

Oregon Department of Agriculture
Plant Pest Risk Assessment for
Barbed and Ovate Goatgrass, *Aegilops triuncialis*, *A. geniculata*
2010

Name: Barbed goatgrass, *Aegilops triuncialis*, a.k.a. barb goatgrass

Name: Ovate goatgrass, *Aegilops geniculata*, a.k.a. *Aegilops ovata*

Family: Grass, *Poaceae*

Findings of this Review and Assessment: Goatgrasses, *Aegilops spp.*, were evaluated and determined to be a category “**A**” rated noxious weeds, as defined by the Oregon Department of Agriculture (ODA) Noxious Weed Policy and Classification System. This determination was based on a literature review and analysis using two ODA evaluation forms. Using the Noxious Qualitative Weed Risk Assessment v.3.8, goatgrasses scored **66** indicating a Risk Category of **A**; and a score of **19** with the Noxious Weed Rating System v.3.2, indicating an “**A**” rating.

Introduction: Barbed goatgrass, *Aegilops triuncialis* and ovate goatgrass, *Aegilops geniculata* are weedy annuals infesting rangelands and pastures in the northern half of California. The USDA federally listed goatgrass as a noxious weeds. Both species also cause injury to grazing animals resulting in increased economic stress for livestock producers.



Barbed goatgrass stem
Photo by Joseph M. DiTomaso, University
of California - Davis, Bugwood.org



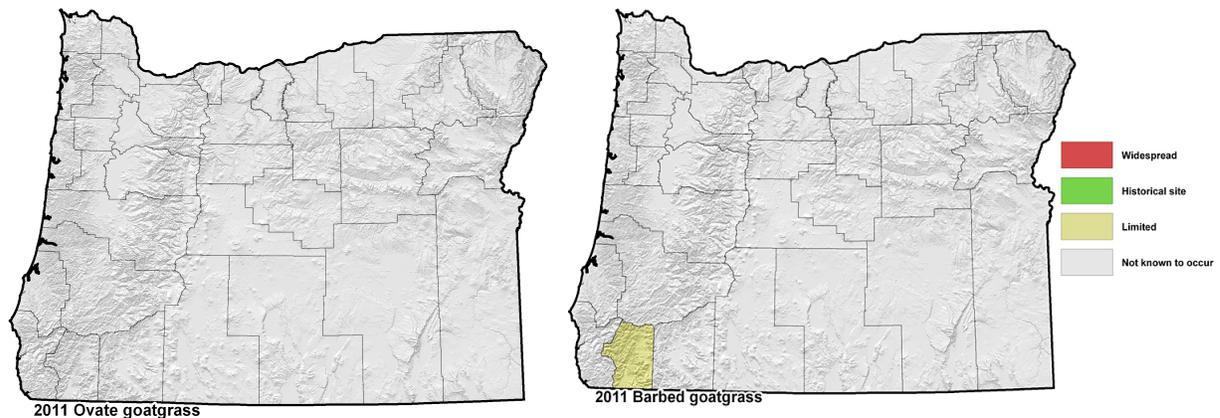
Ovate goatgrass stem
Photo by Joseph M. DiTomaso, University
of California-Davis, Bugwood.org

Growth Habits, Reproduction, and Spread: Barbed and ovate goatgrass are winter annuals, related to (can hybridize with), winter wheat (Wikipedia 2010). They mature in May-June. Immature spikes are often reddish or purplish. Mature spikes are cylindrical in barbed goatgrass; ovate cylindrical in ovate goatgrass. Barbed goatgrass spikes disperse from the parent plant as joined units at maturity, eventually breaking down to release their seeds. Ovate goatgrass spikes remain intact on the plant. The joint ends are sharp and can cause severe mechanical injury to livestock (CDFA 2001). Glume and lemma awns surrounding each seed have minute backward-pointing spines, enabling the awns to work their way into animal eyes and feet making removal difficult and often resulting in infection. Grazing animals should be removed from infested areas before plants mature (CDFA 2001). Seed germination occurs over a wide range of temperatures (less than 5° C and greater than 25° C). Plant growth of barbed goatgrass has a mostly spreading morphology growing vertically up to 45 cm tall. Ovate goatgrass is more tufted and generally reaching a height of 25 cm. Early growth for both species is rapid with the roots reaching a greater soil depth than downy brome and medusahead rye, giving these plants a strong competitive advantage in dryland situations. The species are well adapted to a wide selection of hardiness zones (see Attachment A) including dry cold to dry heat to seasonally moist areas in the temperate zone. Barbed goatgrass has been found growing up to 3000 above sea level. In California, the two species primarily infest rangeland and pastures, including grasslands and oak woodlands, but usually not chaparral. It is tolerant of serpentine soil and grows in hard, shallow, dry, gravelly soils. The habitat available for invasion throughout the West is significant putting this plant in direct conflict with important agricultural activities.

Dispersal: Goatgrasses reproduce only by seed. Barbed goatgrass has long barbed awns which catch easily to objects, which may then be transported by animals, humans, vehicles, and equipment to new locations. Dispersal also occurs through commerce, with the movement of contaminated hay or cereal grains, or by moving water.

Native Range: Barbed and ovate goatgrass are native to Western Asia, and Mediterranean Europe.

Hardiness zones: Goatgrass can be found in 4-5 hardiness zones. See attachment A.



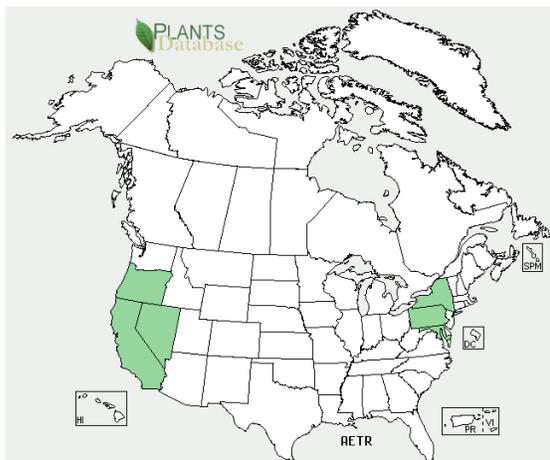
Oregon's distribution of goatgrass on WeedMapper

Distribution in North America: Barbed goatgrass was first reported from California's Sacramento Valley foothills. This introduction was associated with the importation of Mexican cattle into El Dorado and Sacramento Counties in the early 1900's. It has expanded its range recently to the Cascade Range foothills, southern North Coast Ranges, Sacramento Valley, northern and central Sierra Nevada foothills, Central Coast, San Francisco Bay region, and South Coast Ranges. There is a single infestation in Oregon near Cave Junction in Josephine County.

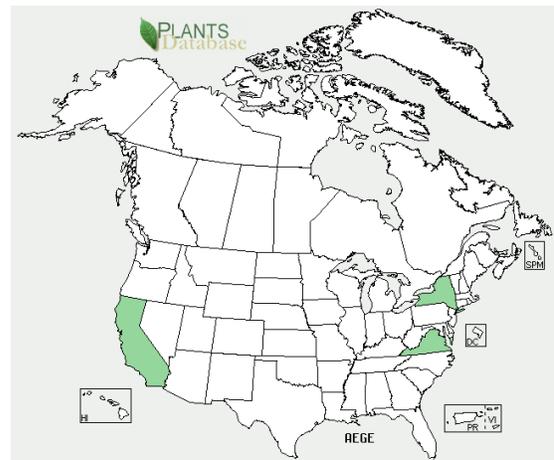
It has been treated yearly with no seed production occurring though it persists with about 30-80 plants a year emerging (French pers.con. 2007). Ovate goatgrass is found in rangeland and non-crop areas of the California Coast Range foothills, Mendocino County, near Willits, California.

Positive Economic Impact: There are no known positive impacts from escaped populations barbed or ovate goatgrass.

Negative Economic Impact: Barbed and ovate goatgrass are unpalatable to livestock, especially at maturity. Its long awns protrude from the seed head and can cause serious physical injury to grazing animals. Goatgrass infestations can reduce forage quality and quantity by up to 50 to 75 percent. Because livestock tend to avoid the plant, selective defoliation of more desirable plants promotes the competitiveness of goatgrasses.



Barbed goatgrass distribution in US



Ovate goatgrass distribution in US

Ecological Impacts: Barbed goatgrass grows in dense stands with a deep and rapidly establishing root system that makes it extremely competitive on annual rangelands. The tillering habit of seedlings and the slowly decomposing thatch create a mulch that crowds out all other desirable forage and native perennial species creating monotypic stands.

Control: Prevention of initial establishment is the key to successful control, because once established, eradication is very difficult. Where known infestations exist, roads, trails and animal paths in the area should be monitored for outlyer populations. Grazing animals should be removed from infested areas before plants mature to prevent seed dispersal by livestock. Hay growers should monitor fields and remove infestations prior to seed development and grain growers should only plant certified seed.

Mowing can be an effective method of reducing goatgrass seed production. However, the timing is critical. Mowing should occur after flowering, but before seeds reach the soft boot stage. Early mowing will result in new tiller growth and late mowing will only spread viable seed. Hand pulling or hoeing small infestations is effective, if the roots are pulled and air-dried. Mature plants should be bagged.

Barbed and ovate goatgrass generally mature later than most annual grasses found in rangelands. This may provide an effective window for controlling goatgrass seed production, without compromising desirable annual grass seed production. Recent research on barbed goatgrass has shown some success that is applicable for both species using an early summer burn. It is important to burn before the jointed seeds disperse, to ensure seed kill. Burning will not effectively control seed on the soil surface.

Dormancy studies indicate seed may be viable in the soil for up to five years. Goatgrass populations may also increase the year after burning due to increased germination resulting from higher fertility and more sunlight. Consequently, a sound second year management strategy must be incorporated targeting seedlings, and the population should be monitored for several years (DiTomaso & Merenlender 2000).

There are no selective herbicides for goatgrass control. Nonselective herbicides such as glyphosate (0.38-0.75 lb ae/A) may be applied to control small infestations. Applications should be made to plants in the spring after goatgrass has tillered but before flowering occurs. A fall reseeding program of perennial grasses and legumes, should follow spot treatments. In rangeland, burning the first year followed by a herbicide and competitive seeding the second year may improve goatgrass control. Monitoring and spot treatments should be employed to detect new infestations and prevent their spread.

Noxious Weed Qualitative Risk Assessment Oregon Department of Agriculture

Common name: Barbed and ovate goatgrass
Scientific name: *Aegilops triuncialis*, *A. geniculata*
Family: Grass, *Poaceae*

For use with plant species that occur or may occur in Oregon to determine their potential to become serious noxious weeds. For each of the following categories, select the number that best applies. Numerical values are weighted to increase priority categories over less important ones. Choose the best number that applies, intermediate scores can be used.

Total Score: 66 Risk Category: A

GEOGRAPHICAL INFORMATION

- 1) **6 Invasive in Other Areas**
0 Low- not know to be invasive elsewhere.
2 Known to be invasive in climates dissimilar to Oregon's current climates.
6 Known to be invasive in geographically similar areas.
Comments: Grows in areas with similar climate.
- 2) **6 Habitat Availability:** Are there susceptible habitats for this species and how common or widespread are they in Oregon?
1 *Low* – Habitat is very limited, usually restricted to a small watershed or part of a watershed (e.g., tree fern in southern Curry County).
3 *Medium* – Habitat encompasses 1/4 or less of Oregon (e.g., oak woodlands, coastal dunes, eastern Oregon wetlands, Columbia Gorge).
6 *High* – Habitat covers large regions or multiple counties, or is limited to a few locations of high economic or ecological value (e.g., threatened and endangered species habitat).
Comments: Potential habitat covers large areas especially small grain growing regions.
- 3) **0 Proximity to Oregon:** What is the current distribution of the species?
0 *Present* – Occurs within Oregon.
1 *Distant* – Occurs only in distant US regions or foreign countries.
3 *Regional* – Occurs in Western regions of US but not adjacent to Oregon border.
6 *Adjacent* – Weedy populations occur adjacent (<50 miles) to Oregon border.
Comments: Occurs in Oregon.
- 4) **10 Current Distribution:** What is the current distribution of escaped populations in Oregon?
0 *Not present* – Not known to occur in Oregon.
1 *Widespread* – Throughout much of Oregon (e.g., cheatgrass).
5 *Regional* – Abundant (i.e., occurs in eastern, western, central, coastal, areas of Oregon) (e.g., gorse, tansy ragwort).
10 *Limited* – Limited to one or a few infestations in state (e.g., kudzu).
Comments: Limited to one known infestation in the state.

BIOLOGICAL INFORMATION

- 5) 4 **Environmental Factors:** Do abiotic (non-living) factors in the environment effect establishment and spread of the species? (e.g., precipitation, drought, temperature, nutrient availability, soil type, slope, aspect, soil moisture, standing or moving water).
- 1 *Low* – Severely confined by abiotic factors.
 - 2 *Medium* – Moderately confined by environmental factors
 - 4 *High* – Highly adapted to a variety of environmental conditions (e.g., tansy ragwort, Scotch broom).

Comments: Highly adapted to a wide variety of environment.

- 6) 5 **Reproductive Traits:** How does this species reproduce? Traits that may allow rapid population increase both on and off site.
- 0 *Negligible* – Not self-fertile, or is dioecious and opposite sex not present.
 - 1 *Low* – Reproduction is only by seed, produces few seeds, or seed viability and longevity are low.
 - 3 *Medium* – Reproduction is vegetative (e.g., by root fragments, rhizomes, bulbs, stolons).
 - 3 *Medium* – Produces many seeds, and/or seeds of short longevity (< 5 years).
 - 5 *High* – Produces many seeds and/or seeds of moderate longevity (5-10 years) (e.g., tansy ragwort).
 - 6 *Very high* – Has two or more reproductive traits (e.g., seeds are long-lived >10 years and spreads by rhizomes).

Comments: Produces seeds of moderate longevity.

- 7) 4 **Biological Factors:** Do biotic (living) factors restrict or aid establishment and spread of the species? (What is the interaction of plant competition, natural enemies, native herbivores, pollinators, and pathogens with species?)
- 0 *Negligible* – Host plant not present for parasitic species.
 - 1 *Low* – Biotic factors highly suppress reproduction or heavily damage plant for an extended period (e.g., biocontrol agent on tansy ragwort).
 - 2 *Medium* – Biotic factors partially restrict or moderately impact growth and reproduction, impacts sporadic or short-lived.
 - 4 *High* – Few biotic interactions restrict growth and reproduction. Species expresses full growth and reproductive potential.

Comments: Few biotic factors inhibit growth.

- 8) 3 **Reproductive Potential and Spread After Establishment - Non-human Factors:** How well can the species spread by natural means?
- 0 *Negligible* – No potential for natural spread in Oregon (e.g., ornamental plants outside of climate zone).
 - 1 *Low* – Low potential for local spread within a year, has moderate reproductive potential or some mobility of propagules (e.g., propagules transported locally by animals, water movement in lakes or ponds, not wind blown).
 - 3 *Medium* - Moderate potential for natural spread with either high reproductive potential or highly mobile propagules (e.g., propagules spread by moving water, or dispersed over longer distances by animals) (e.g., perennial pepperweed).
 - 5 *High* – Potential for rapid natural spread throughout the susceptible range, high reproductive capacity and highly mobile propagules. Seeds are wind dispersed over large areas (e.g., rush skeletonweed).

Comments: Moderate potential for natural spread. Dispersed by animals.

- 9) 4 **Potential of Species to be Spread by Humans.** What human activities contribute to spread of species? Examples include: interstate or international commerce; contaminated commodities; packing materials or products; vehicles, boats, or equipment movement; logging or farming; road maintenance; intentional introductions of ornamental and horticultural species, or biofuel production.
- 1 *Low* – Potential for introduction or movement minimal (e.g., species not traded or sold, or species not found in agricultural commodities, gravel or other commercial products).
 - 3 *Medium* – Potential for introduction or off-site movement moderate (e.g., not widely propagated, not highly popular, with limited market potential; may be a localized contaminant of gravel, landscape products, or other commercial products) (e.g., lesser celandine, Canada thistle).
 - 5 *High* – Potential to be introduced or moved within state high (e.g., species widely propagated and sold; propagules common contaminant of agricultural commodities or commercial products; high potential for movement by contaminated vehicles and equipment, or by recreational activities) (e.g., butterfly bush, spotted knapweed, Eurasian watermilfoil).

Comments: Human agriculture activities move this species.

IMPACT INFORMATION

- 10) 7 **Economic Impact:** What impact does/can the species have on Oregon's agriculture and economy?
- 0 *Negligible* – Causes few, if any, economic impacts.
 - 1 *Low* - Potential to, or causes low economic impact to agriculture; may impact urban areas (e.g., puncture vine, pokeweed).
 - 5 *Medium* – Potential to, or causes moderate impacts to urban areas, right-of-way maintenance, property values, recreational activities, reduces rangeland productivity (e.g., English ivy, Himalayan blackberry, cheatgrass).
 - 10 *High* – Potential to, or causes high impacts in agricultural, livestock, fisheries, or timber production by reducing yield, commodity value, or increasing production costs (e.g., gorse, rush skeleton weed, leafy spurge).

Comments: Species is damaging to small grain production through cross breeding.

- 11) 3 **Environmental Impact:** What risks or harm to the environment does this species pose? Plant may cause negative impacts on ecosystem function, structure, and biodiversity of plant or fish and wildlife habitat; may put desired species at risk.
- 0 *Negligible* – None of the above impacts probable.
 - 1 *Low* – Can or does cause few or minor environmental impacts, or impacts occur in degraded or highly disturbed habitats.
 - 4 *Medium* – Species can or does cause moderate impacts in less critical habitats (e.g., urban areas, sagebrush/ juniper stands).
 - 6 *High* – Species can or does cause significant impacts in several of the above categories. Plant causes severe impacts to limited or priority habitats (e.g., aquatic, riparian zones, salt marsh; or T&E species sites).

Comments:

- 12) 2 **Impact on Health:** What is the impact of this species on human, animal, and livestock health? (e.g., poisonous if ingested, contact dermatitis, acute and chronic toxicity to livestock, toxic sap, injurious spines or prickles, causes allergy symptoms.
- 0 *Negligible* – Has no impact on human or animal health.
 - 2 *Low* – May cause minor health problems of short duration, minor allergy symptoms (e.g., leafy spurge).
 - 4 *Medium* – May cause severe allergy problems, death or severe health problems through chronic toxicity, spines or toxic sap may cause significant injury. (e.g., giant hogweed, tansy ragwort).
 - 6 *High* – Causes death from ingestion of small amounts, acute toxicity (e.g. poison hemlock).

Comments:

CONTROL INFORMATION

- 13) 10 **Probability of Detection at Point of Introduction:** How likely is detection of species after introduction and naturalization in Oregon?
- 1 *Low* – Grows where probability of early detection is high, showy and easily recognized by public; access to habitat not restricted (e.g., giant hogweed).
 - 5 *Medium* – Easily identified by weed professionals, ranchers, botanists; some survey and detection infrastructure in place. General public may not recognize or report species (e.g., leafy spurge).
 - 10 *High* – Probability of initial detection by weed professionals low. Plant shape and form obscure, not showy for much of growing season, introduction probable at remote locations with limited access (e.g., weedy grasses, hawkweeds, skeletonweed).

Comments: Grass is obscure and not tall or showy.

- 14) 2 **Control Efficacy:** What level of control of this species can be expected with proper timing, herbicides, equipment, and biological control agents?
- 1 *Negligible* – Easily controlled by common non-chemical control measures (e.g., mowing, tillage, pulling, and cutting; biocontrol is very effective at reducing seed production and plant density) (e.g., tansy ragwort).
 - 2 *Low* – Somewhat difficult to control, generally requires herbicide treatment (e.g., mechanical control measures effective at preventing flowering and but not reducing plant density; herbicide applications provide a high rate of control in a single application; biocontrol provides partial control).
 - 4 *Medium* – Treatment options marginally effective or costly. Tillage and mowing increase plant density (e.g., causes tillering, rapid regrowth, spread from root fragments). Chemical control is marginally effective. Crop damage occurs or significant non-target impacts result from maximum control rates. Biocontrol agents ineffective.
 - 6 *High* – No effective treatments known or control costs very expensive. Species may occur in large water bodies or river systems where containment and complete control are not achievable. Political or legal issues may prevent effective control.

Comments: Herbicides generally required for treatment.

Category Scores:

22 Geographic score (Add scores 1-4)

20 Biological Score (Add lines 5-9)

12 Impact Score (Add lines 10-12)

12 Control Score (Add Lines 13-14)

66 Total Score (Add scores 1-14 and list on front of form)

Risk Category: 55-89+ = **A** 24-54 = **B** < 24 = unlisted.

This Risk Assessment was modified by ODA from the USDA-APHIS Risk Assessment for the introduction of new plant species.

1/15/2013 v.3.8

Oregon Department of Agriculture
Noxious Weed Rating System

Common Name: Barbed and ovate goatgrass
Scientific Name: *Aegilops triuncialis*, *A. geniculata*

Point Total: 19 Rating: A

- 1) **4 Detrimental Effects:** Circle all that apply, enter number of circles.
1. *Health:* causes poisoning or injury to humans or animals
 2. *Competition:* strongly competitive with crops, forage, or native flora
 3. *Host:* host of pathogens and/or pests of crops or forage
 4. *Contamination:* causes economic loss as a contaminate in seeds and/or feeds
 5. *Interference:* interferes with recreation, transportation, harvest, land value, or wildlife and livestock movement
- 2) **3 Reproduction & Capacity for Spread:** Circle the number that best describes, enter that number.
1. Few seeds, not wind blown, spreads slowly
 2. Many seeds, slow spread
 3. Many seeds, spreads quickly by vehicles or animals
 4. Windblown seed, or spreading rhizomes, or water borne
 5. Many wind-blown seeds, high seed longevity, spreading rhizomes, perennials
- 3) **3 Difficulty to Control:** Circle the number that best describes, enter that number.
1. Easily controlled with tillage or by competitive plants
 2. Requires moderate control, tillage, competition or herbicides
 3. Herbicides generally required, or intensive management practices
 4. Intensive management generally gives marginal control
 5. No management works well, spreading out of control
- 4) **6 Distribution:** Circle the number that best describes, enter that number.
1. Widely distributed throughout the state in susceptible habitat
 2. Regionally abundant, 5 or more counties, more than 1/2 of a county
 3. Abundant throughout 1- 4 counties, or 1/4 of a county, or several watersheds
 4. Contained in only 1 watershed, or less than 5 square miles gross infestation
 5. Isolated infestation less than 640 acres, more than 10 acres
 6. Occurs in less than 10 acres, or not present, but imminent from adjacent state
- 5) **3 Ecological Impact:** Circle the number that best describes, enter that number.
1. Occurs in most disturbed habitats with little competition
 2. Occurs in disturbed habitats with competition
 3. Invades undisturbed habitats and crowds out native species
 4. Invades restricted habitats (i.e. riparian) and crowds out native species

19 TOTAL POINTS

Note: Noxious weeds are non-native plants with scores of 11 points or higher. Any plants in 4.1, 4.2, and 4.3 should not be classified as “A” rated weeds. *Ratings:* 16 + = A, 15 – 11= B
ODA Weed Rating System 1/15/2013 v.3.8

RA produced by Ken French, ODA, 2010. Edited by Glenn Miller, ODA

References:

Aegilops genus. California Department of Food and Agriculture Available from:
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Aegilops. From Wikipedia, the free encyclopedia. Available from:
<http://en.wikipedia.org/wiki/Aegilops>

DiTomaso, J. M., A. Merenlender, et al. (2000). Control of barbed goatgrass using prescribed burning. California Exotic Pest Plant Council Symposium 2000. Concord, CA.

French, Ken 2007 personal communication. Oregon Department of Agriculture.

Plants database: Aegilops triuncialis Available from:
<http://plants.usda.gov/java/profile?symbol=aetr>

Ovate goatgrass. AlterVista available from:
<http://luirig.altervista.org/photos-en/aegilops-geniculata---ovate-goat-grass.htm>

Attachment A

