Biology & Control of Ventenata in Perennial Grass Systems

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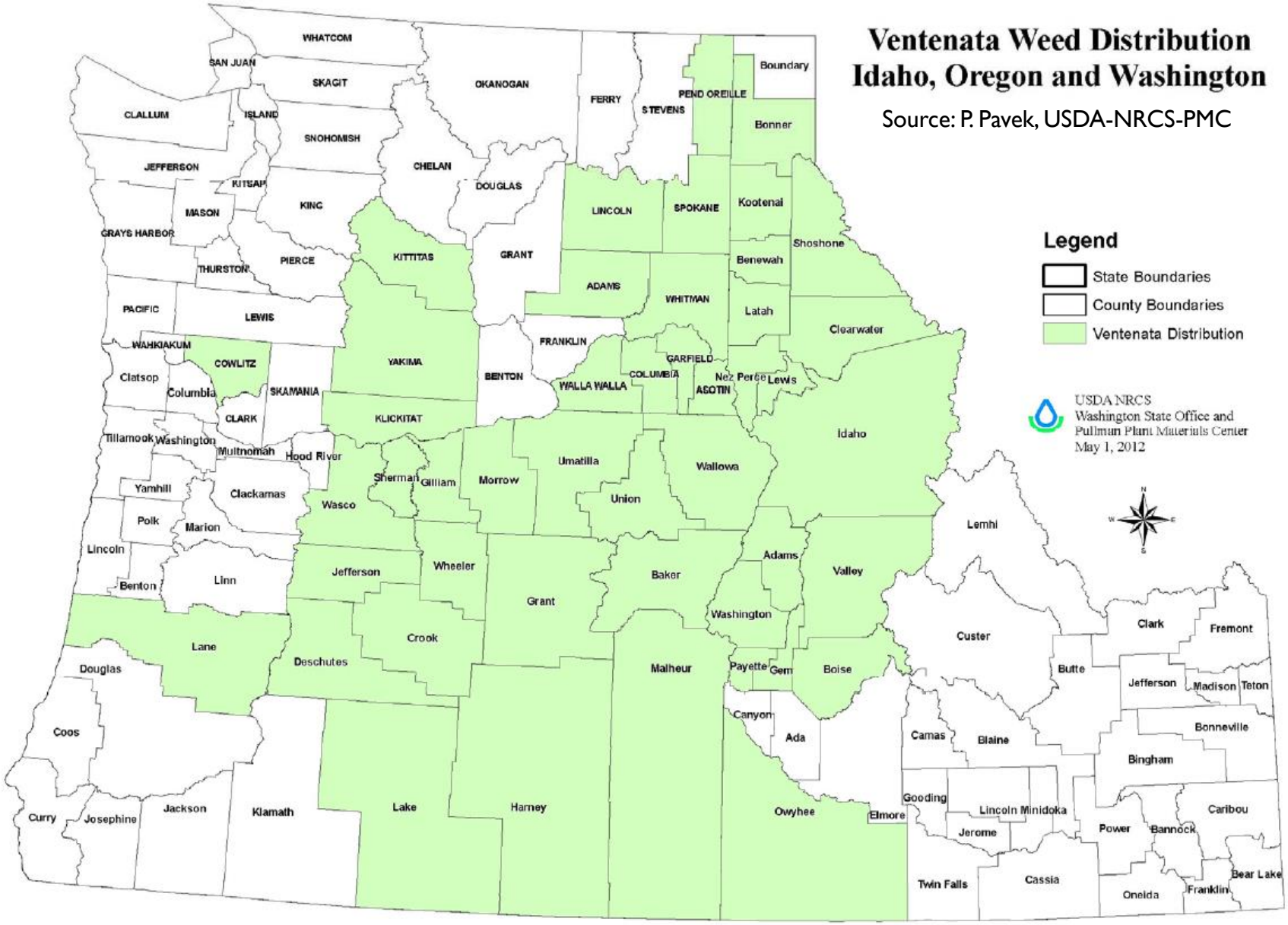
Ventenata Identification & Distribution

- *Ventenata dubia* (North Africa grass; wiregrass)
- Native to Mediterranean Europe and Africa
- First resported in PNW in 1952

VEDU Identification

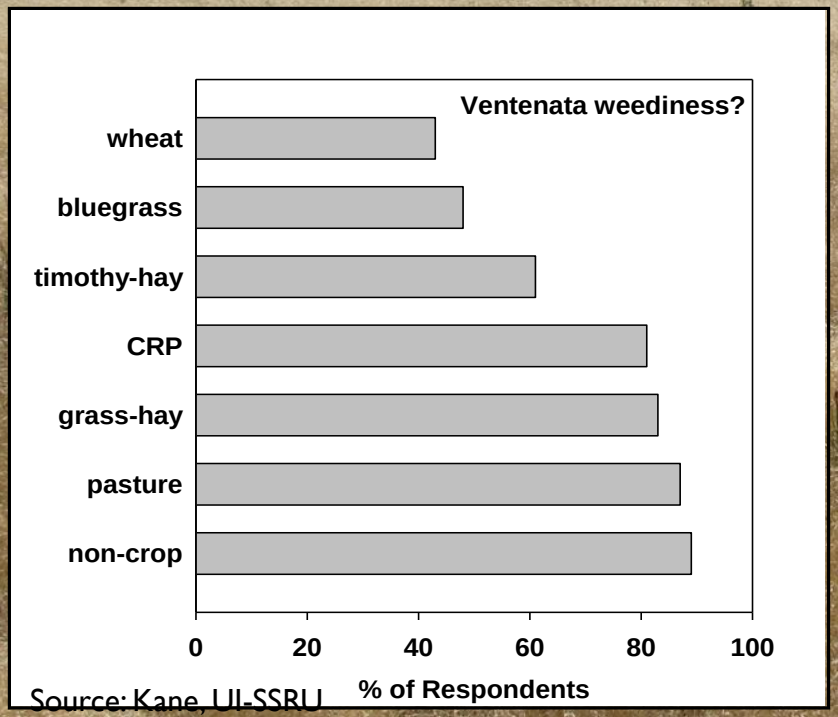
Ventenata Weed Distribution
Idaho, Oregon and Washington

Source: P. Pavek, USDA-NRCS-PMC



Ventenata Weediness in PNW

UI-SSRU; 2011 Survey



Source: Kane, UI-SSRU

Ventenata has thin, wiry stems and narrow leaves. Its seeds resemble miniature wild oats.

PHOTOS: PAMELA PAVEK, USDA NRCS

Fighting A Timothy Hay Foe

Ventenata can take growers out of the export market

in pastures. But, in timothy, registered herbicide options are more limited and Prather encourages growers to discuss them with their Extension agents. "There are always going to be species of grass injured by a herbicide designed to take grasses out of grass," he notes. "That's why local knowledge is so important."

Fountain uses several weed-control strategies. Timothy fields heavily infested with ventenata are replaced years earlier than they would normally, he says. "Ventenata doesn't seem to want to sprout in new soil. However, by the fourth year, it is back."

Sometimes he harvests timothy early while ventenata is still green and cows will eat it.

Although there's risk of damaging the timothy, Fountain has tried some herbicide applications with mixed success. "You want the timothy to be as dormant as possible," he says.

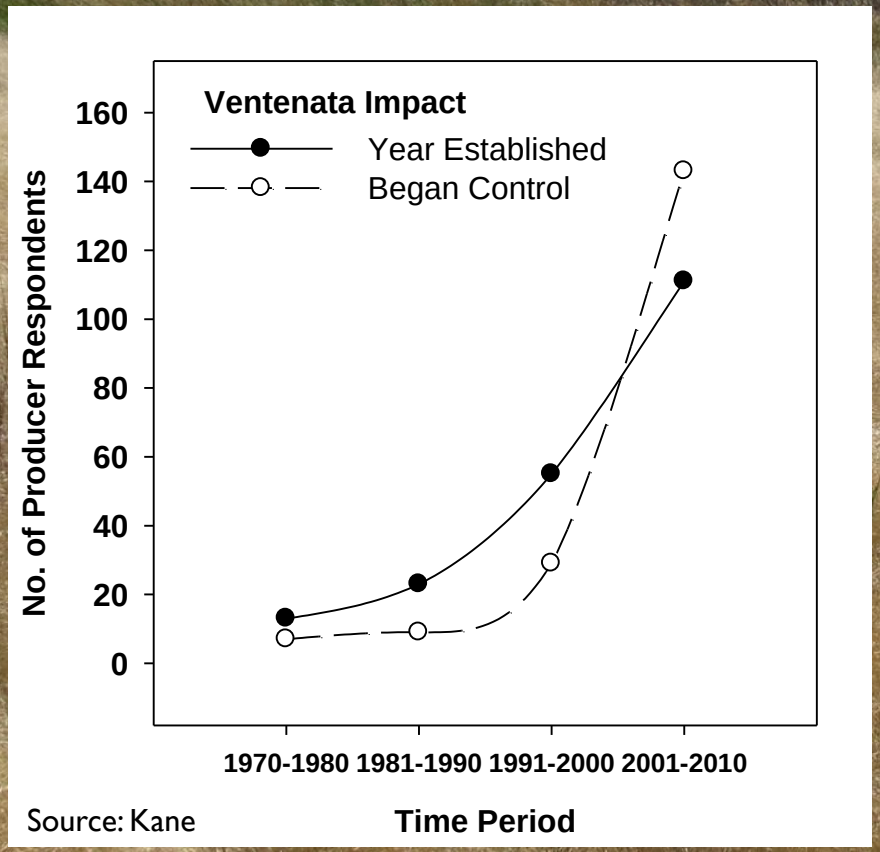
Fence lines are sprayed with Milestone, which isn't registered

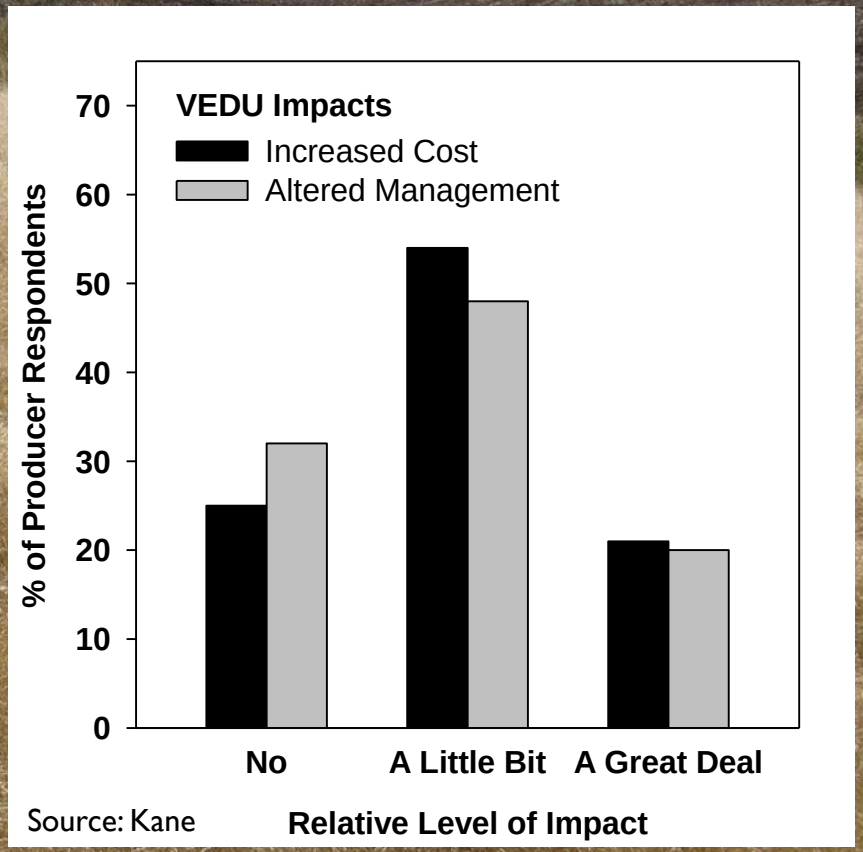
Ventenata Impacts in Perennial Grass Systems

- Economic & Management
- Forage Production & Quality
- Wildlife Habitat

Economic Impacts in PNW

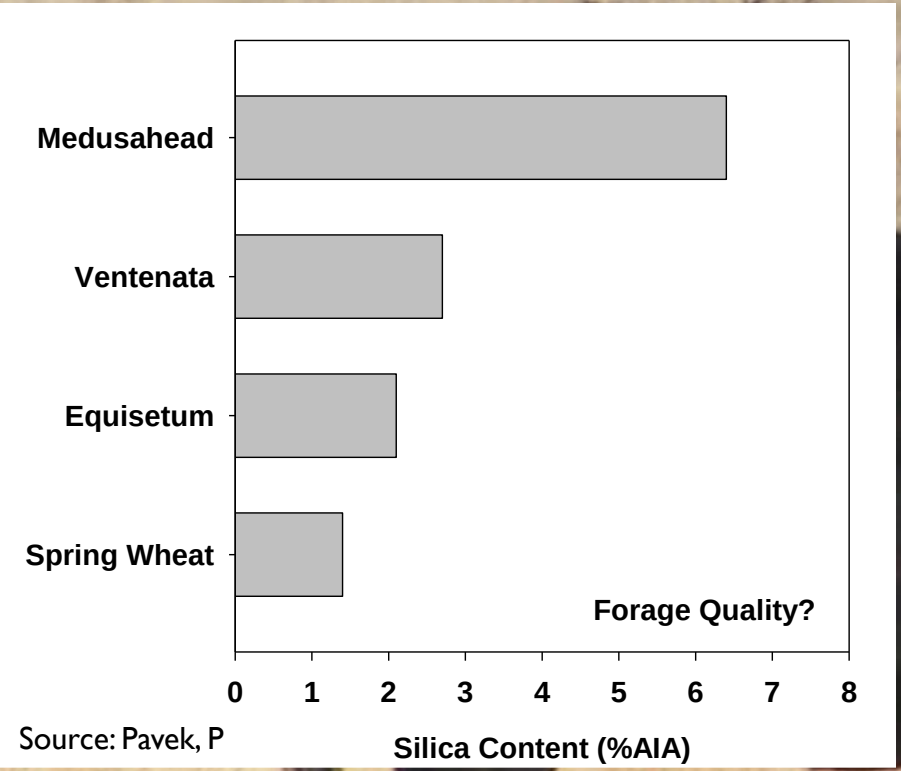
UI-SSRU; 2011 Survey

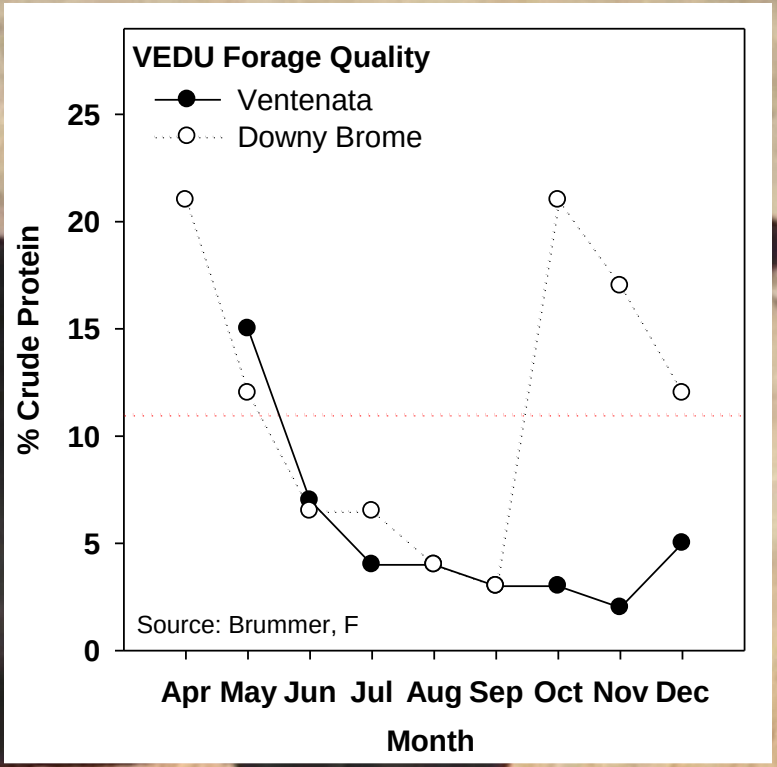




VEDU Effects on Forage Quality

P. Pavek (NRCS-PMC) & F. Brummer (OSU)





Indirect Effects on Wildlife Habitat

A. Mackey (UI: 2012-2013)

	Total Boxes	Avg. Clutch Size	Empty Boxes	Eggs not Viable	Nest Failure	Eggs Laid to Fledge	Survival after Hatch
			----------	----------	%	----------	----------
High VEDU	24	5.00	33	**45**	**25**	**48**	86
Low VEDU	31	5.23	29	**17**	**0**	**79**	95

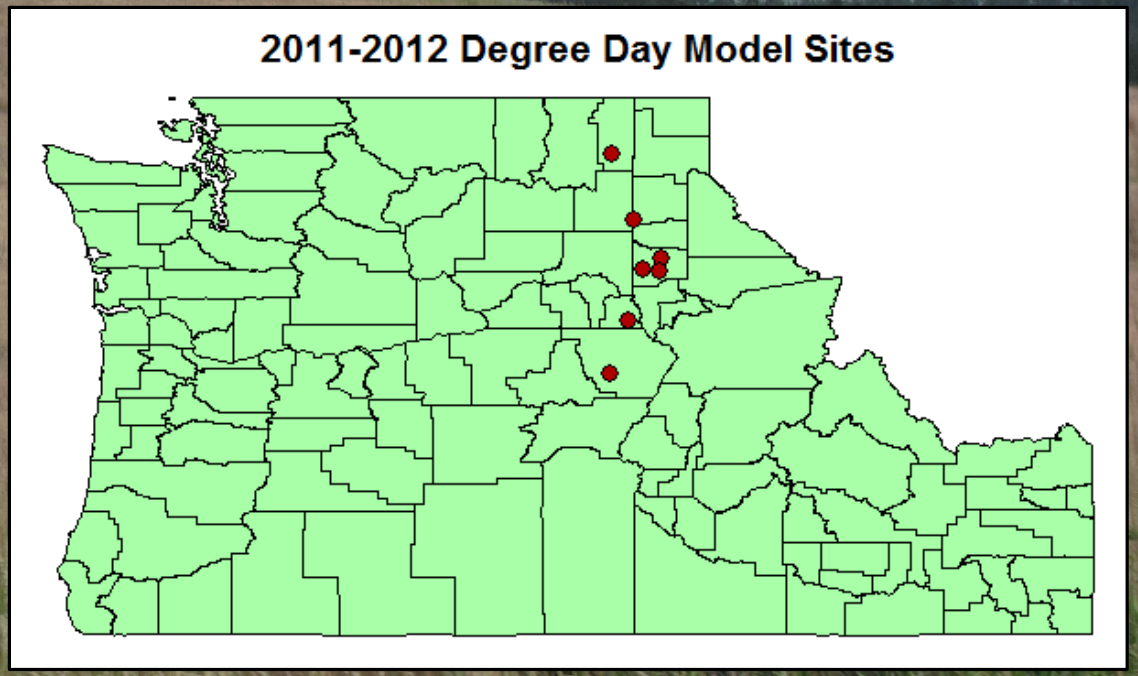
Source: Andrew Mackey

Ventenata Ecology in Perennial Grass Systems

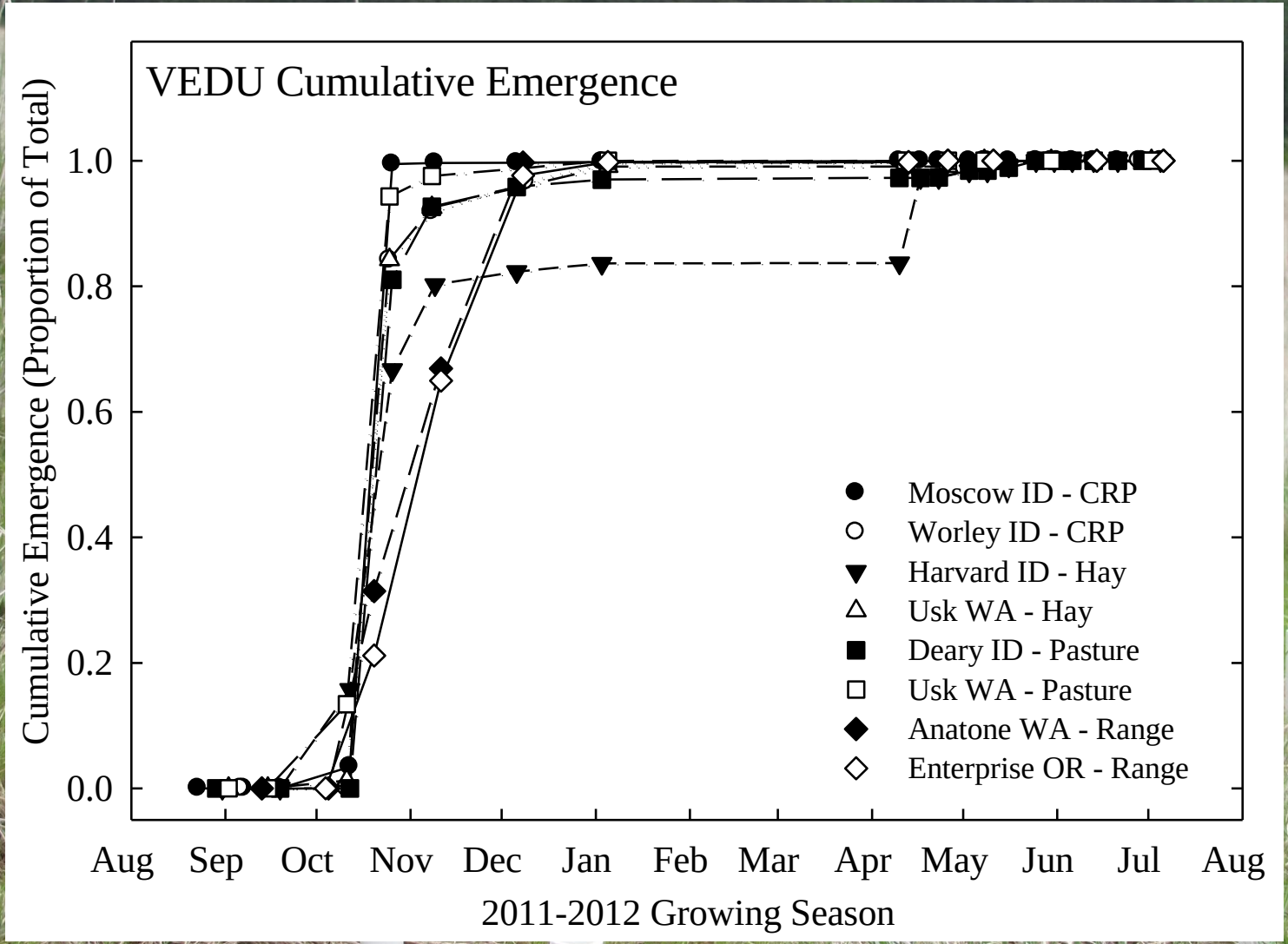
- Growth & Development Patterns
- Degree Day Model (DDM) Development
- Seedbank Life

Growth & Development of VEDU in the Inland NW (2011-2012)

Site Location	System
Moscow ID	CRP
Deary ID	Pasture
Harvard ID	Timothy Hay
Worley ID	CRP
Usk WA	Timothy Hay
Usk WA	Pasture
Anatone WA	Rangeland
Enterprise OR	Rangeland



Source: J. Wallace



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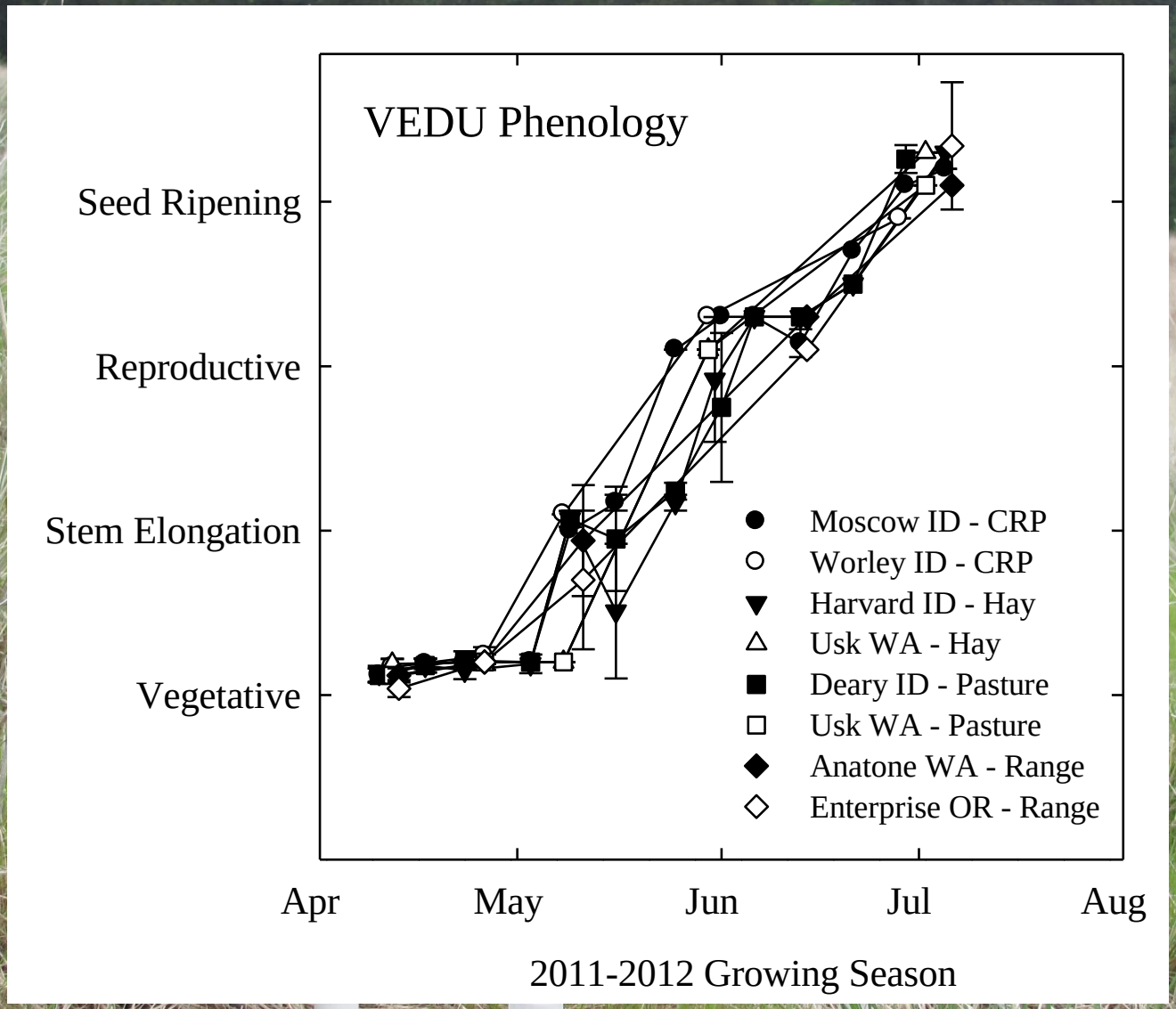
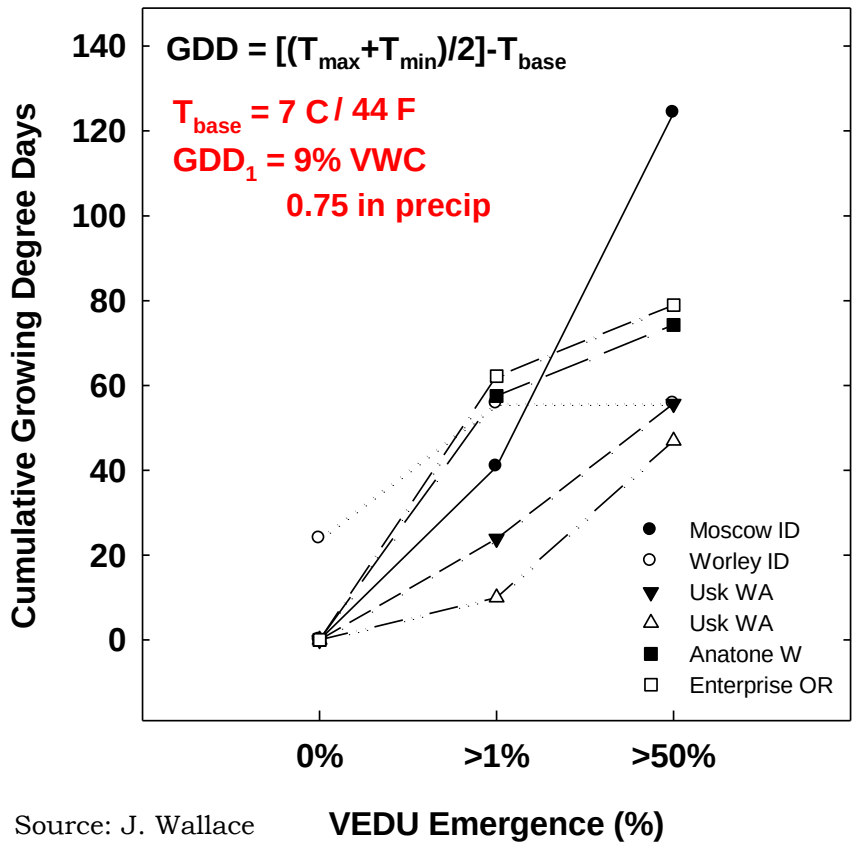


Source: J. Wallace

GDD Model



Source: J. Wallace

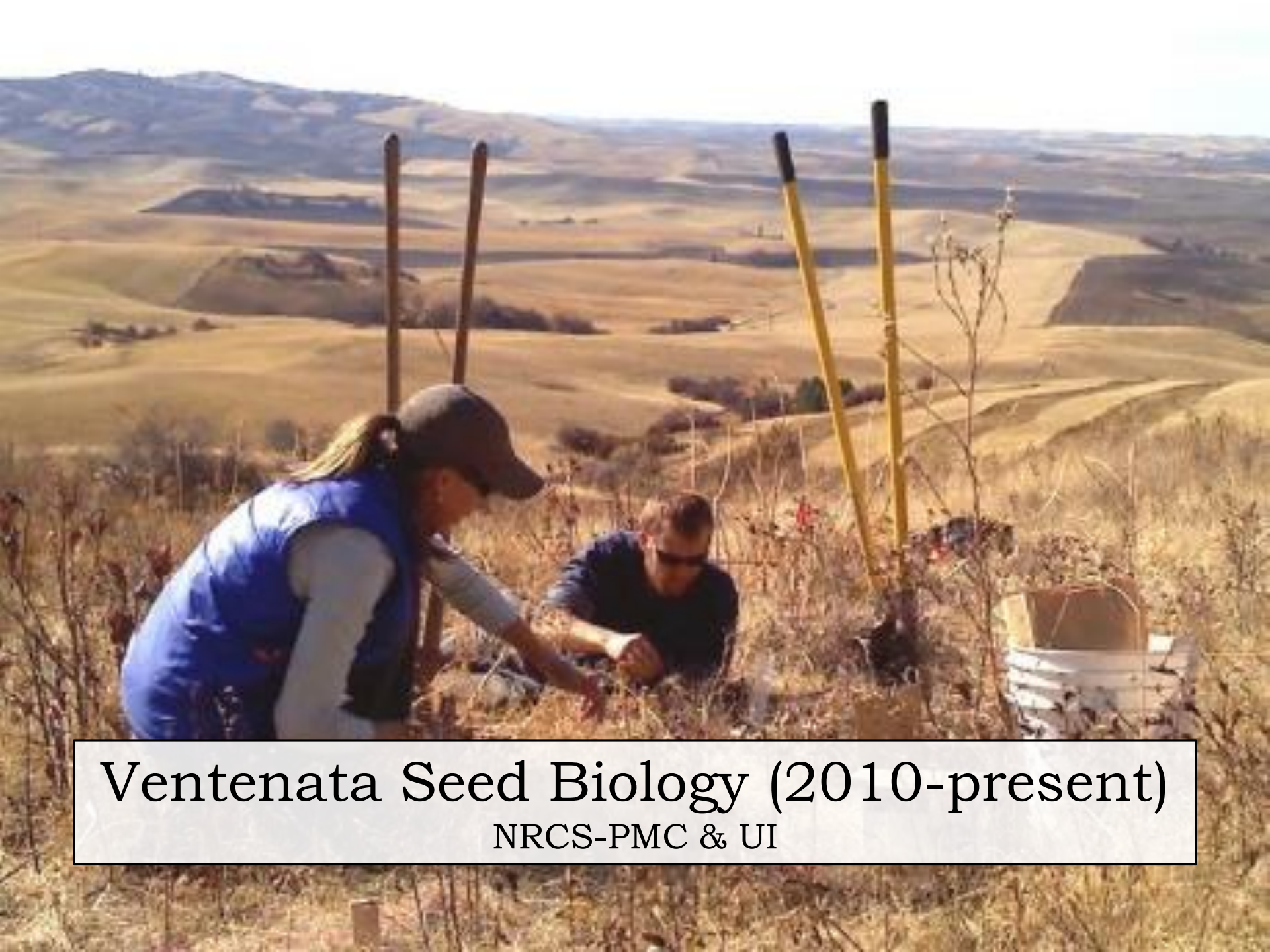
Model Prediction

Scenario:

→After 0.75 in of rain
→And soil temperatures >45 F

→ *VEDU germination will occur within 20 to 60 GDD*

→ $GDD = [(T_{max} + T_{min})/2]-T_{base}$



Ventenata Seed Biology (2010-present)

NRCS-PMC & UI

Site	Months after VEDU seed burial			
	1	6	12	24
	---------- mean % germination ----------			
PMC Farm, Pullman WA				
2 cm burial depth	81	0	0.0025	0
8 cm burial depth	80	0	0	0
Paradise Ridge, Moscow ID				
2 cm burial depth	83	0	0	0.0025
8 cm burial depth	80	0	0	0

Source: P. Pavek

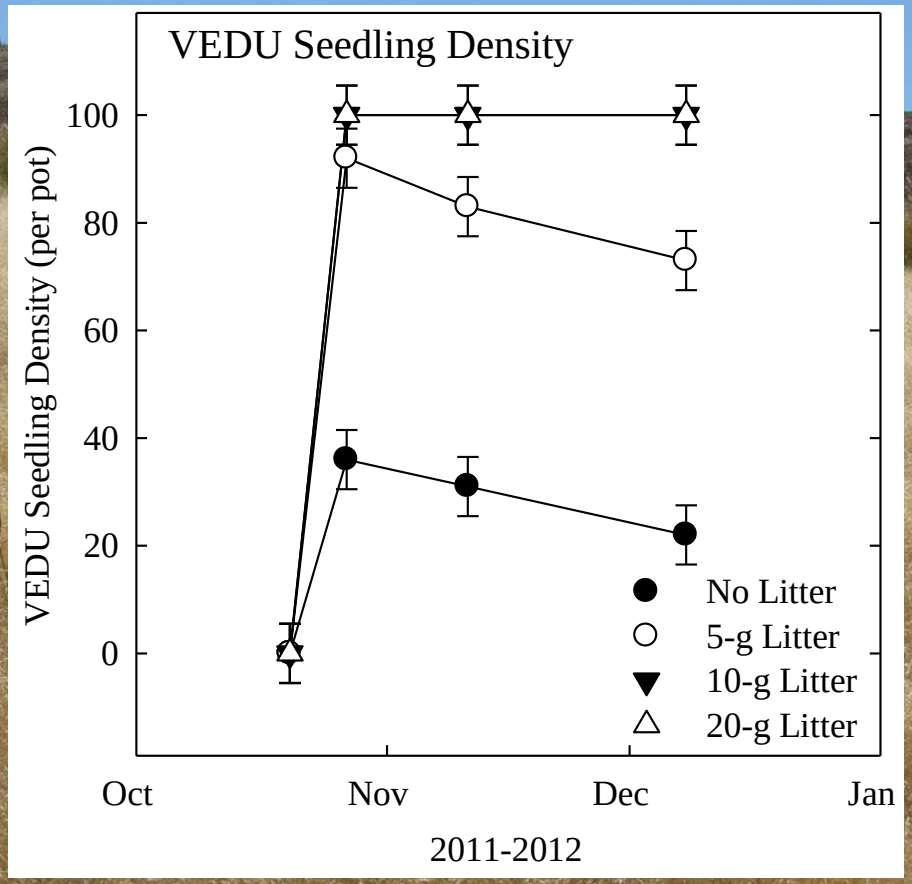
Ventenata Invasion Mechanisms

- Litter Effects on Population Demography
- VEDU – Endophyte Interactions

Positive Litter Feedbacks

(UI; 2011- present)

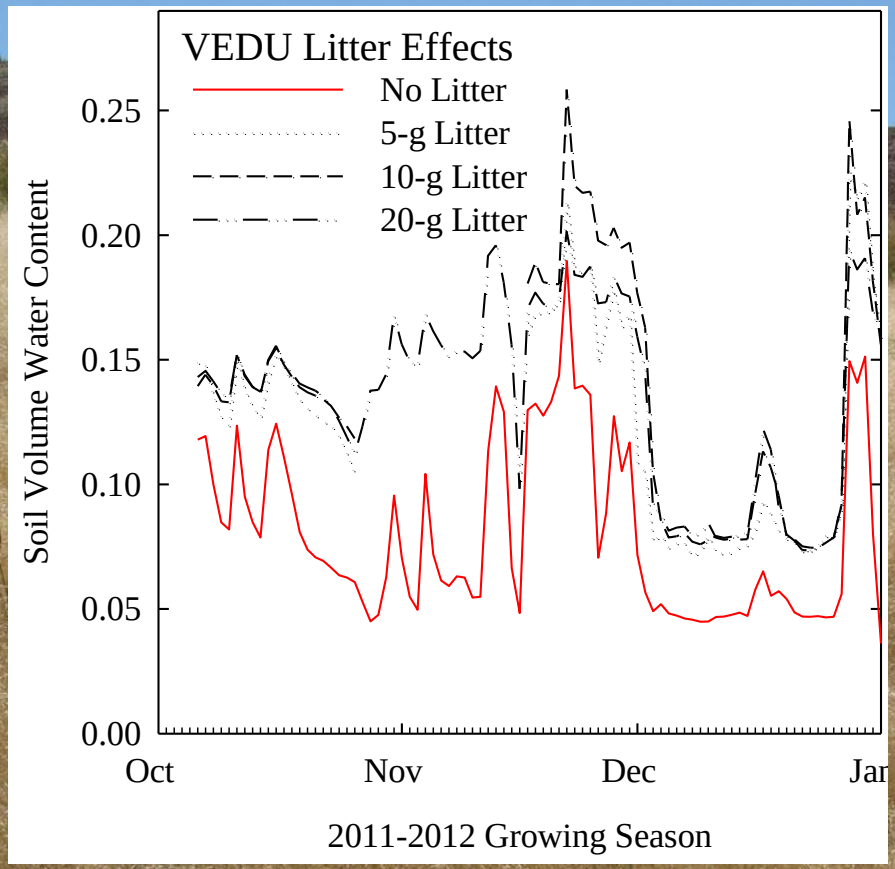
Litter Effects on VEDU Growth



Increased VEDU litter (%) →

1. Higher germination rates
2. Higher seedling survival
3. Higher seedling growth rates

Litter Effects on VEDU Growth



Increased VEDU litter (%) →

1. Higher soil moisture
2. Lower max temperatures
3. Higher min temperatures

VEDU*Endophyte Effects on Grass Competitors?

(UI-CRISSP 2012; Newcombe)

<u>Endophytic Fungi (Observations):</u>

- *Fusarium* strains (16% of total) identified in VEDU plants
- *Fusarium* genus contains plant pathogens

<u>Endophytic Fungi (Greenhouse Trials):</u>

- VEDU not negatively affected by Fusarium infection
- Bluebunch wheatgrass negatively affected by *Fusarium*

Ventenata Control in Perennial Grass Systems

- 2011-2012 Field Trials (Pre- and Post-Emergent Apps)

Ventenata Control in Perennial Grass Systems
(2011-present)

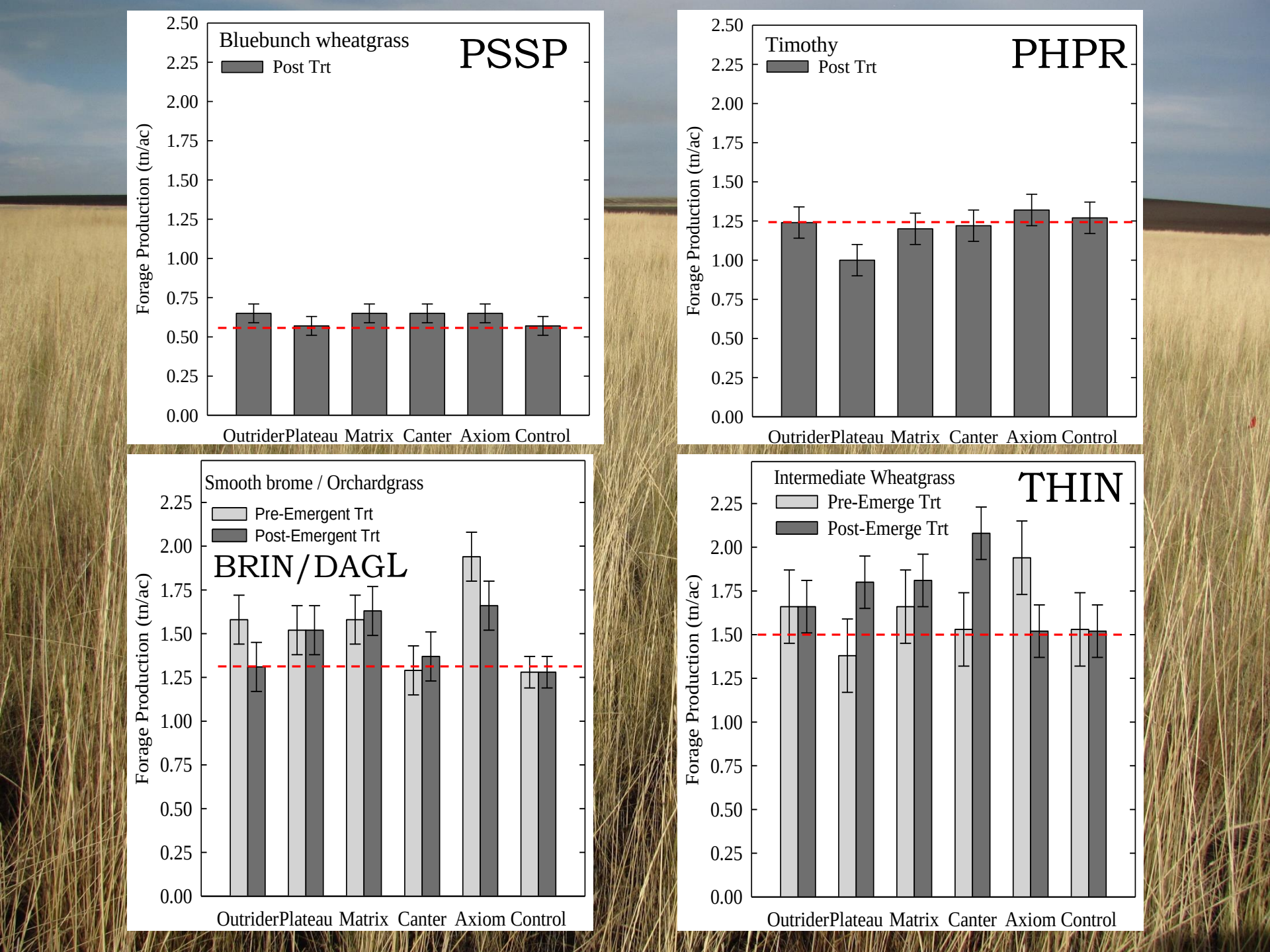
Site Location	Perennial Grass Stand	Soil Texture	% Organic Matter	Soil pH
Anatone WA	Bluebunch wheatgrass	silt loam	6.5	6.2
Grangeville ID	Timothy	loam	7.4	5.4
Moscow ID	Smooth brome/Orchardgrass	silt loam	n/a	n/a
Moscow ID	Intermediate wheatgrass	silt loam	4.1	5.7
Grangeville ID	Intermediate wheatgrass	clay loam	3.7	5.6

Applications (Fall 2011):

- 5 selective herbicides per site; 2 application timings (pre- and post-emergent)
- Pre-emergent (Oct 7-10) & Post-emergent (Nov 1-10; 1-2 leaf stage)

	Label Summary				
Product (chemical)	**fl oz/ac** ($/ac)	VEDU Labeled	Labeled for Use	Other Weedy Grasses Controlled	Grazing Restrictions
Outrider; (sulfosulfuron)	**1.0** ($17/ac)	No	non-crop **pasture** **rangeland** **CRP** natural areas	downy brome bulbous bluegrass	No grazing restriction; Rest 2 wks before and after application for best results.
Plateau (imazapic)	**6.0** ($10/ac)	No	aerial application forage grass grass/legume forage **CRP Land** **small pasture** **rangeland**	downy brome medusahead meadow foxtail Italian ryegrass	No grazing restriction; Do not harvest hay for 7 d after treatment
Matrix (rimsulfuron)	**3.0** ($40/ac)	No	aerial application **non-ag wildlife** non-crop agriculture federal EDRR	downy brome Italian ryegrass meadow foxtail medusahead	No established tolerance for forage grass or grazing; 1 yr grazing restriction
Canter (propoxy-carbazone)	**1.0** ($14/ac)	No	**CRP land** **pasture** **rangeland**	downy brome rattail fescue windgrass	No grazing restriction
Axiom (flufenacet/ metribuzin)	**8.0** (n/a)	No	none applicable	downy brome meadow foxtail rattail fescue	--

Treatment	CRP planting	Application Timing PRE (Oct 7-10)	POST (Nov 1-10)
Outrider (1 oz/ac)	Bluebunch wheatgrass	--	98
	Timothy	--	98
	S. brome/Orchardgrass	85	94
	Intermediate wheatgrass (dry)	91	92
Plateau (6 oz/ac)	Bluebunch wheatgrass	--	91
	Timothy	--	93
	S. brome/Orchardgrass	82	90
	Intermediate wheatgrass (dry)	63	70
Matrix (3 oz/ac)	Bluebunch wheatgrass	--	98
	Timothy	--	98
	S. brome/Orchardgrass	98	95
	Intermediate wheatgrass (dry)	96	88
Canter (1 oz/ac)	Bluebunch wheatgrass	--	75
	Timothy	--	87
	S. brome/Orchardgrass	73	78
	Intermediate wheatgrass (dry)	58	81
Axiom (8 oz/ac)	Bluebunch wheatgrass	--	75
	Timothy	--	92
	S. brome/Orchardgrass	91	88
	Intermediate wheatgrass (dry)	89	75


Bluebunch wheatgrass
PSSP
Post Trt
Forage Production (tn/ac)
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Outrider Plateau Matrix Canter Axiom Control
Timothy
PHPR
Post Trt
Forage Production (tn/ac)
Outrider Plateau Matrix Canter Axiom Control
Smooth brome / Orchardgrass
BRIN/DAGL
Pre-Emergent Trt
Post-Emergent Trt
Forage Production (tn/ac)
Outrider Plateau Matrix Canter Axiom Control
Intermediate Wheatgrass
THIN
Pre-Emerge Trt
Post-Emerge Trt
Forage Production (tn/ac)
Outrider Plateau Matrix Canter Axiom Control

Ventenata Integrative Weed Management Plans

- Herbicide + Fertilization + Litter Management
- CRP, small-pasture & timothy hay systems

VEDU IWM in Pasture & CRP

Litter Management Tools:

- CRP: 1) fall burn, 2) spring burn, 3) cut & bale

- Pasture: 1) fall graze, 2) spring graze, 3) fall & spring graze

- *Litter management tools + chemical control & fertilization*
- *What are the implications for VEDU management?*

VEDU Litter Management in CRP

Hay & Forage Production IWM Strategies

Harvest Heights & NPK Fertilization Timing

Timothy Hay Management Guidelines:
(S. Fransen; WSU-IAREC, Prosser WA)

• Higher harvest heights (> 5 in) preserve stored sugars important for surviving drought stress and growth

• Fall P&K fertilization → increase root and shoot development, resulting in earlier spring green-up.

• *What are the implications for VEDU management?*

Hay & Forage Production IPM Strategies

Harvest Heights & NPK Fertilization Timing

QUESTIONS

Ventenata Resources:

- **NRCS Bulletin: www.plant-materials.nrcs.usda.gov/pubs/**
- **PNW Weed Mmgnt Handbook: www.pnwhandbooks.org/weed/**
- **Ventenata Email Listserve: jwallace@uidaho.edu**

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