crop rotation have been documented. In the low-precipitation zone on Ron Jirava's farm near Ritzville, we are comparing the 2-year WW-SF rotation to a 4-year WC-SF-WW-SF rotation. In the intermediate precipitation zone on Hal Johnson's farm near Davenport, a 3-year WC-spring wheat (SW)-SF rotation is compared to WW-SW-SF. We will determine the effects of having winter canola in the rotation on soil microbial changes, water infiltration into frozen soils, plant health of the wheat crop following winter canola, winter wheat grain yield, and farm economics compared to checks (i.e., rotations without WC in the rotation). The scientists involved in this study are a research agronomist, soil microbiologist, plant pathologist, and agricultural economist. Three rotational years of data will be obtained from each site.

Camelina Agronomy Research in the Pacific Northwest

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Farmers, agricultural industry personnel, government officials, and the general public learn about camelina at the 2007 Lind Field Day.

Passage of the renewable fuel standard for biodiesel in the State of Washington has heightened the need to significantly increase oilseed acreage in the region. Camelina (*Camelina sativa*) is a broadleaf crop in the mustard family that can be sown at low seeding rate, is competitive with weeds, and has a modest requirement for nitrogen and water. A 3-year experiment was initiated in 2007 at four sites in Washington, Idaho, and Oregon to evaluate camelina varieties, seeding rates, planting dates, planting methods, and nitrogen rates. The goal of the research is to develop agronomic practices to incorporate camelina into PNW crop production systems and assist the fledgling oilseed industry to understand and utilize this crop. We have selected representative areas in the PNW that include all the major cropping systems throughout the region. Sites are: (i) Lind, WA, (ii) Pendleton, OR, (iii) Moscow, ID, and (iv) Corvallis, OR, where average annual precipitation is 9.5, 16, 24, and 40 inches, respectively. These four sites represent all the major cropping zones in the PNW. Specific procedures and experimental designs are consistently used at all sites. Although preliminary studies show potential adaptability of camelina, there is not yet sufficient information to provide general crop production practices or indicate the geographic adaptability of the crop. Limited work in Montana and North Dakota suggests that camelina has potential in marginal production areas with low precipitation and shallow soils. This research project will be shown and discussed at the major university field days in 2008 at Lind, Pendleton, Moscow, and Corvallis.

Camelina Cropping Systems Research at Lind

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A 6-year dryland cropping systems experiment was initiated at the WSU Dryland Research Station October 2007 to evaluate camelina in wheat-based systems. Camelina is a Brassica oilseed crop that has shown good potential in low-precipitation regions in the Northern Great Plains and (with limited testing) in the Pacific Northwest. The cropping systems experiment will test the feasibility of a 3-year winter wheat–camelina–summer fallow rotation versus the standard 2-year winter wheat–summer fallow rotation. Experimental design is a randomized complete

Our research results provide insights into (1) the degree of tillage necessary to control persistent cover crops and weeds, (2) the impact of tillage on availability of soil nutrients following long-term pastures, (3) yield estimations to be expected from these low input systems, and (4) costs and profit associated with livestock infrastructure and production costs when rotating soil building grazed pastures with annual production of grains, such as wheat.

Pastures were stocked at 2.76 AU/ac for 40 days in May and June (AU=5 sheep). Total herd weight gain was 134 lbs/ac for a gross value of US $276/ac. Non-grazed alfalfa pasture productivity (hay) was 1.1 ton/ac for a gross value of US $218/ac. Pasture soil carbon dynamics will be analyzed in 2010. In grain following mechanically terminated alfalfa, N response to degree of disturbance is being analyzed. Organic, unfertilized grain yield was positively correlated to degree of disturbance, ranging from 3.23 to 66.8 bu/ac, with a maximum gross value of $1,068/ac. Yield was negatively correlated with alfalfa re-growth. Profitability of grain following alfalfa was compared to alfalfa left standing and hayed. Biomass over three cuttings totaled 9.7 ton/ac for a gross value of $1,947/ac. Use of livestock to facilitate organic grain production may be a profitable form of low external input, highly productive agriculture.

Pacific Northwest Undercutter Project

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The goal of this $905,000 USDA-NRCS Conservation Innovative Grant is to demonstrate and advance the undercutter method for winter wheat–summer fallow farming in the Inland Pacific Northwest. The project, administered by the Washington Association of Wheat Growers, cost shares 50% of the purchase price of an undercutter up to 34 feet in width and equipped to apply fertilizer at the time of primary spring tillage. Farmers accepted into the project are located in wind erosion problem areas in the 12-inch and under rainfall region that encompasses nine counties of east-central Washington and five counties of north-central Oregon. Participating farmers agree to follow a prescribed minimum-tillage program using the undercutter to retain surface residue and increased surface roughness during the fallow period (Fig. 1).

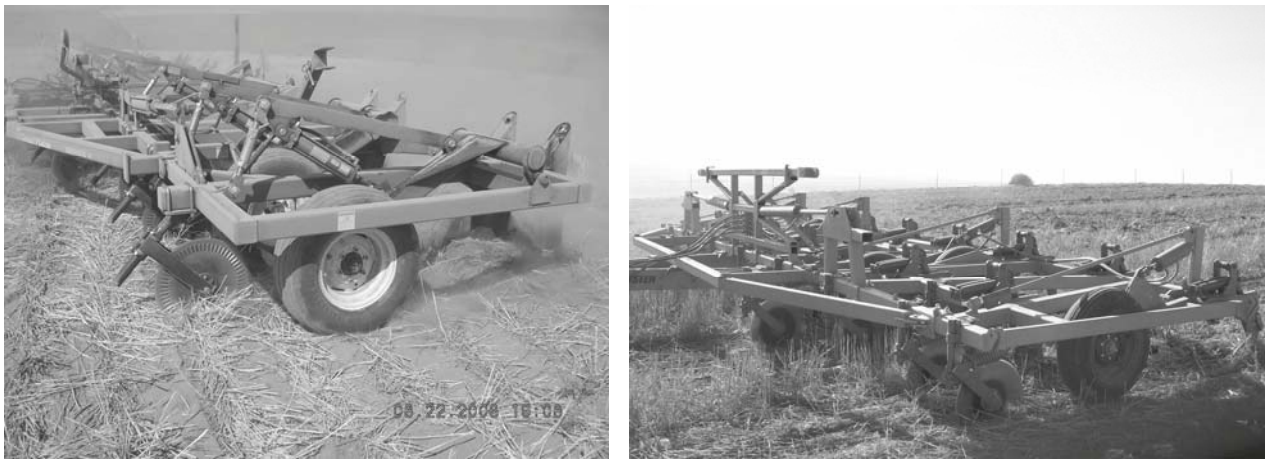

Fig. 1. The Great Plains (left) Duratech Haybuster (right) undercutters shown here slice below the soil surface with minimum surface soil lifting to completely sever capillary pores to halt liquid water movement towards the soil surface as required to retain seed-zone moisture in summer fallow in the low-precipitation region. All undercutters sold to farmers through the PNW Undercutter Project are rigged to deliver either aqua or anhydrous nitrogen during primary spring tillage.

Of the 47 farmers accepted into the project, 30 are from Washington and 17 from Oregon. Location of farmers by county in Washington are: Adams 14, Benton 9, Douglas 2, Franklin 3, Walla Walla 1, and Yakima 1. The Oregon locations by county are: Gilliam 5, Morrow 5, Umatilla 6, and Wasco 1. Specific criteria were established for