

# Weeds and Weed Management

**Weed:** *A plant that is not valued where it is growing and is usually of vigorous growth, especially one that tends to overgrow or choke out more desirable plants – Merriam Webster*



Weeds interfere with a variety of human activities and natural ecosystems, and many methods have been developed and deployed to suppress or eliminate these undesirable, out-of-place plants. Weeds affect the growth of plants surrounding them by competing for nutrients, soil, water, and space. When left unchecked, invasive weeds will overrun plants and can quickly diminish and prevent common grasses from growing and reaching optimal health.

Some weeds are tough to eradicate, making physical removal nearly impossible, particularly in large landscapes. If left uncontrolled, weeds may become hosts for pests such as nematodes, or act as reservoirs for destructive plant pathogens and viruses. Some noxious weeds are also harmful or poisonous to humans, domesticated grazing animals, and wildlife.

Universities and agricultural colleges teach courses in weed control, and work with industry to provide the necessary technologies and tools to manage them. In agriculture, weed control is essential for maintaining high levels of crop production. The United States Department of Agriculture has estimated the average annual loss nationally due to weeds at \$5 billion; the greatest single monetary loss, after soil erosion, facing agriculture today.

## Weed Management Tools

Prevention is the first goal of weed management and is done through a variety of methods and practices including chemical and biological controls, cultivation and soil preparation, cover cropping, mowing, mulching, and heat applications. Various situations merit different and combination techniques for optimal results.

## Weed Prevention

Preventative weed control refers to any control method that aims to prevent weeds from establishing in cultivated crops, pastures, or greenhouses. However, benefits of preventative weed control programs are not restricted to savings on farms. Herbicides are utilized to tamper weed populations in most every aspect of agriculture, public land management, forestry, highway, park and golf course care, and of course, home landscape maintenance.



## Herbicides

In agriculture, forestry, utility and public space management herbicides are the most frequently used weed management tool. An herbicide is a chemical used to control weed growth and development. Herbicides form the foundation of modern weed management in many industries. They are considered to be among the most effective and time-efficient methods of weed control to help maximize crop yields, prevent invasive plant species, and to protect public health and safety in right-of-ways, parks and other public spaces.

Reports show that herbicidal weed control is much cheaper and gives three to four times more net benefit than manual weed controls, which is hard, repetitive work often performed in uncomfortable heat using bare hands, shovels or digging knives. Therefore, weed control by herbicide has established economic and timesaving advantages over manual, mechanical and other weed control methods.

## Biological Weed Control

Biological control of weeds is broadly defined as the use of an agent, a complex of agents, or other biological processes to bring about weed suppression. Examples of biological control agents include, but are not limited to plant pathogens (fungi, bacteria, viruses), arthropods (mites and insects), fish, birds, and other animals who consume undesired weedy plants.



## Roadside Weed Management

Maintaining roadsides is important for safety and aesthetics. Tall weeds can become dangerous, potentially obscuring visibility, particularly at intersections. State departments of transportation and county highway departments regularly work to combat and eliminate invasive plants and noxious weeds. Using herbicides to control unwanted vegetation along roadsides provides many safety and savings benefits.

## Utility Vegetation Management

When vegetation encroaches on infrastructure such as power lines, railways, and generators, it can cause hazards and service disruptions, negatively impacting communities' safety and convenience. To keep hazardous brush from affecting areas surrounding electrical infrastructures or utility assets, vegetation control management often involves using herbicides. Controlling vegetation not only minimizes the potential for hazards and pest proliferation, but also provides sustainable ecosystems for geographically diverse species, including those that are threatened or endangered.



## Park and Golf Course Weed Management

Park and golf course owners have to think about more than just the appearance of their course. They also have to consider safety. Weeds can pose serious hazards if not controlled. Some weeds can cause allergic reactions or skin irritations. Others, like poison oak, can cause more serious health problems. Using herbicides for weed prevention helps to create a safe environment for herbivores. By engaging in weed prevention, golf courses can save money and time while still providing safe, beautiful environments for their patrons.

## Forestry

Forest landowners use herbicides and other practices to prepare forestland for tree planting and to control competing weeds that hinder survival and growth of young trees. They also use herbicides to control invasive noxious weeds, such as Scotch broom, Himalayan blackberry, and Japanese knotweed. These weeds can displace native species, encroach on roads and streams, and lower the quality of habitat for wildlife. Noxious weeds can also increase the risk of wildfires. Herbicide applications are done via aerial (helicopter, fixed-wing or unmanned aircraft system, aka drone), ground equipment or by hand.

## Residential Weed Management

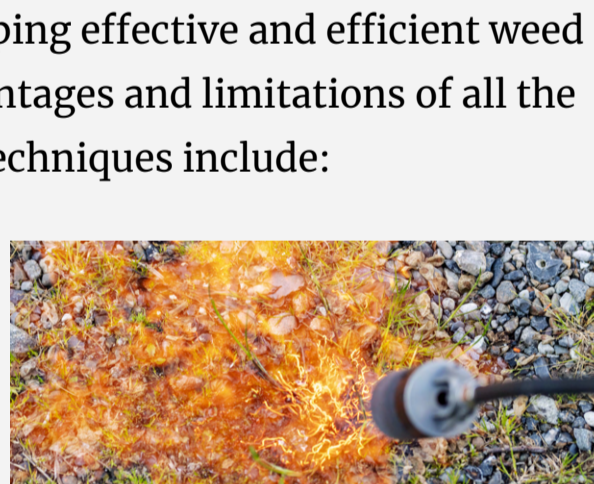
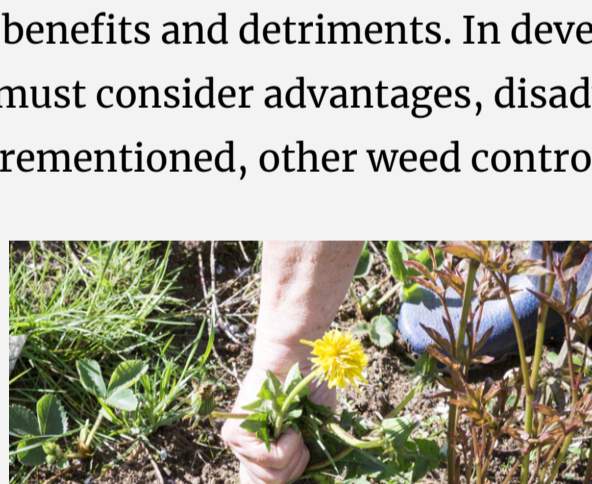
Weeds can be major pests of home lawns and can detract from the natural beauty of desirable grasses. Many weeds can quickly become the dominant species in a lawn. Even with regular mowing, if left unchecked, the weeds in your garden can destroy the patch of land that you spent so much time tending. Herbicides are one component of a residential weed control program. A selective herbicide controls certain plant species without seriously affecting the growth of other plant species. The majority of herbicides used in home lawns are selective herbicides.

## Invasive Species Control

Biological diversity and protection of endangered species includes plants which are threatened by invasive, weedy competing plant species. Three broad categories cover most invasive plant control: biological, chemical, and mechanical. Mechanical control means physically removing plants from the environment through cutting or pulling. Chemical control uses herbicides to kill plants and inhibit regrowth. Biological controls use plant diseases or insect predators, typically from the targeted species' home range. Techniques and chemicals used will vary depending on the species. Herbicides are among the most effective and resource-efficient tools to treat invasive species. Most of the commonly known invasive plants can be treated using only two herbicides—glyphosate (the active ingredient in Roundup and Rodeo) and triclopyr (the active ingredient in Brush-BGone and Garlon).

## Other Weed Control(s)

Every weed control technique has benefits and detriments. In developing effective and efficient weed management strategies, growers must consider advantages, disadvantages and limitations of all the tools available. Aside from the aforementioned, other weed control techniques include:



### Tillage/Plowing:

Tillage involves purposely disturbing the soil to bury, chop, sever, or desiccate weeds. The terms tillage and cultivation are often used interchangeably when referring to a method of controlling weeds through soil disturbance with a mechanical implement. Tillage is most common in agricultural settings but can also be used in non-crop areas and other rangelands. Effective tillage for weed control involves dragging metal blades, or tines, through the soil, usually pulled by a tractor. Tillage can result in short-term control of certain weeds but can also exacerbate weed problems in the absence of repeated treatments.

### Landscape Plastic & Garden Plastic Sheeting:

An alternative weed control, often used in organic production, is plastic sheeting and mulches. These practices block growth and kills all weeds and plants covered by the material. Black/white UV-treated weed control polyethylene sheeting creates a warm, moist environment that mitigates weeds. As the soil warms, more weeds begin to come out of their dormancy. When seeds begin to germinate, they sprout into this dark, suffocating environment, void of sunlight or air movement resulting in the death of the plant. The remaining plant residues are then consumed by worms and other organisms involved in decomposition.

### Hand Weeding:

Clearing land for new garden space can be truly back-breaking work. Ask any gardening group about you should do a stretching routine to loosen your muscles and prepare your body for the task. Pulling up weeds involves identifying the weeds you want to remove from the garden bed, loosening the soil around the weed, and pulling the entire weed up from the root. Typically, a good day to weed is one day after a nice rain.

### Hoe Weeding:

The practice of hoeing traces its long roots back to ancient civilizations. The struggle for existence between weeds and crop plants starts at the seedling stage, and, soon after emergence, weeds interact with nearby plants, either with other weeds or crops, and vie for shared growth resources. Hoeing is a fundamental agricultural practice that involves disruption of the soil surface to manage weeds and enhance soil aeration. There are three basic ways to kill weeds with a hoe: slicing them off, pulling or dragging them out of the soil, and burying them. Hoe weeding involves many workers and takes a great deal of time. If there are enough laborers and growers can afford them, then the system works. However, in the case of worker shortages, as our society faces now, things can change, facilitating a need for adaptation. Herbicides have substituted for laborers hoeing weeds out of fields and have reduced the need for cultivation of weeds with mechanical equipment, but historically, weed control has involved labor-intensive methods like manual pulling or plowing. Although these methods are still utilized, they can be time-consuming, costly, and detrimental to soil health. Modern agriculture seeks more efficient and sustainable ways to manage weeds.

### Using Flames and Electric Shocks:

Electric weed control – also known as zapping – is the process of applying electricity directly to a plant to kill it. Because weeds have been found to build tolerances to some traditional herbicides and weed-killing sprays, electric weed management machines are becoming increasingly popular in agricultural weed removal. Electric weed maintenance machines work in a variety of ways. Most often, they use electricity to essentially boil the weeds, turning the water content in the weeds into steam from tip to root.

Flame weeding entails passing a flame over a weed to heat the plant tissues just enough to kill them. A flame weeder setup consists of a wand connected to a propane tank by a hose. The goal is not to burn up the weed, but to destroy plant tissue so that the weed dies. Flame weeding kills the above ground portion of the weed, but it doesn't kill the roots. When flame weeding, the most effective method is to catch weeds early, from 1-4 inches. At this small stage, the flame is nearly 100% effective at killing weeds. As with any weeding method, if you kill back the tops often enough, the weeds will eventually give up and die.

## Safe Handling



As is the case with all chemicals, biologicals, and other weed management practices, it is important to ensure proper handling and safe usage. Always follow the label directions for the methods you are using. Most chemical and biological product labels have been approved by the Environmental Protection Agency and are based upon best assessments of data generated to register the product for its intended use. Other practices involving heat, plastics, and plowing require training and utilization of best practices to ensure safe and environmentally sustainable use.