



Winter Canola Feasibility in Rotation with Winter Wheat

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS068E

Background

Winter wheat-summer fallow rotations are predominate in the dryland cropping region (< 12" of annual precipitation) of eastern Washington. Farmers in this region rely heavily on continuous applications of Group 2 herbicides for winter annual grassy weed control and suppression (see sidebar). This repeated application of Group 2 herbicides that includes Beyond, Maverick, Olympus, Olympus Flex, Osprey, and PowerFlex increases the potential for herbicide-resistant populations of winter annual grassy weeds such as downy brome (*Bromus tectorum* L.) and jointed goatgrass (*Aegilops cylindrica*) (Campbell 2011).

Winter canola (*Brassica napus* L.) is an oilseed crop that offers non-Group 2 grassy weed herbicide options, including Roundup Ready technology, but has a very limited history in this region and elevates short-term agronomic and economic risks in rotation. Agronomic and economic risks may include lack of grower experience, getting acceptable

Weed Management Approaches

In response to various types of herbicide formulations, a controlled weed does not produce seed for future infestations, while a suppressed weed produces reduced numbers of seed with stunted vigor. With no herbicide applied, weeds grow at their full capacity. See Figure 1 for examples of each.

stand establishment with a small seed under limited soil moisture conditions, harvesting a new crop with a much smaller seed than wheat, and changing marketing strategies. Research was therefore conducted to help producers determine the market prices needed to offset these risks and increase profitability, as well as improve weed control through the utilization of non-Group 2 herbicides.



Figure 1. Weed management approaches for growing winter canola and wheat. A) Grassy weed control in winter canola with Roundup (Group 9). B) Grassy weed suppression in winter wheat with Osprey (Group 2). C) No herbicide application in winter canola.

Study Snapshot

Location: 9 miles east of Ritzville, WA

Annual precipitation: 11–12 inches

Soil type: Silt loam

Crop sequence: winter wheat, summer fallow

Treatments and Operations

A four-year on-farm test near Ritzville, Washington, was initiated in 2006 to examine two treatments: 1) winter canola, summer fallow, winter wheat; and 2) winter wheat, summer fallow, winter wheat (Table 1; Figure 2). The on-farm test was a randomized complete block design with four replications on 6.5 acres. DKA 13-86 RR winter canola and Eltan winter wheat treatments were seeded with John Deere HZ deep furrow drills into a tilled summer fallow system. Canola was seeded at 8 lb/ac on August 22, 2006, and wheat was seeded at 52 lb/ac on September 1, 2006. Fertilizer was applied at 70-0-0-7 to both treatments prior to seeding in the summer fallow system. Downy brome and jointed goatgrass, along with multiple species of broadleaf weeds, were identified prior to spraying. Wheat was sprayed on April 13, 2007, with 4.75 oz/ac Osprey (Group 2), 16 oz/ac MCPA, 2 qt/100 gal non-ionic surfactant, and 3 lb/ac ammonium sulfate. Canola was sprayed on April 16, 2007, with 16 oz/ac Roundup PowerMax (Group 9) and 1 qt/100-gal non-ionic surfactant. Both spray treatments were applied at 11.7 gal/ac. Subsequent Eltan winter wheat was also fertilized at 70-0-0-7, seeded at 52 lb/ac into summer fallow on September 2, 2008, and harvested on August 18, 2009.

Table 1. Study timeline and treatments in an on-farm test near Ritzville, WA.

Crop Year	Treatment #1	Treatment #2
2006	Summer fallow	Summer fallow
2007 [†]	Winter canola	Winter wheat
2008	Summer fallow	Summer fallow
2009 [‡]	Winter wheat	Winter wheat

[†] Referred to as the treatment crop.

[‡] Referred to as the subsequent crop.

Agronomic and Economic Results

The total production costs between the two crops were similar, as both treatments received the same fertilizer package, and the higher seed cost of canola was offset by a lower herbicide cost. Therefore, the economic results are presented as gross returns only. Wheat gross returns were calculated using a Ritzville Warehouse Company free on board price on September 15 each year. Canola gross returns were calculated using local contract prices. In 2007, winter wheat was \$8.17/bu and canola was \$8.50/bu (\$0.17/lb). Wheat produced greater yield and gross returns than canola at the given market prices (Table 2). Subsequent winter wheat yields and gross returns were greater following canola (Table 3). Over the total cropping sequence, no significant difference in gross returns was determined between the wheat and canola; both averaged \$493/ac.



Figure 2. Winter canola and wheat at A) emergence, B) bloom, and C) maturity.

Table 2. Average yield and gross return of winter canola and wheat treatments in an on-farm test near Ritzville, WA.

Treatments	Yield (bu/ac)	Gross Return (\$/ac)
Canola	34.5	293
Wheat	43.5	355
Level of significance	0.01	0.05

Table 3. Average yield and gross return of subsequent winter wheat crop following winter canola and wheat treatments in an on-farm test near Ritzville, WA.

Treatments	Yield (bu/ac)	Gross Return (\$/ac)
Wheat following canola	47.5	197
Wheat following wheat	34.1	142
Level of significance	0.05	0.05

Table 4. The profitability of winter wheat in comparison to winter canola given a specific market price from on-farm trials near Ritzville, WA, from 2006 to 2009. Prices include the rotational value of canola.

Wheat (\$/bu)	Canola (\$/bu)										
	\$5.00	\$5.50	\$6.00	\$6.50	\$7.00	\$7.50	\$8.00	\$8.50	\$9.00	\$9.50	\$10.00
\$4.00	-\$54	-\$72	-\$89	-\$106	-\$123	-\$141	-\$158	-\$175	-\$192	-\$210	-\$227
\$4.25	-\$44	-\$61	-\$78	-\$95	-\$113	-\$130	-\$147	-\$164	-\$182	-\$199	-\$216
\$4.50	-\$33	-\$50	-\$67	-\$85	-\$102	-\$119	-\$136	-\$154	-\$171	-\$188	-\$205
\$4.75	-\$22	-\$39	-\$56	-\$74	-\$91	-\$108	-\$125	-\$143	-\$160	-\$177	-\$194
\$5.00	-\$11	-\$28	-\$46	-\$63	-\$80	-\$97	-\$115	-\$132	-\$149	-\$166	-\$184
\$5.25	\$0	-\$18	-\$35	-\$52	-\$69	-\$87	-\$104	-\$121	-\$138	-\$155	-\$173
\$5.50	\$11	-\$7	-\$24	-\$41	-\$58	-\$76	-\$93	-\$110	-\$127	-\$145	-\$162
\$5.75	\$21	\$4	-\$13	-\$30	-\$48	-\$65	-\$82	-\$99	-\$117	-\$134	-\$151
\$6.00	\$32	\$15	-\$2	-\$19	-\$37	-\$54	-\$71	-\$88	-\$106	-\$123	-\$140
\$6.25	\$43	\$26	\$9	-\$9	-\$26	-\$43	-\$60	-\$78	-\$95	-\$112	-\$129
\$6.50	\$54	\$37	\$19	\$2	-\$15	-\$32	-\$50	-\$67	-\$84	-\$101	-\$119
\$6.75	\$65	\$48	\$30	\$13	-\$4	-\$21	-\$39	-\$56	-\$73	-\$90	-\$108
\$7.00	\$76	\$58	\$41	\$24	\$7	-\$11	-\$28	-\$45	-\$62	-\$80	-\$97
\$7.25	\$86	\$69	\$52	\$35	\$17	\$0	-\$17	-\$34	-\$52	-\$69	-\$86
\$7.50	\$97	\$80	\$63	\$46	\$28	\$11	-\$6	-\$23	-\$41	-\$58	-\$75
\$7.75	\$108	\$91	\$74	\$56	\$39	\$22	\$5	-\$13	-\$30	-\$47	-\$64
\$8.00	\$119	\$102	\$84	\$67	\$50	\$33	\$16	-\$2	-\$19	-\$36	-\$53
\$8.25	\$130	\$113	\$95	\$78	\$61	\$44	\$26	\$9	-\$8	-\$25	-\$43
\$8.50	\$141	\$123	\$106	\$89	\$72	\$54	\$37	\$20	\$3	-\$15	-\$32
\$8.75	\$152	\$134	\$117	\$100	\$83	\$65	\$48	\$31	\$14	-\$4	-\$21
\$9.00	\$162	\$145	\$128	\$111	\$93	\$76	\$59	\$42	\$24	\$7	-\$10
\$9.25	\$173	\$156	\$139	\$121	\$104	\$87	\$70	\$52	\$35	\$18	\$1
\$9.50	\$184	\$167	\$150	\$132	\$115	\$98	\$81	\$63	\$46	\$29	\$12
\$9.75	\$195	\$178	\$160	\$143	\$126	\$109	\$91	\$74	\$58	\$40	\$22
\$10.00	\$206	\$188	\$171	\$154	\$137	\$119	\$102	\$85	\$68	\$51	\$33

	Price structure at which winter wheat is more profitable than winter canola given a ww average yield of 43.4 bu/ac and wc average of 34.5 bu/ac.
	Price structure at which winter canola is more profitable than winter wheat given a wc average yield of 34.5 bu/ac and ww average of 43.4 bu/ac.
	Price structure at which neither crop has an economic advantage, so farmers should consider weed pressure, soil moisture for stand establishment, and price stability.

Conclusions

Winter canola has the potential to be a viable crop to incorporate into a winter wheat-summer fallow rotation to compete economically with winter wheat and reduce the potential for Group 2 herbicide-resistant weed populations. In an on-farm test conducted from 2006 to 2009 near Ritzville, Washington, canola yielded 33.7% less than wheat, but winter wheat following canola yielded 39.3% more than winter wheat following winter wheat. Despite these yield differences, the winter wheat and canola market price differential between the two crops, which can vary dramatically from year to year, has a larger influence on profitability. Overall, canola needs to have a 26.4% price advantage per bushel over wheat to produce significantly greater gross returns (Table 4).

Examples

If wheat is selling for \$6.00/bu, canola selling at \$8.00/bu will be significantly ($LSD_{0.10} = \$57$) more profitable.

In the on-farm test, canola selling for \$8.50/bu compared to wheat selling for nearly \$8.25/bu generated almost \$9/ac more profit, but was not statistically significant.

Reference

Campbell, J.C., C. Mallory-Smith, A. Hulting, and D. Thill. 2011. Herbicide-Resistant Weeds and Their Management. Extension Publication PNW 437, <http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0437.pdf>.



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Cover image: Harvesting winter canola on Ron Hennings' farm. All photos were taken by Aaron Esser.

Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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