

# Washington Invasive Ranking System

Washington Natural Heritage Program

## *Anthoxanthum odoratum* (Sweet Vernalgrass)

Assessed by

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Ecological Impact Rank: **Moderate** (51)

Confidence: **Moderate** (63)

Management Difficulty Rank: Moderate (58)

Confidence: Moderate (60)

Biological Characteristics of Invasiveness: Moderate (57)

Confidence: High (67)

Concern Related to Distribution and Abundance: High (78)

Confidence: High (90)



**Photo Credit:** Ryan Batten 2011, used under Creative Commons license (CalPhotos, 2024).

### Ranking Notes

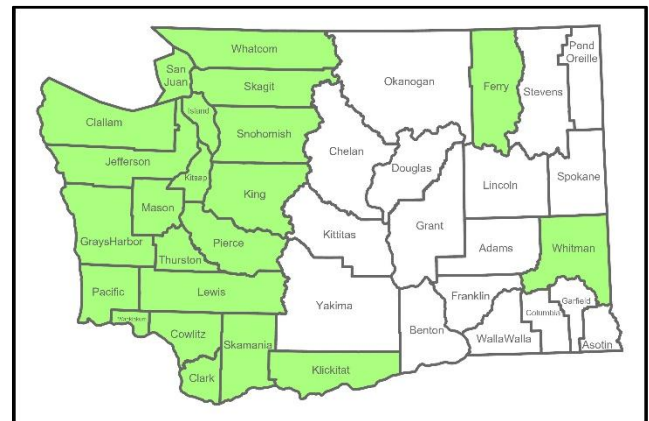
*Anthoxanthum odoratum* was assessed by multiple individuals. Range of assessor ratings is provided in parentheses following the final assigned rating.

### Legal Listings

[Washington State Weed Board](#): No

[Washington Invasive Species Council](#): No

### Section 1: Distribution and Abundance



**Figure 1.** Distribution of counties where *Anthoxanthum odoratum* has been documented in Washington State (CPNWH, 2024; EDDMapS, 2024; iNaturalist Community, 2024).

### Q1: Current Range Size in Washington

Rating: High

Confidence: High

*Anthoxanthum odoratum* is found in 24 of 39 (62%) of counties in Washington State (CPNWH, 2024; EDDMapS, 2024; iNaturalist Community, 2024).

Source: Professional expertise, Herbarium records and other observations

## Q2: Current Trend in Total Range

Rating: Moderate

Confidence: High

iNaturalist records suggest that *Anthoxanthum odoratum* has expanded into the northern Olympic Peninsula over the last 12 years (iNaturalist Community, 2024). This species has not apparently expanded its range in the rest of the state over the last 20 years (CPNWH, 2024; iNaturalist Community, 2024).

Source: Professional expertise, Herbarium records and other observations

## Q3: Proportion of Potential Range Currently Unoccupied

Rating: Low

Confidence: High

*Anthoxanthum odoratum* is found in 62% of the counties in Washington, but is predicted to be able to grow in all counties in Washington (CPNWH, 2024; EDDMapS, 2024; iNaturalist Community, 2024).

Source: Professional expertise, Herbarium records and other observations, Model predictions

## Q4: Local Range Expansion or Change in Abundance

Rating: Moderate

Confidence: Moderate (range Moderate - High)

Herbarium records and iNaturalist records suggest that local abundance and range are increasing moderately for *Anthoxanthum odoratum* west of the Cascades. New observations of this species east of the Cascades have not apparently been documented (CPNWH, 2024; iNaturalist Community, 2024).

Source: Professional expertise, Herbarium records and other observations

## Q5: Diversity of Ecosystems Invaded

Ecosystem types: Forest & Woodland, Grassland & Shrubland, Marine Coastal Shore, Emergent Open Wetland

Rating: High

Confidence: Moderate

*Anthoxanthum odoratum* occurs in open grasslands, savannas and woodlands, and disturbed areas. This species grows in both mesic and xeric conditions but exhibits greater survival in mesic habitats (Platenkamp, 1990). In the Pacific Northwest and northern California, this species is most common in coastal prairies and wet Willamette Prairie habitats, but it is also found in pastures, roadsides and other disturbed places (Platenkamp, 1990; Clark, 2002; Thorpe, 2011; Pitcher & Russo, 2012). It frequently grows in poor soils (Pitcher & Russo, 2012).

Source: Published research, Informal publication, Professional expertise

## Section 2: Biological Characteristics

### Q6: Aggressive Mode of Reproduction

Rating: Yes

Confidence: High

*Anthoxanthum odoratum* only spreads by seed (Pitcher & Russo, 2012). Plants are self-incompatible (Roach, 1987). A study in North Carolina found individual plants produce 58–1257 seeds (Brusati & Warner, 2004; Pitcher & Russo, 2012). One study in New York found over 100 *A. odoratum* seeds per square meter at an old field site, making this species one of the 10 most abundant species in the seed bank (Morris et al., 1986). However, observations in northern California suggest spread of this species is slow (Brusati & Warner, 2004), and other research suggests that *A. odoratum* experiences high juvenile mortality (Roach, 1987). While this species is sometimes capable of producing more than 1000 seeds per plant, it appears to be less aggressive than other introduced species in the Pacific Northwest.

Source: Published research, Informal publication, Professional expertise

### Q7: Innate Potential for Long-Distance Dispersal

Rating: No

Confidence: Moderate

*Anthoxanthum odoratum* usually spreads only short distances (Brusati & Warner, 2004) with 90% of seeds found within 1.2 meters of their parent plants (Platenkamp, 1990). Awns can help move seeds short distances across the soil (Pitcher & Russo, 2012), but otherwise this species has no adaptations for long distance seed dispersal. A post-wildfire study in a *Quercus garryana* savanna in British Columbia found that *A. odoratum* was able to disperse from the neighboring community into areas where the original vegetation and seed bank had been removed by combinations of intense fire and firefighting techniques that washed top soil away (Lysgaard, 2022), suggesting at least some effective natural dispersal abilities. However, other studies have assumed that pollen and seed from this species could not disperse more than 50 m (Roach, 1987), suggesting, that in general, this species has very little innate potential for long distance dispersal.

Source: Published research, Informal publication, Thesis

#### **Q8: Potential to be Spread by Human Activities**

Rating: Yes

Confidence: High

*Anthoxanthum odoratum* is dispersed mostly through human activities, including transportation along roadsides, and by mowing or other equipment, or on shoes (Brusati & Warner, 2004). This species was introduced to North America in the 1700s (Pitcher & Russo, 2012).

Source: Informal publication

#### **Q9: Allelopathy**

Rating: Yes

Confidence: Moderate

Live *Anthoxanthum odoratum* plants are allelopathic, and this species has been shown to suppress germination in other grass species. Chemicals from *A. odoratum* (and closely related species) can encourage growth in other *A. odoratum* plants. Decaying *A. odoratum* plants encourage the growth of other grass species, possibly due to the high level of phosphorus in the roots providing a fertilizing effect as they decay

(Brusati & Warner, 2004; Pitcher & Russo, 2012). This species also stimulates legume germination.

Source: Informal publication

#### **Q10: Competitive for Limiting Abiotic Factors**

Rating: Yes

Confidence: Moderate (range Moderate - High)

*Anthoxanthum odoratum* is competitive for water, light, nitrogen, phosphorus, and potassium. This species can outcompete other grass species, including nonnative *Lolium perenne*, *Holcus lanatus*, and *Dactylis glomerata*, though it is generally more competitive against annual than perennial grasses. *Anthoxanthum odoratum* is also competitive against forbs, such as *Plantago lanceolata* (Platenkamp, 1990; Dennehy et al., 2011; Pitcher & Russo, 2012). This species is better able to coexist with *Cytisus scoparius* than most other introduced or native species, allowing it to rapidly increase when *C. scoparius* is removed (Lysgaard, 2022).

However, some studies have also demonstrated negative effects of competition on this species, including studies in coastal prairie habitats in northern California that shows *A. odoratum* has higher mortality and lower seed production when it is grown with neighboring plants (either *A. odoratum* or *H. lanatus*). *Anthoxanthum odoratum* also appears to be more competitive in mesic habitats than xeric ones (Platenkamp & Foin, 1990).

Source: Published research, Informal publication, Thesis

#### **Q11: Growth Form**

Rating: No

Confidence: Low

*Anthoxanthum odoratum* doesn't generally form smothering or tall monocultural stands, but it can still be competitive for light (Dennehy et al., 2011). Observations from northern California coastal prairies suggest that this species doesn't entirely exclude other species or form particularly dense populations. However, it can form thick root mats that exclude other species from establishing (Brusati &



Warner, 2004). In Willamette Prairie, *A. odoratum* occurs intermixed in a community of introduced perennial grasses and is usually shorter than most other introduced perennial grasses it co-occurs with.

Source: Informal publication, Professional expertise

### **Q12: Germination Requirements**

Rating: No

Confidence: Moderate

Germination of *Anthoxanthum odoratum* relies on local disturbances in most cases (Platenkamp & Foin, 1990; Brusati & Warner, 2004).

Source: Published research, Informal publication

### **Q13: Invasiveness of Other Plants in Genus**

Rating: Yes

Confidence: High

*Anthoxanthum aristatum* is also invasive in the Pacific Northwest (Anzinger & Radosevich, 2008), and is considered undesirable in Taylor's Checkerspot Butterfly restoration sites at Joint Base Lewis McCord (R. Johnson pers. comm. 2025).

Source: Informal publication

### **Q14: Shade Tolerance**

Rating: Low/Insignificant

Confidence: Moderate

*Anthoxanthum odoratum* is generally found in open or disturbed areas. High light availability may result in earlier reproduction (Platenkamp, 1990). However, one study found that *A. odoratum* was one of a number of grass species that grew more biomass in partial shade than full sun in its native range (Pang et al., 2019). Another study found *A. odoratum* produced fewer but taller tillers, and did not have a reduction of biomass in reduced light (Edelkraut & Güsewell, 2006). While experiments suggest that shade doesn't affect growth in this species, it still appears to be mostly a plant of open areas, suggesting that *A. odoratum* does not thrive in shaded conditions.

Source: Published research, Professional expertise

### **Q15: Disturbance Tolerance**

Rating: Yes

Confidence: Moderate

*Anthoxanthum odoratum* thrives on disturbance. In most cases disturbance is required for establishment of this species, and it is more likely to invade disturbed areas (Brusati & Warner, 2004). A study in British Columbia found that *A. odoratum* showed the greatest increase in abundance post removal of *Cytisus scoparius*, and also readily colonized areas disturbed by wildfire and wildfire suppression techniques (Lysgaard, 2022). In western Washington, this species is known to move into areas where tall oatgrass has been removed (R. Johnson, pers. comm. 2025).

Source: Informal publication, Professional expertise, Thesis

### **Q16: Propagule Persistence**

Rating: <5 years

Confidence: Moderate

*Anthoxanthum odoratum* seeds generally germinate between 4 and 8 weeks of dispersal. One study found that most seeds in the soil germinated within three months, and by 10 months all remaining seed were not viable. However, another study found that seeds in storage for four years were still 85% viable. Variation in temperature and conditions may reduce seed viability (Pitcher & Russo, 2012).

Source: Informal publication

### **Q17: Palatability**

Rating: Yes, plant is unpalatable

Confidence: Moderate

*Anthoxanthum odoratum* was introduced and is planted as a forage plant and grazing animals will eat this species (Brusati & Warner, 2004; Pitcher & Russo, 2012; Lysgaard, 2022). However, most grazers tend to prefer native grasses to *A. odoratum*, resulting in increases of this species where grazing occurs, at least in the Pacific Northwest (Dennehy et al., 2011).





Source: Informal publication, Thesis

### Section 3: Ecological Impact

#### Q18: Impact on Ecosystem Abiotic Processes

Abiotic Processes: Nutrient dynamics, Light availability

Rating: Moderate

Confidence: Moderate

*Anthoxanthum odoratum* stimulates legume germination, (Brusati & Warner, 2004), potentially increasing nitrogen fixation. Decaying *A. odoratum* plants increase nitrogen and phosphorus, which may benefit other grass species over forbs (Dennehy et al., 2011) and though *A. odoratum* doesn't grow in classic smothering monocultural stands, it is frequently abundant enough that it can reduce light availability for co-occurring species.

Source: Informal publication, Professional expertise

#### Q19: Impact on Ecosystem Structure

Rating: Low

Confidence: Moderate

Given evidence that this species might not have strong effects on community composition, it likely has low effects on ecosystem structure.

Source: Published research, Professional expertise

#### Q20: Impact on Ecosystem Composition

Rating: Moderate (range Low - High)

Confidence: Moderate (range Moderate - High)

*Anthoxanthum odoratum* is part of a suite of introduced perennial grasses that occur in Willamette Prairie and similar habitats. Introduced perennial grasses contribute reduction of plant community diversity and native plant diversity where they occur. In particular, *Phalaris arundinacea* is more productive when *A. odoratum* is present (Molofsky et al., 1999). *Anthoxanthum odoratum* can also prevent reestablishment of native plant species. However, at least in coastal prairie northern California, this plant

does not appear to entirely exclude native plants, or significantly change species composition on its own (Brusati & Warner, 2004).

Source: Published research, Informal publication, Professional expertise

#### Q21: Impact on Particular Native Species

Rating: Moderate

Confidence: Moderate

At Rocky Prairie, *Anthoxanthum odoratum* is implicated in population declines of *Castilleja levisecta*, potentially by crowding out more suitable host plants. At this site, *A. odoratum* is being specifically targeted for removal and replaced with native *Festuca roemerii* to improve *C. levisecta* habitat (R. Johnson, pers. comm. 2025). Not all host plants provide equal benefit for *Castilleja* species, and the loss of appropriate host taxa can reduce or prevent reproduction in at least some *Castilleja* (Adler, 2003). Reduction in host plant quality combined with direct competition for space and other resources could make hemiparasitic taxa like *Castilleja* more vulnerable than co-occurring native taxa to invasion by introduced species.

At a Willamette Prairie restoration site near Eugene, Oregon, *A. odoratum* has also been documented as a "significant threat" (in community with other invasive grasses) to *L. bradshawii*. Managers singled out *A. odoratum* in particular as a management target at that site. *Lomatium bradshawii* occurs in wet prairies in Clark County and is considered rare in both Oregon and Washington (Thorpe, 2011), suggesting potential concern for impact more broadly. However, few details on the specific impact *A. odoratum* might have on *L. bradshawii* were provided.

Source: Published research, Informal publication, Professional expertise

#### Q22: Observed Ability to Invade Undisturbed Ecosystems

Rating: Low

Confidence: High

*Anthoxanthum odoratum* can occasionally germinate in or invade undisturbed sites, and adult plants can survive without disturbance. However, germination in these conditions likely relies on limited competition from co-occurring species (Brusati & Warner, 2004).

Source: Informal publication

### **Q23: Observed Ability to Invade Naturally Disturbed Ecosystems**

Rating: Yes

Confidence: High

*Anthoxanthum odoratum* is found in both restored and remnant Willamette Prairie habitats. This species may rely on human activities for dispersal, but if a seed source is nearby, *A. odoratum* can likely establish in areas of natural disturbance.

Source: Professional expertise

## **Section 4: Management Difficulty**

### **Q24: General Management Difficulty**

Rating: Moderate

Confidence: Moderate (range Moderate - High)

Herbicide applications or tilling and reseeded with desirable species may be the most effective treatments for managing *Anthoxanthum odoratum*. Hand removal is effective for removing small patches of this species (Pitcher & Russo, 2012). Mowing and prescribed fire are being researched as control techniques; in at least some cases, these methods have been shown to increase flowering or abundance of this species (Clark, 2002; Dennehy et al., 2011; Lysgaard, 2022). Biocontrols are currently impractical for this species, and grazing also increases its abundance (Pitcher & Russo, 2012). “Intensive, long term restoration” may be necessary to control introduced species in oak woodland and prairie habitats, including *A. odoratum* (Lysgaard, 2022).

Source: Informal publication, Thesis

### **Q25: Minimum Time Commitment**

Rating: High

Confidence: High

Land managers have only recently started to treat *Anthoxanthum odoratum*, so not much is currently known, but it will likely require constant management (R. Johnson, pers. comm., 2024). Monitoring and treatment of the species minimally should continue until the seed bank is exhausted (2–5 years) (Pitcher & Russo, 2012). Restoration with desirable native plants is also important in preventing recolonization.

Source: Informal publication, Professional expertise

### **Q26: Impacts of Management on Native Species**

Rating: Low (range Low - High)

Confidence: Moderate

Treatments of *Anthoxanthum odoratum* that involve broadcast spraying or tilling will likely have long-term negative effects on native plant abundance and diversity. Using a grass-specific herbicide reduces impact to co-occurring native species. Native upland prairie grass species like *Festuca roemerii* may be resilient to grass specific herbicides that kill *A. odoratum*. However, in wet prairies, several native grass species are also susceptible to the herbicides that are effective against *A. odoratum* (Dennehy et al., 2011). Because *A. odoratum* occurs in wet prairies and with native endangered species, control techniques for this grass are constrained by the need to protect rare native species and use wetland-safe herbicides (Thorpe, 2011). The most effective treatments for this species are likely to have significant and potentially long-lasting effect on co-occurring native species.

Source: Informal publication, Professional expertise

### **Q27: Inaccessibility of Invaded Areas**

Rating: Low

Confidence: Moderate

*Anthoxanthum odoratum* is mainly spread by human activity (Brusati & Warner, 2004), so populations are likely to be in relatively accessible areas.

Source: Informal publication, Professional expertise

**Q28: Sociopolitical Implications of Management**

Rating: Insignificant (range Insignificant - Moderate/Low)

Confidence: Moderate

*Anthoxanthum odoratum* is not considered beneficial for agriculture and it is considered a threat in rare ecosystems that support several federally protected plant and insect species. Therefore objections to treatment for this species likely focus on herbicide use.

Source: Professional expertise

**Additional Comments**

None

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