

Yield Decline of Wheat After Canola: In Search of a Microbial Cause

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In a series of replicated field trials over six years in the Reardan area, spring wheat grown after winter canola had an average 17% yield decrease compared to when grown after winter wheat (Schillinger and Paulitz, 2018, *Field Crops Research* 223: 26-32). We could not explain this with diseases, nutrients, weeds, or water use. We postulated that canola may either favor a microbial community deleterious to wheat or may decrease beneficial microbes that are important for wheat health (Hansen et al., 2018, *Applied Soil Ecology* 130:185-193). We attempted to answer this question by sampling the DNA from the rhizospheres of wheat and canola from fields in Douglas and Adams County (see 2018 Field Day Abstracts page 50) but did not come up with a “smoking gun”. Many of the fungal and bacterial communities on the roots of wheat and canola were in common, but we could detect some differences. We now have an opportunity to address this question again in a long-term cropping systems project near Ritzville (see previous abstract) where we are experiencing this same yield reduction of wheat after canola.

In the spring of 2019 (and planned again for 2020), we sampled bulk and rhizosphere soils of actively-growing spring wheat following canola, winter wheat and winter triticale. DNA will be extracted from the samples and sequenced with Illumina MiSeq. We will analyze the bacterial and fungal communities to identify differences among the three rotations. This will complement the phospholipid fatty acid analysis which is underway concurrently by Jeremy Hansen and colleagues. We hope to understand how canola may impact soil health, both positively and negatively. By understanding the cause of this phenomenon, we can understand the conditions under which it is a problem and possibly how it can be mitigated.



The term “rhizosphere soil” refers to soil that adheres to the roots of plants as seen here with winter canola. Photo by Jeremy Hansen, USDA-ARS.