Pacific Northwest's Least Wanted List:

Invasive Weed Identification and Management

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Weed Terms

Apex (pl. apices)—The tip.

Auricle—A small, ear-shaped lobe or appendage.

Awn—A slender, usually terminal bristle.

Axil—The angle between a leaf and stem.

Bract—A small, leaflike structure below a flower.

Disk flower—A tubular flower.

Glabrous—Smooth; without hairs.

Inflorescence—The flowering part of the plant.

Ligule—A thin, membranous outgrowth or fringe of hairs from the base of a grass blade.

Ocrea—A sheath around the stem above the base of the leaf.

Panicle—A loose, irregularly compound flowering part of a plant with flowers borne on individual stalks.

Petiole—A stem or stalk of a leaf.

Pinnate—Arising from several different positions along the side of an axis.

Raceme—An arrangement of flowers along a stem on individual stalks about equal in length.

Ray flower—Marginal petallike flowers.

Rhizome—An underground stem, usually lateral, sending out shoots above ground and roots below.

Rosette—A compact cluster of leaves arranged in an often basal circle.

Senesced—Dead.

Sepal—The outer, leaflike part of a flower.

Serrate—Saw-tooth with forward-pointing teeth.

Silique—An elongated capsule with two separate valves.

Spikelet—A flower cluster in grasses consisting of usually two basal bracts and one or more florets.

Stipule—One of a pair of appendages at the junction of a leaf petiole and a stem.

Stolon—A horizontal stem that roots at the nodes.

Surfactant—A product commonly added to herbicides to improve the wetting, emulsifying, spreading, or dispersing properties.

Trifoliolate—With three leaflets.

Umbel—A flat or rounded flower cluster with all stalks radiating from a common center.

Use Herbicides Safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the herbicide label—even if you've used the herbicide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply herbicides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from herbicide use.

By Jed Colquhoun, Extension weed specialist, Oregon State University.

Cover photo: Three invasive species that dominate the landscape—scotch broom (with yellow flowers), Himalayan blackberry (background), and slender false-brome (foreground, bottom left corner).

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Introduction

What is an invasive weed?

Invasive weeds are plants that have been introduced into an environment outside of their native range. In their new environment, they have few or no natural enemies to limit their reproduction and spread (Anonymous 2002). Invasive weeds affect us all—farmers, homeowners, taxpayers, consumers, and tourists.

Several invasive weeds also are considered noxious weeds. Noxious weeds are nonnative plants that have been legally designated as serious pests because they cause economic loss or harm the environment. Oregon, Washington, and Idaho each has a state-designated noxious weed list that changes over time as weed invasions occur. Some, but not all, of the currently designated noxious weeds are included in this publication.

Why should we care about invasive weeds?

Invasive weeds reduce crop yield and quality.

Five hundred introduced plant species have become invasive weed pests in agriculture. About 73 percent of agricultural weeds are nonnatives. Crop losses due to nonnative weeds are estimated at $24 billion per year. Additionally, $3 billion worth of herbicides are applied each year to manage invasive weeds.

Ranchers alone spend about $5 billion per year on weed control, but invasive weeds continue to spread rampantly in range and pasture land (Pimentel 2000). Invasive weeds have spread over 17 million acres of public rangeland in the western United States at a rate of 4,600 acres per day. The culprits, including leafy spurge, yellow starthistle, and medusahead, are unpalatable or even toxic to livestock (Westbrook 1998).

Invasive weeds reduce not only crop yield, but also crop quality. In Oregon, cleaning of seed crops contaminated by invasive weed seeds represents a major cost of production.

All of these impacts are eventually passed on to consumers as higher product costs.

Invasive weeds reduce biodiversity and displace native plant and wildlife species.

Invasive weeds are considered to be the second most important threat to biodiversity, after habitat destruction (Westbrook 1998). Two-thirds of all endangered plant and animal species are threatened by nonnative competitors. In many areas of the Pacific Northwest, invasive weeds such as yellow starthistle and cheatgrass now grow in monoculture (solid stands) on ground that was previously diverse and productive in plant species and wildlife.

Invasive weeds reduce land values.

The value of cropland often is reduced by invasive species such as leafy spurge and Himalayan blackberry. In Klamath County, Oregon, for example, leafy spurge is so prolific in some areas that cropland has been abandoned.

Invasive weeds inhibit recreational activities and tourism.

Much of the land used for recreational and tourist activities is publicly owned. Thus, the cost of invasive weed management often is passed on to taxpayers. Invasive weeds such as gorse and Himalayan blackberry act as physical barriers that prevent the use of land for recreational activities.

Weed management in the turf industry is very costly. It has been estimated that $500 million per year is spent on invasive weed control in residential turf and $1 billion per year in the golf course industry (Pimentel 2000). Common dandelion, for example, was introduced to North America as a salad green in the 1600s, but is now ubiquitous in American lawns.

Invasive weeds impede water flow, reduce water availability, and increase soil erosion.

Invasive weeds such as purple loosestrife can impede water flow in irrigation canals and streams, thus reducing the amount of water available for irrigation and increasing the risk of flooding. Other weeds deplete water resources used by native plants and wildlife. Saltcedar (tamarisk), for example, can use up to 200 gallons of water per day.

Invasion by weeds that have shallow root systems increases soil erosion on slopes and stream banks. English ivy has a very shallow root system and does not protect erodible soils.

Invasive weeds cause fire hazards.

Dormant or senesced invasive weeds provide fuel for wildfires. Cheatgrass, or downy brome, increases fire frequency from once every 60 years to once every 3 to 5 years. Restoration and fire management in cheatgrass-dominated lands cost taxpayers millions of dollars per year. In 1936, gorse provided the primary fuel source for a fire that burned the town of Bandon, Oregon. Gorse is highly flammable and grows in densely populated coastal areas where property values are high.

Some invasive weeds are toxic to animals and humans.

Several invasive weeds are not only unpalatable to livestock, but also can be toxic. The milky sap of leafy spurge, which dominates a large portion of pasture and rangeland in the western U.S., irritates cattle's eyes, mouth, and digestive tract.

Invasive weeds that are poisonous to humans are not uncommon. Giant hogweed, a weed found in residential areas, ironically was introduced as an ornamental. Unfortunately, the sap is an irritant that, when combined with exposure to sunlight, causes severe skin blistering.

Why are some nonnative plants invasive, while others are not?

The most successful invasive weeds share several biological characteristics:

- Specialized adaptations for spreading long distances by seed
- Seed dormancy that ensures germination and growth in environmental conditions that favor survival and reproduction
- Prolific reproductive capabilities—both as seed and as vegetative tissue (roots, rhizomes, etc.)
- Long seed life in soil or water
- Rapid early growth and expansion of a root system
- Rapid and early maturation
- Tolerance of low resource levels (e.g., nutrients and water)
- Absorption of excessive levels of nutrients and water that otherwise would be used by neighboring plants
- Genetic and environmental adaptability that ensures survival in a variety of climate, soil, and environmental conditions
- Ability to adapt to management strategies (e.g., to develop resistance to herbicides)

General weed management techniques

Cutting/mowing

Cutting or mowing plants effectively controls some weeds, while stimulating regrowth and branching of other species. In general, control often is greatest when weeds are young and with species that branch above the point of cutting or mowing. Low-branching species often grow multiple shoots from a single cut branch, thus increasing the reproductive potential and competitiveness with desirable species. It often is important to remove plant material from the site after plants are cut or mowed to prevent resprouting or weed seed production.

Manual removal

Manual removal of annual weeds, particularly when they are seedlings, can effectively limit their establishment when they are confined to small areas. This management technique is limited by the size of the infested area relative to what can be practically removed by hand. Some invasive weed species, such as giant hogweed, are toxic to humans, so manual removal can be dangerous. As with cutting or mowing, manually pulled weeds often need to be removed from the site to prevent seed production and resprouting.

Biological control

Biological control of invasive weeds can include feeding by insects or animals or control with a plant pathogen. Biological controls available for release must pass stringent standards to ensure that they are specific to the invasive weed and will not harm desirable or native species. Introduced biological control agents also must be able to survive in their new habitat. While these requirements often limit the ability to successfully implement biological control, there are several success stories of invasive weeds being kept in check by introduced agents. Consult your state Department of Agriculture for a list of acceptable control agents and sources of their availability.

Burning

Where allowed and feasible, burning can effectively and economically control several invasive weed species that have spread over large areas. However, several weed species (such as gorse) are extremely flammable and thus pose a fire hazard. Others are very tolerant of fire and opportunistically take advantage after a fire of resources previously occupied by fire-intolerant plant species.

Herbicides

Invasive weeds often are managed with herbicides. The practical use of herbicides for invasive weed management is limited by cost or lack of selectivity. (Desirable species are injured by the herbicide.) Herbicide application timing is critical to successful weed control. Perennial weeds often are controlled best when herbicides are applied from the time the plant is in the bud stage until the first hard frost. At this stage, perennial weeds are moving resources from the aboveground portion of the plants to the roots, and translocated herbicides (herbicides, such as glyphosate, that move in the plant's piping system) will accompany these resources into the root system. For more information on herbicides, consult *How Herbicides Work* (Oregon State University Extension Service publication EM 8785). ***The herbicides listed in this guide are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.***

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CONTENTS

This publication describes the identifying characteristics, origin, habitat and ecology, and management strategies for selected invasive weeds in the Pacific Northwest. The list is not inclusive of all invasive weeds, but focuses on the most dominant or potentially invasive species that plague our land.

Blessed milkthistle (*Silybum marianum*)

Life cycle

Winter annual or biennial

Identification

Blessed milkthistle often is referred to as a thistle, but is a member of the sunflower family. Large (up to 1 foot long) leaves with spiny margins and distinctive white marbling along veins. Multiple ridged stems up to 6 feet tall end in a thistlelike red to purple flower head. Flower head has bracts with long, spiny tips.

Origin

Blessed milkthistle is a native of Europe, the Mediterranean, and North Africa, but is now distributed worldwide. It is thought to have been introduced to the western U.S. in cattle feed and spread quickly in the 1940s.

Blessed milkthistle seedling (top) and mature plant (bottom).

Impact

Blessed milkthistle contains high nitrate levels, which can cause health problems in livestock. It is commonly found in pastures, where it reduces forage yield and marketability. Blessed milkthistle forms dense stands that outcompete native and desirable species.

Habitat and ecology

Blessed milkthistle reproduces by seed but not vegetatively. Seed production is up to 5,000 seeds per plant. Seeds remain viable for about a decade. Germination occurs soon after fall moisture. Plants remain in the rosette stage during winter months, then bolt and flower in early summer. Common in disturbed soils with high fertility and minimal soil litter or plant residue. Poor competitor in established plant communities, but will take advantage of areas of weak vegetation in noncropland areas and pastures.

Management

Cutting/mowing: Cutting or mowing can be effective, particularly when repeated.

Manual removal: Pulling plants is effective in small populations and during the seedling stage. Areas opened by plant removal should be seeded immediately with desirable species to suppress future blessed milkthistle seedlings.

Biological control: The thistle head weevil (*Rhinocyllus conicus*) in the larval stage will attack the seed head and reduce blessed milkthistle seed production. Some strains attack native thistles, so use caution when deciding whether insect release is appropriate.

Burning: Burning effectively limits seed production, but may stimulate germination of seeds already in the soil.

Herbicides: Effective herbicides include:

Herbicide	Comments
2,4-D (several trade names)	Apply to seedlings in the rosette stage for maximum control.
dicamba (Banvel, Clarity, etc.)	Apply to seedlings in the rosette stage for maximum control.
picloram (Tordon)	Apply to seedlings in the rosette stage for maximum control.

The above herbicides are listed based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

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