

**WRITTEN FINDINGS OF THE  
DRAFT WASHINGTON STATE NOXIOUS WEED CONTROL BOARD  
Proposed Noxious Weed for 2016**

Scientific Name: *Ventenata dubia* (Leers) Coss.  
Synonyms: *Avena dubia* Leers, *Ventenata avenacea* Koeler  
Common Name: wiregrass, North Africa grass, ventenata, softbearded oat grass  
Family: Poaceae  
Legal Status: Proposed Class B noxious weed for 2016



Images: left, overall plant habit showing few narrow leaves on the lower half of stems, image by Rich Old, XID Services; center, purple-black stem node and long leaf ligule, image by Pamela Scheinost, USDA-NRCS, right, green spikelets of *Ventenata dubia* with bent awns, image by Rich Old, XID Services.

Description and Variation:

Overall habit:

*Ventenata dubia* is a basally branched, tufted winter annual grass that has rolled or folded leaves and membranous ligules. Openly branched panicles are pyramidal in overall shape and have spikelets comprised of typically 3 florets. The awns of some of the florets are bent and twisted.

Key identification traits for *Ventenata dubia* include: reddish-black nodes in late spring; the long, membranous leaf ligule; the inflorescence is an open panicle in June-July; upper floret awns that are twisted and bent (MSU Monthly Weed Post 2013).

Roots:

*Ventenata dubia* has shallow roots that are typically within the top 2 inches of soil (DiTomaso et al. 2013).

Stems:

*Ventenata dubia* stems are slim, upright to erect, and 4 to 18 inches (10 to 46 cm) tall though they can grow up to 29.5 inches (75 cm) tall (Smith, Jr. 2013, Scheinost et al. 2008 NRCS). Stems are covered in small hairs to glabrous while the nodes are glabrous (Smith, Jr. 2013). The nodes are exposed and in late spring are purple-black (Crins 2007). Plants produce one to few tillers (Pavek et al. 2011).

#### Leaves:

*Ventenata dubia* leaves mostly occur on the lower half of the stem and have open leaf sheaths (Crins 2007). Leaves have glabrous, membranous ligules that are obtuse, usually lacerate (cut into narrow segments) and 0.04 to 0.3 inches (1 to 8 mm) long (Hitchcock et al. 1969). The leaf blades are 1 to 3 mm wide and 2 to 7 cm (occasionally to 12 cm) long, usually glabrous on the upper surface, scabrous on the lower surface, starting out flat and becoming rolled or folded (Crins 2007, Hitchcock et al. 1969).

#### Flowers:

*Ventenata dubia*'s inflorescence is an open panicle, pyramidal in shape, and 2.8 to 8 inches (7 to 20 cm) long (occasionally longer to 16 inches/40 cm) (Crins 2007). The panicle is light yellow in color and has a sheen (Burrill et al. 1996). Panicle branches are spreading to drooping, 0.6 to 2.8 inches (1.5 to 7 cm) long (Hitchcock et al. 1969, Crins 2007). Spikelets on pedicels, are 0.08 to 0.7 inches (2 to 18 mm) long, and contain on average 3 florets (Hitchcock et al. 1969). The pair of glumes at the base of each spikelet are sometimes awn-tipped, with the lower glume 0.2 to 0.3 inches (5 to 6.5 mm) long with 6 or 7 nerves and the upper glume 0.3 to 0.4 inches (7 to 9 mm) long with 8 or 9 nerves (Hitchcock et al. 1969). Of the florets in each spikelet, the lowest is usually staminate and the remainder are bisexual (Crins 2007). The first lemma slightly exceeds the glumes and has acuminate, awned tips, with awns 1 to 3 mm long (Hitchcock et al. 1969). The upper 1 or 2 lemmas have bristle-like teeth (bifid), teeth 1 to 2 mm long, and also have a dorsal, twisted and bent awn that is 0.4 to 0.6 inches (10 to 16 mm) long (Crins 2007; Hitchcock et al. 1969). The anthers are about 1.3 mm long (1 to 2 mm) (Crins 2007, Hitchcock et al. 1969).

Disarticulation occurs above the first florets and between the distal florets (Crins 2007). Because of where the spikelets disarticulate, on mature specimens the straight-awned floret remains, while the bisexual florets with bent awns have broken away (Chambers 1985 in Crins 2007).



Image: upper florets broken away from spikelet with bent awns, image by Matt Lavin from Bozeman, Montana, USA (licensed under the Creative Commons Attribution-Share Alike 2.0 Generic license).

#### Fruit:

The fruit is a caryopsis (a dry, one-seeded fruit) that is glabrous and about 3 mm long (Crins 2007).

Similar species:

This is the only species in the genus *Ventenata* found in North America (Crins 2007). *Ventenata dubia* can be distinguished from another weedy grass, cheatgrass also called downy brome (*Bromus tectorum*), which grows in similar habitats and is also an annual growing to a similar height. Characteristics that help distinguish *Bromus tectorum* from *V. dubia* are that it has straight awns and shorter ligules (1 to 3 mm) (Van Vleet 2009).



Image: left, *Bromus tectorum* with straight awns, image by Steve Dewey, Utah State University, Bugwood.org

Habitat:

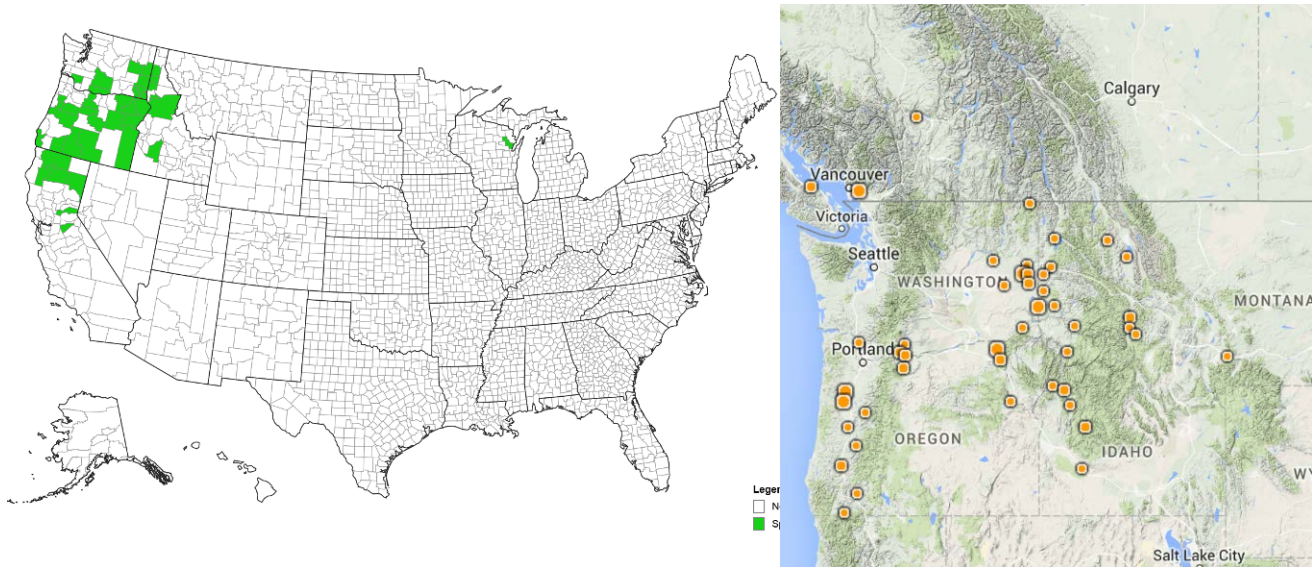
*Ventenata dubia* grows in a variety of dry, open and often disturbed habitats, tending to prefer sites that are inundated in early spring but dried out by late spring (Crins 2007, Old 2008 in Scheinost et al. 2008). It is commonly found on south-facing hillsides with shallow, rocky clay or clay-loam soils (Old 2008 in Scheinost et al. 2008 in NRCS) though it can be found on other aspects and substrates (Pavek et al. 2011). In a survey of land managers throughout eastern Oregon, central and eastern Washington and northern Idaho, *V. dubia* was found growing in areas receiving 13.8 to 44.1 inches (35 to 112 cm) of annual precipitation and elevations of 33 to 5906 feet (10 to 1800 m) (Pavek et al. 2011). It grows in rangeland, dry meadows, pastures, roadsides, rocky swales, open forests (*Pinus ponderosa* understory), Conservation Reserve Program (CRP) lands, and sagebrush communities, including areas previously dominated by or having cheatgrass, *Bromus tectorum* (Wallace et al. 2015, Northam and Callian 1994 in Bansal et al. 2014).

*Ventenata dubia* can grow in agricultural lands such as grain crops and managed hay fields (Wallace et al. 2015, MSU Monthly 2013). It also grows in native Palouse Prairie remnants (Nyamai et al. 2011).

Geographic Distribution:

According to the Clayton et al. (2006 onwards), *Ventenata dubia* is native to parts of Europe (central, southwestern, southeastern, and eastern), northern Africa, and temperate parts of Asia (Caucasus and western).

In Canada, *Ventenata dubia* has been documented naturalized in British Columbia, Alberta, Ontario, Quebec, and New Brunswick (Scheinost et al. 2008 in NRCS). In the United States, *V. dubia* is found growing in Washington, Oregon, California, Idaho, Montana, Wyoming, Utah, Wisconsin, New York, and Maine (USDA NRCS 2015). It appears to be most prevalent in the intermountain Pacific Northwest.



Maps: left, county level presence/absence distribution of *Ventenata dubia* in the United States by EDDMapS 2015; right, herbarium specimens of *V. dubia* in the Pacific Northwest (Consortium of Pacific Northwest Herbaria 2015).

#### Washington:

*Ventenata dubia* was first documented in the United States in Washington State in 1952 (Crins 2007).

Early herbarium records documenting *V. dubia* in Washington include: a collection near Spokane in Spokane County in 1960 (WTU 196614); another Spokane collection in 1961 (WTU 203061); a collection in Klickitat County near the Columbia River Gorge on a dry grassy bank in 1962 (WTU 209565); another Klickitat County collection in 1963 from north of White Salmon (WS 254791); a Spokane County collection east of Cheney in 1971 (EWU 2299); a Lincoln County collection from 1980 along drying edges of ephemeral ponds (WS 283941); a Spokane County collection north of Spangle in 1985 (WS 368893) (Consortium of Pacific Northwest Herbaria 2015). The Turnbull National Wildlife Refuge in eastern Washington, Spokane County, which includes Mima mound prairie, first documented *V. dubia* in 1990, and has seen an increase in its abundance, even with efforts to eliminate human disturbance (Anicito 2013). In a survey by Anicito (2013) of the Turnbull National Wildlife Refuge, a 15-fold increase was found in *V. dubia* abundance from 2009 to 2013.

The first western Washington herbarium record of *Ventenata dubia* is from 1990, collected in Cowlitz County from a weedy gravel pit area (WS 346625) (Consortium of Pacific Northwest Herbaria 2015).

*Ventenata dubia* was listed as a Class B noxious weed in Washington from 1988 and 1989 and was then removed from the list in 1990.

#### Growth and Development:

*Ventenata dubia* is a winter annual that germinates in the fall and produces an inflorescence the following spring (Scheinost et al. 2008).

Seed germination of *Ventenata dubia* was found to be highest with a 90 day after-ripening period (Wallace et al. 2015). Seeds primarily germinate in the fall, when temperatures are moderate, 23 to 29 C (optimally), and after fall rains have begun (Wallace et al. 2015). Most seedlings emerge within 6 weeks once germination begins (Wallace et al. 2015). This generally corresponds to an October to November time period (Wallace et al. 2015). Seedling emergence rates decline in November and were found to be negligible in the following 3 months in a study by Wallace et al. (2015). On CRP land, 95% of the seedlings emerged in the fall growing

season (Wallace et al. 2015). Seedlings can emerge in the spring in areas where fall germination is not favorable, such as in more highly managed systems like timothy hay fields and rangelands (Wallace et al. 2015).

*Ventenata dubia* seedling emergence and survival have been found to be higher in areas with higher amounts of *V. dubia* litter compared to bare soil surfaces during drier or colder fall growing seasons (Wallace et al. 2015). In areas of bare soil (no litter), seedlings had almost 50% higher mortality than those in areas with *V. dubia* litter (Wallace et al. 2015).

*Ventenata dubia* vegetative growth is vibrant green with a sheen in the spring, with plants keeping around 2 to 3 leaves and shedding older leaves, with little to no increase in biomass (Wallace et al. 2015, Scheinost et al. 2008). During spring growth, plants develop the purple-black nodes and long ligules (Scheinost et al. 2008). Stems start to elongate in mid-May (Wallace et al. 2015). Inflorescences develop and flower in June and produce seeds by early July (Wallace et al. 2015). The depletion of soil moisture is typically a trigger for seedhead production (Pavek et al. 2011). During late season summer growth, plants turn from silvery green to tan (Scheinost et al. 2008).



Images: left, infestation of *Ventenata dubia* in later summer when plants are a tan color, image by John M. Randall, The Nature Conservancy, Bugwood.org; *V. dubia* with blooming inflorescences and green stems, image by Matt Lavin, (licensed under the Creative Commons Attribution-Share Alike 2.0 Generic license).

#### Reproduction:

*Ventenata dubia* is an annual grass that reproduces by seed. Each plant produces around 15 to 35 seeds (Pavek et al. 2011). Seed production per meter squared is estimated at 30,298 +/- 5,773 seed in areas with no litter and 43,429 +/- 5,773 in areas with high *V. dubia* litter (Wallace et al. 2015). Seeds are believed to persist in the seedbank for only a couple of years, with a great portion of the seeds produced germinating in the first year depending on weather conditions (Wallace et al. 2015). A small fraction of seeds (<1%) remained germinable for up to 3 years in shallow soil depth (2 cm) (Wallace et al. 2015).

The bent, twisted awns on seeds help with dispersal and “self-burial” in the soil profile and with attachment to animals, equipment and humans (Sharma and Vanden Born 1978 in Wallace et al. 2015). Seeds are also dispersed and introduced to new areas in contaminated hay. Hay harvest in the Pacific Northwest commonly occurs at the beginning of July, when more *V. dubia* seed are present (Wallace et al. 2015). Beside hay, seed are spread as a contaminant of grass seed, such as Kentucky bluegrass and annual crops (Conn 2012, Scheinost et al. 2008). It is also able to spread along roadways and other transportation corridors, where it can move into nearby sites (Scheinost et al. 2008).

#### Economic Importance:

### Detrimental:

*Ventenata dubia* is a nonnative, invasive, annual grass that has rapidly expanded in perennial grass systems, in disturbed areas and managed areas in the past two decades throughout the Pacific Northwest (Pavek et al. 2011). It has expanded in areas including the Snake River canyon grasslands and sage brush steppe, increasing in these sites that were previously dominated by *Bromus tectorum* and *Taeniatherum caput-medusae* (McCloskey et al. 2011 and Butler 2011 in Wallace et al. 2015).

*Ventenata dubia* is increasingly becoming a problem in managed grass-hay systems where infestations can cause yield reductions of 50% or more within a few years (Wallace et al. 2015, Prather and Steele 2009). Prather (2009) details a survey conducted by the USDA NRCS Plants Materials Center (Pullman WA) in eastern Oregon, central and eastern Washington, and northern Idaho, that found 74% of the counties surveyed had *Ventenata dubia* present. The survey also found that *V. dubia* was a particular problem in pasture, CRP, and hay production systems, particularly Timothy hay (*Phleum pretense*), and were susceptible to damage. Some farmers who responded to the survey in north central Idaho reported they had to disk timothy hay fields only 3 to 4 years old due to *V. dubia* infestations. Fountain (2011) reported that the export market for Timothy hay had maintained a price of \$200 to \$215 per ton for the past several years. Hay that includes *V. dubia* is rejected for export and so limits its sale to the domestic market where it only brings a price of \$70 to \$100 per ton (Fountain 2011). Producers of timothy hay have tried various methods such as altered harvest schedules, crop rotations, and other strategies to avoid losses to the export market from *V. dubia* infestations (Fountain 2011 in Wallace et al. 2015). *Ventenata dubia* seed can also easily be spread during harvest, quickly spreading the infestation further in fields (Fountain 2011).

Beside hay, *V. dubia* can invade bluegrass, alfalfa, small grains, and other crops (Old and Callihan 1987 in Van Vleet 2009).

In improved grazing pastures, *Ventenata dubia* can displace mixed stands of perennial forage grasses as well as invade and displace grasses on CRP lands that are relatively less disturbed (Wallace and Prather 2011 in Wallace et al. 2015). *Ventenata dubia* has been observed to even edge out other weedy grasses such as cheatgrass and medusahead in some areas (Weaver 2013). Where *V. dubia* has become a problem on CRP land, some landowners have had to take it out of CRP and go back into wheat rotation (Wallace pers. comm. in Weaver 2012).

*Ventenata dubia* is also invading native Palouse Prairie, a threatened habitat in the intermountain Pacific Northwest, remnants of which are located in eastern Washington and northern Idaho (Wallace et al. 2015, Nyamai et al. 2011). The Turnbull National Wildlife Refuge in eastern Washington, which includes channeled scabland habitat, first documented *V. dubia* in 1990 and has observed a great increase over the past 5 years (Anicito 2013). *Ventenata dubia* infestations seriously degrade the quality of these habitats as well as native range and transitional forest habitats (DiTomaso et al. 2013).

Besides displacing desirable forage, *Ventenata dubia* contains silica (~2.7%), making it a poor forage plant where animals, including cattle, will not graze once inflorescences have formed (Pavek et al. 2011 in Wallace et al. 2015, DiTomaso et al. 2013). *Ventenata dubia* may be grazed in the early spring before stems harden and become unpalatable, but its forage value is minimal (Scheinost et al. 2008).

*Ventenata dubia*'s shallow root system may also cause soil to be prone to erosion (Prather and Steele 2009, Scheinost et al. 2008 NRCS).

Over time, *V. dubia* can lead to decline of productivity and land condition, leading to a decline in land value. (Prather and Steele 2009, Scheinost et al. 2008 NRCS).

### Beneficial:

Though some early grazing may occur on *Ventenata dubia* prior to development of its inflorescence, it appears to have little forage value. Infested areas are not sustaining livestock and there are no other known uses for this plant (Prather 2009, Scheinost et al. 2008).

### Control:

*Ventenata dubia* can be difficult to control, and an integrated approach will be needed for effective control and to promote and support healthy communities (DiTomaso et al. 2013, Scheinost et al. 2008 NRCS).

It is important to prevent spreading *Ventenata dubia* to new locations. When working around *V. dubia*, make sure to clean equipment and clothing to prevent dispersing seed to new locations. Due to at least some *V. dubia* seed surviving in the seedbank up to 3 years, at least 3 to 4 years of intensive integrated management methods will be needed to reduce effects on grass systems (Wallace et al. 2015). It is important to prevent *V. dubia* seed production. Soil disturbance may cause more seeds to germinate so monitoring and follow up management may be needed. Establishing and promoting diverse, healthy plant communities will provide competition to *V. dubia* and help reduce infestations.

### Mechanical Control:

Hand pulling plants when the soil is moist is a possibility but only where infestations are small (generally < couple square yards), as hand-pulling is labor intensive (DiTomaso et al. 2013).

Mowing in some cases may help to prevent *V. dubia* seed production. It is reported that *V. dubia* cannot be mowed during heading as plants will only bend or become tangle in equipment (Lass and Prather 2007). Plants that are mowed prior to heading may produce another flush of inflorescences, so mowing multiple times throughout the growing season will be needed to prevent seed production (Gribble in Scheinost et al. 2008). Targeted mowing in CRP and harvesting hay for silage before *V. dubia* seed production are options that are being tried (Wallace et al. 2015). Harvesting hay early, before *V. dubia* develops seed, is possible, but unstable weather during June makes early harvest risky (Fountain 2011). *Ventenata dubia* stems are difficult to cut and need sharpened equipment and slow mow speeds (Fountain 2011).

### Cultural Control:

Fire, combined with other management methods, may help control *Ventenata dubia* infestations. Burning the litter of *Ventenata dubia*, which protects and aids its seedlings, can help reduce *V. dubia* germination and survivorship (Wallace et al. 2015). *Ventenata dubia* has been found to flourish in Oregon following fire, though in Idaho, fire did suppress *V. dubia*, but did stimulate annual weedy bromes (MSU Extension 2013). Fire, while a useful tool, cannot be used alone to control *V. dubia*, as it may provide an environment that could encourage seed germination (Scheinost et al. 2008). Fire can also clear and prep a site for an herbicide application of post fire emerging nonnative species (Anicito 2013). Integrating the use of fire with herbicide treatments and seeding of competitive species will help prevent the further germination of *V. dubia*.

Incorporating the planting and seeding of competitive native and non-invasive plants will provide competition to *Ventenata dubia* seedlings. Some species that have been planted to provide competition to *V. dubia* include Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda*), 'Sherman' big bluegrass (*Poa secunda* 'Sherman'), intermediate wheatgrass (*Thinopyrum intermedium*), smooth brome, grassy tarweed (*Madia gracilis*), and clarkia (*Clarkia pulchella*) (Anicito 2013, Butler 2011).

### Biocontrol Control:

There are no approved biological control agents for *Ventenata dubia*.

Grazing does not seem a likely or reliable management tool since animals tend to avoid plants, especially when *V. dubia* matures (Prather 2009). Grazing could be used for site preparation in mixed stands where *V. dubia* is a small component of the plant community (Prather and Steele 2009). Grazing in summer or fall of co-occurring plant species can remove plant biomass in order to increase the amount of herbicide contact on *V. dubia* seedlings that emerge in the fall (Prather and Steele 2009).

#### Herbicide Control:

Herbicide information on *Ventenata dubia* is available in the Pacific Northwest Weed Management Handbook and includes information on rates and timing: <http://pnwhandbooks.org/weed/other-items/control-problem-weeds/wiregrass-african-ventenata-dubia>

Other sources provide herbicide information on *Ventenata dubia* control. See DiTomaso et al. (2013) herbicide recommendations: [http://wric.ucdavis.edu/information/crop/natural%20areas/wr\\_V/Ventenata.pdf](http://wric.ucdavis.edu/information/crop/natural%20areas/wr_V/Ventenata.pdf) In general, late fall herbicide applications just after seedlings emerge are the most effective for controlling invasive winter annual grasses, but changing weather conditions may make treatment difficult (Wallace et al. 2015).

Overall, herbicide should be used with other management methods to control *Ventenata dubia*. Using other methods such as fire and providing competition by seeding other plant species will be needed to successful control *V. dubia* infestations. Always read and follow the herbicide label instructions. Check with your local county noxious weed control board to discuss treatment options.

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