University of Idaho Extension

MANAGING CHEATGRASS IN CROPS & PASTURE

DOUG FINKELNBURG
CROPPING SYSTEMS
AREA EXTENSION EDUCATOR

INTEGRATED MANAGEMENT OF DOWNY BROME IN WINTER WHEAT

PNW PEER REVIEWED

PNW668

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By
Drew J. Lyon, Professor and Endowed Chair Small Grains Extension and Research, Department of Crop and Soil Sciences, Washington State University
Andrew G. Hulting, Associate Professor and Extension Weed Management Specialist, Oregon State University
Judit Barroso, Assistant Professor, Crop and Soil Science, Oregon State University
Joan M. Campbell, Principle Researcher, University of Idaho

USDA United States Department of Agriculture

Field Guide for Managing Cheatgrass in the Southwest

Forest Service Southwestern Region

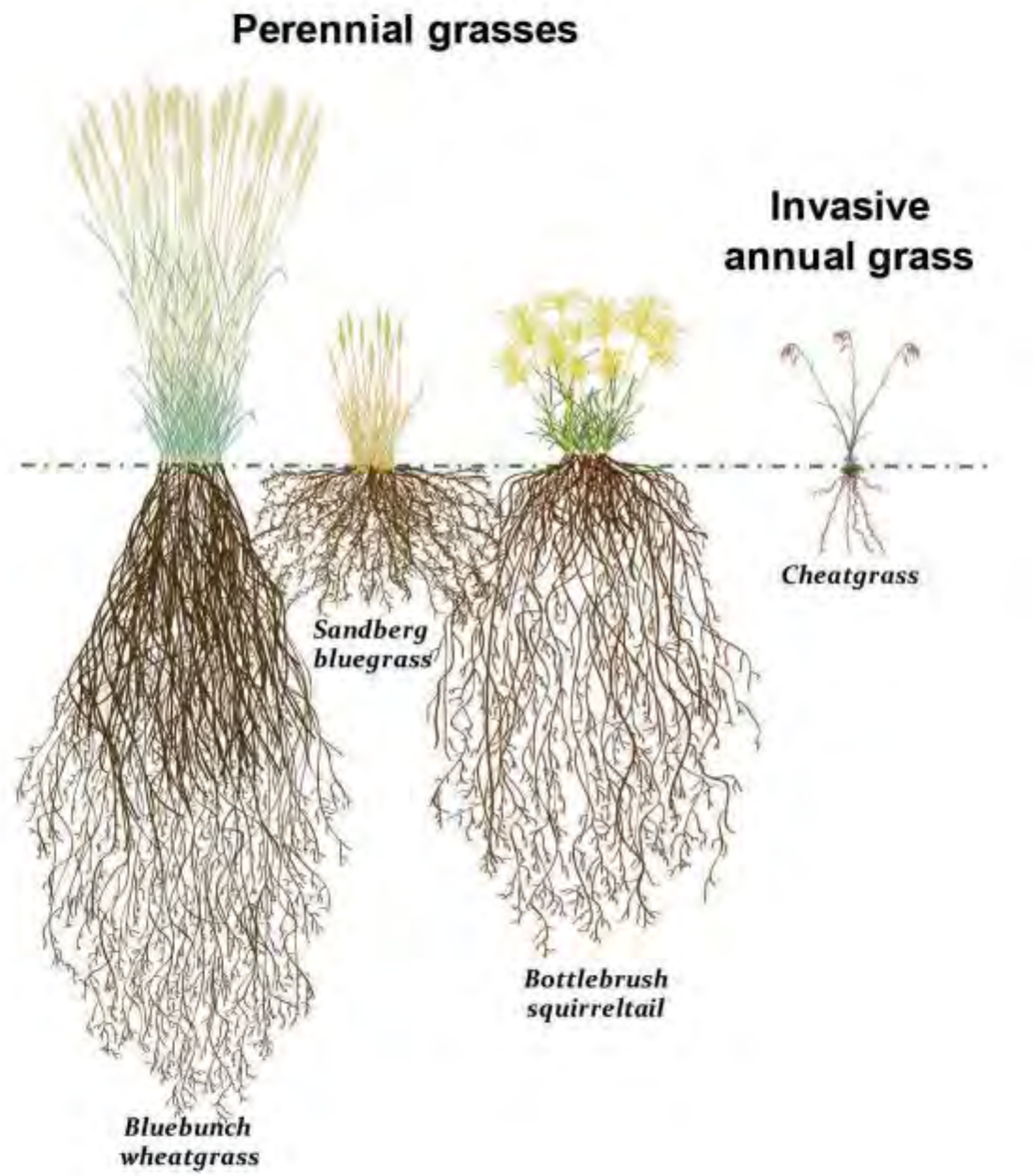
TP-R3-16-04 September 2014

DOWNY BROME

Bromus tectorum L.

AKA CHEATGRASS

- Mediterranean origin
- Introduced in 1861
- Throughout continent by 1914
- Adapted to 6”-22” of precipitation
- Found in disturbed and undisturbed sites
- Wide range of soil types



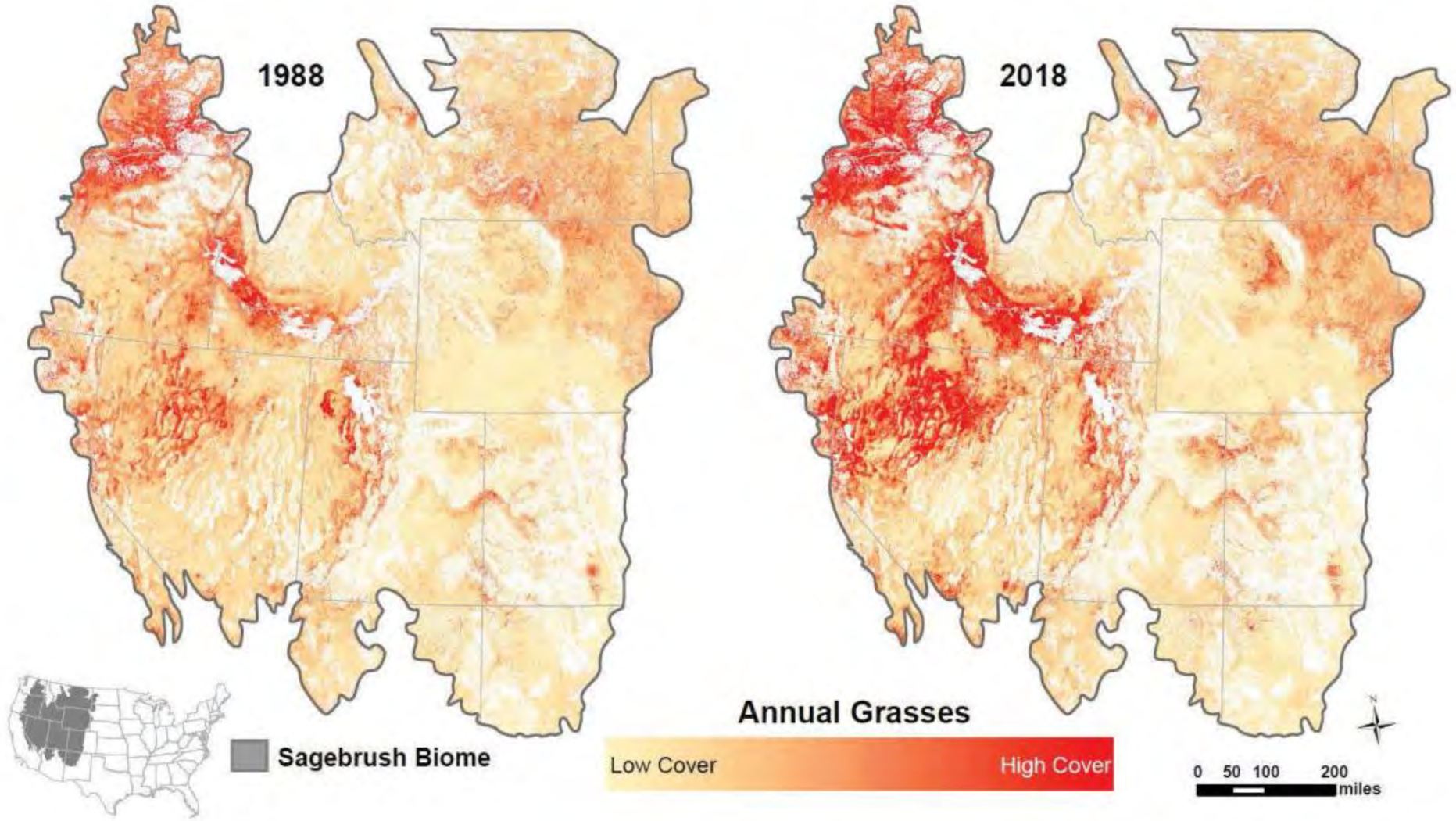
From USDA "Tackling Idaho's Cheatgrass Challenge

INVASIVE ANNUALS

- Leave soil more prone to erosion
- Less forage of lower quality for wildlife
- Contribute less to soil function (health)
- Fuel for wildfire
- Compete with annual/perennial crops

Tackling Idaho's Cheatgrass Challenge

A Call-to-Action to Reduce Cheatgrass and Other Invasive Annual Grasses in Sagebrush Country



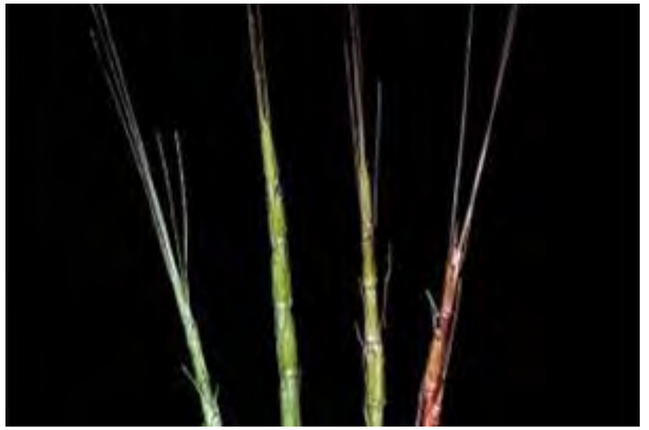
From USDA "Tackling Idaho's Cheatgrass Challenge

DOWNY BROME LEGAL STATUS IN IDAHO

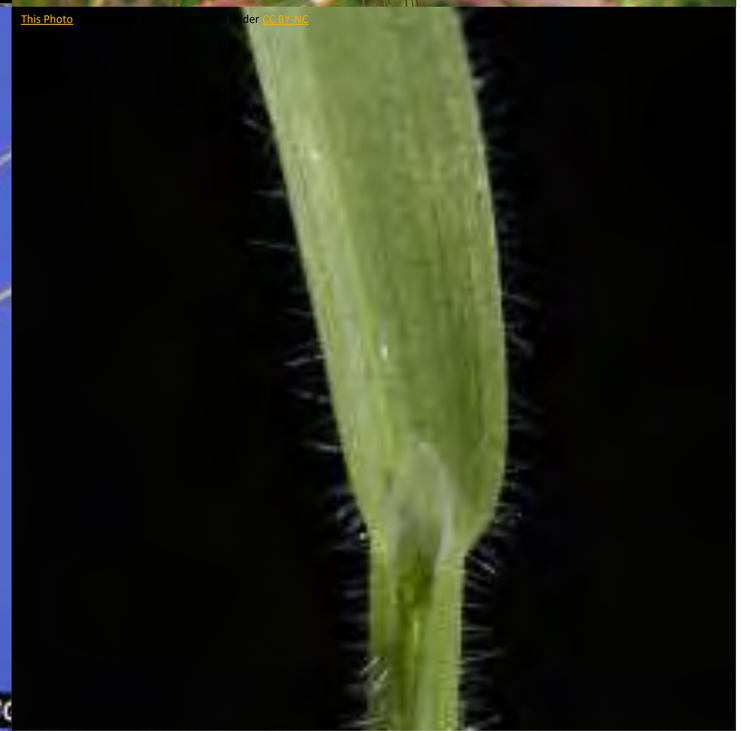
NOT LISTED ON NOXIOUS WEEDS LIST

Cogon Grass (Temporary)
EDRR

Johnsongrass
Statewide Control



Jointed Goat Grass
Statewide Containment



IDENTIFICATION

- Winter annual grass
- 12”-24” height
- 2”-6” seed head, 5-8 spikelet flower
- ½” long seeds
- ½” - ¾” long awns
- Fine hairs on leaf sheaths and blades

BIOLOGY

Requires Vernalization

- Exposure of young plants to cold temperatures to promote flowering.
- Amount of time needed changes among D. brome populations

Germination

- Begins in autumn when soils are warm (~70 F^{o})
- Will continue to 35^{o}-40^{o} soil temps if enough soil moisture

Growth Habit

Overwinters in vegetative stage

Resume rapid growth in early spring

Matures May – June

Can produce seedhead if spring germinating but less prolific

Seed Ripening

- Requires short after-ripening period for optimum germination
- Process prevents seeds from sprouting too early

BIOLOGY

Germination

- Little seed dormancy
- >95% if buried within 2” of surface
- ~0% if buried below 4” of soil
- Seeds in residue live longer
- 2-3 year viability

Roots

- Primary roots develop from seed
- Grow throughout fall/winter if soil above freezing
- Secondary roots emerge from crown
- Can be 4’ deep but 95% > 15”

Competitive Advantage With Winter Cereals

Typically ahead of fall grains by 3-4 weeks

Matures and seeds shatter out by grain harvest

Seed Production

- Under competition 140 – 1350 seeds/plant in winter wheat*
- Ideal conditions: 500+ lbs seed/acre or 125 million plants

MANAGEMENT STRATEGIES

START CLEAN

CERTIFIED SEED

REPUTABLE SEED DEALER WITH SOME QUALITY ASSURANCE MECHANISM

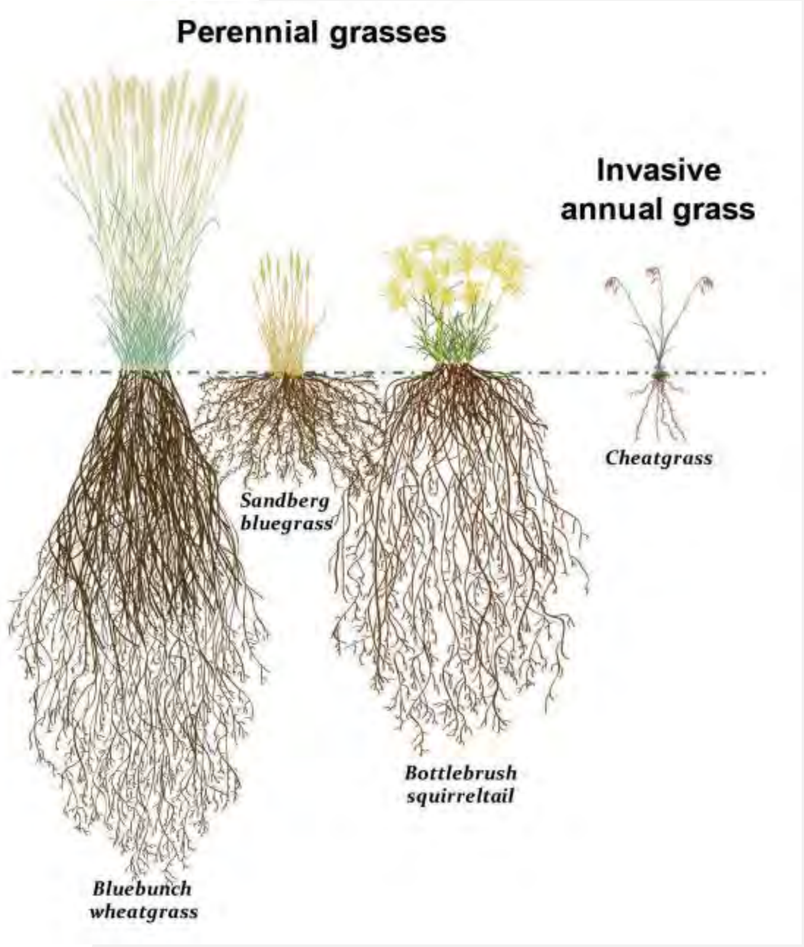
START CLEAN

CULTIVATING/PRE-PLANT CHEM-BURNDOWN

Producer spraying out winter weeds before spring planting

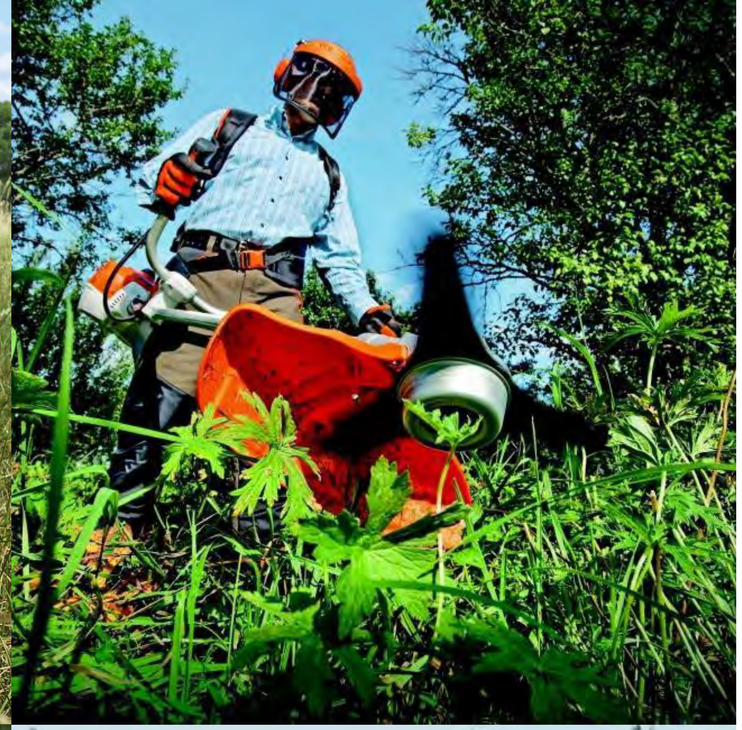
SEED PERENNIAL, COOL-SEASON GRASSES IN NON-CROP AREAS AND FIELD BORDERS.

- Highly competitive with annual weeds



Perennial, cool-season grass species options for non-crop areas and field borders to prevent downy brome infestation.

Precipitation zone (inches/year)	**Grass cultivar**
High (20+)	'Durar' hard fescue 'Rush' intermediate wheatgrass 'Alkar' tall wheatgrass
Intermediate (15–20)	'Durar' hard fescue 'Nordan' crested wheatgrass 'Bannock' thickspike wheatgrass
Low (less than 15)	'Covar' sheep fescue 'Sodar' streambank wheatgrass 'Vavilov II' Siberian wheatgrass



ELIMINATION OF SEED SOURCES

- Destroy seedlings before they produce seed
- Monitor field borders
- Spot apply small patches – don’t wait!
- Mow close to the ground before seed set, be ready to repeat

CROP DIVERSITY & ROTATION

N. IDAHO CASE STUDY

- Wheat is a winter annual grass
- Grown 1-3/3 years in most rotations
- N. Idaho annual rotations tend to include spring grain crop 1/3 years
- Broad leaf crop 1/3 years (if at all)
- Rotations selects for annual grasses, dominated by winter annual/facultative grassy weeds

ROTATION STRATEGIES

2-YEARS OF SPRING CROPS BETWEEN WINTER CEREALS

- Allows fall & spring weed control before planting
- Allows use of selective grassy weed herbicides
  - Gp 1 ACCase inhibitors
    - Sethoxydim (Poast) – Peas, Lentils, Dry Beans, Canola,
    - Clethodim (Select Max) – Peas, Dry Beans Canola, Lentils
    - Quizalofop (Agressor, Assure II, Targa) – Peas, Lentils, Chickpea, Canola

ROTATION STRATEGIES

2-YEARS OF SPRING CROPS BETWEEN WINTER CEREALS

- Allows fall & spring weed control before planting
- Allows use of selective grassy weed herbicides
  - Gp 3 (Microtubule inhibitors)
  - Ethalfluralin (Sonalan HFP) –dry beans, peas & oilseeds
  - Pendimethalin (Prowl H2O) – peas and lentils, edible beans
  - Trifluralin (Treflan HFP) – peas, lentils, chickpea, canola,

ROTATION STRATEGIES

2-YEARS OF SPRING CROPS BETWEEN WINTER CEREALS

- Allows fall & spring weed control before planting
- Allows use of selective grassy weed herbicides
  - Gp 15 (long chain fatty acid syn. inhibitors)
  - Dimethanamid (Outlook) – Peas, Lentils, Chickpea, Canola
  - S-metolachlor (Dual Magnum) – Peas, Lentils, Chickpea

ROTATION STRATEGIES

2-YEARS OF SPRING CROPS BETWEEN WINTER CEREALS

- Barley is good spring cereal alternative
- Fewer herbicides but can be delayed without as much yield penalty as spring wheat
- Very competitive
- Key is to create two years of low downy brome seed input to deplete seed bank

WHAT ABOUT PASTURE?

WEED CONTROL IN ESTABLISHED PASTURE AND HAYED GROUND IS COMPLICATED

- Cultivation not an option
- Cultural practices important
  - Optimal Fertility = Competitive crop
  - Maximize genetics, right species for right environment
- Selective herbicides necessary*

MAXIMIZING CROP COMPETITION

NORTHERN IDAHO NON-IRRIGATED GRASS PASTURES

- Take soil tests semi-annually for P, K & S
- pH < 5.1? Add ag-lime
- **Split N application annually**
  - 1st Feb-April
  - 2nd June

Table 1. Nitrogen fertilizer rates for grass pastures based on annual precipitation.

Annual precipitation	N application
(inches)	(lb/acre)
less than 20	80 to 110
20 to 22	100 to 130
22 to 25	120 to 145
more than 25	135 to 160
irrigated pastures	140 to 170

CIS 835 Northern Idaho Fertilizer Guide Grass Pastures

MAXIMIZING CROP COMPETITION

NORTHERN IDAHO NON-IRRIGATED GRASS PASTURES

- Apply Phosphorous in fall
- 1-3 year supply
- 10-110 lbs/A
- Up rates 25% if soils high in volcanic ash

Table 2. Phosphorus fertilizer rates for grass pastures based on a soil test.

Soil test P (0 to 12 inches)[1]			P_2O_5 application rate[2]		
NaOAc	Bray	$NaHCO_3$	1-year supply	2-year supply	3-year supply
(ppm)	(ppm)	(ppm)	(lb/acre)	(lb/acre)	(lb/acre)
0 to 2	0 to 20	0 to 8	50	90	110
2 to 4	20 to 40	8 to 14	35	45 to 55	70 to 80
4 to 8	40 to 80	14 to 20	0	10 to 20	20 to 40
over 8	over 80	over 20	0	0	0

[1] Soil test P can be determined by three different procedures: sodium acetate (NaOAc), Bray I method, or sodium bicarbonate ($NaHCO_3$). Sodium bicarbonate should not be used on soils with pH values less than 6.2. Use the column indicated by your soil test report.

[2] P_2O_5 x 0.44 = P, or P x 2.29 = P_2O_5.

CIS 835 Northern Idaho Fertilizer Guide Grass Pastures

MAXIMIZING CROP COMPETITION

NORTHERN IDAHO NON-IRRIGATED GRASS PASTURES

- Grass is greedy for K (potassium)
  - Fall apply when needed

Table 3. Potassium fertilizer rates based on a soil test.

Soil test K[1]	K_2O[2]
(ppm)	(lb/acre)
0 to 35	80
35 to 75	55
75 to 100	35
more than 100	0

[1] Sodium acetate-extractable K in the 0- to 12-inch depth.

[2] $K_2O \times 0.83 = K$, or $K \times 1.20 = K_2O$.

CIS 835 Northern Idaho Fertilizer Guide Grass Pastures

MAXIMIZING CROP COMPETITION

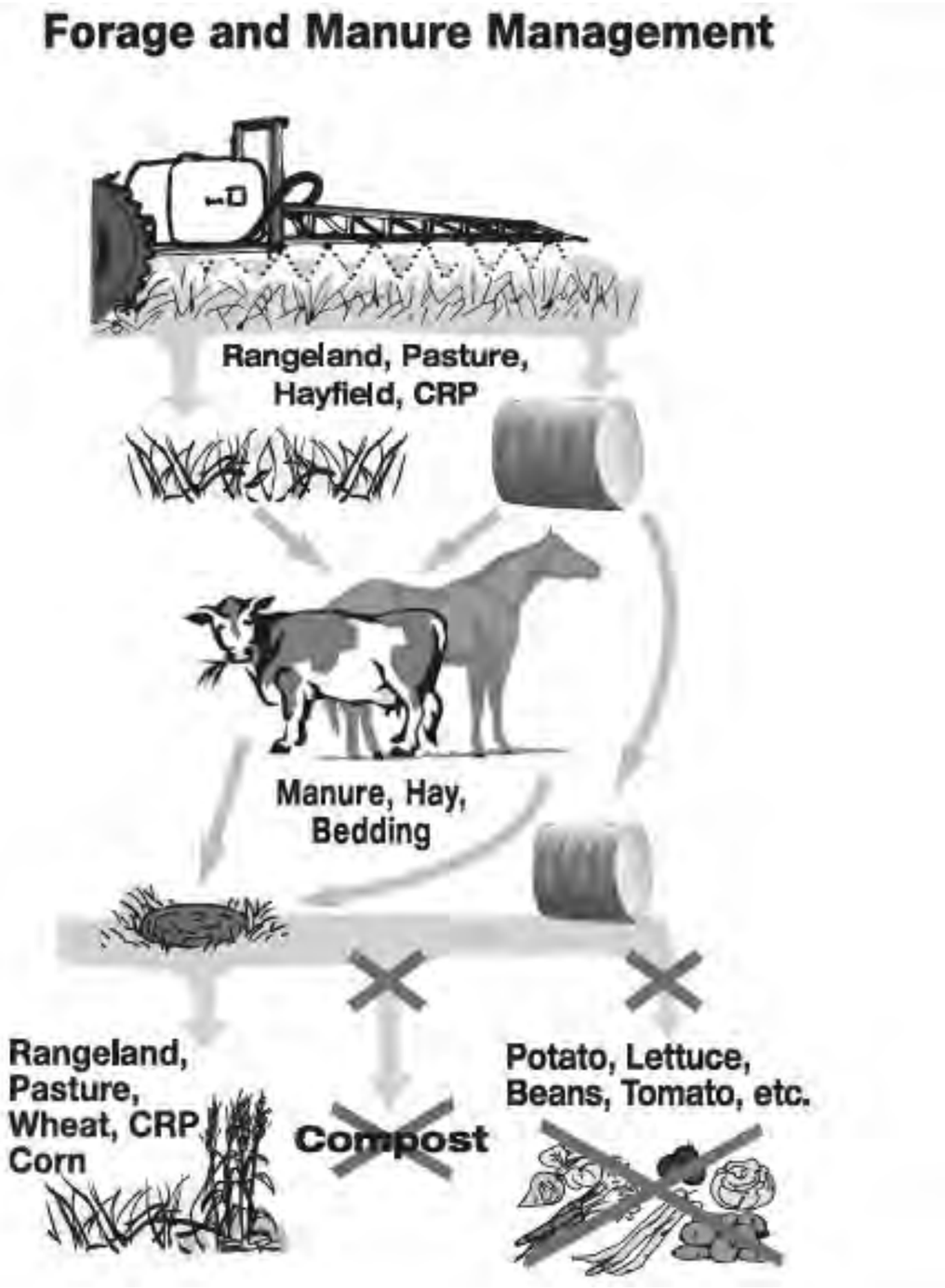
NORTHERN IDAHO NON-IRRIGATED GRASS PASTURES

- Sulfur often deficient, mobile
- Spring apply
- Up rates 25% if soils high in volcanic ash

Table 4. Sulfur fertilizer needs of grass pastures based on a soil test.

Soil test S (0 to 12 inches)		S application rate
(ppm SO_4-S)	(ppm S)	(lb/acre)
0 to 10	0 to 4	20
over 10	over 4	0

CIS 835 Northern Idaho Fertilizer Guide Grass Pastures



PASTURE HERBICIDES FOR DOWNY BROME

- Aminopyralid (Gp 3)
- Milestone 7-14 fl oz/Acre
- Application should be made in late summer prior to rains/germination
- Long residual activity!

PASTURE HERBICIDES FOR DOWNY BROME

PROWL H2O - PENDIMETHALIN (GP 3)

- Only to established perennial cool-season forage grasses
- Apply before germination in fall
- 1.1-4.2 quarts/Acre, 30 days between application, no more than 4.2 quarts/Acre/year
- No preharvest interval for forage grasses
- Do not apply to mixed stands with forage legumes besides alfalfa

PASTURE HERBICIDES FOR DOWNY BROME

LARAMIE 25DF – RIMSULFURON (GP 2)

- Pre or early post emergent application (3-4 oz/acre effective on D. brome
- Most effective when weeds are small
  - Need a few hours to absorb before rain/irrigation
- Best Pre-results when little/no residue, needs water to activate
- Do not graze or feed forage, grain, or fodder (stover) from treated areas to livestock within 30 days of Laramie 25DF application.

HERBICIDES FOR DOWNY BROME

Rejuvra – Indaziflam (Gp 29)

Preemergence Herbicide for the restoration and protection of **Rangeland**, Conservation Reserve Program **(CRP)** lands, **Natural Areas** e.g., Parks and Open Space, **Wildlife Management Areas**, **Recreational Areas, Fire Rehabilitation Areas**, **Prairies** and **Fire Breaks** and including any of these **sites that are grazed or cut for grass hay.**

Rotational Crop Restrictions

Rotational Crops	Minimum Plant Back Interval (Months After Rejuvra® Application)
Cereal Crops e.g., Wheat, Corn, Sorghum, and Barley	22
Root Crops e.g., Carrot, Radish, Potato, and Sugar Beet	22
Soybean*	22

*Soybeans may be rotated after 22 months provided the forage and hay are not fed to livestock.

Caution!

Soil movement from site of application can result in crop or plant injury where soil is deposited.

For release of established perennials.

Broadleaf Weeds Controlled (selected)

Canada Thistle (from seed)

Diffuse Knapweed

Kochia

Russian Thistle

Yellow Starthistle

Annual Grasses Controlled

Annual Brome

Downy Brome (Cheatgrass)

Barnyardgrass

Foxtail (yellow, green)

Medusahead

Ventenata

If Grazed –

Do not exceed 5 fl oz per acre of Rejuvra® (0.065 lb active ingredient per acre) in a single application. • Do not exceed 6 fl oz per acre of Rejuvra® (0.078 lb active ingredient per acre) in a 12-month period.

DO NOT harvest hay within 40 days of any single application.

HERBICIDE RESISTANCE

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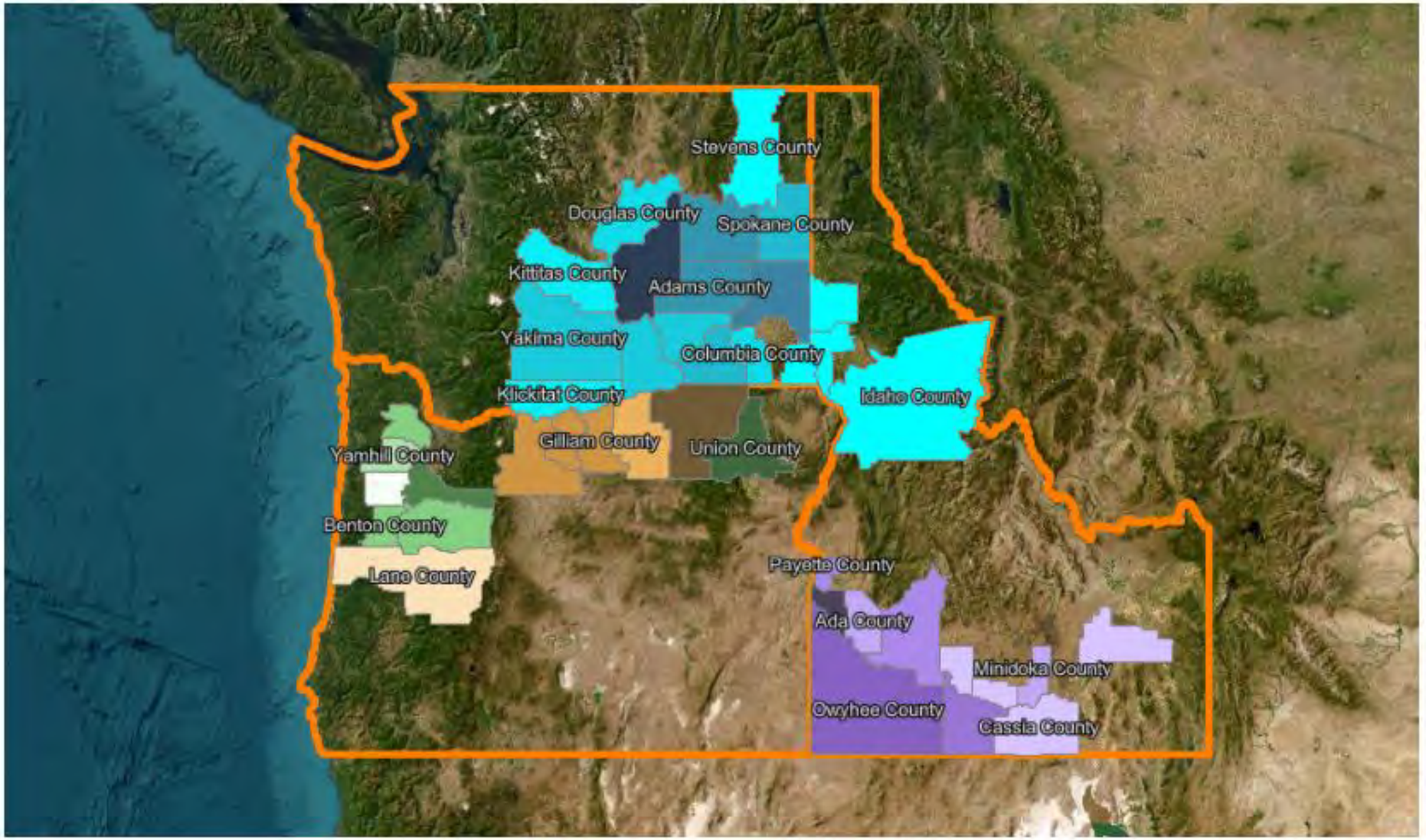

Herbicide Resistance Tracking Map

Nez Perce County

Species - *Bromus tectorum*
Common Names - Downy Brome, Cheatgrass, Downy Chess
Resistance Found:

- **Group 2** - Imazamox, Mesosulfuron, Propoxycarbazone, Pyroxsulam, Sulfosulfuron
- **Group 5** - Metribuzin

Image Credit: Matt Lavin - https://www.flickr.com/photos/plant_diversity/3860522

Commercial Products

Group 2

- Imazamox - Beyond®, Clearcast®, Clearmax®, Raptor®, Raptor DG®, Davai®
- Mesosulfuron - Osprey®
- Propoxycarbazone - Olympus™, Lambient™
- Pyroxsulam - PowerFlex HL®
- Sulfosulfuron - OutRider®

Group 5

- Metribuzin - Sencor®, Lexone®

Cross-resistance (resistance within the same group):

- **Group 2:** Imazamox, Pyroxsulam, Sulfosulfuron

Multiple resistance (resistance across different groups):

- Imazamox and Metribuzin, Pyroxsulam and Metribuzin, Sulfosulfuron and Metribuzin

Cross and multiple site resistance are based on reported information and does not apply to every population. Cross and multiple site resistance could occur in additional chemical families or group numbers but have not be tested or reported at this point in t

ADDITIONAL RESOURCES

HTTPS://SMALLGRAINS.WSU.EDU/WEEDERS-OF-THE-WEST/

SUMMARY

- Identify & make a plan
- Incorporate cultural, mechanical & chemical control strategies
- Monitor effectiveness of control program
  - If ineffective, why?
  - Timing? Applicator error?
- Consider herbicide resistance

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DOUGF@UIDAHO.EDU