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Cover Cropping for the Inland Northwest;

a work in progress

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RAVEN

WESTERN SARE
Sustainable Agriculture Research & Education

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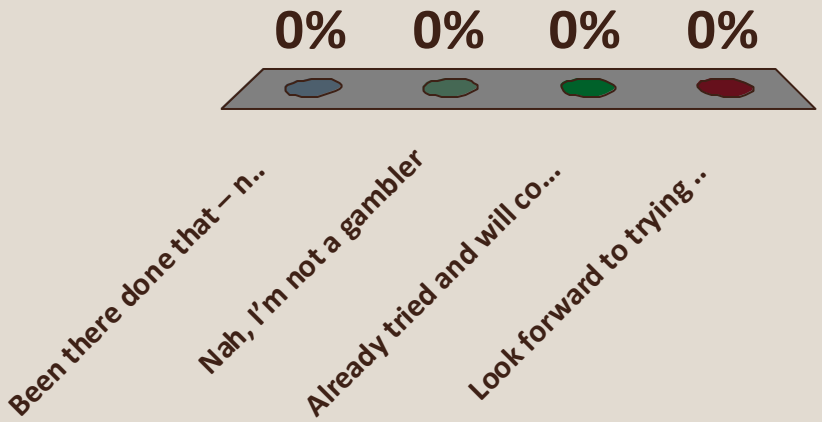
Please rate your interest in cover cropping

A. Been there done that – not for me
B. Nah, I'm not a gambler
C. Already tried and will continue
D. Look forward to trying to improve my soil with cover crops!



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A Farmer-Driven Project!

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Project model: The farmers have the Great Ideas!

… then we grow acres of strange plants in replicated strips on the WSU Wilke Farm…

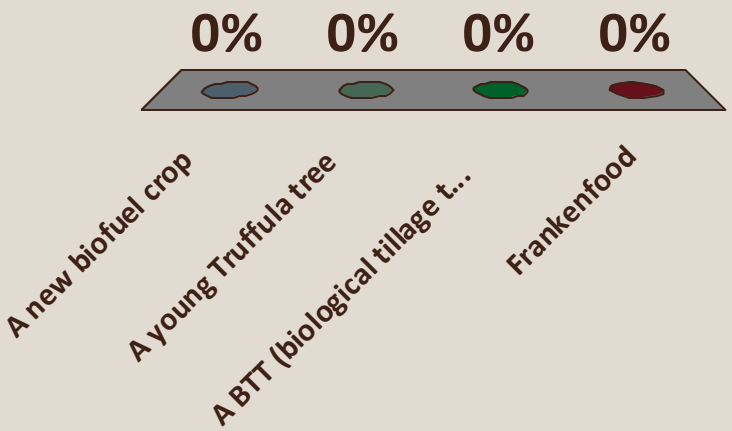
The item being passed around & in the previous slide is:

A. A new biofuel crop

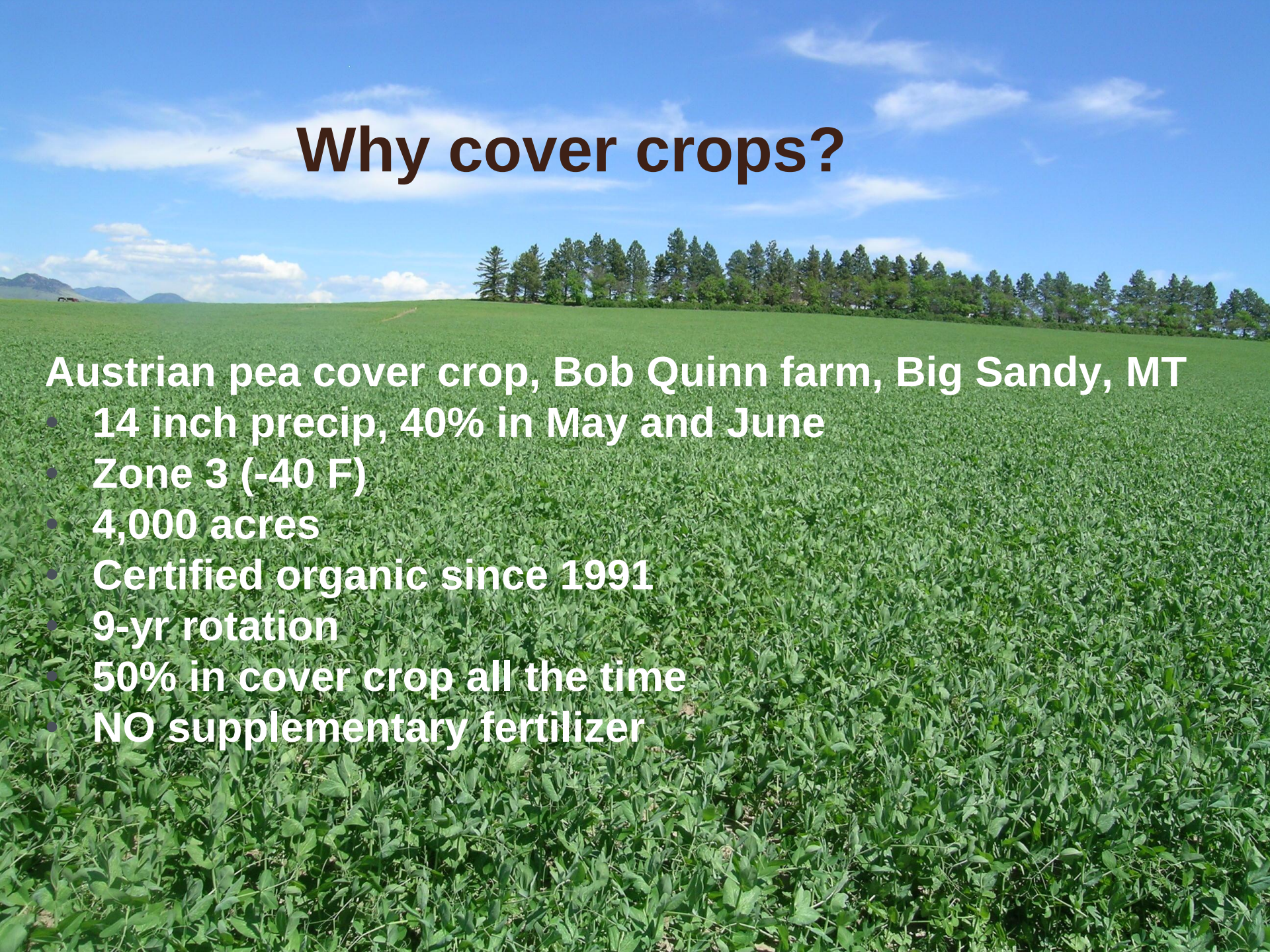
B. A young Truffula tree

C. A BTT (biological tillage tool)

D. Frankenfood, for sure!



Why cover crops?

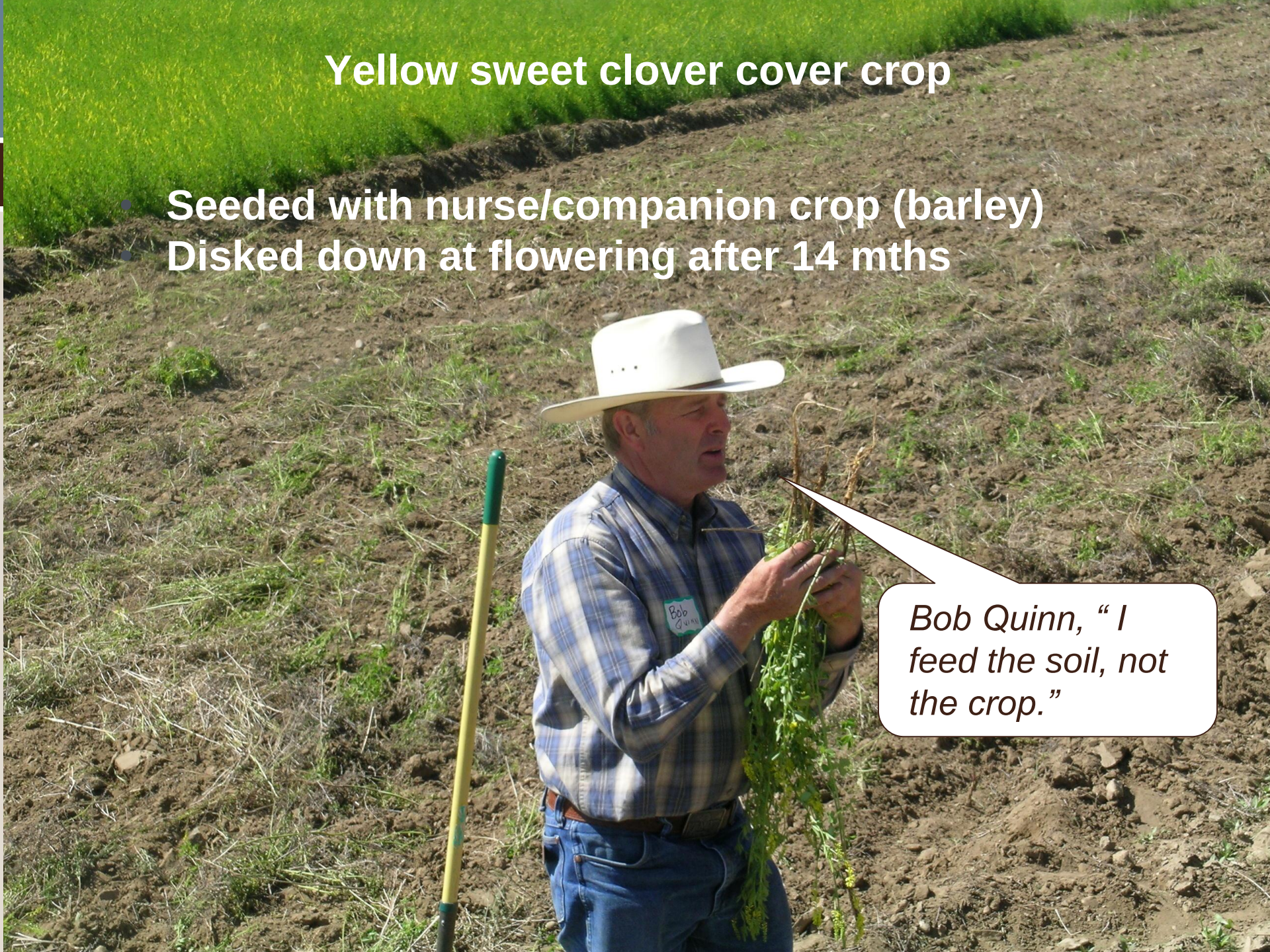


Austrian pea cover crop, Bob Quinn farm, Big Sandy, MT

- 14 inch precip, 40% in May and June
- Zone 3 (-40 F)
- 4,000 acres
- Certified organic since 1991
- 9-yr rotation
- 50% in cover crop all the time
- NO supplementary fertilizer

Yellow sweet clover cover crop

- Seeded with nurse/companion crop (barley)
- Disked down at flowering after 14 mths



Bob Quinn homestead


Fred Fleming, “After taking this tour and seeing Bob's farm it confirmed my belief that a cover crop for soil health needs to be incorporated into my own direct seed farming system.”

Cover crop history in WA

- Walter Goldstein (1980s) – crimson clover promising
- Joel Jahn, Cliff Carstens (1992) – black medic not competitive
- David Huggins (USDA-ARS) “We tried cover crops at Pullman and nothing was economic”

I have confidence in Farmers to Find a Way!

Definitions:

- **Cover Crop** – grown to feed/benefit the soil so no harvested material leaves the field. Incorporated by tillage or sprayed down
  - Legumes in the Palouse benefit subsequent crops but are not cover crops
- **Companion Crop** – cover crop grown together with a harvested crop
- **Cover Crop Cocktail** - mixture of 7 – 9 species as cover crop
  - Warm season
  - Cool season
  - Grasses - biomass
  - Broadleaves – tap root
  - Legumes – fix nitrogen
- ND data showed very little moisture loss, even in a dry year

"Something will thrive!"

Cover Crop Chart

GROWTH CYCLE	RELATIVE WATER USE	PLANT ARCHITECTURE
A = Annual	= Low	= Upright
B = Biennial	= Medium	= Upright-Spreading
P = Perennial	= High	= Prostrate

----------Cool Season---------- ----------Warm Season----------

---Grass---	----------Broadleaf----------							---Grass---
A Barley								A Pearl millet
A Oat	A Phacelia						A Amaranth	A Foxtail millet
A/P Ryegrass	A Flax		----------Legumes----------				A Buckwheat	A Proso millet
A Wheat	A Spinach	B Turnip	A Field pea	A Berseem clover	A/P Medic	A Chickpea	A Sunflower	A Sudan grass
A Cereal rye	A Kale	A Radish	A Lentil	B/P Red clover	P Birdsfoot trefoil	A Cowpea	A Safflower	A Teff
A Triticale	A/B Canola	B Beet	A Lupin	P White clover	P Sainfoin	A Soybean	A Squash	A Grain sorghum
A Annual fescue	A/P Mustard	A/B Carrot	A/B Vetch	A/B Sweetclover	P Alfalfa	A Mung bean	P Chicory	A Corn

V 1.2. December 2010

◈*Additional Information*

Goals/Resource Concerns of the Group

- Increase nitrogen
  - Scavenge nitrogen from deep soil
- Increase soil organic matter
  - Increase water holding capacity
  - Improve soil structure
  - Increase microbial activity
- Feed livestock
- Control wireworms
- Break hardpan

2011 Cover Crop Trial A

Crop	lb/acre	$/lb seed	$/acre
Oats	30	$0.14	$ 4.20
Pea	20	$0.15	$ 3.00
Crimson Clover	5	$0.73	$ 3.65
Hairy vetch	5	$1.81	$ 9.05
Turnip Purple top	1	$1.86	$ 1.86
Mustard	2	$1.25	$ 2.50
Sorghum/Sudan	5	$0.50	$ 2.50
Sunflower	1	$0.70	$ 0.70
Safflower	2	$1.05	$ 2.10
Inoculant	1	$2.50	$ 2.50
Blending fee	72	$0.025	$ 1.80
Total	72		$ 32.06


WSU Wilke Farm, Davenport, WA
- replicated strips 18 ft x 200 ft
- seeded mid-May
7 area farms, 5-acre demonstrations
06/15/2011


06/28/2011


07/15/2011

Phacelia tanacetifolia (lacy Phacelia) attracts native pollinators


07/15/2011


07/22/2011

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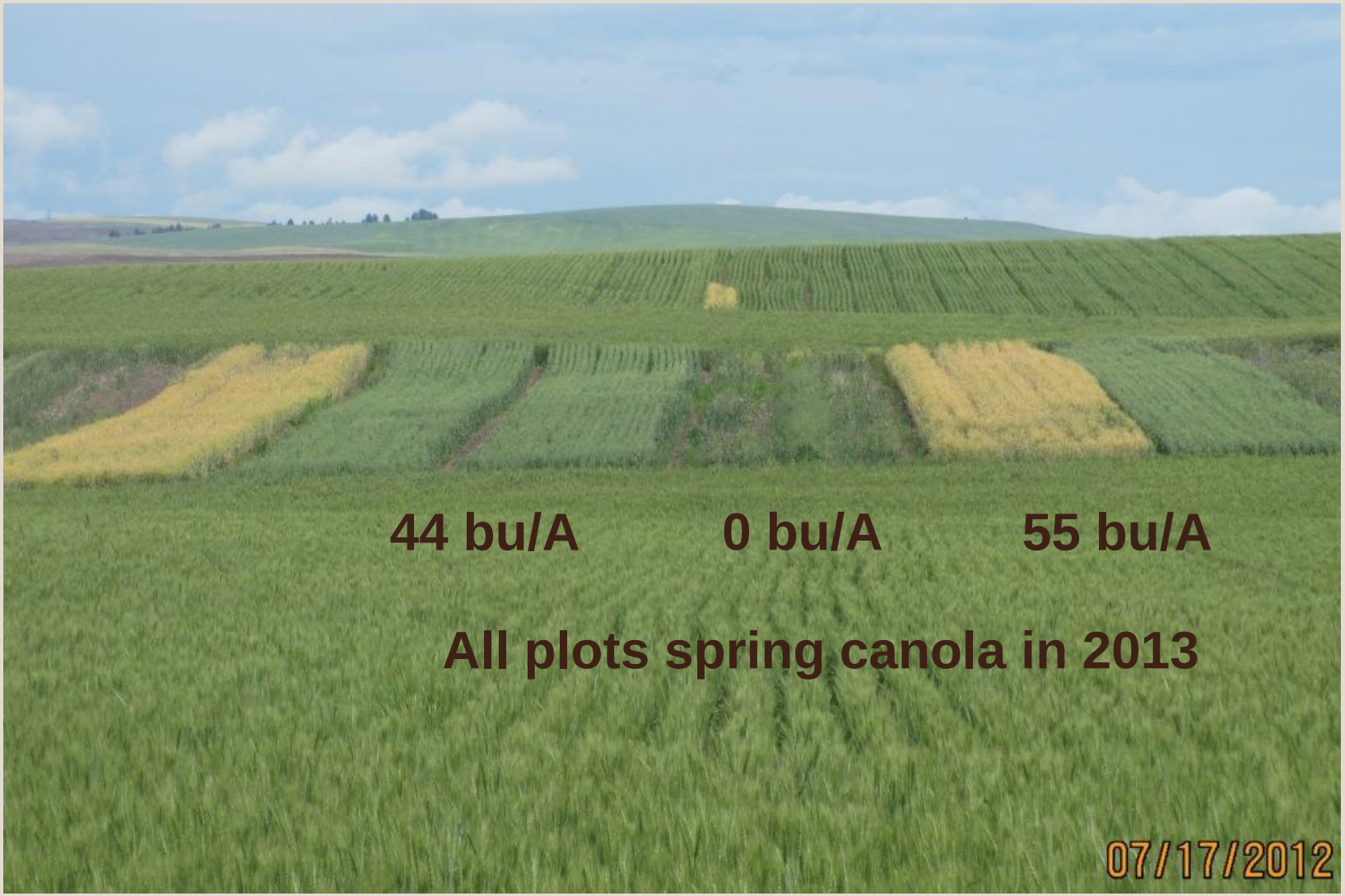
2012 wheat yields after CCC



Wilke 2011 Cover Crop Trial A

2011	No-till fallow	9-way Cover Crop Cocktail	9-Way Cover Crop Cocktail
4 reps		May 18 - July 22	May 18 - July 22
Roller-crimp not work		**Inoculant**	**Inoculant**
2012	Winter wheat - Xerpha	Winter wheat - Xerpha	Spring wheat - JD
4 reps	55 bu/A	0 bu/A (herbicide damage)	44 bu/A
2013	Spring canola - RR 4551 - harvested together in error	Spring canola - RR 4551 - harvested together in error	Spring canola - RR 4551 - harvested together in error
2014	Spring wheat - harvest separately	Spring wheat - harvest separately	Spring wheat - harvest separately
2015	Control	Some cover crop combination	Some cover crop combination


2012 Cover Crop Trial B
07/09/2012
Faba bean
Millet
Buckwheat
Crimson clover
Flax

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2012 – Warm season CCC

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Wilke 2012 Cover Crop Trial B

2012	No-till fallow	5-Way Cover Crop Cocktail (Warm Season)	5-Way Cover Crop Cocktail (Warm Season)
4 reps		May 17 - July 31	May 17 - July 31
		Inoculant	**Inoculant**
2013	Winter wheat - Xerpha	Winter wheat - Xerpha	Spring wheat - Diva
4 reps	61 bu/A	52 bu/A	39 bu/A
2014	Spring barley - harvest separately	Spring barley - harvest separately	Spring barley - harvest separately
4 reps			

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Revised Goal – Cover crops work with winter precip. system

Grandfathers used yellow sweet clover as cover crop…

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YSC is a biennial…

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I was nervous waiting for the YSC to show last spring…

Spray out at Bolting

Spray out at Flowering
(nodules slough off)


11 18 2013

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Wilke 2012 Companion Crop Trial C

2012	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid
3 reps	Fert: **Zero :(** Seed 70 lb/A	Fert: **Zero :(** Seed 70 lb/A	Fert: **Zero :(** Seed 70 lb/A	Fert: **Zero :(** Seed 70 lb/A
2012/13	YSC biennial	YSC biennial	YSC biennial	YSC biennial
3 reps	May 9, 2012 - May 28, 2013 Bolting	May 9, 2012 - May 28, 2013 Bolting	May 9, 2012 - July 9, 2013 Full flower	May 9, 2012 - July 9, 2013 Full flower
	Fert: **Zero :(** Seed 10-15 lb/A Broadcast **No Inoculum :(**	Fert: **Zero :(** Seed 10-15 lb/A Broadcast **No Inoculum :(**	Fert: **Zero :(** Seed 10-15 lb/A Broadcast **No Inoculum :(**	Fert: **Zero :(** Seed 10-15 lb/A Broadcast **No Inoculum :(**
2014	Winter wheat - Xerpha	Spring wheat	Winter wheat - Xerpha	Spring wheat
3 reps	10-Sep		10-Sep	

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Wilke 2013 Companion Crop Trial D

2013	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid	Spring barley - Lenatah - Companion crop Yellow sweet clover - Madrid
3 reps	Barley April 25 - Aug 24 1.6 ton/A	Barley April 25 - Aug 24 1.6 ton/A	Barley April 25 - Aug 24 1.6 ton/A	Barley April 25 - Aug 24 1.6 ton/A
	Fert: 68-10-0-7 Seed 70 lb/A	Fert: 68-10-0-7 Seed 70 lb/A	Fert: 68-10-0-7 Seed 70 lb/A	Fert: 68-10-0-7 Seed 70 lb/A
2013/14	YSC biennial	YSC biennial	YSC biennial	YSC biennial
3 reps	May 25, 2013 Seed 20 lb/A **Broadcast No inoculant :(**	May 25, 2013 Seed 20 lb/A **Broadcast No inoculant :(**	May 25, 2013 Seed 20 lb/A **Broadcast No inoculant :(**	May 25, 2013 Seed 20 lb/A **Broadcast No inoculant :(**
	May 30, 2013 10 lb/A **Drilled No inoculant :(**	May 30, 2013 10 lb/A **Drilled No inoculant :(**	May 30, 2013 10 lb/A **Drilled No inoculant :(**	May 30, 2013 10 lb/A **Drilled No inoculant :(**
2015	Winter wheat	Spring wheat	Winter wheat	Spring wheat
3 reps				

Fall 2013 Companion Crop - Charles Gross's idea


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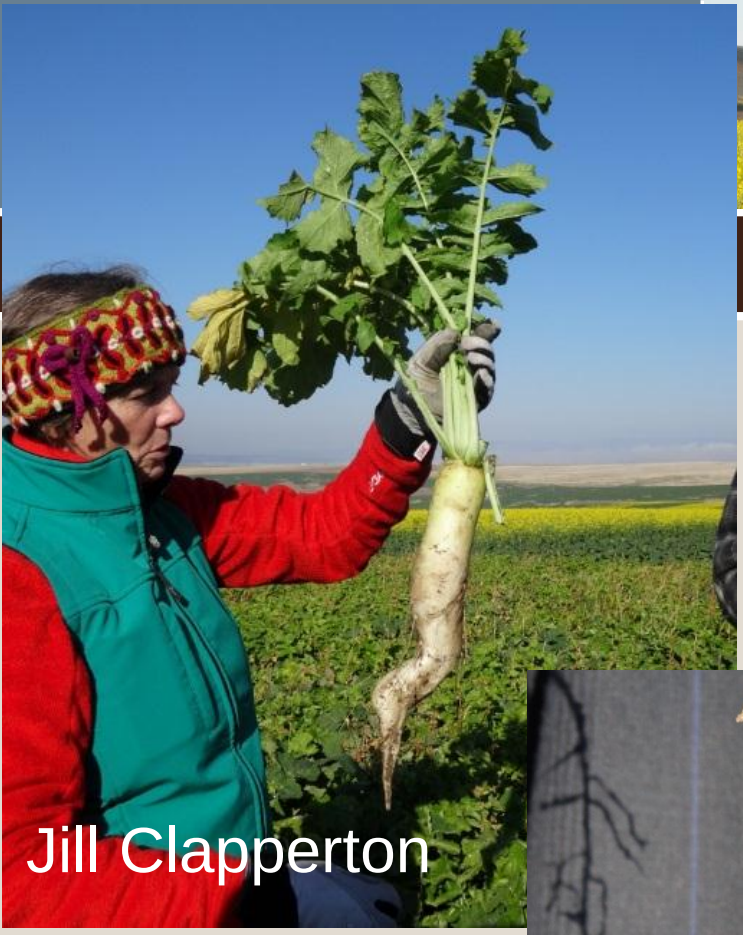
Wilke 2013 Companion Crop Trial E

2014	No-till (double) fallow	Winter canola - RR Camas	Winter canola - RR Camas Companion Crop (Should Winterkill) Buckwheat + Nitro Radish + Spring Peas
4 reps		Canola Aug 6, 2013 Fert 16-20-0-14 Seed 4.6 lb/A	Canola Aug 6, 2013 **Peas inoculated**
			Radish 5.7 lb/A Buckwheat 9.8 lb/A Peas 21 lb/A
2015	Winter/spring wheat	Winter/spring wheat	Winter/spring wheat
4 reps			

Effective crop species?



Nitro radish

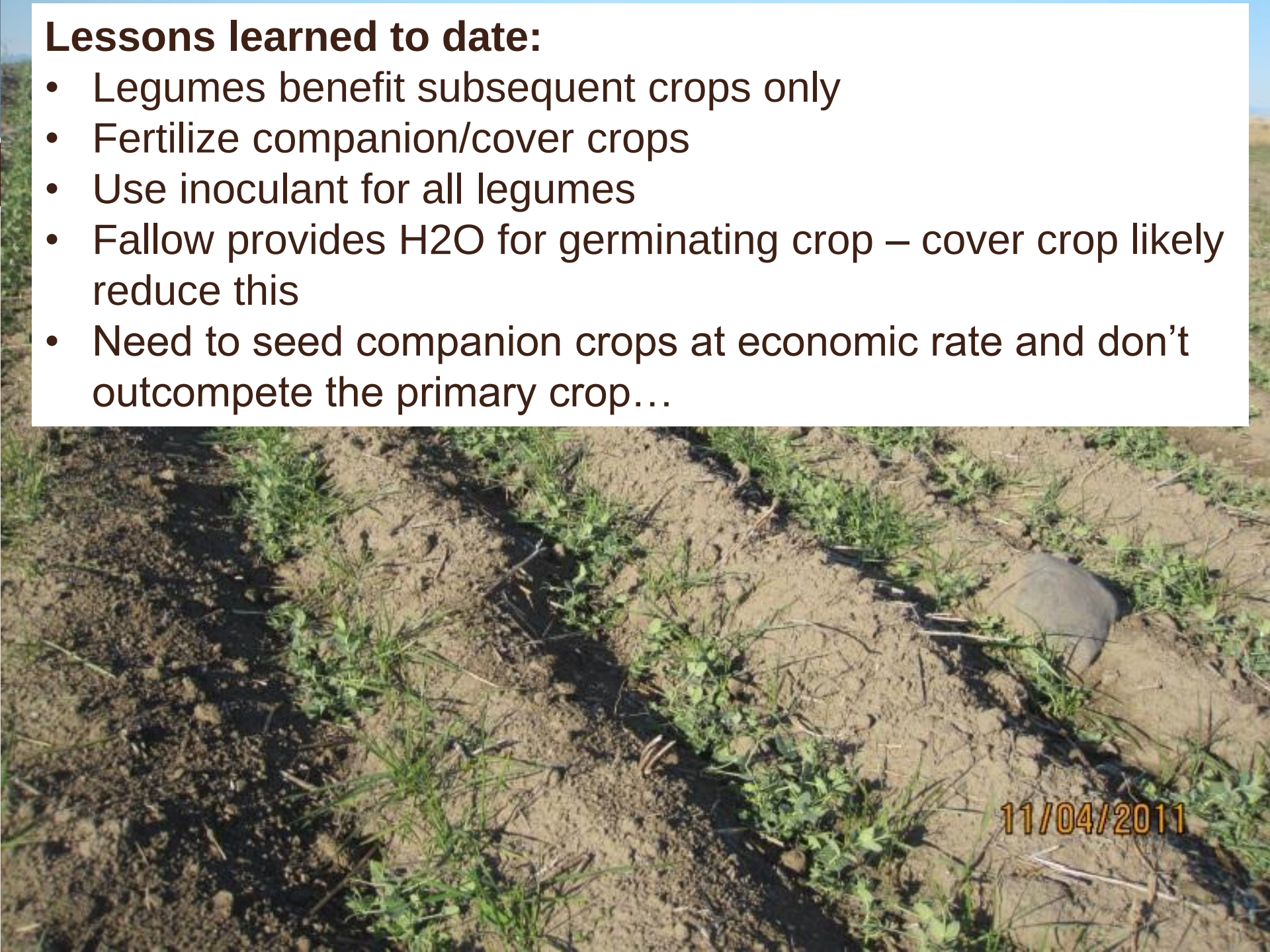
Crimson clover

Faba bean

NRCS (Pamela Pavek) testing individual species

Lessons learned to date:

- Legumes benefit subsequent crops only
- Fertilize companion/cover crops
- Use inoculant for all legumes
- Fallow provides H2O for germinating crop – cover crop likely reduce this
- Need to seed companion crops at economic rate and don't outcompete the primary crop…



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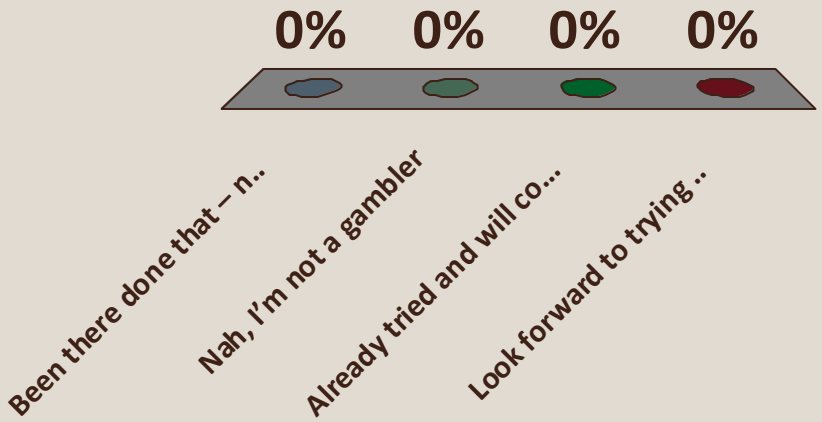


Participate in tours!
Questions?