Nightshade and Nutsedge Control in Dry Beans

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Topics of the Day

- Hairy nightshade and yellow nutsedge biology
- Nightshade and nutsedge herbicide labels
- Research results
- Ideas for Idaho

Hairy nightshade biology

- **Introduced from South America in the 1800's**
  - First collected in ballast at Nanaimo, Vancouver Island in 1887
- ***Solanum physalifolium* (SOLSA)**
  - The weed formerly known as *Solanum sarrachoides*
  - Same family as potato (*Solanum tuberosum)*
- **Host to insects, nematodes, and diseases**
- Problem weed in beans: ***competition, harvest efficiency, bean quality***

Hairy nightshade biology

- **Annual – 12 to 24 inches**

- Begins germination in early spring and ***continues germinating throughout the summer***
  - ***Doesn't need light to germinate***
  - ***Germinates under wide temperature range***
- **Produces flowers and fruit until the end of the growing season in PNW**
  - Can produce viable seed as soon as 4 to 5 weeks after flowering and as late as 6 to 7 weeks before a killing frost

- **A light frost does not kill**

Hairy nightshade biology

- **A large plant can produce 1700+ berries**
  - 10 to 35 seeds per berry
- **Innate dormancy for 4+ months after maturity**
  - Seed buried in the field developed dormancy when exposed to high temperatures
- **Longevity in soil**:
  5 yrs = 90% germination
  8 yrs = 2% germination
- **Reports of germination after 39 yrs in soil**

Hairy nightshade biology

seed production example

- 800 berries/plant x 10 seeds/berry = **8,000 seeds/plant!**
- **10 plants/sq ft in our nontreated checks**
- **43,560 sq ft/A**
- **43,560 x 10 plants x 8,000 seeds/plant**
  = **3,484,800,000 seeds/A !!!**

Hairy nightshade biology

- Sometimes mistaken for cutleaf nightshade

hairy nightshade

Hairy nightshade cotyledon stage

cutleaf nightshade

Cutleaf nightshade cotyledons with true leaves emerging

Cutleaf nightshade

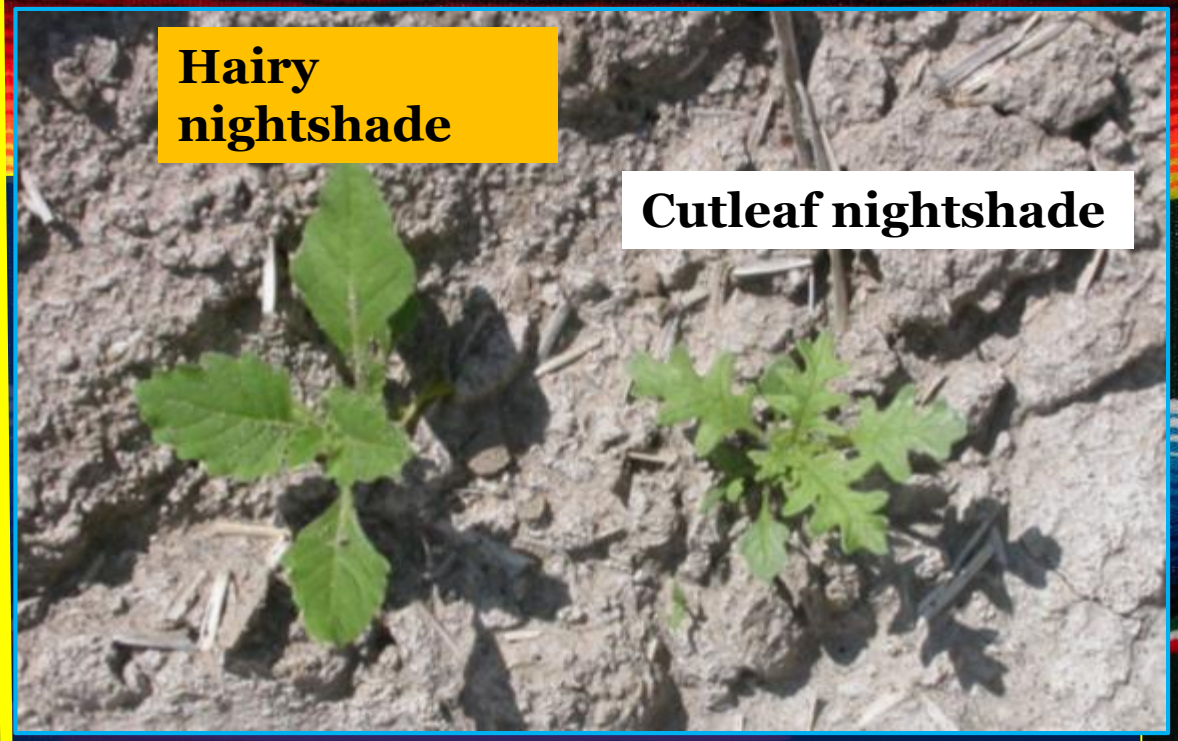
Both plants are hairy nightshade

Hairy nightshade

Hairy nightshade with wavy and smooth leaf margins

Hairy nightshade

Cutleaf nightshade



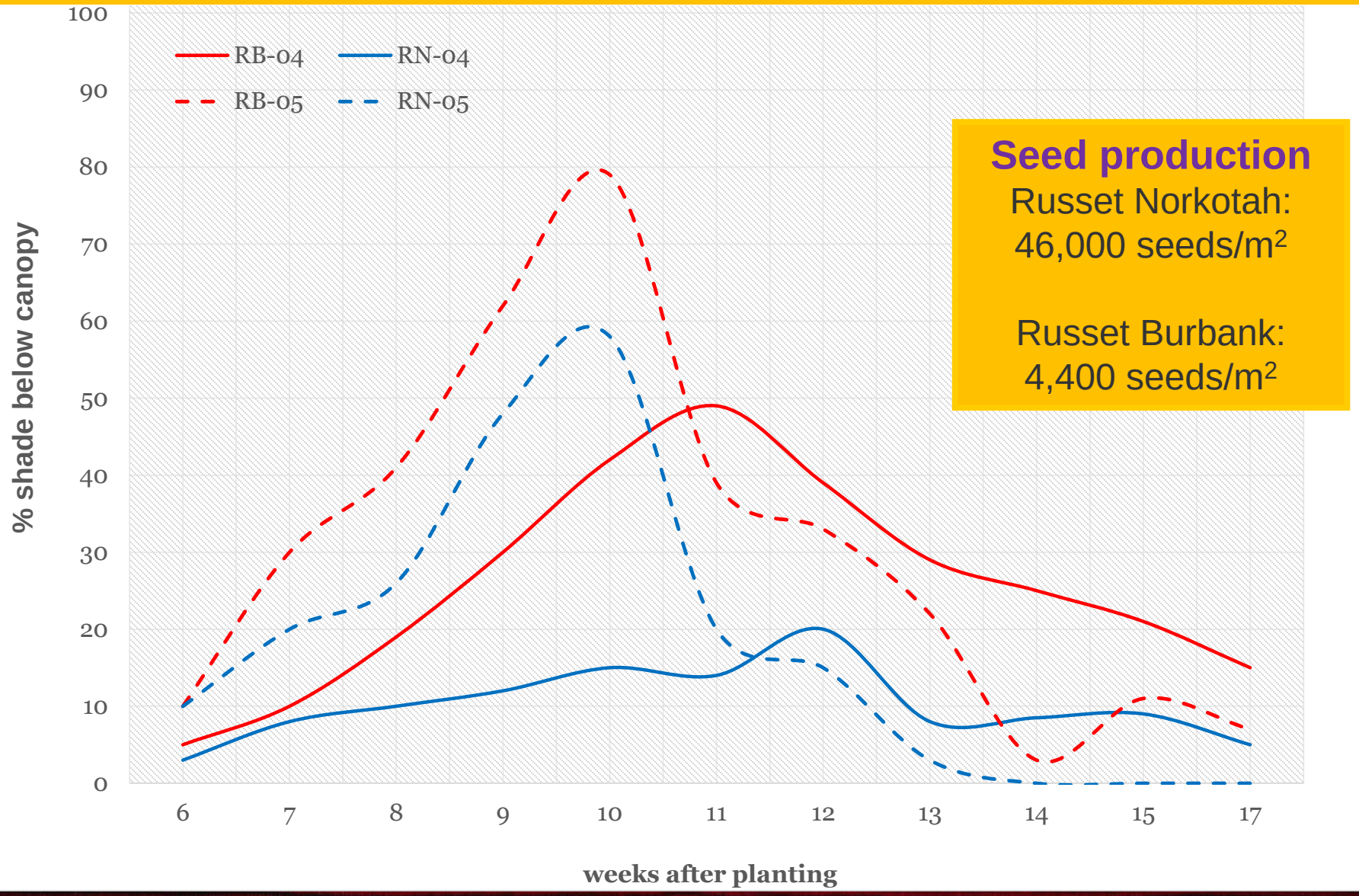
Hairy nightshade leaf surfaces and stems have *glandular hairs*

Hairy nightshade

Cutleaf nightshade

Shade provided by Russet Burbank and Russet Norkotah canopy

% shade below canopy



Seed production

Russet Norkotah: 46,000 seeds/m^2

Russet Burbank: 4,400 seeds/m^2

Hairy nightshade in Beans

- **Competition for light, water, nutrients**
  - Two hairy nightshade plants per m of dry bean row season-long reduced bean seed yield 13%
  - 100 plants per m row resulted in 77% bean yield loss in a Canadian study
- Just as with potato, dry bean are more competitive with hairy nightshade and other weeds once the foliage closes over the rows
  - As mentioned, germination and seed production can still occur and plants below canopy can harbor insects, diseases, nematodes

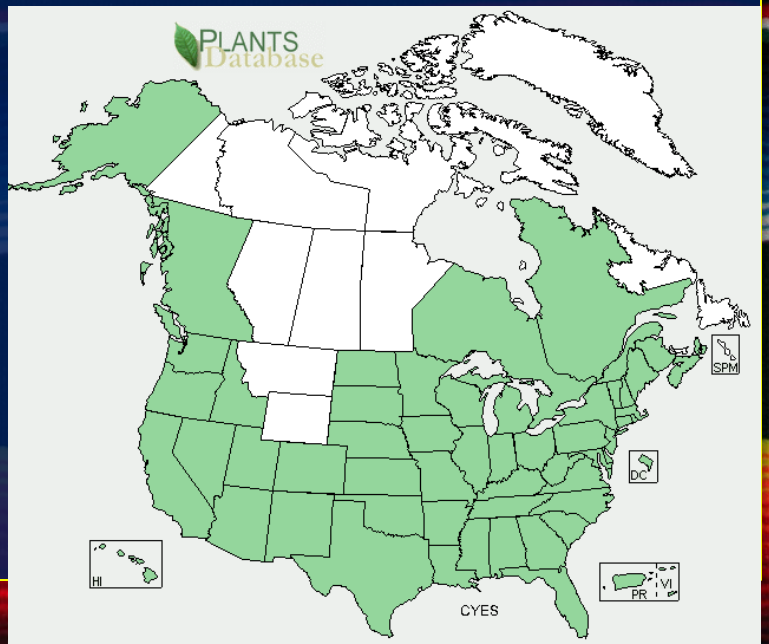
Yellow nutsedge biology

The U.S. patent office imported cultivated chufa tubers as a potential vegetable crop in 1854, and this may have been a source of weedy tubers as well

Cyperus esculentus

Found throughout North America as a common weed

in agronomic and horticultural crops, nurseries, turfgrass, and lawns



Yellow nutsedge biology

A fibrous-rooted perennial, has erect, triangular, yellow-green stems that grow 12 to 32 inches tall

Yellow nutsedge grows from perennial tubers

The leaves are narrow and grass-like, growing in three vertical rows on the stem

Joel Felix, OSU, Malheur Experiment Station

Most of the leaves are clustered at the base of the stem

Yellow nutsedge biology

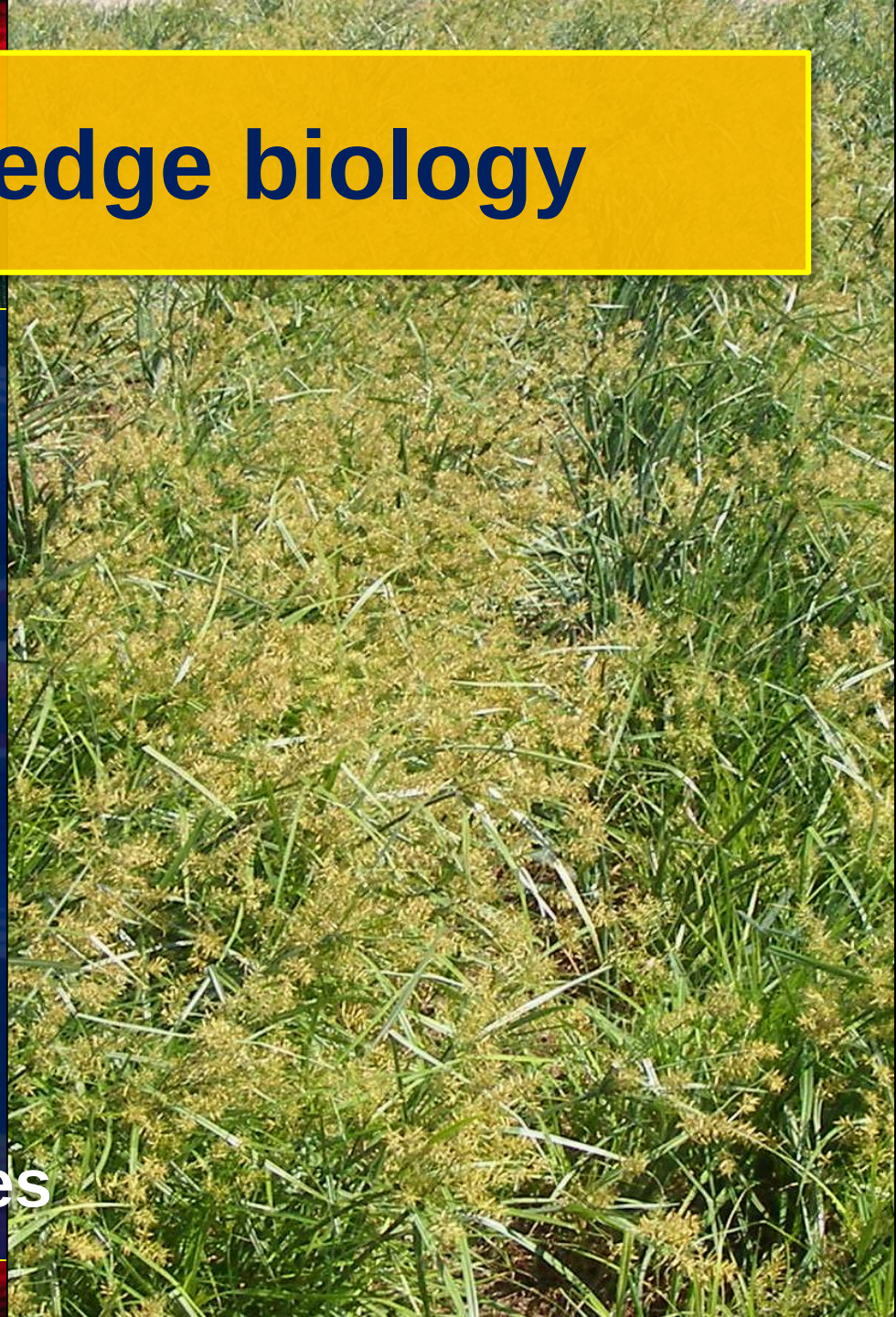
- One of the world's worst weeds
- Produces a leaf every 4 to 5 days
- Millions of tubers are produced per acre each year
  - Tubers may be viable up to 4 years or longer
- Thrives in irrigated systems
- Grows in almost any kind of soil

Yellow nutsedge biology

Once yellow nutsedge is established it is very hard to control

Don’t let it get established!

Try to get it controlled before 5-6th leaf emerges



Yellow nutsedge cultural control

- Unlike hairy nightshade, yellow nutsedge is intolerant of shade so a quick-growing crop canopy is an advantage
- Post harvest weed control is critical
  - Frequent disking can help deplete reserves in younger tubers
    - Older tubers can re-sprout 3 times!
  - Glyphosate usually doesn't translocate to rhizomes/tubers for a more complete kill so still want to apply to smaller/newer plants

Yellow nutsedge cultural control

- Crop rotation matters
  - Control nutsedge in each crop
  - Fast growing crops such as corn provide a full canopy cover and shade as well as a wider herbicide selection
- Cultivation & handweeding
  - every 2 to 3 weeks, probably not practical

Hairy nightshade and Yellow Nutsedge in Beans: Challenges

- **Herbicides**
  - Herbicide incorporation
  - Herbicide timing
  - **Season-long control** especially with hairy nightshade
  - Crop safety to herbicides – varietal and type
- **Cultivation**
  - Breaks herbicide “barrier”
  - Compaction and root pruning
  - In-row control is not attained

H. nightshade and Y. nutsedge control: labeled herbicides for beans

Eptam for dry beans only

- Preplant incorporated (PPI) or directed spray at lay-by
  - **Early-season nightshade control (~6 wks after app)**
  - **Has activity on yellow nutsedge**
  - 2.25 to 4.5 pt/A Eptam 7E and don't exceed 9 pt/year
  - Volatile so incorporate 3 to 4 inches deep immediately after app
  - Do not apply pre-irrigation
- Can be metered into furrow irrigation water before weed emergence
- Won't control emerged weeds

H. nightshade and Y. nutsedge control: labeled herbicides for beans

Outlook (dimethenamid-p) for dry beans, great Northern, red kidney, cranberry

- *Hairy nightshade and yellow nutsedge control*
- Preplant surface, PPI up to 2 wks before planting (incorporate 1 to 2 inches)
- Preemergence (PRE), or early postemergence (EPOST) 1st to 3rd trifoliate
- Rate range depends upon soil texture %O.M.
  - Single app up to 21 fl oz/A
  - Split app of 10 to 14 fl oz/A followed by 7 to 10 fl oz/A allowed
- Won't control emerged weeds

Hairy nightshade control: labeled herbicides for beans

Prowl 3.3EC 1.2 to 3.6 pt/A or H_2O 3.8 CS 2 to 3 pt/A (pendimethalin)

- *Some activity on hairy nightshade*
- PPI up to 60 days before planting
  - Rate depends on soil type and %O.M.
  - Incorporate within 7 days of app
- PRE to dry beans under sprinkler irrigation
  - Minimum planting depth of 2 inches
- Do not tank mix with EPTAM on Lima beans

- Won't control emerged weeds
- See label for crop rotation restrictions

H. nightshade and Y. nutsedge control: labeled herbicides for beans

Sonalan 3 EC (ethalfluralin) 1.5 to **4.5** pt/A PPI up to 3 wks before planting

- **Use the high (4.5 pt/A) rate and 2 incorporation passes for nightshade control**
- Do not tank mix with Eptam on Lima beans
- Rotation restrictions to sugar and red beets
- Won't control emerged weeds

Dual Magnum or Dual II Magnum (s-metolachlor) 1 to 2 pt/A (depends on soil type/O.M.) PPI or PRE

- **Can provide yellow nutsedge control**
- **Some activity on hairy nightshade**
- See label for bean types (do not tank mix with Eptam on Lima beans)
- furrow irrigation – must apply PPI

H. nightshade and Y. nutsedge control: labeled herbicides for beans

Basagran (bentazon) 4SC 1 to 2 pt/A POST (See label for tolerant bean types)

- *Hairy nightshade and yellow nutsedge control*
- Beans must have fully extended 1st trifoliate leaf by app time
- Irrigation may be needed before app to insure actively growing weeds
- Do not apply in cool weather days below 75 F/nights below 55 F
- Do not cultivate within 5 days before or after app

H. nightshade and Y. nutsedge control: labeled herbicides for beans

Raptor 1SC (imazamox) 4 oz/A POST to weeds –

- ***For hairy nightshade control***
- If beans are emerged must have 1 full expanded trifoliate and don't apply after bloom
- Can add AMS or 28 or 32% N
- See label for bean types: not for garbanzo beans, fresh Lima beans

Glyphosate for app to bean preplant or PRE burndown; also pre-harvest

- ***Can be used preplant to control emerged yellow nutsedge***
- PRE app must be before cracking or crop injury/death will result
- Do not tank mix with Eptam on Lima beans

H. nightshade and Y. nutsedge control: labeled herbicides for beans

Sandea 75DF (halosulfuron) PRE 0.5 to 1 oz/A to beans or post-directed between rows

- ***Provides hairy nightshade and yellow nutsedge control***
- Use only up to 0.66 oz/A on light textured soils w/ low %O.M.

Paraquat pre-harvest see label – Restricted use

- *Can reduce hairy nightshade seed viability by 10%*

Micro-Tech (alachlor) shallow PPI for dry and Lima beans

- Early-season nightshade control
- Restricted-use herbicide

Hairy nightshade control: labeled herbicides for beans

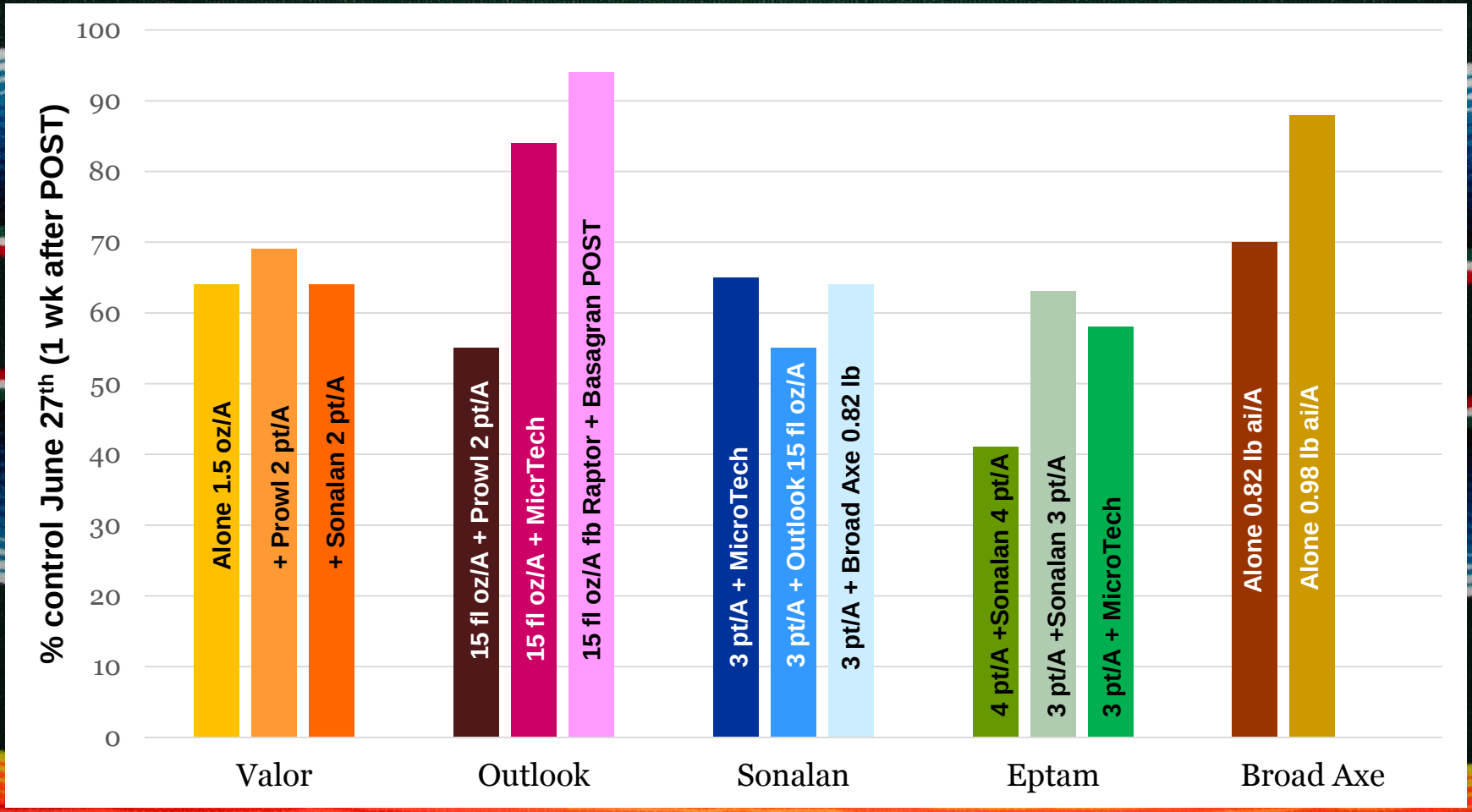
Treflan (trifluralin) 1 to 2 pt/A 4EC fall incorporated, spring PPI or PRE

- Rate depends on soil type and %O.M.
- Photodegrades so incorporation soon after app is recommended
- Crop rotation restrictions
- Do not tank mix with Eptam on Lima beans

Pursuit (imazethapyr) 1.08 oz/A 70DG or 3 fl oz/A 2LC PPI w/in 30 days of planting

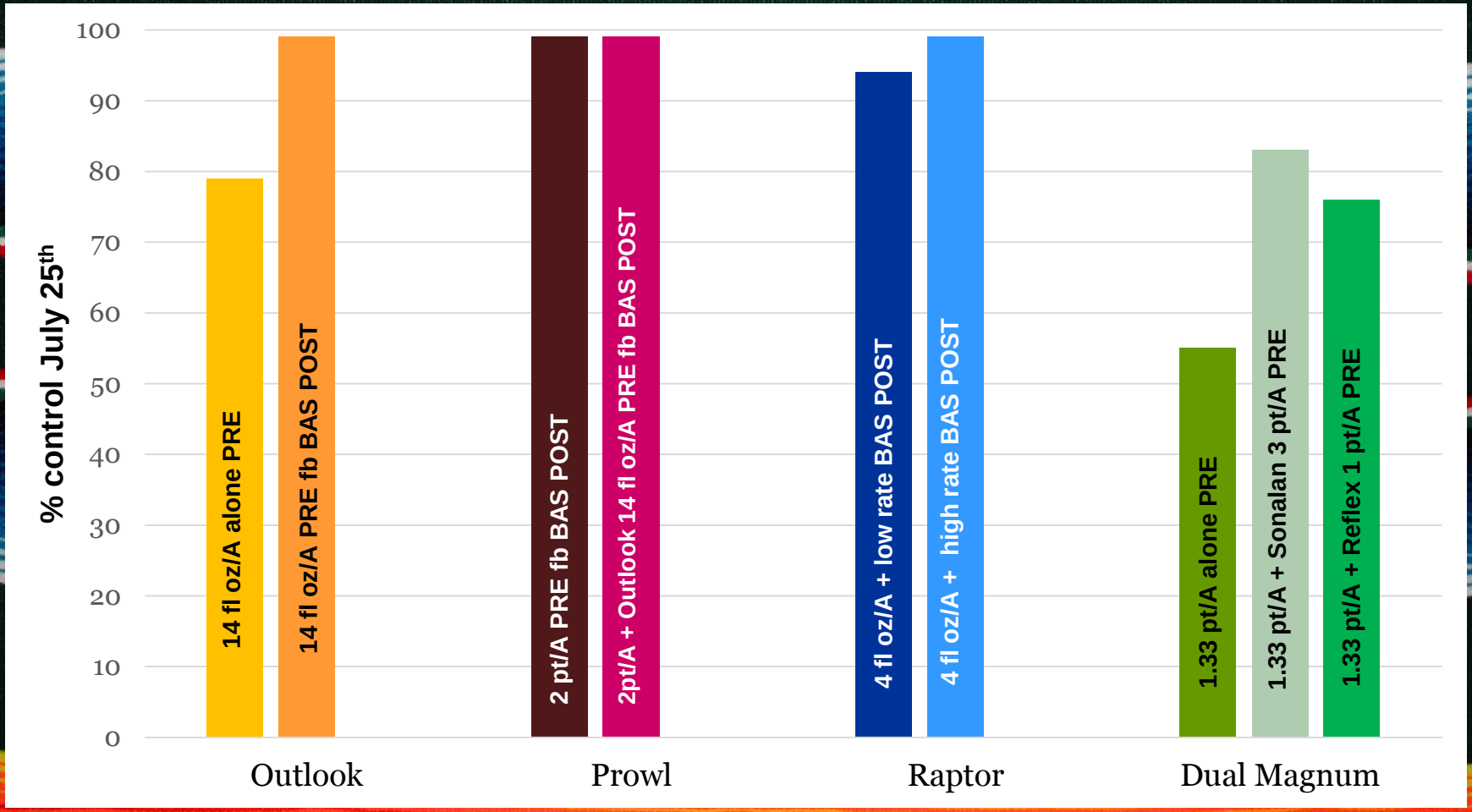
- Only for use in certain counties – see label
- Do not incorporate below 3 inches
- Can be applied in the fall before spring planting; needs rainfall for incorporation/activations
- Crop rotation restrictions

2013 Hairy Nightshade Control Tank-mix Trial
Kimberly R&E Center



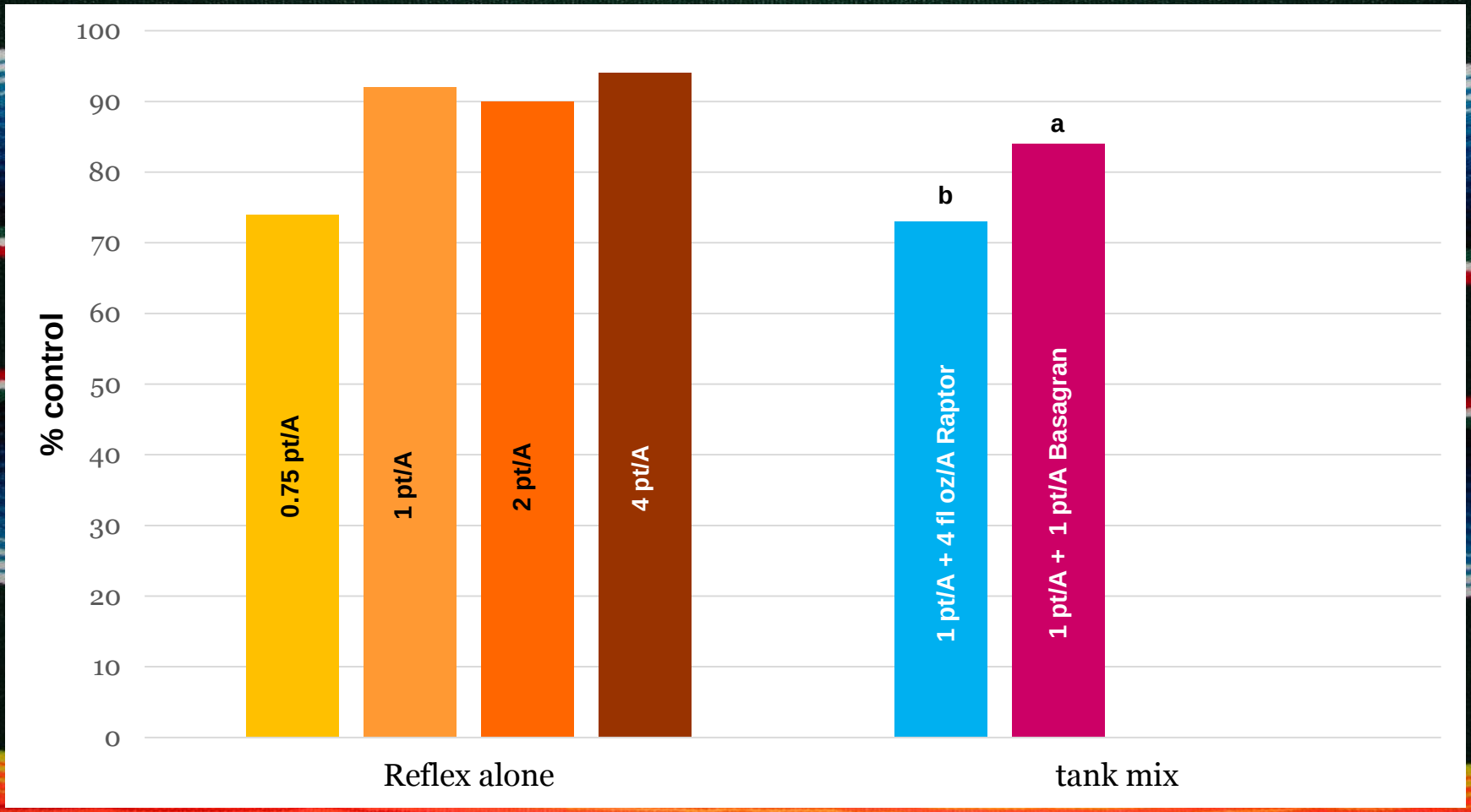
2013 Don Morishita UI Kimberly, ID; **Cultivar**: Bill Z Pinto; **Planted:** 5/31/13
Treated: PRE 6/04/13; POST 6/20/13
Broad Axe is a pre-mix of sulfentrazone and s-metolachlor

2013 Hairy Nightshade Control PRE fb POST Trial
Kimberly R&E Center



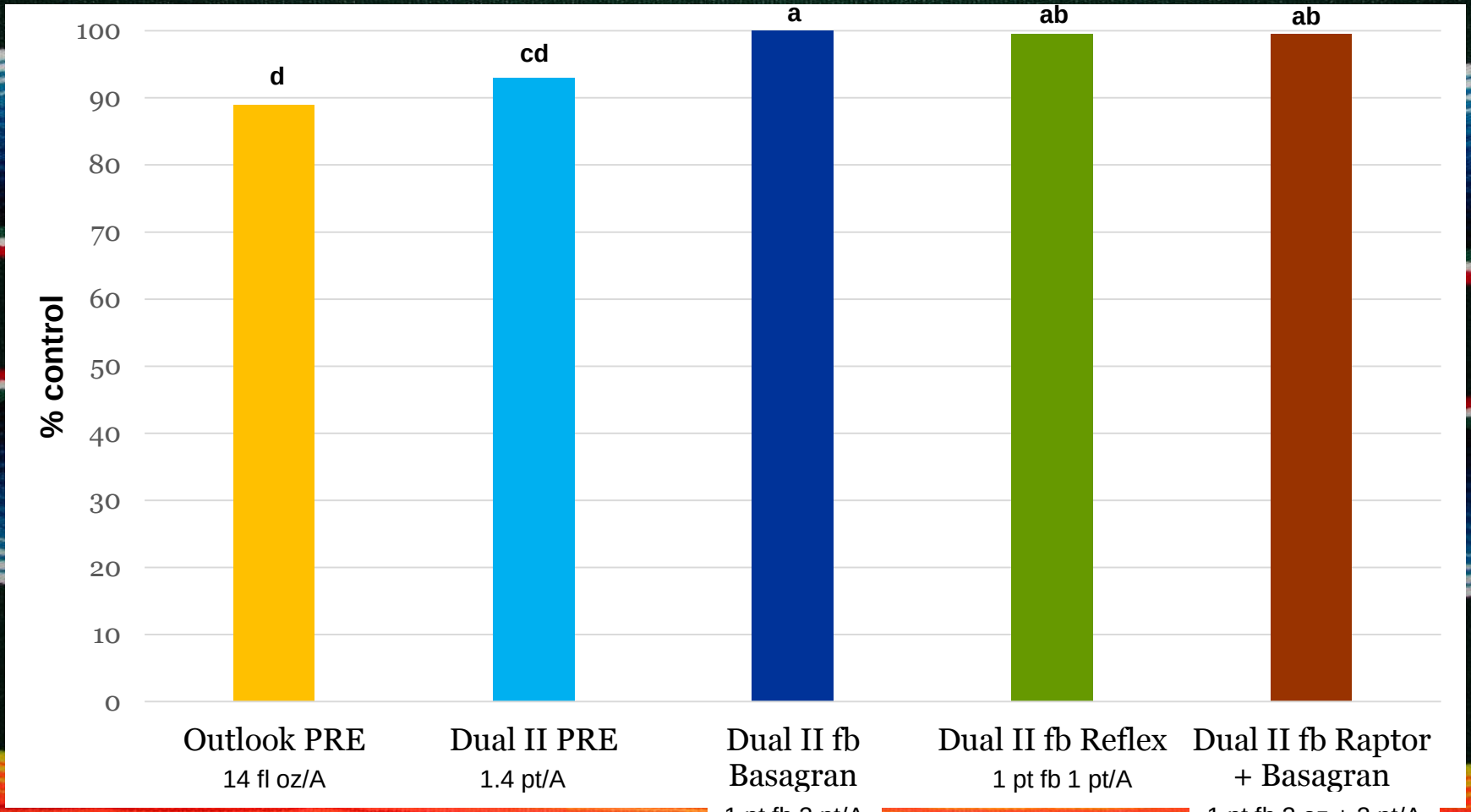
2013 Don Morishita UI Kimberly, ID; **Cultivar**: Bill Z Pinto; **Planted:** 5/31/13
Treated: PRE 6/04/13; POST 6/20/13
BAS is a pre-mix of Raptor and Basagran

Hairy Nightshade Control with POST-applied Reflex 2005 - Dr. R. Wilson Univ of Nebraska Scotts Bluff



Reflex alone on Great Northern
Tank mix control averaged across 6 bean types: black, GN, LR Kidney, Navy, Pink, Pinto

Hairy Nightshade Control with PRE Dual II Magnum fb POST
2006 - Dr. R. Boydston USDA/ARS Prosser, WA



2006 Lima bean study; POST applied approx. 30 days after PRE

Yellow nutsedge control

Treatment	2007
Untreated	2928 (1,959)
Dual II Magnum 1.5 pt/a–PRE Glyphosate 32 fl oz/a –POST	732 (1,690)
Dual II Magnum 1.5 pt/a–PRE Glyphosate 32 fl oz/a + Dual II Magnum 1.5 pt/a –POST	581 (1,722)
Dual Magnum 3 pt/a–PRE Glyphosate 32 fl oz/a -POST	603 (1,421)

Tubers/yd^2 After treatment (before)

Joel Felix, OSU, Malheur Experiment Station

Yellow nutsedge fumigation

- Fumigation (RESTRICTED USE)
  - Vapam, Metam sodium, Telone
  - Effective against the tubers that are treated
  - Tubers below the fumigated zone may survive

Yellow nutsedge Fall Fumigation Study

Joel Felix, OSU, Malheur Experiment Station

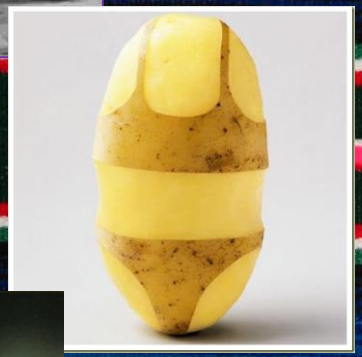
		Fall 2006	Spring 2007	Fall 2007
		------ Tubers/yd² ------		
Vapam	50 gal/A	1,320	211	112 d
Dual Magnum	2 pt/A	2,130	326	258 b
Telone C-17	23 gal/A	1,835	273	177 c
Vapam; Dual M	50 gal/A; 2 pt/A	1,091	133	96 e
Telone; Vapam	23 gal/A; 30 gal/A	1,835	176	63 e
Telone; Dual M	23 gal/A; 2 pt/A	1,140	430	161 c
Dual M;Telone; Vapam	2pt/A;23 gal/A; 50 gal/A	540	85	57 e
Untreated		850	614	871 a

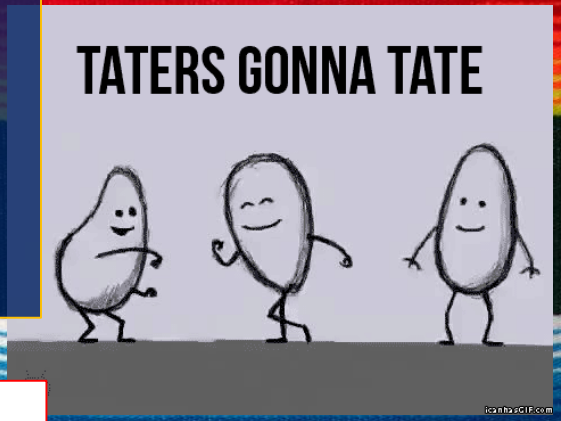
Ideas for Idaho

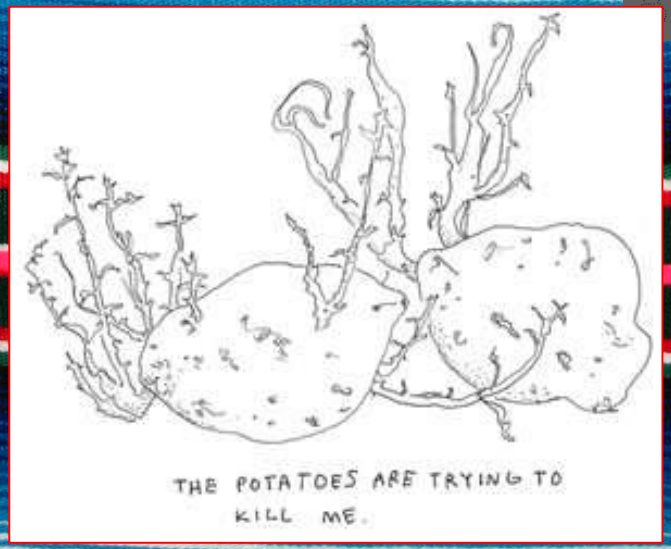
- **Valor PRE; Reflex herbicide PRE or POST**
  - Provides hairy nightshade control according to U of I, UNL, and WA research
- **Pre-mixes: BAS 762 O1H (Raptor + Basagran); Broad Axe (sulfentrazone + Dual II Magnum)**
- Herbicide timing
  - Basagran applied POST at different times of the day
  - Dew, mid- and late-day temperatures
- In-furrow application after cultivation???
  - Similar to spray boom on back of dammer-diker in potatoes
- Solid seeding beans with skip rows for tractor wheels
  - More competitive against weeds
- **Your ideas???!!!???**
- **Don Morishita 2014 research trials Kimberly R&E Center**

Thanks!

Questions?







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