lb/acre at Pomeroy, which had greater soil water and N supplies than at Okanogan, which yielded 795 lb/acre. Water use efficiencies were 65 and 105 lb/ac yield per inch water used for Okanogan and Pomeroy respectively, similar to spring canola in the area. Total season unit N requirements were higher than current regional extension bulletin literature, at 26 lb N per 100 lb yield in Okanogan and 17 lb N per 100 lb yield in Pomeroy. N inefficiencies appeared to occur in the fall and winter seasons to a greater degree than the harvest season. Volatilization, immobilization, and ammonium fixation are potential N loss pathways.

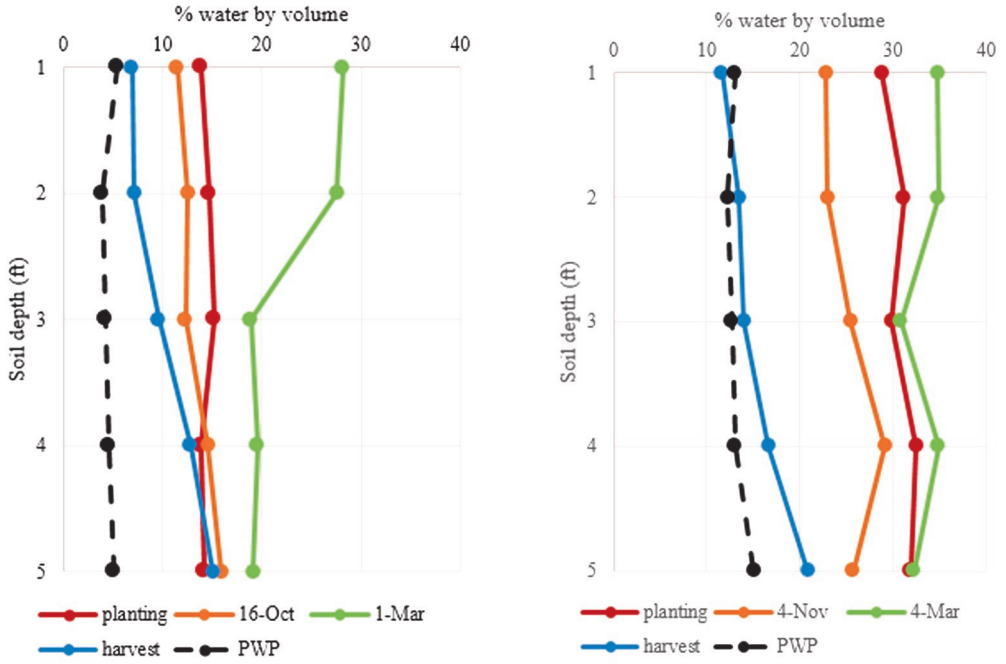

Figure 1. Soil water profiles at Okanogan (left) and Pomeroy (right) in 2014-15 for selected sampling dates, compared to dry soil at permanent wilting point (dashed).

Cropping Systems: Economic Returns to Canola Rotations in Eastern Washington

VICKI A. MCCRACKEN AND JENNIFER R. CONNOLLY
SCHOOL OF ECONOMIC SCIENCES, WSU

Canola growers have observed rotational benefits from growing canola including increased yield in subsequent wheat crops, decreased weed pressure, and improved soil quality. These benefits accrue in crops following canola, impacting total farm returns. Growing canola in traditionally cereal-only rotations also impacts costs due to the use of herbicides that are compatible in rotations with canola, and different tillage needs following canola as a result of canola residue breaking down differently than cereal crops. These impacts affect both costs and returns in the year canola is grown and in years later in a rotation.

Assessing returns for complete rotations gives a more accurate picture of the profitability of canola than assessing returns for a single year. Enterprise budgets have been developed for the low and intermediate rainfall areas of eastern Washington and include expanded features that allow for the rotational impacts of canola. These interactive computer tools are available online and can be used by growers and advisors to growers (e.g. bankers and other agricultural industry personnel) to assess the on-farm economics of growing canola. Each enterprise budget file includes separate tabs for summary, crop calendars, crop budget sheets (differentiated by rotation), and machinery complements and costs. The summary tab presented below (based on 2013 data) provides detailed, interactive summary economic information useful in comparing alternative crops and rotations with and without canola.

Inclusion of canola into crop rotations may offer agronomic benefits to farms that translate into improved overall farm profitability over time. Our research finds favorable economic returns of selected crop rotations that incorporate canola as compared to returns of traditional crop rotations when rotational impacts are considered, under some alternate price and production scenarios.

Table 1. Summary of Returns by Crop ($/acre) Over a Two-Year Period*

Adjust costs on the individual crop budgets in tabs numbered 1-5 and totals will update here on the Summary tab.

Budget:	By Crop**:	Unit	Yield per acre	Price per unit	Revenue per acre ($/acre)	Variable Costs (VC) ($/acre)	Fixed Costs (FC) ($/acre)	Total Cost (TC) of Operation ($/acre)	Returns over VC ($/acre)	Returns over TC ($/acre)	Crop & Cost Share*** Cost ($/acre)	Percentage Share Owner Share	Percentage Share Operator Share
	Canola Rotation: Fallow - WC - Fallow - WW												
1	Winter Canola (WC)	lb	1500	$0.22	$330	$219	$122	$341	**$111**	**-$11**	$69	33%	67%
2	Soft White Winter Wheat (SWWW)	bu	50	$6.42	$321	$186	$119	$305	**$135**	**$16**	$71	33%	67%
3	Hard Red Winter Wheat (HRWW)	bu	45	$7.65	$344	$198	$124	$322	**$147**	**$22**	$75	33%	67%
	Wheat Rotation: Fallow - WW - Fallow - WW												
4	Soft White Winter Wheat (SWWW)	bu	50	$6.42	$321	$189	$121	$310	**$132**	**$11**	$72	33%	67%
5	Hard Red Winter Wheat (HRWW)	bu	45	$7.65	$344	$203	$128	$330	**$141**	**$14**	$76	33%	67%

*For average annual costs or returns, divide by two.
**Crop budgets include costs of preceding summer fallow. Individual crop costs and returns are for a two-year period.
***In a crop- and cost-share arrangement, the landowner and the farm manager split the crop and the specified costs, typically fertilizer, chemicals, and crop insurance.

Table 2. Summary of Returns by Rotation ($/acre) over Two-Year Period*

Click on the rotations below (**red text**) to select and compare alternative rotations from the drop down menu.

Select the Rotation: (Click on these cells to select other rotations from drop-down menu)	Budget(s):	Revenue per acre ($/acre)	Variable Costs (VC) ($/acre)	Fixed Costs (FC) ($/acre)	Total Cost (TC) of Operation ($/acre)	Returns over VC ($/acre)	Returns over TC ($/acre)	Crop-Share Land Cost ($/acre)
F-SWWW-F-SWWW	4	$321	$189	$121	$310	**$132**	**$11**	$72
F-WC-F-SWWW	1 and 2	$326	$202	$120	$323	**$123**	**$3**	$70

*For average annual costs or returns, divide by two.

Extension and Outreach: Getting Oilseed Information in the Hands of Stakeholders

KAREN SOWERS[1], DENNIS ROE[1], BILL PAN[1], FRANK YOUNG[2], AARON ESSER[1], AND BILL SCHILLINGER[1]
[1]DEPT. OF CROP AND SOIL SCIENCES, WSU; [2]USDA-ARS

As evidenced by the numerous reports in this section of the abstracts, the Washington Oilseed Cropping Systems (WOCS) project continues to crank out a wide range of research results annually. The WOCS team's top priorities is to conduct research to answer production questions from growers, to improve production, and to be applicable in a range of precipitation zones in eastern Washington and the Pacific Northwest. Just as important as the research is finding effective ways to disseminate the data and findings to growers, crop consultants, and other stakeholders. We have found that a variety of formats of outreach is key to effective communication. Methods we use throughout the year are online via the WOCS website (www.css.wsu.edu/biofuels), email updates and notifications, five field days during the growing season, individual farm visits, on-farm trials, Extension publications, presentations at university and industry events, and finally, our annual oilseed production workshops and/or conference. In 2015, 1335 people attended all WOCS events. Ten Farmer Technology breakfast meetings were held in Colfax and Lewiston, all of which had an oilseed component.

After partnering with the Pacific Northwest Direct Seed Association for a large conference in 2014 and 2015 and based on survey results, we returned to our original format of several smaller workshops dedicated specifically to oilseed production, marketing and processing information. The workshops were held in Odessa, Colfax and Dayton, and the response from growers and industry was overwhelmingly positive. Attendees placed the highest value on the presentations being geared toward the production region where each workshop was at, and the interactive format of the breakout sessions. We will be having workshops again in 2017 with the interactive format, potentially a more hands-on approach, and growers and industry involved in the planning.

Winter canola plans with growers and WOCS staff were challenged, and in many cases failed, last summer and fall with drought conditions. Additionally, there was a period of time during seeding time when bids were not available for canola and there was uncertainty about the future of a major processor where most growers take their crop. Those factors