





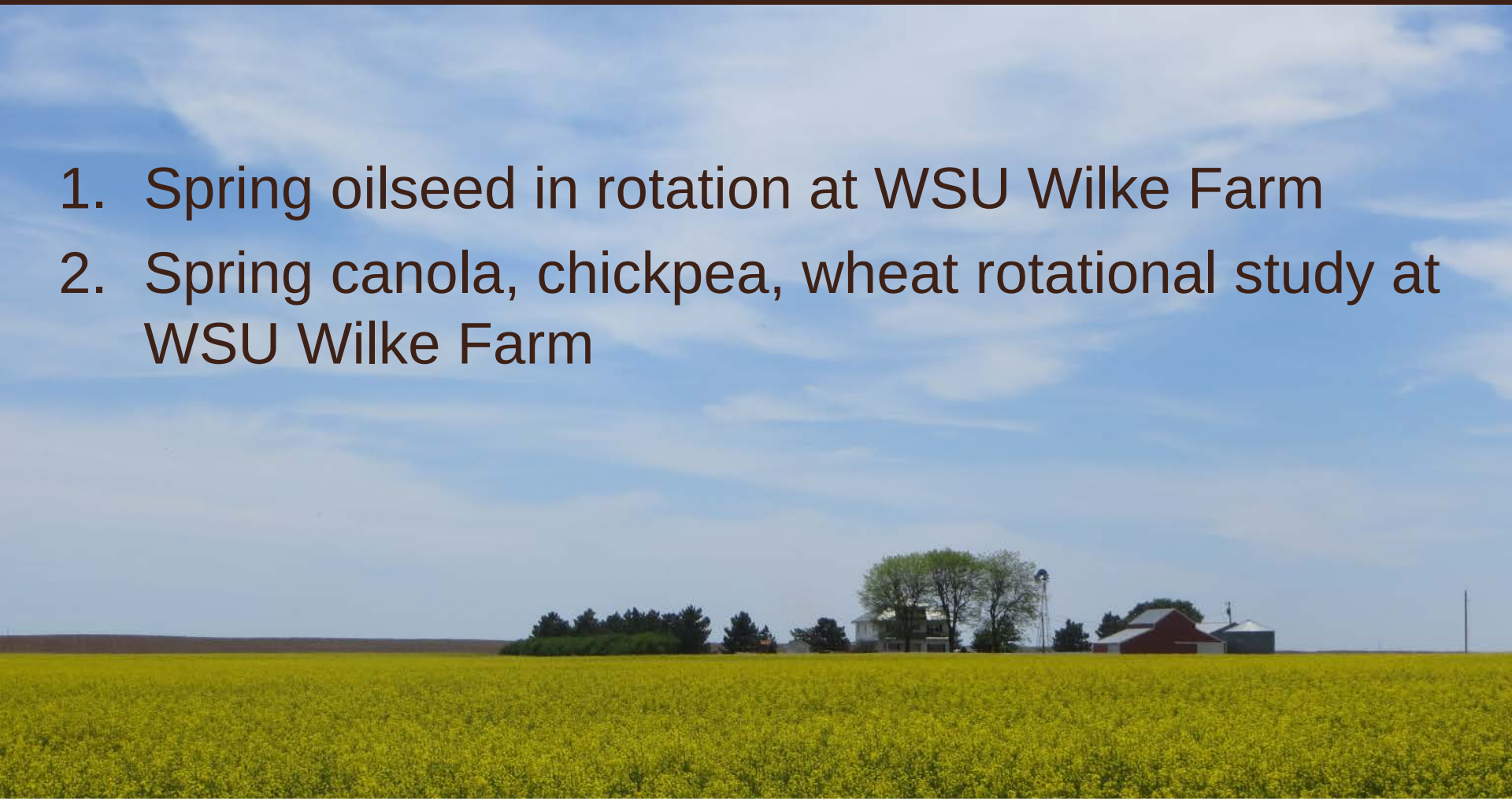
Esser, A.D., D. Appel. 2019. "***Incorporating Oilseeds in Intermediate Rainfed Crop Rotations.***" WSU Oilseed Meeting. Pullman, Washington, February .

WSDA

Washington State Department of Agriculture

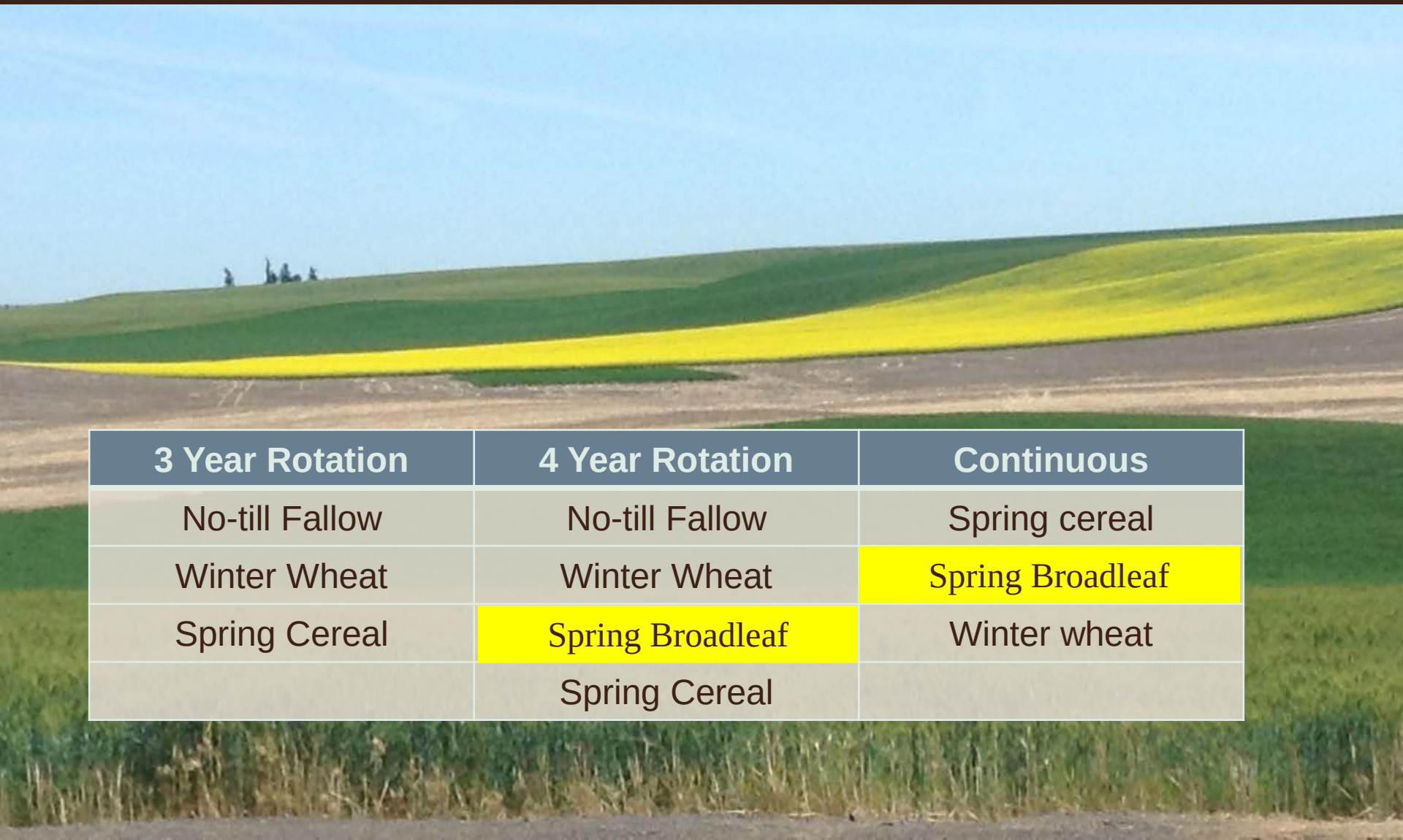
Washington State University Extension

Introduction



1. Spring oilseed in rotation at WSU Wilke Farm
2. Spring canola, chickpea, wheat rotational study at WSU Wilke Farm

Practice what we preach!



3 Year Rotation	4 Year Rotation	Continuous
No-till Fallow	No-till Fallow	Spring cereal
Winter Wheat	Winter Wheat	Spring Broadleaf
Spring Cereal	Spring Broadleaf	Winter wheat
	Spring Cereal	

Outreach Focus

- Incorporating canola into rotation to diversify grassy weed control options in wheat
- Minimizing herbicide resistance.
- Profitable crop rotation
  - **NOT A SNAP SHOT!**

Outreach Focus

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Outreach Focus

Group
(9) (1, 4 6, 4)
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Wilke: Plot 1
(4-yr rotation)

Year	Crop
2010	Barley
2011	DNS wheat
2012	*[NTF]* → RR canola
2013	[WW] → DNS wheat
2014	LL canola
2015	DNS wheat
2016	**NTF**
2017	WW (Cl+)
2018	CL canola
2019	Spring cereal
2020	NTF
2021	WW

	Plot 1	Plot 3	Plot 4	Plot 6
Cropping Specifics				
Acreage	21.7	27.5	26.2	26.9
Crop	'DG 200 CL+' Spring Canola	'Alum' DNS wheat	'Jasper' Winter Wheat	No-till Fallow
Crop Production				
Yield	1,022 lb/ac	50.3 bu/acre	77.5 bu/acre	--
Mkt Grade	#1 Canola GMO 1.80%	#1 DNS 62.3 1.10% 12.4% 353 FN	#1 SWH 60.7 0.1% 393 FN	--
Gross Economic Return†				
Mkt Price	$0.162/lb	$5.97/bu	$5.42/bu	--
Gross Return	$165.23/acre	$300.48/acre	$419.87/ac	--
Input Costs				
Seed	$32.00/acre	24.45/acre	$17.67/acre	--
Fertilizer	$49.27/acre	$57.60/acre	$48.47/acre	--
Herbicides	$16.20/acre	$22.16/acre	$15.28/acre	$36.66/acre
Fungicide	--	--	--	--
Total	$97.47/acre	$104.21/acre	$81.42/acre	$36.66/acre
Summary				
Return over Costs	$67.76/acre	$196.27/acre	$338.45/acre	-$36.66/acre
4-Year Rotation Return over Input Costs‡			**$144.17/acre**	

†Revenue does include any crop insurance revenue.
‡Costs do not include fixed costs associated with the farm.

Oilseeds in Rotation

WSU Wilke R&E Farm economic return over input costs summary.

Rotation	Plot	2012	2013	2014	2015	2016	2017	2018	Ave
4	3	290	156	74	-36	263	100	196	149
4	4	193	-38	304	21	186	-43	338	137
3	2	241	129	-55	87	144	-43	276	111
4	1	287	230	-91	48	-50	263	68	108
3	5	214	-38	192	42	-29	293	80	108
4	6	167	95	-58	131	311	75	-37	98
C	N	158	61	71	25	80	34	186	88
3	7	-30	280	61	-36	239	83	-37	80

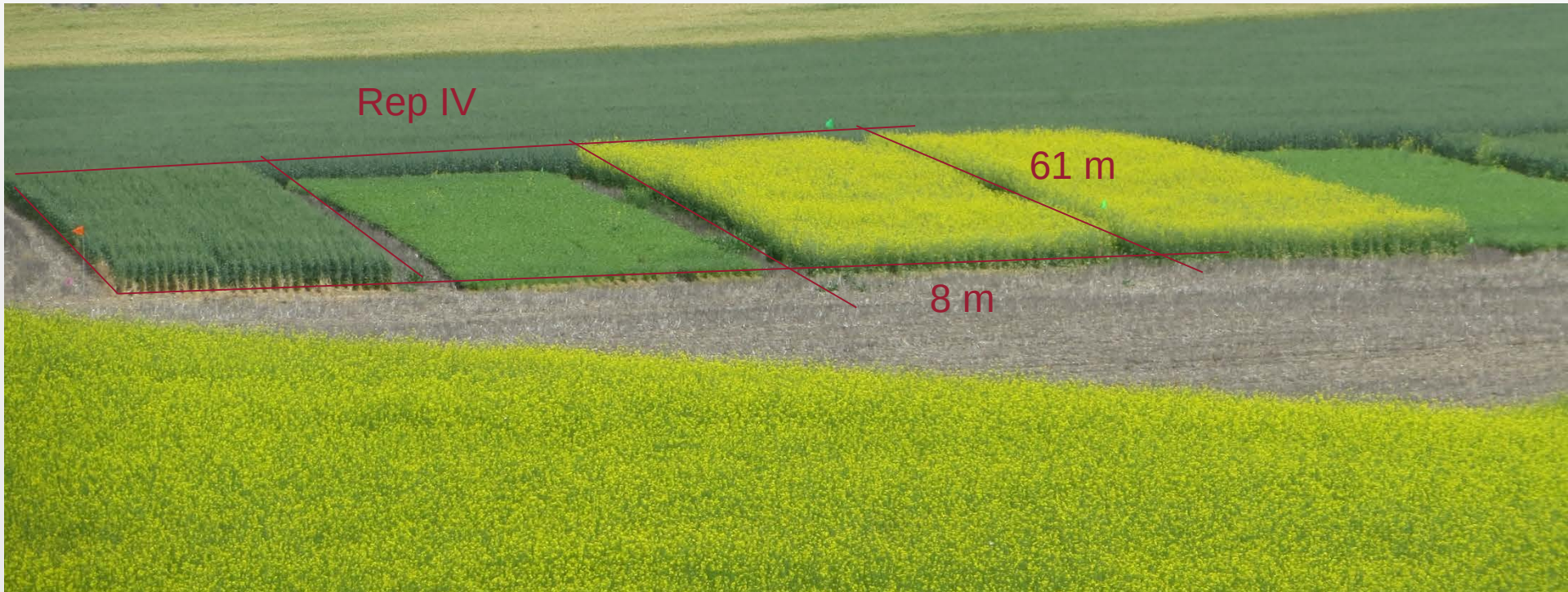
We have had 5 star weed control each of the 7 years!

Wilke Moving Forward

- Spring seeding dates have all been within a day.
  - In reality seeding could be earlier following broadleaf crops
  - I feel this has really limited the rotational benefit of these crops

Material and Methods

- In 2014 a large scale multi-year rotation study was initiated comparing spring wheat, canola and chickpea (*Cicer arietinum* L.)
- RCBD with 4 replications



Material and Methods

2014	2015	2016	2017	2018	2019	2020	2021
TRT	WW	SC	TRT	WW	SC		
	TRT	WW	SC	TRT	WW	SC	
		TRT	WW	SC	TRT	WW	SC

Treatment crops → recrop winter wheat → spring cereal

Treatment Crop Data

Crop Treatment	Trt Crops			
	Yield (lb/ac)	Return ($/ac)	Costs ($/ac)	R/C ($/ac)
Wheat	2062 A	194 A	117	77 A
Canola	923 B	154 B	122	32 B
Chickpea	896 B	234 A	115	92 A
Level of Sign.	0.001	0.001	n/a	0.001
Tukey (P<0.10)	126	22	n/a	22
CV	12.6	15.29	n/a	42.71

† Significant TRT x YR interaction (*P*<0.05)

Subsequent Winter Wheat Crop Data

Crop Treatment	Subsequent Crops				Total
	Yield (bu/ac)	Test Wt (#/bu))	Protein (%)	R/C ($/ac)	R/C ($/ac)
Wheat	51 C	57.8 B	11.8	78 B	168 B
Canola	56 B	58.7 A	11.6	97 AB	132 C
Chickpea	59 A	58.0 B	11.8	117 A	206 A
Level of Sign.	0.001	0.001	n.s.	0.007	0.001
Tukey (P<0.10)	3	0.4	0.4	22	26
CV	5.95	0.77	3.4	24.68	16.9

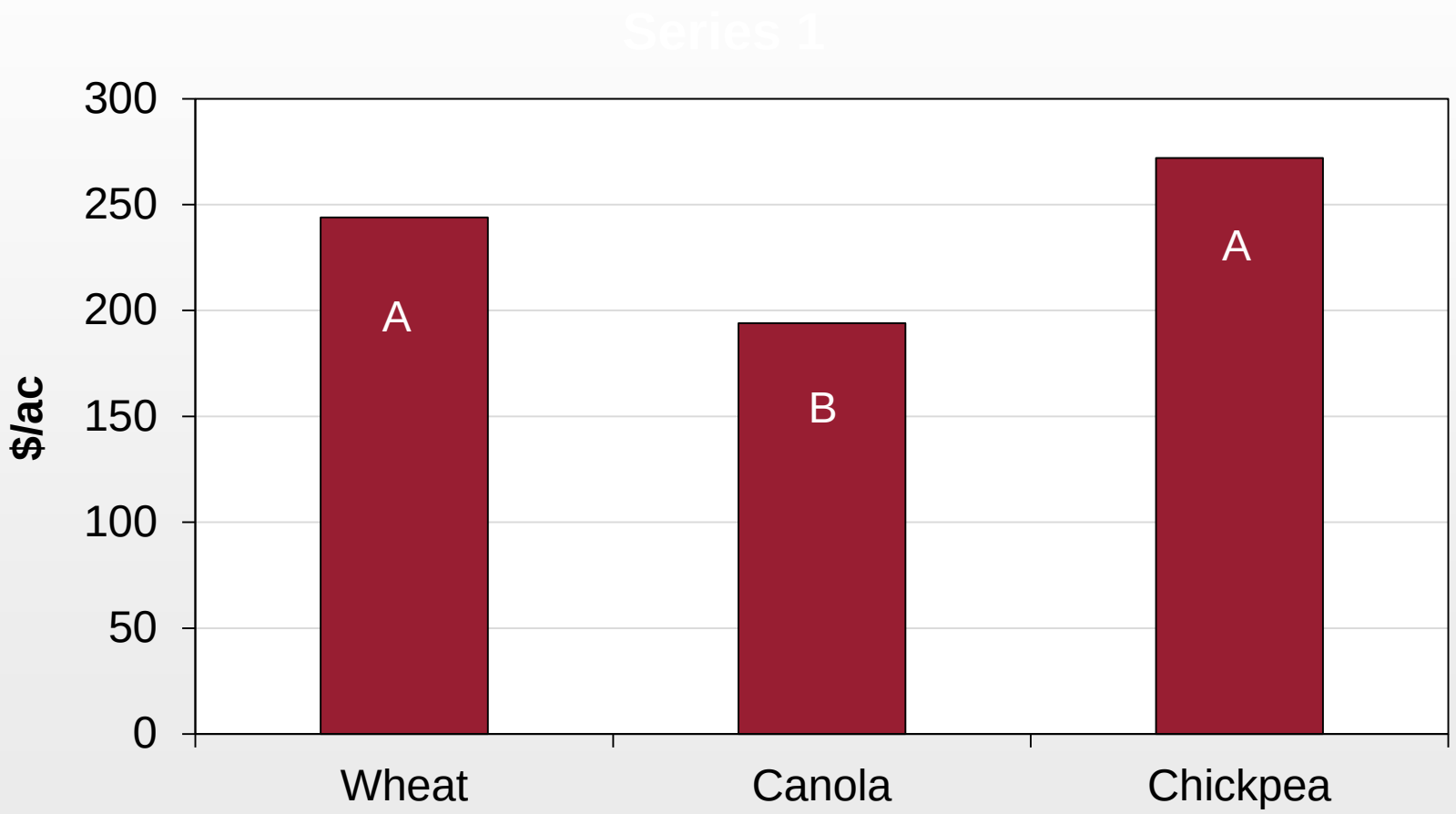
† Significant TRT x YR interaction (*P*<0.05)

Subsequent Spring Cereal Crop Data

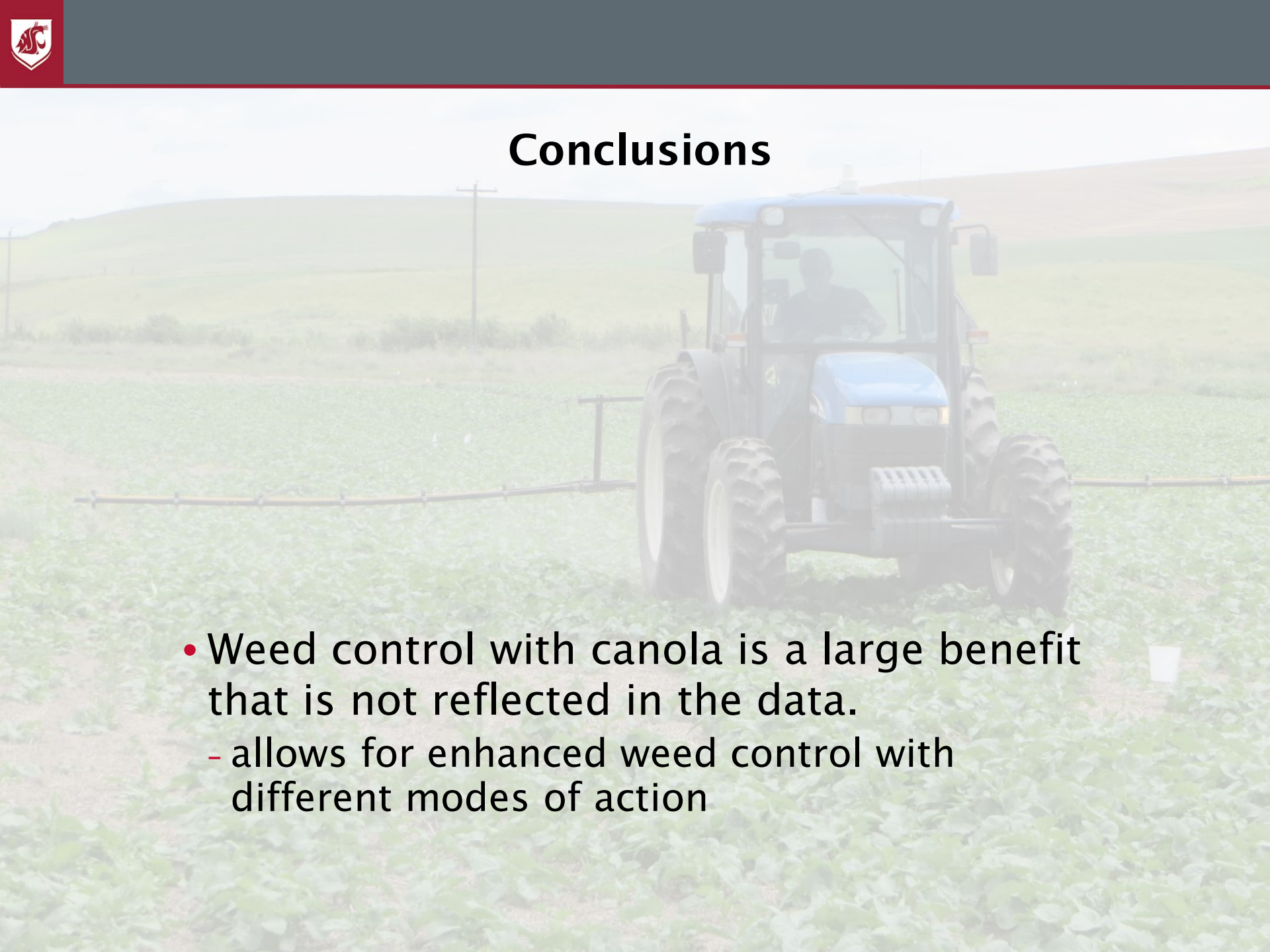
Crop Treatment	3 Yr Average†			
	Yield (lbs/ac)	Return ($/ac)	Costs ($/ac)	R/C ($/ac)
Wheat	2356 A	187 A	108	79 A
Canola	2156 A	173 B	108	65 B
Chickpea	2209 A	177 AB	108	70 AB
Level of Sign.	0.053	0.026	n/a	0.025
Tukey (P<0.05)	203	13	n/a	12
CV	8.3	6.4	n/a	15.8

† **NO** significant TRT x YR interaction (*P*<0.05)

3-Yr Total Return over Costs



Conclusions



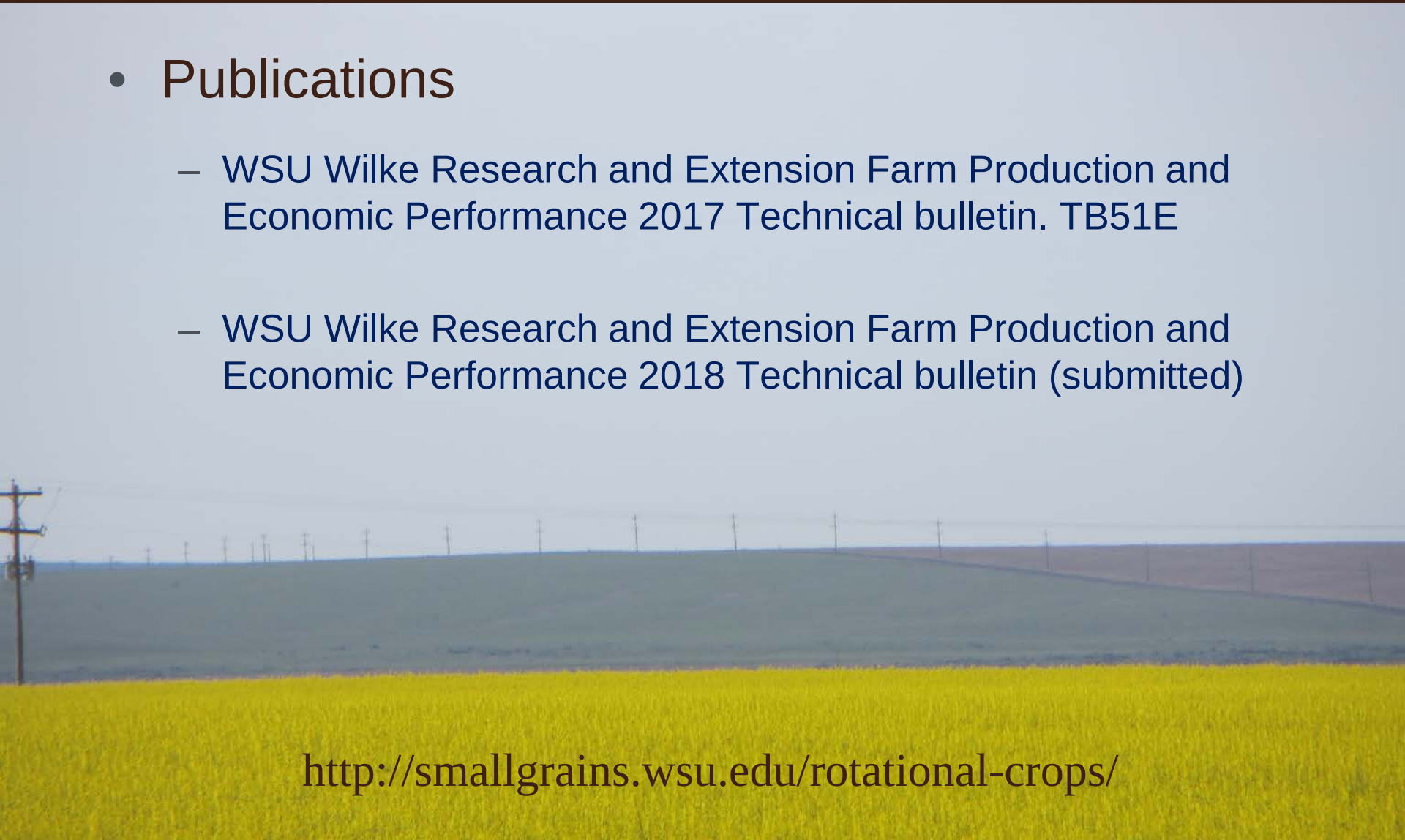
- Weed control with canola is a large benefit that is not reflected in the data.
  - allows for enhanced weed control with different modes of action

Outreach

- Field Days:
  - WSU Wilke Field Research and Extension Field Day, June 2018

Outreach

- Publications
  - WSU Wilke Research and Extension Farm Production and Economic Performance 2017 Technical bulletin. TB51E
  - WSU Wilke Research and Extension Farm Production and Economic Performance 2018 Technical bulletin (submitted)



http://smallgrains.wsu.edu/rotational-crops/

Outreach

- Presentations
  - **Multiple presentations including 2018 ASA Meeting**

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Questions