Dr. Hansen is currently leading a study to determine if injecting mycorrhizal inoculum beneath newly emerged SW seedlings at our Ritzville site will enhance mycorrhizae populations and, if so, see how this affects SW grain yield. Concurrently, Dr. Tim Paulitz is conducting DNA sequencing of SW roots and soil adhering to the roots (i.e., rhizosphere soil) to measure the presence of numerous taxa of fungi and bacteria at the Ritzville site. We are excited about this research!

Finally, we need to state that there is no evidence that wheat yield is negatively affected when there is a year-long fallow period after a canola crop prior to planting wheat. On the contrary, there are numerous reports by scientists and farmers from around the world that show wheat yield is often enhanced when the previous crop is canola. Our collective research in the Pacific Northwest indicates that soil microbial biomass decline with canola is temporary and that soil microbial populations return to their previous levels in about one year.

Acronyms used: C, canola (either winter or spring canola); F, 13-month-long fallow; SW, spring wheat; WP, winter pea; WT, winter triticale; WW, winter wheat.

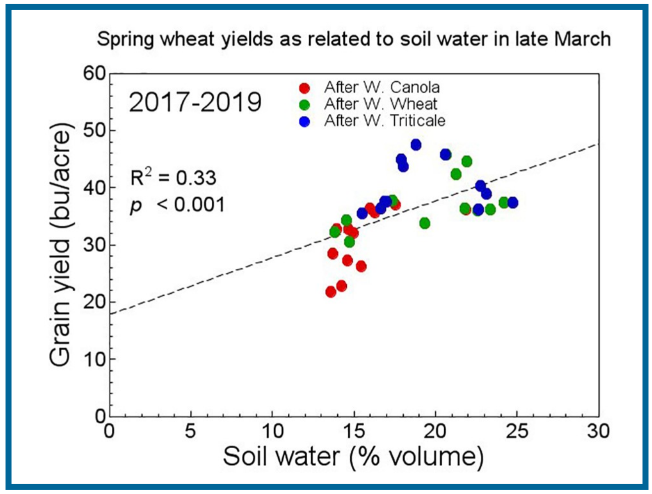

Figure 2. Relationship between soil water content in late March at time of sowing of spring wheat and the grain yield of spring wheat. The correlation coefficient (R^2) of 0.33 means that 33% of the difference in spring wheat grain yield following canola, winter triticale, and winter wheat is due to the amount of soil water in 6-foot soil profile in late March. The remaining 67% of spring wheat yield differences following canola, winter triticale, and winter wheat is due to other factors.

A Study to Support Phosphorus Fertility Recommendations for Winter and Spring Canola

WOCS WASHINGTON OILSEED CROPPING SYSTEMS *Part of the Washington State Biofuels Initiative*

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Phosphorus is an essential nutrient for crops. It is a structural element in many molecules such as ADP and ATP, nucleotides, nucleic acids, and co-enzymes. Sufficient amount of phosphorus supply during canola growing season ensures functionality of these molecules, strengthens seed formation, and prevents lodging as a result of better development of stem tissues. However, there are limited studies on phosphorus fertility strategies for canola (*Brassica napus*). In order to support phosphorus fertilizer recommendations for the Northwest, we initiated a small plot research on Washington State University Wilke Research and Extension Farm in the fall of 2019. We will use the small plot experiment to study yield and quality responses of winter canola to phosphorus application rate and application method. We established a field-scale research in Almira, WA to study spatial variability of such responses. In spring 2020, we were able to conduct one small plot research on Wilke Research and Extension Farm for a similar study for spring canola. In additional to phosphorus, the treatment included zinc which allows us to study the interaction effect of phosphorus and zinc on spring canola's yield and quality. We will repeat the study and conduct more research trials in 2021 and 2022. The results will be used to (1) determine agronomic and economic optimum rate for P for winter and spring canola yield and quality; (2) determine agronomic critical level for soil test phosphorus, above which no phosphorus should be applied; (3) determine the best placement strategy for P uptake, yield, and quality of winter and spring canola; (4) evaluate how soil and climate conditions affect crop yield response to P

Winter canola trial to study phosphorus fertility strategy (photo was taken on May 13, 2020).

fertilization, and within- and across-fields spatial variability in yield response on P. Farmers who would like to participate this research, please contact Dr. Haiying Tao at haiying.tao@wsu.edu. The more farmers participate in the research, the better recommendations will be developed for variety, soil, and weather.

Companion Crops as a Method for Improving Winter Canola Stand Establishment and Winter Survival

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Companion cropping is the practice of planting crops in proximity to one another with the objective of the plant species benefiting each other. Companion crops may be may exist of a single cash crop and one or more 'companion' crops. In general, the companion crop is grown with a specific benefit to the cash crop in mind. Modern mechanized agriculture has not used companion cropping to a large extent. However, certain companion cropping system have the potential to benefit mechanized agriculture. One system that is gaining interest is using spring oats as a nurse crop for winter canola in order to improve stand establishment and winter survival. In the fall of 2019 near Davenport, WA a trial was established comparing winter canola grown with a companion crop of oats to winter canola planted in a conventional monoculture. Fall (9/19/19) and spring (4/2/20) plant counts were taken to assess the effect of the companion oat crop on winter canola stand establishment and winter survival. The fall plant counts revealed no significant difference in the number of canola plants which successfully established. However, the companion cropping system showed a more uniform distribution (Fig. 1). The monoculture winter canola did show a significantly higher percentage of winter survival than the companion cropped winter canola (Fig. 2). The average winter survival in the monoculture canola was 51% while the average winter canola in the companion cropped canola was 34%. While the monoculture canola appeared to have a clear advantage over the companion cropped treatment in this system, we do not consider this brief study to have conclusively answered the question of whether or not companion cropping may have a role in the future of canola production. Anecdotal evidence has shown this practice to be effective in other regions, and we plan to pursue the roll of companion cropping in canola further. Future research will examine the effects planting date, and the density of the companion crop on stand establishment and winter survival.

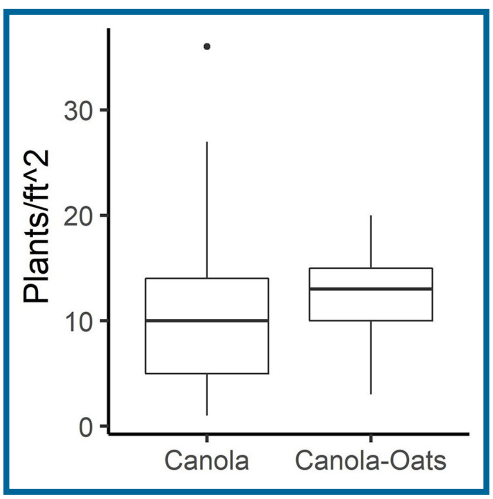

Figure 1. Box plot showing the variability and median stand counts in canola in a monocrop and canola in a production crop production method. The monocrop canola shows a wider range of values than the companion crop method and a slightly lower average plant count.

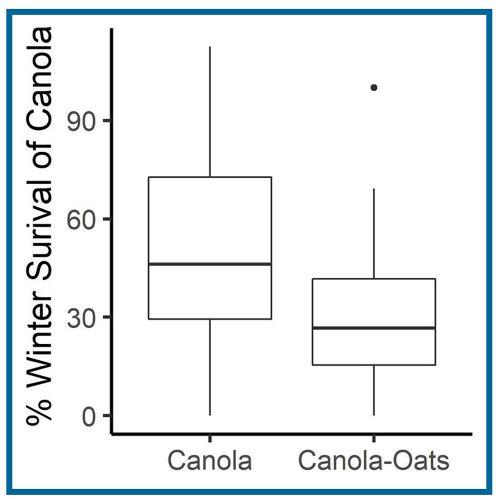

Figure 2. Box plot demonstrating the differences in winter survival between the monocrop winter canola and the companion cropped winter canola. While there was substantial variation in both groups, the monocrop winter canola had a significantly higher winter survival at 51% compared to the companion cropped winter canola at 34%.