ALL proteins are made from 20 amino acids. Thus, theoretically, glyphosate doesn't affect any animals but will kill all plants. Of course, it needs photosynthesis to work.

Triclopyr is a synthetic auxin. This is a plant hormone that controls plant growth. Treatment causes the plant to grow wonky (it can't decide if it's Spring or Fall) and it dies while growing. It can be applied in winter and will begin working in Spring. It doesn't bother grasses or conifers, just broadleaf plants but it's toxic to wetland plants so must not be used near water.

Buckthorn Blasters™ are tools that can be used to apply chemicals with minimal risk of spills enabling them to be safely carried and keep costs quite low. Instructions are to use only with glyphosate but they be used with triclopyr if you clean it out thoroughly after use.

Again, read the label!

Typically, it wants a concentration of 25-50% glyphosate to kill a woody plant.

If the stuff you buy is 41% glyphosate, you can use it straight. You can reduce the concentration by adding water. A few drops of surfactant can help.

Dishwashing detergents contain surfactants. Lemon Joy works well.

Triclopyr 4 likes a 10% solution but it is mixed with oil. Diesel with an emulsifier is usually recommended but you probably don't want that in your yard. Try a horticultural oil or vegetable oil. Methylated seed oil works and is pretty cheap. There are special oils sold by the manufacturer but they are expensive and available only in large quantities.

When cutting woodies, cut to 3” or shorter. If you’re planning on mowing any of the area you’re clearing, you will want to cut low enough for the mower to clear. There may be seedlings sprouting the following year and mowing is an easy way to control them. If you drag away the cut brush, be aware you may be shedding seeds! Cutting before they grow viable seeds prevents this.

Final caveats:

The cloth end of the dauber is fragile.

Press and squeeze lightly, don't rub!

Coat the entire top except the heart-wood. Don't drip down the sides.

Cut plant stumps ooze sap which dries waterproof in about 5 minutes. Glyphosate must be applied before this. The oil with triclopyr will penetrate it.

Disposal of chemicals:

Rinsate can be saved to mix more chemicals later. Small quantities can go down a septic tank since binding with organic substances and breakdown by microbial action is how these chemicals are decomposed. Otherwise, the county engineer provides occasional toxic waste disposal.

Next, we'll be going outside to try out our new knowledge.

Before we go, are there any questions?

We've given you a handout with basic notes and a list of herbicides and local sources.