Water and Temperature Stresses Impact Canola (*Brassica napus* L.) Fatty Acid, Protein, and Yield over Nitrogen and Sulfur

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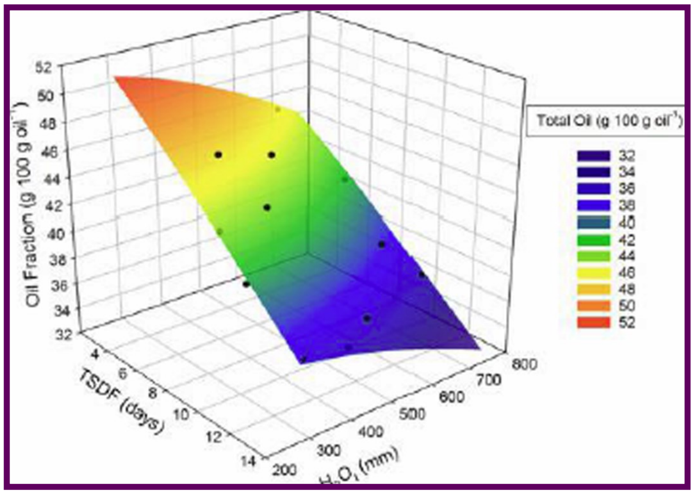

Figure 1. Total oil response to total available water (H2Ot) and atmospheric temperature (TSDF) at (adjusted R2 = 0.57).

Interactive effects of weather and soil nutrient status often control crop productivity and quality. An experiment was conducted to determine effects of nitrogen (N) and sulfur (S) fertilizer rate, soil water, and atmospheric temperature on canola (*Brassica napus* L.) fatty acid (FA), total oil, protein, and grain yield. Nitrogen and sulfur were assessed in a 4-yr study with two locations, five N rates (0, 45, 90, 135, and 180 kg ha−1), and two S rates (0 and 17 kg ha−1). Water and temperature were assessed using variability across 12 site-years of dryland canola production. Effects of N and S were inconsistent. Unsaturated FA, oleic acid, grain oil, protein, and theoretical maximum grain yield were highly related to water and temperature variability across the site-years. A nonlinear model identified water and temperature conditions that enabled production of maximum unsaturated FA content, oleic acid content, total oil (Fig. 1), protein, and theoretical maximum grain yield (Fig. 2).

Water and temperature variability played a larger role than soil nutrient status on canola grain constituents and yield.

For further reading, see on line reprint: Hammac, A.H., T.M. Maaz, R.T. Koenig, I.C. Burke, W.L. Pan. Water, temperature, and nitrogen effects on canola (Brassica napus L.) yield, protein, and oil. Journal of Agriculture and Food Chemistry 65: 10429–10438. https://pubs.acs.org/doi/abs/10.1021/acs.jafc.7b02778

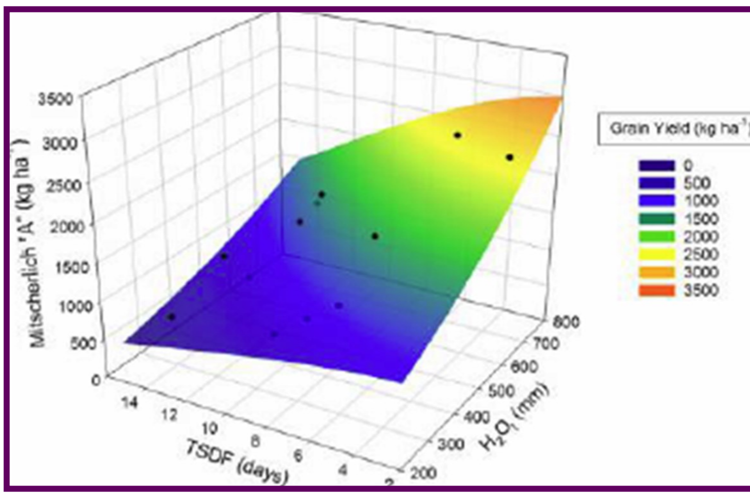

Figure 2. Mitscherlich theoretical maximum grain yield response to total available water (H2Ot) and atmospheric temperature (TSDF) at (adjusted R2 = 0.64)

Rhizosphere Microbial Communities of Canola and Wheat at Six Paired Field Sites

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Plant physical and chemical characteristics are known to alter rhizosphere microbial communities, but the effect of introducing canola into monoculture wheat rotations is not clear. Results from a field study in eastern Washington showed that winter canola (WC) influenced the bulk soil microbial community and differentiated it from the community associated with winter wheat (WW) (see articles on page 40 and page 50). Abundance of soil fungi, including mycorrhizae, was reduced with the introduction of WC.

The objective of this research was to determine the differences and similarities in the rhizosphere microbial communities of WC and WW. Canola and wheat rhizosphere soil was collected from six dryland farms in Adams and Douglas Counties, WA. Each farm was a paired site with WC and WW grown in adjacent fields of the same soil type, landscape orientation, and crop history. Canola, or any non-cereal crop, had never been grown previously at the experimental sites. Microbial biomass and community composition, determined using phospholipid fatty acid analysis (PLFA), revealed differences that were primarily associated with landscape position at the initial fall sampling (Fig. 1A). Data from spring samples, however, showed significant differences in microbial communities between WC and WW rhizosphere soils (Fig. 1B). Data suggest that initial (fall) microbial community composition were an artifact of previous histories of monocrop wheat production and varied with expected differences in landscape position. As the crops developed, microbial communities became more dissimilar and were discriminated by crop species. Our results show that WC can have significant effects on rhizosphere microbial biomass and community structure in wheat-based cropping systems (see related article on page 36). Changes in microbial abundance and community structure can affect microbially-mediated soil processes, and potentially the performance of subsequent crops.

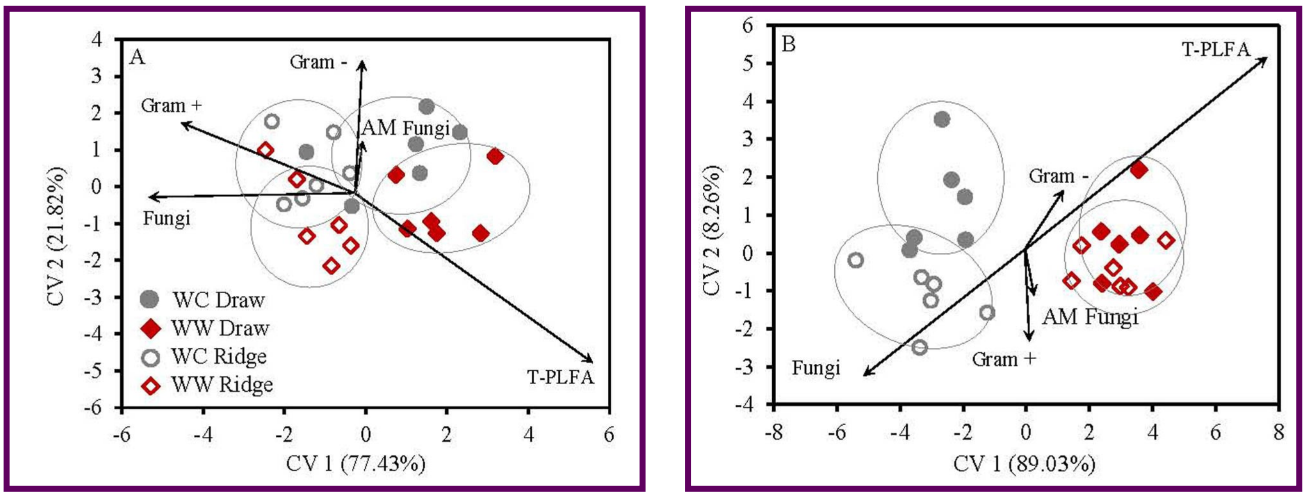

Figure 1. Canonical variates for lipid biomarker groups in winter canola (WC) and winter wheat (WW) at two landscape positions. Vectors represent standardized canonical coefficients for each biomarker group and total PLFA (T-PLFA), from fall 2015 (A), and spring 2016 (B). Vector magnitude and direction indicate the contribution of each biomarker group to each canonical variate. Each sample point is represented and cluster by treatment. Each cluster is accompanied by a mean ellipse at the 95% confidence interval (Treatments groups that differ significantly have confidence ellipses that do not intersect).

Pacific Northwest Canola Association Becomes Reality

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At this time last year there was talk of having a Pacific Northwest Canola Association (PNWCA) up and going in short order. So what has happened during the past year? A steering committee for the association comprised of PNW canola producers, industry members, and university faculty met in June 2017, and a Certificate of Incorporation was received in July, making the PNWCA official. Ten Producer Members from Idaho, Montana, Oregon, and Washington were elected to the board of directors in November. The Producer Members met in January of this year to elect officers and discuss next steps, including hiring an executive director. Another meeting was held in March, and the board approved hiring Karen Sowers as interim executive director. A membership campaign kicked off in April to gain grower, industry, and agency membership.