Evaluation of Camelina Varieties and Numbered Lines at Lind

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We are currently in the third year of multi-location camelina agronomy trials. Identical experiments are conducted in four precipitation zones in the Pacific Northwest. These locations are Lind, Pendleton (Don Wysocki, OSU), Pullman (Stephen Guy, WSU), and Corvallis (Tom Chastain, OSU). This brief report covers the performance of numerous camelina varieties and numbered lines during 2009 at Lind.

For the 2009 crop year, 18 camelina varieties and numbered lines were planted in the fall and 25 varieties and numbered lines were planted in the spring. We built a small-plot drill (using John Deere 450 double-disc openers on 6-inch row spacing) for this purpose. Camelina was sown into standing winter wheat stubble at a rate of 4 lbs/acre. Individual plots were 5 x 20 feet and all entries were replicated four times in a randomized complete block arrangement. Fall planting was conducted on November 19 and spring planting on February 27. Plots were fertilized with 25 lbs/acre of nitrogen.

Precipitation for 2009 crop year (Sept. 1 – Aug. 31) at the Lind Research Station was 8.46 inches. Long-term average crop-year precipitation for this site is 9.50 inches. Grain yields among entries ranged from approximately 400 to 600 lbs/acre for both fall and spring planting dates (Fig. 1). The variety 'Calena' was one of the top producers from both planting dates.

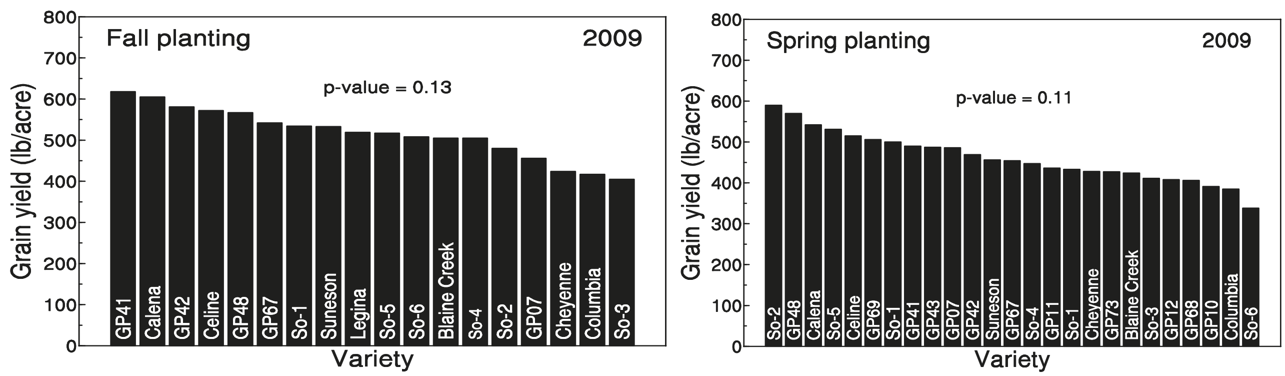

Fig 1. Grain yield of camelina varieties and numbered lines at Lind, WA in 2009. (Left) 18 camelina varieties and numbered lines were direct-drilled into wheat stubble on November 19, 2008. There were no significant grain yield differences among entries. (Right) 25 camelina varieties and numbered lines were direct drilled at Lind on February 27, 2009. There were no significant grain yield differences among entries.

Winter Canola Feasibility in Rotation with Winter Wheat

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Producers in the dryland (<12 inches annual precipitation) cropping region of eastern Washington continue looking for profitable alternatives to winter wheat (*Triticum aestivum* L.) to limit grassy weed resistance to Group 2 herbicides. Winter canola (*Brassica napus* L.) is an oil seed crop that offers non Group 2 grassy weed herbicide options but has a very limited history in this region as agronomic and economic risks are elevated. The objective of this research is to help producers determine market prices needed to minimize risks, increase profitability, and decrease potential for herbicide resistances. An on-farm test (OFT) was initiated in the fall of 2006 examining two treatments: 1. winter canola, summer fallow, winter wheat; 2. winter wheat, summer fallow, winter wheat. The OFT was a RCBD with 4 replications and was 6.5 acres in size. Total production costs between the two crops were similar. Winter wheat produced greater yield and gross economic return at 43.5 bu and $355/ac compared to canola at 34.5 bu and $293/ac. Subsequent winter wheat yield was 39.3% greater following canola and over the total cropping sequence, no significant difference in gross economic returns were determined between winter wheat and canola averaging $493/ac. In conclusion, yield differences were documented between winter wheat and canola but market price differential between the two crops has a larger influence on the profitability and can vary dramatically from year-to-year. Overall winter canola needs to have a 26.4% price advantage per bushel over wheat to produce significantly greater gross economic returns.

Camelina Planting Date and Planting Method Experiment at Lind

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We are now in the third year of several camelina agronomy trials at Lind. For the planting date and planting method experiment, camelina is sown on several dates from October 15 through March 15. Two planting methods are used, either direct seed with a no-till drill or broadcast and lightly incorporate into the soil with a 5-bar tine harrow. Nitrogen at a rate is 25 lbs/acre is applied in early February. Poast™ herbicide is used in early spring to control downy brome and other grass weeds. Grain yield is determined using a plot combine. We replicate each treatment four times in a randomized complete block design. Each plot is 8 ft x 100 ft. Camelina is sown at a rate of 4 lbs/acre into standing winter wheat stubble.

Precipitation for 2009 crop year (Sept. 1 – Aug. 31) at the Lind Research Station was 8.46 inches compared to the long-term average of 9.50 inches. Camelina produced an average yield of about 500 lbs/acre (Fig. 1). The experiment was shown and discussed with 225 people who attended the Lind Field Day as well as with several individuals and groups who stopped by the Lind Station during the year. The same experiment is being conducted by Stephen Guy in Pullman, Don Wysocki in Pendleton, OR, and Tom Chastain in Corvallis, OR.

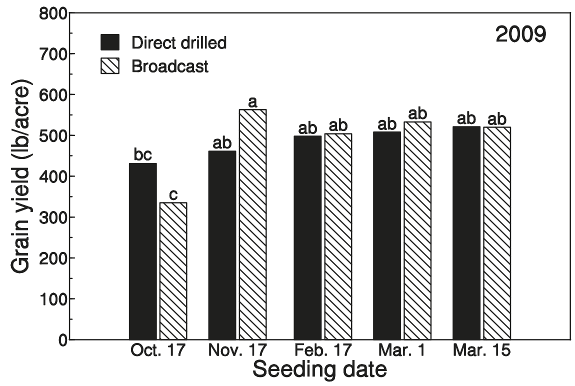

Figure. 1. Grain yield of camelina (cv. Calena) at Lind, WA in 2009 as affected by two planting methods and five planting dates. There were no significant differences in planting method on any individual date, but there were some relatively minor differences in grain yield as affected by planting date. We suspect that cold temperatures in December 2008 may have damaged the October 17 planting,, as this was the only planting that had emerged at that time. Means followed by the same letter are not significantly different at $P < 0.05$.

Site-Specific Trade-offs of Harvesting Wheat Residues for Biofuel Feedstocks

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Crop residues are considered to be an important lignocellulosic feedstock for future biofuel production. Harvesting crop residues, however, could lead to serious soil degradation and loss of productivity. Our objective was to evaluate trade-offs associated with harvesting residues including impacts on soil quality, soil organic C and nutrient removal. We used cropping systems data collected at 369 geo-referenced points on the 92 acre Washington State University Cook Agronomy Farm to aid our evaluation. Site-specific field estimates of lignocellulosic ethanol production from winter wheat residues (50% harvesting efficiency) ranged from 87 to 189 gallons/ac and averaged 145 gallons/ac suggesting that targeted harvesting of crop residues may be an important consideration. Harvesting winter wheat residues reduced remaining residue C inputs to levels below that required to maintain soil organic C under conventional tillage practices. This occurred as a function of both residue removal and the inclusion of a low residue producing spring pea crop in rotation with wheat. Harvesting winter wheat residues under conventional tillage resulted in negative Soil Conditioning Indices (SCI) throughout the field. In contrast, SCI's under no-till were positive despite residue harvesting. The value of nutrients harvested in each ton of wheat straw was $13.48/ton assuming N @ $0.50/lb; P_2O_5 @ $0.60/lb; K_2O @ $0.30/lb and S @ $0.40/lb. Field average amounts of nutrients removed in harvested wheat residue were N: 14 lb/ac; P_2O_5: 6 lb/ac; K_2O: 33 lb/ac; and S: 3 lb/ac valued at $21.70/ac. Across the field, the estimated value of harvested residue in fertilizer replacement dollars ranged from $17.99 to $28.24/ac. We concluded that substantial trade-offs exist in harvesting wheat straw for biofuel, that trade-offs should be evaluated on a site-specific basis, and that support practices such as crop rotation, reduced tillage and site-specific nutrient management need to be considered if residue harvest is to be a sustainable option.