



## WSU WILKE RESEARCH AND EXTENSION FARM OPERATION, PRODUCTION, AND ECONOMIC PERFORMANCE FOR 2017

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## Current Situation

The WSU Wilke Research and Extension Farm is a 320-acre facility located on the eastern edge of Davenport, WA, and is split (north and south) by State Highway 2. Washington State University maintains and operates this facility. The focus of this annual technical bulletin is on farmers and crop consultants in the intermediate cropping zone (12 to 17 inches of annual precipitation). It also provides documentation of the operations and production on the Wilke Farm to assist University faculty with small plot research experiments. Previous technical bulletins can be found on the WSU Small Grains website: (<http://smallgrains.wsu.edu/rotational-crops>).

The Wilke Farm remains in a direct-seed cropping system utilizing no-till fallow, winter wheat, spring cereals, and broadleaf crops. Broadleaf crops are used for spring and winter cereals when weed pressures and market prices create opportunities for profitable production. The predominant cropping system practiced by farmers in this region is a 3-year rotation, which includes summer fallow, winter wheat, and spring cereals. Farmers are interested in intensifying rotations to reduce fallow years and increase crop diversity to improve long-term agronomic and economic stability.

The south side of the farm is divided into seven plots; three plots are in a more traditional 3-year crop rotation, and four plots are in an intensified 4-year crop rotation. The north side of the farm remains in an intensified rotation that forgoes

summer fallow and is now in continuous crop production after many years in continuous cereal grain only production. In 2010 through 2013, cereal rye (feral rye) infestations caused cropping decisions to be altered on the Wilke Farm, especially in the no-till fallow winter wheat portion of the rotations. In the fall of 2013, the no-till fallow winter wheat portion of the rotation was seeded as planned according to the rotation without alteration due to cereal rye. Over the last two years light fall disking has been used to help germinate weeds where needed.

Soil compaction and wireworm population data are collected each spring from GPS-recorded locations within each plot. Soil samples are also collected from these GPS locations prior to seeding and fertilizer is applied according to soil sample results and WSU recommendations

## Operations

Plot 2, Plot 3, and Plot 4 were lightly disked after the 2016 harvest to incorporate cereal rye seed on the soil surface to encourage germination and enhance long-term control. Winter wheat into fallow was seeded with Mondovi Corner Farm's JD 1895 direct-seed low disturbance disk drill on 7.5-inch spacing. The spring crops were seeded with Kevin Klein's SeedMaster hoe drill on 12-inch spacing. The farm was harvested with the farm's John Deere 6622 combine from August 15 through September 6.



## Winter Wheat

### (3-year Plot 5; 4-year Plot 1)

Plot 5 was seeded to ‘Jasper’ soft white winter wheat on September 20, 2016, at 78 lb/acre (780,000 seeds/acre) into no-till fallow. Seed was treated with Albaugh’s RSC Gold 0.5. Dry 16-20-0-14 fertilizer was applied at a rate of 8-10-0-7 with the seed. Anhydrous ammonia was applied below the seed at 91 lb N/acre. An additional 55 lb N/acre and 10 lb S/acre in the form of UAN and ThioSul was applied on April 20, 2017 with a spoke wheel fertilizer applicator. Post emergence weed control included Talinor applied at 16 oz/acre with 3.2 oz/acre CoAct, 4.0 oz/acre Tilt fungicide, 20 oz/acre boron, 20 oz/acre Zinc and 1qt/100 gal Activate Plus on April 26, 2017.

Plot 1 was seeded to ‘Curiosity CL+’ soft white winter wheat on September 20, 2016, at 78 lb/acre (800,000 seeds/acre) into no-till fallow. Seed was treated with Albaugh’s RSC Gold 0.5. Dry 16-20-0-14 fertilizer was applied at a rate of 8-10-0-7 with the seed. Anhydrous ammonia was applied below the seed at 76 lb N/acre. Post emergence weed control included Beyond applied at 3 oz/acre with 12 lb/100 gal AMS Max and 1.0 qt/100 gal Activate Plus on November 9, 2016. Beyond was also applied at 5 oz/acre with 4 qt/100 gal Modified Vegetable Oil and 2 gal/acre UAN on April 28, 2017. Travipro fungicide was applied at 4.0 oz/acre (A) and 10.5 oz/acre (B) with 1 qt/100 gal Activate Plus for stripe rust control on May 2, 2017.

## Spring Wheat

### (3-year Plot 7; 4-year Plot 6)

Plot 7 and Plot 6 were seeded to ‘Alum’ hard red spring wheat on May 9 and May 10 at 75 lb/acre. It was treated with Albaugh’s RSC Gold 1.1. Plot 7 was seeded into winter wheat residue, and Plot 6 was seeded into oriental mustard residue. Liquid 11-37 and 12-0-0-26 fertilizer was applied at a rate of 8-10-0-10 with 32 oz/acre zinc chelate on the seed. Anhydrous ammonium averaged 103 lb N/acre for Plot 7 and 98 lb N/acre for Plot 6. Twelve days prior to seeding 32.0 oz/acre RT3 and 12 lb/100 gal AMS Max were applied. Post-emergence weed control was applied on June 18. This application included 17 oz/acre Orion, 6 oz/acre Bison, 4.0 oz/acre Tilt, 1.0 gal/acre solution 32 fertilizer, 1 gal/acre Ag-Xcelerate fertilizer, 1 gal/acre CoRoN fertilizer, and 4 oz/acre Interlock.

## Chickpea

### (4-year Plot 3)

‘Billy Bean’ chickpeas were seeded and fertilized in one pass on May 8 into winter wheat residue at 125 lb/acre. Liquid 11-37 and 12-0-0-26 fertilizer was applied at a rate of 8-10-0-10 with 32 oz/acre zinc chelate on the seed. No additional fertilizer was applied. Prior to seeding on April 28, 32.0 oz/acre RT3 and 12 lb/100 gal AMS Max were applied. Post plant, pre-emergent broadleaf weed control included 1 oz/acre Sharpen, 3 oz/acre Spartan, 22 oz/acre RT3, 12 lb/100 gal AMS Max and 2 qt/100 gal crop oil was applied on May 10.



Post-emergence weed control included 12.0 oz/acre Assure II, 4 qt/100 gal crop oil and 1 gal/acre Ag-Xcelerate fertilizer on June 12 for grassy weed control only. Priaxor fungicide was applied at 4 oz/acre on June 29 for Ascochyta blight prevention. Preharvest burn down herbicide application included 40 oz/ac RT3, 1 qt/100 gal Activate Plus and 1.5 qt/100 gal Alliance on August 22.

**No-till Fallow**

*(3-year Plot 2; 4-year Plot 4)*

Both plots of no-till fallow were treated the same and were maintained relatively weed free with four herbicide applications. Plots were lightly disked in the fall of 2016 to help germinate feral rye. The first herbicide application was applied on May 9 at 32.0 oz/acre RT3, 1.0 oz/acre Sharpen and 12 lb/100 gal AMS Max. The second application was on June 23 and was 32.0 oz/acre RT3 and 12 lb/100 gal AMS Max. The third application was on July 28 at 32.0 oz/acre RT3 and 1.0 qt/100 gal

Full Load. The fourth and final application was 45 oz/acre Gramoxone, 2.5 oz/acre Interlock, and 1.0 qt/100 gal Aduro on September 10.

**Spring Canola**

*(Continuous North)*

‘Invigor L233P’ spring canola was seeded into spring barley residue on May 8 at 4 lb/acre. Liquid 11-37 and 12-0-0-26 fertilizer was applied at a rate of 8-10-0-10 with 32 oz/acre zinc chelate on the seed. Anhydrous ammonium rate was applied deep at 69 lb N/acre. Two weeks prior to seeding 32.0 oz/acre RT3, 2.1 oz/acre Airlink, and 12 lb/100 gal AMS Max were applied. Post-emergence weed control was applied on June 12. This application included 22.0 oz/acre Liberty, 5.0 oz/acre Assure II, 1 gal/acre Ag-Xcelerate, and 1.5 lb/100 gal AMS Max. Post-harvest herbicide was applied to kill the canola and any weed on August 30. This application included 48 oz/acre Gramoxone, 2.5 oz/acre Interlock, 1 gal/acre 9-0-0-10, and 1.5 qt/100 gal Aduro.

**Soil Compaction**

Soil compaction data are collected with a Spectrum Soil Compaction meter. Data are collected within each plot in the spring of the year prior to seeding and monitor compaction levels over time within a given crop rotation, which assists in potential management decisions. Plot 4 and 5 were deep ripped in the fall of 2014 with a low disturbance Case IH Ecolo-til 2500 to monitor changes over time. Plot 4 had the least amount of compaction with an average of 156 psi/18 inches, and Plot 6 had the greatest average with 214 psi/18 inches (Figure 1). North, Plot 3, 2, and 7 compaction averaged 160, 168, 176, and 177 psi/18 inches respectively.

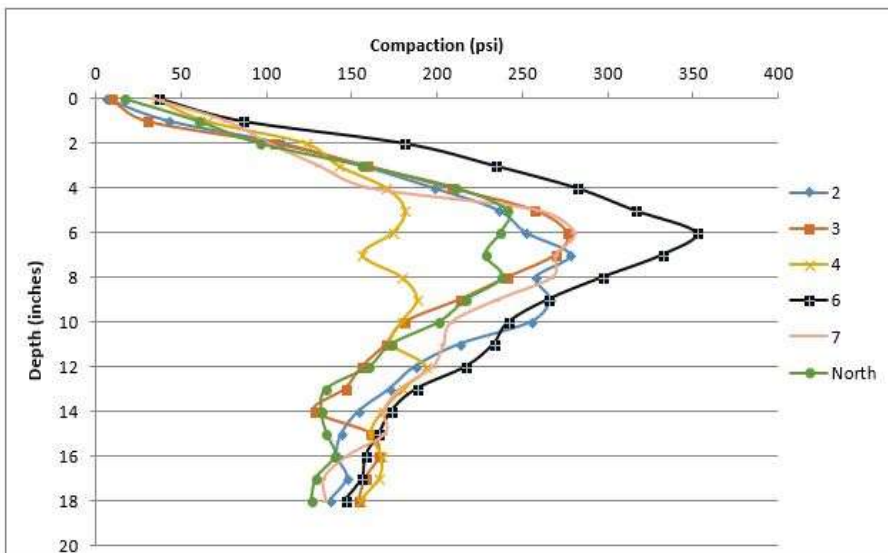


Figure 1. Soil compaction data collected in the spring of the year from the plots at the WSU Wilke Research and Extension Farm in 2017.

## Wireworm Populations

Wireworm population data are collected within each plot in the spring of the year prior to seeding using the modified solar bait trap method. This is done to monitor populations over time and better match seed-applied insecticide with wireworm populations. Plot 3 had the least amount of wireworms averaging 0.6/trap, and Plot 6 had the greatest population averaging 3.2/trap. Plots 2, 4, 7, and North averaged 2.2, 2.2, 2.6, and 2.4/trap, respectively.

## Soil Samples

All soil samples were collected prior to seeding. No-till fallow plots are soil sampled at the same time as those plots being spring cropped. Soil samples are used to help determine yield potential and nutrient requirements for the crops each year (Tables 1–8). They are also used as a historical reference for changing soil conditions over time. Soil pH, organic matter, phosphorus, and ammonium nitrogen is collected from the top 12 inches of soil only.

Table 1. Winter Wheat 3-year Plot 5.

Soil pH	6.1					Phosphorus	20 mg/kg	
Organic Matter	1.6% (32 lb/acre N)					Ammonium N	8 lb/acre	
	Soil Depth (in)							
	<u>0–12</u>	<u>12–24</u>	<u>24–36</u>	<u>36–48</u>		<u>Total</u>		
Nitrate-N (lb/acre)	78	14	13	22		127		
Sulfate-S (mg/kg)	9	5	6	--		20		
Moisture (in)	1.5	1.7	1.8	1.9		6.9		
<b>Sum of Tested N: 167 lb/acre N</b>								

Table 2. Winter Wheat 4-year Plot 1.

Soil pH	5.7					Phosphorus	17 mg/kg	
Organic Matter	2.3% (45 lb/acre N)					Ammonium N	7 lb/acre	
	Soil Depth (in)							
	<u>0–12</u>	<u>12–24</u>	<u>24–36</u>	<u>36–48</u>		<u>Total</u>		
Nitrate-N (lb/acre)	51	20	28	47		146		
Sulfate-S (mg/kg)	6	6	11	--		23		
Moisture (in)	2.3	2.1	1.9	1.8		8.1		
<b>Sum of Tested N: 198 lb/acre N</b>								

Table 3. Spring Canola Plot Continuous North.

Soil pH	6.5					Phosphorus	11 mg/kg	
Organic Matter	1.7% (34 lb/acre N)					Ammonium N	8 lb/acre	
	Soil Depth (in)							
	<u>0–12</u>	<u>12–24</u>	<u>24–36</u>	<u>36–48</u>		<u>Total</u>		
Nitrate-N (lb/acre)	10	8	8	17		41		
Sulfate-S (mg/kg)	9	13	14	--		34		
Moisture (in)	3.4	2.6	2.5	2.3		10.9		
<b>Sum of Tested N: 83 lb/acre N</b>								

Table 4. Spring Wheat 3-year Plot 7.

Soil pH	5.7			Phosphorus	17 mg/kg
Organic Matter	2.5% (49 lb/acre N)			Ammonium N	10 lb/acre
	<u>Soil Depth (in)</u>				
	<u>0-12</u>	<u>12-24</u>	<u>24-36</u>	<u>36-48</u>	<u>Total</u>
Nitrate-N (lb/acre)	10	5	4	3	22
Sulfate-S (mg/kg)	10	11	15	--	36
Moisture (in)	3.2	2.6	2.2	2.4	10.5
<b>Sum of Tested N: 82 lb/acre N</b>					

Table 5. Spring Wheat 4-year Plot 6.

Soil pH	6.1			Phosphorus	24 mg/kg
Organic Matter	2.5% (51 lb/acre N)			Ammonium N	10 lb/acre
	<u>Soil Depth (in)</u>				
	<u>0-12</u>	<u>12-24</u>	<u>24-36</u>	<u>36-48</u>	<u>Total</u>
Nitrate-N (lb/acre)	16	11	30	19	79
Sulfate-S (mg/kg)	10	13	51	--	74
Moisture (in)	2.8	2.5	2.1	2.1	9.5
<b>Sum of Tested N: 137 lb/acre N</b>					

Table 6. Chickpea 4-year Plot 3.

Soil pH	6.1			Phosphorus	16 mg/kg
Organic Matter	2.4% (49 lb/acre N)			Ammonium N	9 lb/acre
	<u>Soil Depth (in)</u>				
	<u>0-12</u>	<u>12-24</u>	<u>24-36</u>	<u>36-48</u>	<u>Total</u>
Nitrate-N (lb/acre)	6	4	3	4	17
Sulfate-S (mg/kg)	6	7	11	--	24
Moisture (in)	2.8	2.7	2.3	2.2	10.0
<b>Sum of Tested N: 75 lb/acre N</b>					

Table 7. No-till Fallow 3-year Plot 2.

Soil pH	5.9			Phosphorus	10 mg/kg
Organic Matter	2.9% (57 lb/acre N)			Ammonium N	7 lb/acre
	<u>Soil Depth (in)</u>				
	<u>0-12</u>	<u>13-24</u>	<u>25-36</u>	<u>37-48</u>	<u>Total</u>
Nitrate-N (lb/acre)	12	14	14	7	47
Sulfate-S (mg/kg)	7	8	14	--	30
Moisture (in)	3.2	3.1	2.7	2.6	11.5
<b>Sum of Tested N: 111 lb/acre N</b>					

Table 8. No-till Fallow 4-year Plot 4.

Soil pH	6.2				Phosphorus	13 mg/kg
Organic Matter	2.4% (49 lb/acre N)				Ammonium N	7 lb/acre
	Soil Depth (in)					
	<u>0–12</u>	<u>12–24</u>	<u>24–36</u>	<u>36–48</u>	<u>Total</u>	
Nitrate-N (lb/acre)	9	7	12	10	38	
Sulfate-S (mg/kg)	9	13	16	--	38	
Moisture (in)	3.2	3.2	2.4	2.2	11.1	
<b>Sum of Tested N: 94 lb/acre N</b>						

### Production and Economic Performance

Nitrogen uptake efficiency across the farm was near or above 50 percent across both winter wheat plots but well below 50 percent for spring wheat plots (Table 9). For winter wheat this implies the nitrogen fertilizer program was adequate and an average amount of nitrogen should be available in the soil for next year’s production. For spring wheat this implies the crop was over fertilized and above average fertilizer should be available for next year’s production.

Table 9. 2017 Nitrogen Use Efficiency.

	<b>Plot 1</b>	<b>Plot 5</b>	<b>Plot 6</b>	<b>Plot 7</b>
Soil Test Nitrogen <sup>†</sup>	188	159	125	31
Applied Nitrogen	90	154	114	119
Total Nitrogen	278	313	229	140
Grain Yield	90.8	93.6	32.1	32.8
Grain Protein	10.8%	11.7%	13.3%	13.7%
Lb N/bu	3.1	3.3	7.5	4.6
<b>Nitrogen Use Efficiency</b>	<b>53%</b>	<b>52%</b>	<b>23%</b>	<b>39%</b>

<sup>†</sup>Soil test nitrogen is calculated using soil test results in combination with the WSU Dryland Wheat Nitrogen Fertilizer Calculator.



The WSU Wilke Farm grain marketing plan begins once the crop has emerged using forward contracts and post-harvest selling. All grain is marketed by November 15. The average marketing window for winter wheat is about 13 months, and 7 months for spring crops. Forward contract values do not exceed the crop revenue insurance coverage value. The potential for a forward contract is evaluated monthly and is based on a targeted rate of return on investment based on estimated expenses. Market grades for each crop are provided as these also impact final market price. Chickpea is marketed through a contract with Central Washington Grain Growers.

Average input costs per year at the WSU Wilke Farm was up 17.4% over the last 3-year average and the highest since 2013. Economic returns over input costs were up only 4.2% over the previous 3-year average and was \$59/acre less than 2016. This is caused primarily by planting spring crops with increased input costs, and decreased spring crop yields because of late seeding dates and hot dry summer conditions. Tables 10–15 summarize the rotation, production, and economic performance of the 3-year rotation, 4-year rotation, and continuous cropping system at the Wilke Farm in 2017.

The 3-year crop rotation returns above input costs averaged \$103/acre, 11.6% more than the 3-year average. The 4-year crop rotation returns above input costs averaged \$89/acre, only 0.7% more than the previous 3-year average. The continuous cropping system returns above input costs averaged \$34/acre, 20% less than the previous 3-year average. The WSU Wilke Farm is enrolled in the farm program and crop insurance is purchased each year, but any revenue or costs associated with this is not included in the plot summaries to maintain consistency over years and results based specifically on crop production only.

Table 10. 3-year cropping rotation sequence at the Wilke Farm from 2013–2017.

<b>Year</b>	<b>Plot 2</b>	<b>Plot 5</b>	<b>Plot 7</b>
2013	DNS Wheat (60.9 bu/acre)	No-till Fallow	Winter Wheat (85.5 bu/acre)
2014	No-till Fallow	Winter Wheat (51.7 bu/acre)	HWSW (19.8 bu/acre)
2015	Winter Wheat (51.5 bu/acre)	DNS Wheat (24.5 bu/acre)	No-till Fallow
2016	DNS Wheat (49.0 bu/acre)	No-till Fallow	Winter Wheat (84.2 bu/acre)
<b>2017</b>	<b>No-till Fallow</b>	<b>Winter Wheat (93.6 bu/acre)</b>	<b>DNS Wheat (32.8 bu/acre)</b>
2018	Winter Wheat	Spring Cereal	No-till Fallow

Table 11. 3-year crop rotation production at the Wilke Farm, 2017.

	<b>Plot 2</b>	<b>Plot 5</b>	<b>Plot 7</b>
<b>Cropping Specifics</b>			
Acreage	27.5	24.6	34.0
Crop	No-till Fallow	'Jasper' SWWW	'Alum' DNS Wheat
<b>Crop Production</b>			
Yield	--	93.6 bu/acre	32.8 bu/acre
Mkt Grade	--	#2 SWH 59.1 0.3%	#1 DNS 60.9 0.4% 13.7%
<b>Gross Economic Return<sup>†</sup></b>			
Mkt Price	--	\$4.38/bu	\$6.29/bu
Gross Return	--	409.97	\$206.60/acre
<b>Input Costs</b>			
Disking	\$10.00/acre	--	--
Seed	--	\$17.82/acre	\$29.28/acre
Fertilizer	--	\$79.18/acre	\$60.10/acre
Herbicides	\$32.84/acre	\$17.30/acre	\$31.44/acre
Fungicide	--	\$2.81/acre	\$2.81/acre
Total	\$42.84/acre	\$117.11/acre	\$123.63/acre
<b>Summary</b>			
Return over Costs	-\$42.84/acre	292.86/acre	\$82.97/acre
<b>3-Year Rotation Return over Input Costs<sup>‡</sup></b>		<b>\$102.76/acre</b>	

<sup>†</sup>Revenue does not include crop insurance revenue.

<sup>‡</sup>Costs do not include fixed costs associated with the farm.



Table 12. 4-year cropping rotation sequence at the Wilke Farm from 2013–2018.

Year	Plot 1	Plot 3	Plot 4	Plot 6
2013	SWSW (65.7 bu/acre)	Spring Canola (1,748 lb/acre)	No-till Fallow	DNS Wheat (50.4 lb/acre)
2014	Spring Canola (701 lb/acre)	SWSW (23 bu/acre)	Winter Wheat (55.9 bu/acre)	No-till Fallow
2015	DNS Wheat (23.0 bu/acre)	No-till Fallow	Spring Canola (479 lb/acre)	Winter Wheat (50.1 bu/acre)
2016	No-till Fallow	Winter Wheat (94.5 bu/acre)	DNS Wheat (48.9 lb/acre)	Oriental Mustard (1,325 lb/ac)
2017	<b>Winter Wheat (90.8 bu/ac)</b>	<b>Chickpea (1,066 lb/ac)</b>	<b>No-till Fallow</b>	<b>DNS Wheat (32.1 bu/ac)</b>
2018	Broadleaf	Spring Cereal	Winter Wheat	No-till Fallow

Table 13. 4-year crop rotation production at the Wilke Farm, 2017.

	Plot 1	Plot 3	Plot 4	Plot 6
<b>Cropping Specifics</b>				
Acreage	20.5	26.0	26.2	28.0
Crop	‘Curiosity’ SWWW	‘Billy Bean’ Chickpea	No-till Fallow	‘Alum’ DNS wheat
<b>Crop Production</b>				
Yield	90.8 bu/ac	1,066 lb/acre	--	32.1 bu/acre
Mkt Grade	#1 SWW 60.5 0.50%	#1 Chickpea 5.2% 1.4% smalls	--	#1 DNS 62.3 0.4% 13.3%
<b>Gross Economic Return<sup>†</sup></b>				
Mkt Price	\$4.35/bu	\$0.24/bu	--	\$6.13/bu
Gross Return	394.98	\$255.86/acre	--	\$197.10/acre
<b>Input Costs</b>				
Disking	--	\$10.00	\$10.00	--
Seed	\$19.77/acre	58.75/acre	--	\$29.28/acre
Fertilizer	\$39.79/acre	\$22.37/acre	--	\$58.27/acre
Herbicides	\$42.57/acre	\$65.14/acre	\$32.84	\$31.44/acre
Fungicide	\$19.58/acre	\$13.76/acre	--	\$2.81/acre
Total	\$131.71/acre	\$156.25/acre	\$42.84/acre	\$121.80/acre
<b>Summary</b>				
Return over Costs	\$263.27/acre	\$99.61/acre	-\$42.84/acre	\$75.30/acre
<b>4-Year Rotation Return over Input Costs<sup>‡</sup></b>			<b>\$89.16/acre</b>	

<sup>†</sup>Revenue does not include crop insurance revenue.

<sup>‡</sup>Costs do not include fixed costs associated with the farm.

Table 14. Continuous crop rotation sequence at the Wilke Farm from 2013–2018.

<b>Year</b>	<b>North Side</b>
2012	<i>Spring Wheat</i> (41.7 bu/acre)
2013	Spring Barley (1.73 ton/acre)
2014	DNS Wheat (21.0 bu/acre)
2015	HR Winter Wheat (24.4 bu/acre)
2016	Spring Barley (1.68 ton/acre)
2017	<b>Spring Canola</b> <b>(1,055 lb/acre)</b>
2018	Cereal Crop

Table 15. Continuous crop rotation production at the Wilke Farm, 2017.

<b>North Side</b>	
<b>Cropping Specifics</b>	
Acreage	55.8
Crop	‘Invigor L233P’ Spring canola
<b>Crop Production</b>	
Yield	1,055 lb/acre
Mkt Grade	#1 canola 2.6%
<b>Gross Economic Return<sup>†</sup></b>	
Mkt Price	\$0.175/lb
Gross Return	\$184.63/acre
<b>Input Costs</b>	
Seed	\$54.40/acre
Fertilizer	\$47.64/acre
Herbicides	\$48.75/acre
Fungicide	--
Total	\$150.80/acre
<b>Summary</b>	
<b>Continuous Rotation Return over Input Costs<sup>‡</sup></b>	<b>\$33.83/acre</b>

<sup>†</sup>Revenue does include any crop insurance revenue.

<sup>‡</sup>Costs do not include fixed costs associated with the farm.

## Summary

Weather played a major role in the overall agronomic and economic production in 2017 with favorable wet conditions early increasing yield potentials but limited by hot dry summer conditions. Overall 2017 (Table 16) and 2016 (Table 17) growing season totals were very similar. However, within the 2017 season the fall was wetter with 6.37 inches of precipitation compared to 2.87 inches. The winter of 2017 was colder with only 14 accumulated growing degree days (GDD) compared to 215 GDD in 2016. The spring of 2017 was cooler and wetter with only 1303 GDD and 6.75 inches of precipitation compared to 1660 GDD and only 4.49 inches in 2016. The summer of 2017 was hotter and drier than 2016 with 3,272 GDD and only 0.38 inches of precipitation compared to 3,088 and 2.03 inches.

A summary of WSU Wilke Research and Extension Farm economic returns over input costs using 3-year averages is shown in Figure 2. Over the last three years (2015 to 2017), the 3-year rotation, 4-year rotation, and continuous cropping have averaged returns above input costs of \$97, \$97, and \$39/acre, respectively. Over the last six years, the 3-year rotation and 4-year rotation have averaged returns above input costs of \$115/acre and \$112/acre, respectively. These are both significantly greater than \$70/acre return above cost of the continuous cropping system.

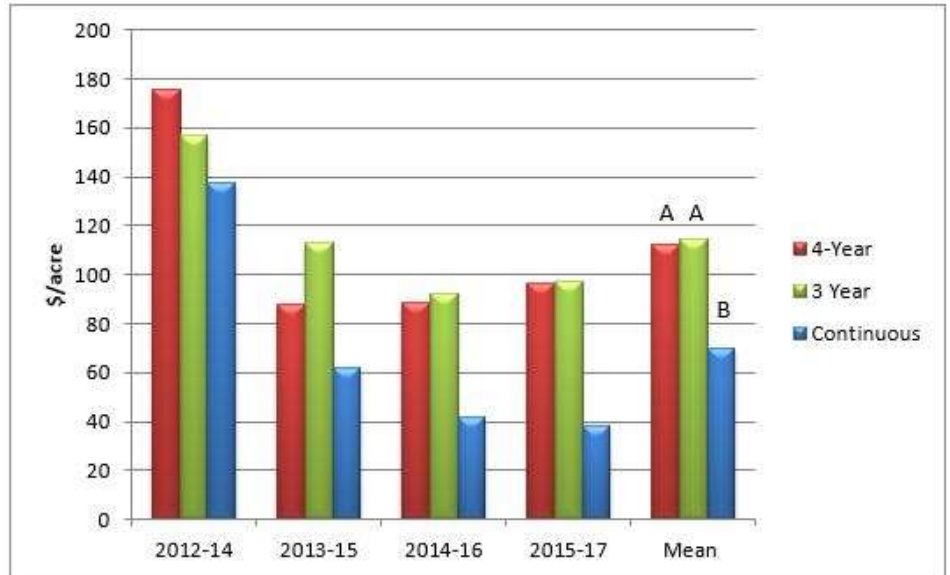


Figure 2. Three-year average economic return over input costs of 3-year, 4-year, and continuous cropping systems at the WSU Wilke Research and Extension Farm. Costs do not include fixed costs associated with the farm. Means within columns assigned different case letters are significantly different ( $P < 0.10$ ).

## Weather Data

The following tables provide weather data for Davenport, WA, in 2017 and 2016, respectively.

Table 16. Weather data for Davenport, WA, in 2017 (Crop Year Summary: 09/01/2016 to 08/31/2017).

Month	Temperature			Degree Days*	Rain Fall	Rain Days
	High	Low	Mean			
9	70.7	42.9	56.8	744	0.25	4
10	54.3	38.7	46.1	450	4.70	21
11	49.1	34.3	41.0	297	1.42	16
12	27.0	13.6	21.1	2	0.37	5
1	23.5	12.6	18.4	4	1.17	8
2	32.0	19.2	26.2	8	2.15	12
3	45.6	31.1	38.2	210	3.33	19
4	54.9	34.3	44.3	377	1.84	10
5	66.9	43.3	55.6	716	1.58	10
6	74.8	46.6	62.0	862	0.38	4
7	86.9	54.1	72.2	1193	0.00	0
8	87.4	55.1	72.0	1217	0.00	0
<b>Total</b>				<b>6080</b>	<b>17.19</b>	<b>109</b>

\*Degree days calculated using 32° base.

Table 17. Weather data for Davenport, WA, in 2016 (Crop Year Summary: 09/01/2015 to 08/31/2016).

Month	Temperature			Degree Days*	Rain Fall	Rain Days
	High	Low	Mean			
9	69.8	43.3	56.9	737	0.96	3
10	63.5	41.9	51.8	641	0.85	9
11	40.5	26.1	40.5	121	1.06	9
12	34.2	24.4	29.4	64	3.12	12
1	32.7	25.3	29.1	21	3.33	18
2	44.1	29.7	36.1	166	0.63	8
3	50.4	32.2	40.7	288	3.45	16
4	65.1	39.5	52.5	609	0.41	4
5	68.6	44.7	57.0	763	0.58	8
6	77.1	48.0	63.9	917	1.00	4
7	80.4	51.0	66.9	1045	0.86	9
8	83.7	52.9	69.1	1126	0.17	3
<b>Total</b>				<b>6498</b>	<b>16.42</b>	<b>103</b>

\*Degree days calculated using 32° base.

## Special Thanks

Canola

Seed Donation:



Talinor and Trivapro  
donation:



Mondovi Corner Farm

Seeding donation



Rocky Top Ranch  
Use of grain truck at harvest

WSU EXTENSION | WSU WILKE FARM OPERATION, PRODUCTION, AND ECONOMIC PERFORMANCE FOR 2017  
AGWEATHERNET STATION located at the Wilke Research and Extension Farm.



You can access Wilke weather data at <http://wilkefarm.wsu.edu/>. AgWeatherNet link on the widget takes you to a map of weather stations throughout the state.

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Wilke Farm website: <http://wilkefarm.cahnrs.wsu.edu>  
Lincoln-Adams Extension website: <https://extension.wsu.edu/lincoln-adams/>





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