

Oregon Department of Agriculture
Plant Pest Risk Assessment for Matgrass
Nardus stricta
March, 2010 Revised February 2015

Name: Matgrass (*Nardus stricta*) aka. Moor grass, Nard grass, Old man's beard
Family: Poaceae (alt. Gramineae)

Findings of this review and assessment: *Nardus stricta* has been determined to be a category of an "A" listed noxious weed as defined by the Oregon Department of Agriculture (ODA) Noxious Weed Policy and Classification System. This determination is based on two independent risk assessments following a literature review. Using a rating system adapted from United States Department of Agriculture, Animal and Plant Health Inspection Services, Plant Protection and Quarantine (USDA-APHIS PPQ) Weed Risk Assessment Guidelines, Matgrass scored **59** out of a potential score of 90. Using the ODA Noxious Weed Rating system, Matgrass scored **16**.

Introduction: Matgrass (*Nardus stricta*) is a member of the Poaceae or grass family and is native to Eastern Europe and the Caucasus Mountains and Siberia. Matgrass has spread over large acreages in Scotland, England, Denmark, and Sweden as well as other areas in Western Europe. Matgrass appears in sub-alpine meadows and lowland moors in Europe (Mitchel et.al. 2008). The plant is invasive in moist acid soils with low calcium content such as alpine meadows and peat ground. In the Scandinavian countries, England, and Scotland, matgrass has converted much of the native peat bog pastures to near solid stands of *nardus stricta*. Matgrass has invaded the poorer soils of the hillsides in these European countries as well. The plant is wiry and unpalatable to most livestock and is only grazed by sheep or goats.

Growth Habits, Reproduction, and Spread: Matgrass is a tussock grass, or perennial bunch type grass. It grows up to 8 inches in height and produces colonies of three feet and larger in diameter. It is one of the first grasses to start growing in April on the pastures in the Fort Klamath area, starting just a couple of weeks after the snow melts, and blooms in late May to early June. The leaves of matgrass appear to be narrow or cylindrical because the leaves are folded tightly along the midrib. Flower spike lets form on one side of the tips of the stems. *Nardus stricta* is self fertile which enables even single plants to produce viable seed and establish new colonies (Kissling et. al. 2006). The seeds ripen by mid-June and are released or flung by the plant and generally land only a few inches from the mother plant, thereby enlarging the colony as they germinate. Seedling plants usually are only about 1/2 inch to 1 inch in diameter are extremely hard to find amongst the other grasses. Each plant will grow up to 3 to 4 inches in diameter and after over- wintering often will have a straw colored tuft of dead leaves in the center. Matgrass has been spread by the cloven hooves of animals in Europe.

Native Range: The Caucasus Region of Asia and Siberia. It has become naturalized in most of Eastern Europe and in Western Europe from Scotland, England, to the Scandinavian countries.

Distribution in North America: The earliest introduction into North America occurred in the Eastern U.S. states of Massachusetts, Michigan, New Hampshire, Vermont, and New York. Matgrass is also found in Canada in Ontario, Quebec, New Foundland, and Nova Scotia. In the Western U.S. matgrass is only found at one site in Idaho and one site in Oregon. Oregon's infestation occurs in Klamath County on a peat pasture in Fort Klamath, probably originating during the late 1960's or early 1970's. It has been speculated that the seed was brought to the pasture in the feathers of a goose that had migrated in from Siberia (Barrett per.com.2009). The weedy grass was first noticed around 1975 by the landowner as enlarging colonies among the native grasses. Since that time, the infestation has spread from the one pasture into three adjacent pastures and in 2007 an additional pasture was identified as infested. The practice of dragging fields in the spring to break up manure piles on the pastures in Fort Klamath has apparently moved the matgrass over about 200 acres gross, with there being about 3 net acres of matgrass plants (Barrett per com.2009). Chemical treatment has been made on the matgrass infestation every year since 1976. New infestations will be difficult to detect in the early stages. The species is low growing, not showy and blends in well with other grasses. It would take a trained observer to locate small outbreaks that may occur throughout lands in Eastern Oregon.



Habitat availability in Oregon: Wet pastures and meadows are matgrass' preferred habitat (Kissling et.al. 2005). Significant acres of seasonally wet grasslands exist especially in Klamath, Harney and Lake counties. These moist native pastures are also the most productive grass producers.



Positive Economic Impact: In Europe, where *Nardus* is common in heath and moorlands, the grass is best grazed by a combination of sheep and cattle (Mitchel et.al. 2008). In North America, other native and introduced grasses provide superior forage resulting in no net economic benefits associated with matgrass..

Negative Economic Impact: Matgrass has a coarse or stiff leaf texture, and is unpalatable to most livestock. Livestock, deer, and elk will not graze on matgrass except by accident whereby they tend to spit it out. Matgrass forms colonies, which grow in size each year displacing valuable pasture grasses, making infested pastures less productive and valuable for forage. Forage loss in these most productive pastures would create economic stress in livestock dependent communities. Large infestations of matgrass would also decrease land values should those lands become less valuable as forage producers. Because of these threats, matgrass is listed as an “A” rated noxious weed by the Idaho Department of Agriculture and Oregon Department of Agriculture

Ecological Impacts: Matgrass colonizes sub-alpine meadows, peat soils, and soils that tend to be wet and acidic. Matgrass will move upslope onto less productive soils also. Matgrass forms colonies that increase in diameter each year displacing all native vegetation within each colony. In New Zealand Kissling et. al. 2005 showed that the plant was able to dominate up to 90% of the cover, seriously decreasing native plant populations.

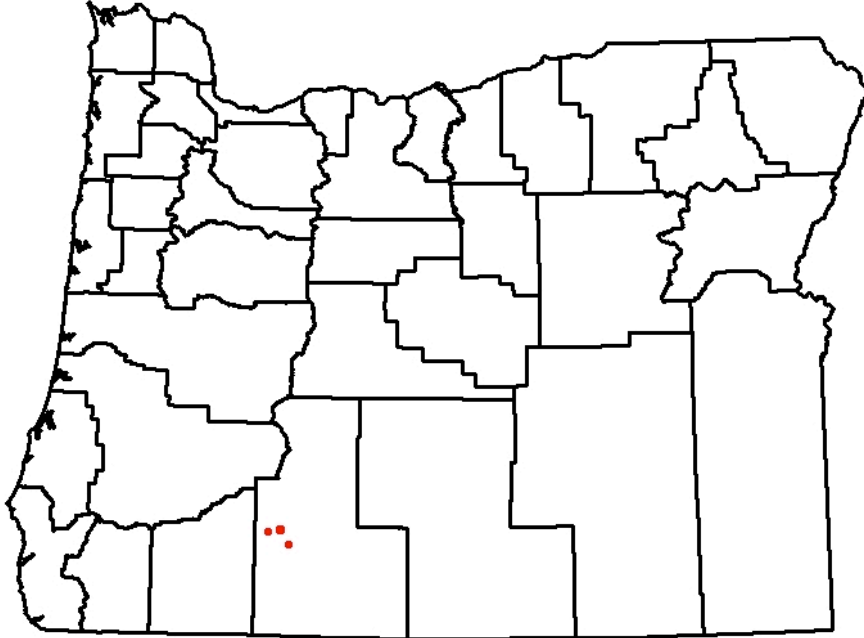
Biological factors that restrict plant growth: Matgrass is fairly resistant to grazing from both mammals and insects. In Oregon, it appears to grow to its full potential.

Dispersal factors: The movement of contaminated hay or livestock would play a big role in matgrass spread. Seeds attached to animal hooves must be considered a likely risk factor. Landowners with infested land must be made aware of the potential risk associated with the removal of hay and livestock from infested property.



Control: Matgrass can be controlled using grass herbicides such as glyphosate. Spot treatments of glyphosate on matgrass colonies are very effective in destroying colonies or large individual plants. The most troubling problems with control projects are locating matgrass seedlings amongst other grasses, which is very difficult due to their small size and very fine leaves.

Matgrass seedlings that are not treated appear to set seed in eight weeks or less. Digging matgrass plants out of the ground does not appear to be an effective control method due to the disturbance of the soil, which actually encourages seeds to sprout (Barrett pers. com. 2009). The most effective control program for matgrass appears to be a broadcast chemical treatment of the infested area plus a large area surrounding the infestation for multiple years until the soil seed bank is depleted. If the matgrass infested ground could be placed in an annual cultivation program for several years the soil seed bank could be depleted also.



Oregon Distribution
Weedmapper

Noxious Weed Qualitative Risk Assessment
Oregon Department of Agriculture

Common name: Matgrass
Family: Poaceae (alt.Gramineae)
Scientific name: *Nardus stricta*

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: 59 Risk category: A

GEOGRAPHICAL INFORMATION

- 1) 6 **Invasive in Other Areas**
- 0 Low- not known 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:

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: Explanation: Susceptible habitat is enormous. Matgrass can invade Oregon's coastal zone and perhaps even areas in the Willamette Valley that are similar in climate and soils to European infestations.

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:

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:

BIOLOGICAL INFORMATION

5) 3 **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: Plant can tolerate a range of temperatures but requires adequate soil moisture to thrive.

- 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 many 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: Species expresses full growth and reproductive potential.

- 8) 2 **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: Movement by livestock or water.

- 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: May be moved by equipment and in hay.

IMPACT INFORMATION

10) 5 **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: Causes a decrease in desirable forage production on infested lands.

11) 2 **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: May impact native plant communities by competing with native plants.

12) 0 **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: No impact on human health.

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: Probability of detection by all people low including professionals.

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: Difficult to distinguish. Herbicides required for control.

Category scores:

22 Geographic score (Add scores 1-4)

18 Biological score (Add lines 5-9)

7 Impact score (Add lines 10-12)

12 Control score (Add Lines 13-14)

59 **Total score** (Add scores 1-14 and list on front of form)

Risk category: 55-90 = **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.

Vers. 3.8 1/15/2013

**Oregon Department of Agriculture
Noxious Weed Rating System**

Matgrass

Common Name

Nardus stricta

Scientific Name

Point categories:

- 1) **2 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) **1 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 in part of the state, 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) **4 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

TOTAL POINTS: 16

Note: Noxious weeds are those non-native plants with total 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

Acknowledgments:

Author: Bob Barrett, Oregon Dept. of Agriculture Contributing text: Glenn Miller, Oregon Dept. of Agriculture, Thomas Forney, Oregon Dept. of Agriculture
 Photos: Bob Barrett, Fort Klamath, Elmore Nicholson Ranch, 2008

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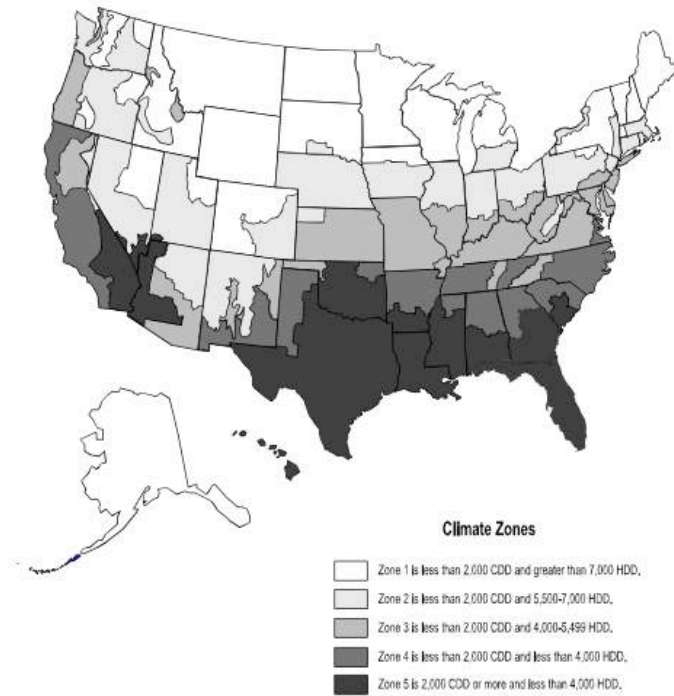
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Attachment 1

U.S. Climate Zone Map



Note: Cooling degree-days (CDD) and heating degree-days (HDD) are explained in the glossary.