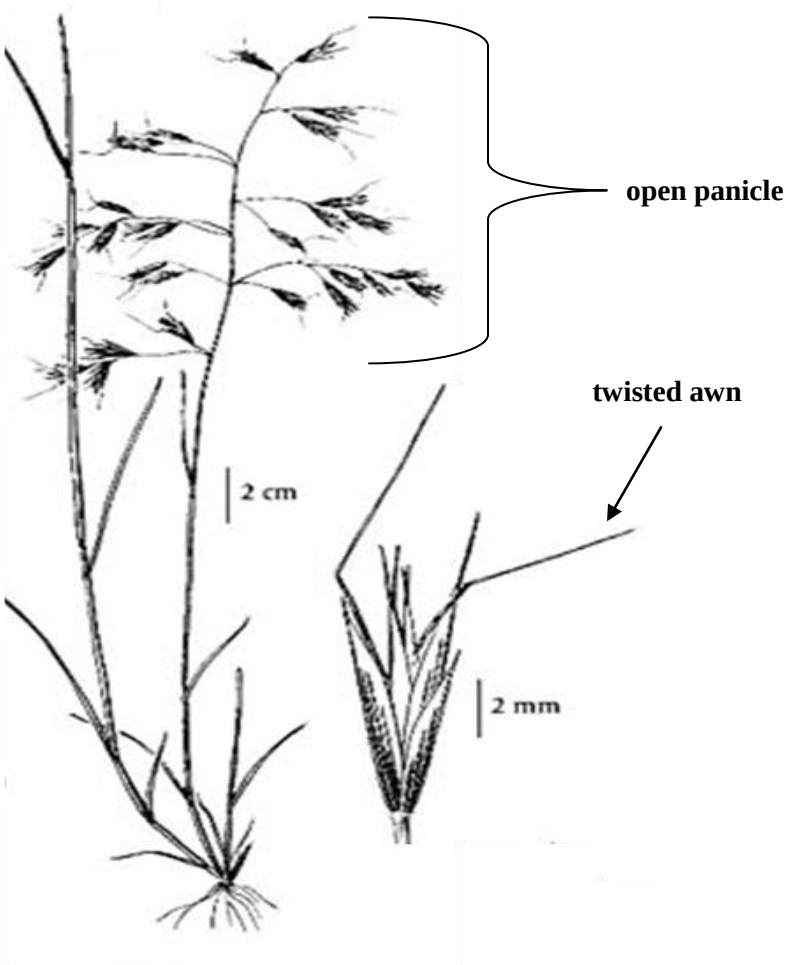
Ventenata Biology & Management in Pasture, Hay & CRP
University of Idaho Field Tours
June 2013

Ventenata. Ventenata (*Ventenata dubia*; North Africa grass) is an exotic annual grass that has become a significant pest of forage systems and conservation lands in the Pacific Northwest in the past decade. In early summer, ventenata produces seed heads characterized by an open panicle and twisted awns as the plant matures (*see below*). Identification of ventenata in the fall after seedlings emerge and in early spring can be difficult.



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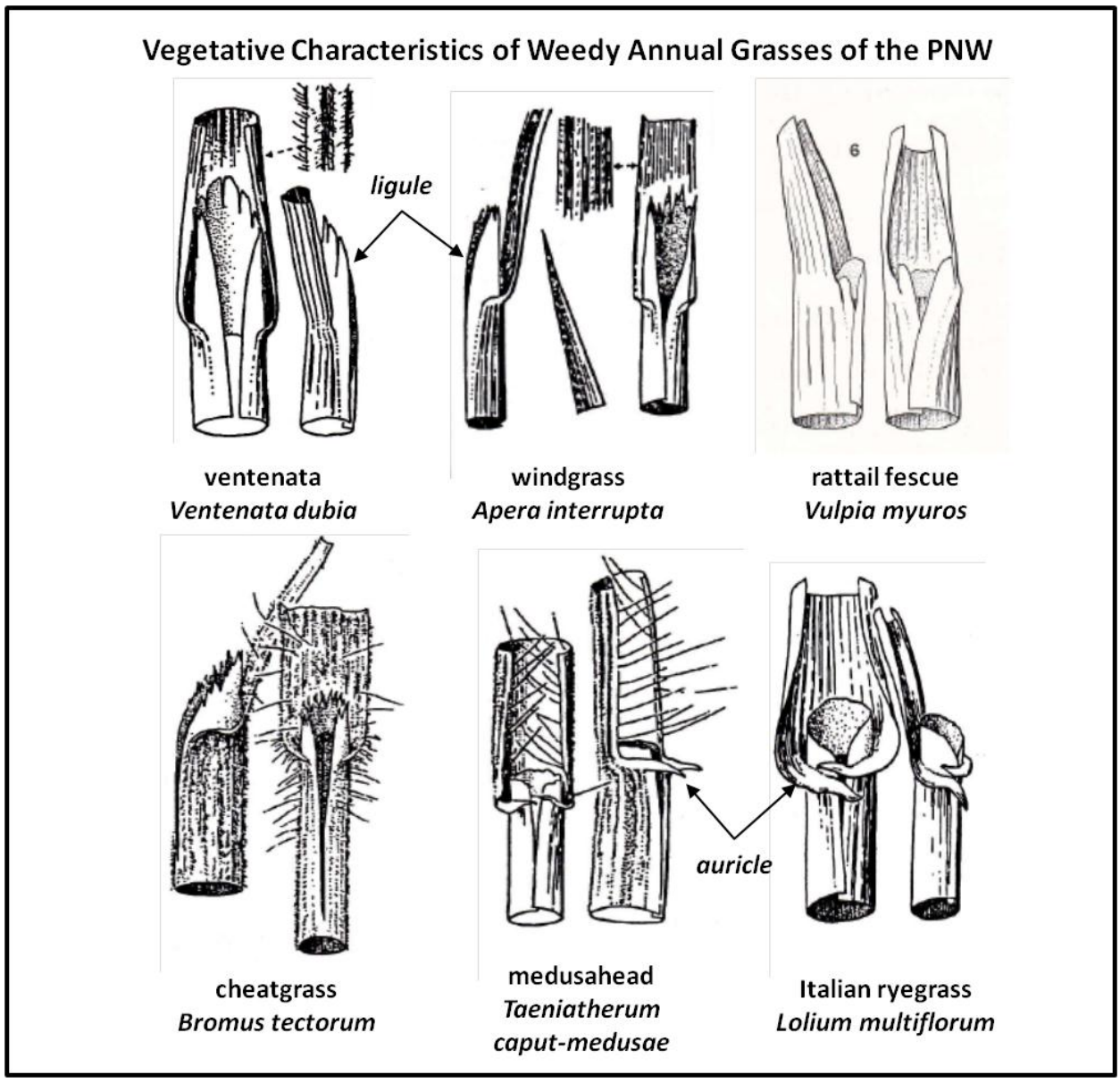
Ventenata Vegetative Characteristics. Identification of ventenata in the fall after seedlings emerge and in the early spring can be difficult. Ventenata seedlings can often be found beneath litter created from the previous growing season in the fall and spring. The illustrations below compare the vegetative characteristics of several narrow-leaved weedy annual grasses in the Pacific Northwest.



Ventenata Biology. Several field studies have been conducted in recent years by researchers at the University of Idaho, the NRCS Plant Materials Center in Pullman WA, and at Oregon State University to describe the biology of ventenata ventenatain the Inland Northwest:

Seedbank and Seedling Emergence Patterns (UI & NRCS-PMC: Pavek).

- Up to 80% of the seed produced in a growing season germinates and emerges in the fall.
- A small fraction (< 3%) of deposited seed remains viable in soil up to 3 years.
- Presence of ventenata litter increases seedling emergence (40% to >95%) in fall.
- Presence of ventenata litter decreases winter mortality of ventenata seedlings
- Presence of ventenata litter increases growth of seedlings in fall.

Growth & Development Patterns (see Table 1).

- Approximately 67 to 100% of the total seedlings emerging per year occur prior to Dec 1
- No seedling emergence has occurred in the spring within CRP and rangeland/pasture sites, compared to 1 to 33% of total emergence in timothy hay.
- Seedling emergence starts to occur after approximately 0.75 inches of rainfall
- Comparatively, ventenata germination occurs later in fall than cheatgrass (*OSU: Sbatella*)
- Seedlings overwinter as small plants (2 leaf-stage) under litter layers
- Plants remain in the 2 leaf-stage, shedding leaves, throughout early spring (Feb-Apr)
- Stem development starts to occur in early May, followed by seedhead development.
- Seedheads are fully developed (open panicles) by mid- to late-June.

Table 1. Calendar dates of ventenata emergence and growth stage transitions for the 2012 and 2013 growing seasons at sites across the Inland Northwest.

	Seedling Emergence (% of total)			Growth Stage (transition)	
Location (System) & Growing Season	> 1%	50%	100%	Stem Elongation	Full Panicle
Usk, WA (Timothy Hay)					
2011-2012	Oct 1	Oct 18	Apr 26	May 20	Jun 20
2012-2013	Nov 16	Nov 16	Apr 24	Jun 4	--
Princeton, Idaho (Timothy Hay)					
2011-2012	Oct 1	Oct 18	May 5	May 5	Jun 28
2012-2013	Oct 25	Nov 1	Apr 25	May 21	--
Moscow, Idaho (CRP)					
2011-2012	Oct 12	Oct 26	Nov 9	May 9	Jun 21
2012-2013	Oct 18	Oct 29	Nov 28	May 14	--
Anatone, WA (Rangeland)					
2011-2012	Oct 13	Nov 11	Dec 8	May 11	Jun 25
2012-2013	Oct 20	Oct 30	Nov 27	May 28	--

Ventenata Biology, contd.

Forage Quality Characteristics (OSU: Brummer & NRCS-PMC: Pavek).

- Ventenata has higher silica content (2.7%) than most desirable forage grasses
- Ventenata is not comparatively different than cheatgrass as a nutrient source (% crude protein) or in digestibility (%ADF & %NDF) in early spring.
- It is a general view that cattle avoid ventenata relative to other annual grasses.
- The small, wiry growth habit of ventenata may be a physical impediment to grazing.

Ventenata & Fungal Associations (UI: Newcombe & Griffith).

- ventenata harbors *Fusarium* strains in the Palouse region.
- *Fusarium* is a common plant pathogen.
- *Fusarium* collected from ventenata negatively impacts bluebunch wheagrass & cheatgrass.

Ventenata Control with Selective Herbicides. Several factors should be considered prior to spraying for ventenata control in perennial grass systems (*Table 2*):

1. *Selective herbicide availability*: A limited number of annual grass herbicides are available for use in perennial grass systems (noncrop, rangeland and pasture, CRP). Timothy- and grass-hay growers need to carefully review any herbicide label to ensure its use is allowed under label directions

2. *Herbicide selectivity*: In general, annual grass herbicides also have activity on desirable perennial grasses. Greater selectivity can be gained by using the lowest application rate that achieves desirable annual grass control levels and by applying herbicides in the fall growing season when annual grasses are actively growing and perennial grasses are dormant.

3. *Perennial grass tolerance*: Certain perennial grasses are known to be more or less tolerant to specific annual grass herbicides. Labels should be inspected for guides on perennial grass tolerance at various application rates. Small test plots are recommended in tolerance is unknown.

Table 2. Summary of selective herbicides tested for ventenata control in perennial grass systems.

	Selective Herbicides[1]					
Label & Field Study Summary	**Outrider®**	**Plateau®**	**Canter®**	**Axiom®**	**Matrix®**	**Landmark®**
Labeled for Use						
non-crop	Yes	Yes	No	No	Yes	Yes
pasture & rangeland	Yes	Yes	Yes	No	w/ restriction	w/ restriction
hay (mixed grass or timothy)[2]	w/restriction	w/restriction	w/restriction	No*	No	No
Conservation Reserve Program (CRP)	Yes	Yes	Yes	No	w/ restriction	No
Use Restrictions						
grazing (pre/post spray re-entry)	14 days	no restriction	no restriction	---	no grazing	no grazing
hay (post spray harvest timing)	30 days	7 days	7 days	---	no hay	no hay
Annual Grass Application						
application rate range (product oz/ac)	0.75 - 1.33	4 – 8	0.9 – 1.2	8 – 10	3 – 4	0.75 – 2.25
recommended rate (product oz/ac)	1.00	6	1.00	8	3	0.75
application cost at recommended rate	$17/ac	$10/ac	$14/ac	NA	$40/ac	$8/ac
Ventenata Control @ Recommended Rate	--- Control Ratings: High (>90%), Mod (75 – 90%), Low (<75%), NA (not available) ---					
labeled for ventenata control	No	No	No	No	No	No
pre-emergent control (fall; 3 wks)	Mod - High	Low-Mod	Low-Mod	Mod-High	High	NA
post-emergent control (fall; + 2 leaf)	High	Mod-High	Mod	Mod-High	High	High
Other Annual Grasses Controlled (label)[3]	------- Control Categories: C (controlled), S (suppressed), NA (not available) -------					
downy brome (cheatgrass)	C	C	C	S	C	C
Italian ryegrass	S	C	S	C	NA	NA
rat-tail fescue	NA	NA	S	C	NA	NA
medusahead wildrye	NA	C	NA	NA	C	C
Perennial Grass Injury (fall application studies)[4]	--- Injury Categories: Low (stunting), Mod (yield reduction), High (severe yield loss) ---					
Bluebunch wheatgrass	Low	Low	Low	Low	Low	NA
Intermediate wheatgrass	Low	Low	Low	Low	Low-Mod	NA
Smooth brome	Low – Mod	Mod	Low – Mod	Low	Low	NA
Orchardgrass	Low – Mod	Mod	Low	Low	Low	NA
Timothy	Mod	High	Low - Mod	Low	Mod	NA

[1] Outrider® (sulfosulfuron); Plateau ® (imazapic); Canter® (propoxycarbazone); Axiom® (flufenacet/metribuzin); Matrix ® (rimsulfuron); Landmark® (sulfometuron methyl/chlorsulfuron).

[2]Hay growers need to carefully review any herbicide label to ensure its use is allowed under label directions (see WSDA memo).

[*]IR4 program is currently investigating Axiom label for timothy hay in ID & WA

[3,4]Consult herbicide labels for additional information about annual grass control and perennial grass injury or tolerance.

Ventenata IPM Strategies

Timothy-Hay IPM Strategies. Field studies were designed to identify minimal inputs for maintaining or improving timothy yields given different levels of ventenata infestations (low: <25% ventenata cover, and high: >75% ventenata cover). Our approach focused on 1) selective control of ventenata, followed by 2) altering harvest height, and 3) fertilizer applications to increase crop competitiveness.

1. *Herbicide control*. On 2 Nov 2012, Axiom® (flufenacet/metribuzin) was applied at 8 fl oz/ac using a handheld boom calibrated at 15 gpa and with a non-ionic surfactant at 0.25% v/v. ventenata seedling emergence had started in the previous 10 days.

2. *Harvest height*. We compared cutting timothy at two heights: > 4" and 2". Research suggests that increasing harvesting height to 4-5" leads to greater development of corms on timothy roots, which decreases plant stress due to high temperatures in late summer. See handout on timothy hay from WSU Extension (S. Fransen).

3. *Fertilizer applications*. We applied NPK in fall of 2012 with rates based PNW Grazing Handbook guidelines for soil fertility test results. Timothy sheds approximately 80% of its roots yearly, and new root growth occurs in the fall growing season. In particular, phosphorous and potassium are critical nutrients for root development. Consequently, fall applications of P and K are critical for timothy root development and crop competitiveness. We applied nitrogen as a split application in the fall and in the spring. Taken together, the timing of these NPK applications should increase timothy competitiveness during the fall and spring growing seasons.

Treatment Schedule		High VENTENATA	Low VENTENATA	Application
Fall Application		---------- lb/ac ----------		
Fall Nitrogen	46-0-0	25	25	
Phosphorous	0-45-0	100	40	10/22/12
Potassium	0-0-62	150	150	
Spring Application				
Nitrogen	46-0-0	25	25	4/17/2013

Conservation Reserve Program (CRP) Land IPM Strategies. Field studies were designed to identify minimal inputs for controlling ventenata and maintain CRP perennial grass standards given different levels of ventenata infestations (low: <25% ventenata cover, and high: >75% ventenata cover). Our approach focused on 1) selective control of ventenata, followed by 2) utilizing mid-management strategies available to landowners in order to manage ventenata litter and stimulate perennial grasses.

1. *Herbicide control*. On 1 Nov 2012, Outrider® (sulfosulfuron) was applied at 1 oz/ac product using a boomless ATV sprayer calibrated at 15 gpa and with a non-ionic surfactant at 0.25% v/v. ventenata seedling emergence had started in the previous 10 days.

2. *Mid-management strategies* (litter management + perennial grass stimulation).

- Sickle Mow & Remove: A sickle mower was used on August 16 to cut all vegetation at a 2" height and then raked, which decreases ventenata and perennial grass litter.

- Flail Mow: A flail mower was used on August 21 to cut all vegetation at a 2", which increases mulched vegetation on the site.
- Fall Burn: A prescribed burn was conducted on Nov 6. High litter consumption occurred.
- Spring Burn: A prescribed burn was conducted on Apr 2. Moderate litter consumption occurred.
- Fertilization: Fertilizer was applied as a dry granule with a hand broadcaster on Oct 25. Rates were based on results of a standard fertility test and PNW Grazing Handbook guidelines:

Treatments		High VENTENATA	Low VENTENATA	Application
Nitrogen	46-0-0	25	25	
Phosphorous	0-45-0	60	60	10/25/2012
Potassium	0-0-62	48	44	

Small Pasture IPM Strategies. Field studies were designed to identify minimal inputs for controlling ventenata and improve forage quality given different levels of ventenata infestations (low: <25% ventenata cover, and high: >75% ventenata cover). Our approach focused on 1) selective control of ventenata, followed by 2) fertilizing to increase forage quality and 3) utilize grazing timing and intensity to manage litter and perennial vegetation height.

1. *Herbicide control.* On Nov 16th 2012, Outrider® (sulfosulfuron) was applied at 1 oz/ac product using a boomless ATV sprayer calibrated at 15 gpa and with a non-ionic surfactant at 0.25% v/v. ventenata seedling emergence had started in the previous 10 days.

2. *Grazing treatments.* We compared pre- and post-treatment grazing (Summer 2012 and Spring 2013) to evaluate treatment effectiveness. Grazing prior to treatments removes litter and vegetation to allow for better uptake of herbicide. Grazing post treatment allows the vegetation to be rested for a year to increase forage competitiveness. Grazing was closed off once 45% utilization of the existing forage was consumed or destroyed.

Grazing Period	Summer 2012		Spring 2013	
	High VENTENATA	Low VENTENATA	High VENTENATA	Low VENTENATA
Open	6/15	6/12	5/29	5/29
Close	9/25	9/25	6/10	6/14

3. *Fertilization*. Fertilizer was applied as a dry granule with a hand broadcaster. Rates were based on results of a standard fertility test and PNW Grazing Handbook guidelines

Treatment Schedule		High VENTENATA	Low VENTENATA	Application
Fall Application		---------- lb/ac ----------		
Fall Nitrogen	46-0-0	25	25	
Phosphorous	0-45-0	100	40	10/30/12
Potassium	0-0-62	150	150	
Spring Application				
Nitrogen	46-0-0	25	25	4/11/2013