High Residue No-Till for Soil Moisture Conservation and Canola Establishment

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Current research at the Ralston Project (11 inch rainfall zone) is evaluating the use of tall cereal varieties for maximum biomass production, and harvest with a stripper header to create tall standing stubble, which is maintained during chemical fallow. When compared to cereal crops harvested with a conventional header, the high-residue fallow resulting from stripper header harvest influenced the microclimate at the soil surface by reducing soil temperatures and wind speeds, which resulted in increased seed-zone moisture retention. Maintenance of adequate seed-zone moisture with high surface residues may enable growers to plant winter canola at a convenient late summer planting date, rather than having to rely on early fall rains and/or cool postplant temperatures. More uniform soil moisture in chemical fallow appears to improve canola stand establishment compared to tilled fallow.

We established a uniform stand of no-till winter canola on 28 July 2013 in stripper header wheat and triticale stubble compared to conventionally planted winter canola into traditional summer fallow. Plants were in the large rosette stage (complete canopy cover, 16’’ row spacing) in the fall. Plants survived cold temperatures in December 2013; however, in February 2014 ambient air temperature reached -7 F, and with no snow cover to protect the plants, the winter canola planted in this trial did not survive. The plots have been replanted with spring barley, and will be harvested with the stripper header. This will provide another year of microclimate monitoring in stripper header stubble, and show if there is a difference in effect between high residue winter crops and lower residue spring crops.

New Long-Term Winter Triticale, Winter Canola, and Winter Pea Cropping Systems Study Initiated Near Ritzville

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A new long-term no-till cropping systems study was initiated in March 2014 at the Ron Jirava farm near Ritzville. The experiment includes four winter crops: winter triticale (WT), winter canola (WC), winter pea (WP), and winter wheat (WW). There are two 4-year crop rotations involving no-till summer fallow (NTF) that will be compared to the “check” treatment of the traditional 2-year WW-tilled summer fallow (TF) system.

Crop rotation treatments are:

- WC-NTF-WT-NTF
- WP-NTF-WT-NTF
- WW-TF

The experimental design is a randomized complete block with four replicates. Individual plot size is 100 x 32 feet. Each phase of all rotation sequences is present each year for a total of 40 individual plots covering at a total of 2.94 acres.

Winter canola will be planted with a Cross-slot drill sometime between late June to mid-July, depending on surface soil moisture conditions in the NTF and predicted air temperatures for the ensuing week (i.e., the cooler the predicted air temperatures, the better). The ongoing WC planting date experiment at this site will help to further define the optimum planting date (see related article on page 51). Fertilizer will be “stream jetted” on the surface in mid-October or later to help reduce excessive WC vegetative growth in the summer.

Winter pea will be planted deep into moisture with a deep-furrow drill into NTF during the first week of September (see related WP article on page 59). Winter pea has a large seed and is capable of emerging from deep planting depths under marginal seed-zone moisture conditions.

Winter triticale will be planted deep into NTF during the first week of September if seed-zone moisture is adequate. If moisture is not adequate, we will "dust in" the WT in mid- October. Winter triticale yields are much higher than those of winter wheat with late planting (see winter triticale article on page 60). Fertilizer for WT will be applied by stream jet in late fall.

The 2-year WW-TF check treatment will be established using the non-soil-inversion undercutter method, where fertilizer is delivered with the primary-tillage undercutter operation in late spring followed one or two rodweedings during the summer to control Russian thistle and other weeds. Winter wheat will be planted with a deep-furrow drill during the first week of September.

Farmers and researchers in the low-precipitation region of east-central Washington have long been interested in testing no-till cropping systems that are economically competitive with WW-SF. Winter triticale, winter canola, and winter pea have all shown excellent yield potential in this dry environment. Thus, with the use of NTF, the two 4-year rotation sequences hold promise as possible stable, profitable, and ecologically-friendly crop rotations for the low-precipitation zone.

Winter Canola Planting Date Effects on Soil Water Use

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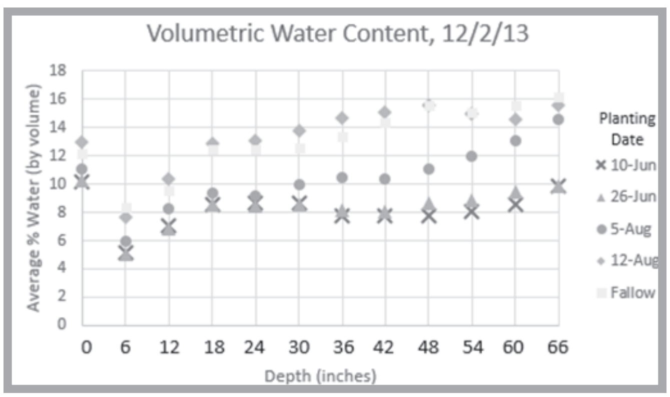
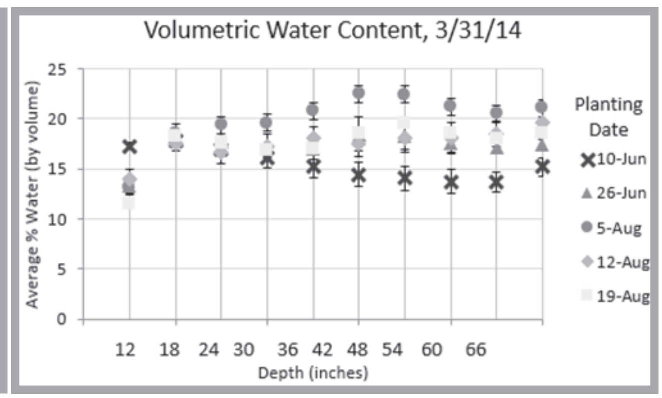
An on-farm winter canola seeding date trial was initiated in June of 2013 near Ritzville. Plots were established on June 10, June 26, August 5, and August 12, 2013, with four replications of each date. Soil available moisture and extraction depths were main focuses of this experiment, monitored down to six feet by neutron probe, gravimetrically-analyzed cores, and continuously-measuring Decagon sensors. There were clear differences in soil water content heading into winter, seen in the graph on the left with measurements taken early December. Soil recharge is also depicted from data in early spring (graph on the right).





However, this season's study has been terminated due to excessive winter-kill. Two sub-zero temperature events, combined with minimal snow cover, likely caused the high mortality. June 10 and June 26 planting dates had a 0% survival rate, while 31% of the August 5 plants survived. The August 12 planting also retained a good and commercially viable spring stand. One potential reason for this differential survival is crown height: the August 12 late planting had no stalks taller than one inch, while the June 10 and 26 plants had stalk heights averaging about four inches. The August 5 planting date was of intermediate height. Shorter crowns benefit more from the thermal storage and radiation of soil, avoid higher wind speeds, and may be more protected by snow.

A second year of this seeding date experiment will begin again this June. Russian thistle and insect ecology components will be examined next season, in addition to the soil moisture and yield data. The ultimate objective of this multi-year experiment is to identify an optimum winter canola planting window in Washington's low rainfall region by: (1) determining canola responses to variable temperature and moisture regimes, and – more specifically – (2) defining water and nitrogen use efficiencies.