

## WASHINGTON OILSEEDS COMMISSION PROGRESS REPORT FOR 2017 PROJECTS

### Project No.:

**Title:** Value-added rotational benefits of canola: Microbiology at the root

**Personnel:** Catherine Reardon (PI), John Williams (Co-PI)

**Reporting Period:** 2017

### Accomplishments:

*The objective of this research is to determine whether specific microbiological benefits to wheat occur in cropping systems that include canola and mustard compared to wheat-fallow.*

- The background and preliminary data for this proposal were presented at the Pendleton and Moro Field days to educate producers and the public on the plant-microbe interactions, decomposition and microbial nutrient cycling as a source of plant available phosphorous, carbon, nitrogen and sulfur.
- As part of our on-going research, we identified that canola and *B. carinata* oilseeds do not improve soil aggregation compared winter and spring cereals (wheat, barley, triticale) in the low precipitation zone (11.8 inch mean annual precipitation) after a single crop year.

### Results:

- An experiment to determine whether oilseed cropping provides a benefit wheat was completed in a growth chamber study to control environmental conditions of light, temperature and humidity. The potting experiment used soil collected from a larger-scale cropping system study to take advantage of field-relevant, plant-driven changes to the soil microbiology resulting from oilseed and wheat cropping. Wheat was planted in pots with soil collected after harvest of winter wheat, *B. carinata* (Ethiopian mustard), *B. napus* (canola) or the fallow period following the three crops. In general, the aboveground wheat biomass after 5 weeks growth was significantly greater for plants grown in soil from oilseed plots rather than wheat plots, regardless of whether the soils were collected after crop harvest or the fallow period following harvest. The field soils varied in the amount of inorganic nitrogen; however, the growth benefit to wheat was not attributable to differences in nitrogen for all comparisons. Currently, we are repeating the growth chamber study to validate the results and will include analyses of the nutrient cycling capacity of the soils, the soil nutrient contents (nitrogen, carbon, phosphorous, sulfur) in addition to identification and contrast of the fungal and bacterial communities of the wheat root-associated soil. The community sequencing will be completed in December. The community information will reveal if and which microbial populations or mechanisms (i.e. disease suppression, enhanced nutrient cycling) in the oilseed soils benefit wheat.
- Local testimonies indicate improved soil structure following canola; however, in the tested environment, we were unable to detect *significant* or *reproducible* differences in the amount of water stable aggregates. Enhanced soil aggregation can improve water percolation, water holding capacity, and reduce energy requirements for tillage and reduce wind/water erosion.

**Publications:** Williams, J.D., Reardon, C.L., Wuest, S.B., and D.S. Long. Soil wet aggregate stability of different crops in the dryland Pacific Northwest. **Submitted** to Soil Science Society of America Journal. August 2017.

## WASHINGTON OILSEEDS COMMISSION

### PROGRESS REPORT FOR 2017 PROJECTS

Instructions:

1. Record information for active and pending projects.
2. All current research to which principal investigator(s) and other senior personnel have committed a portion of their time must be listed whether or not salary for the person(s) involved is included in the budgets of the various projects.
3. Provide analogous information for all proposed research which is being considered by, or which will be submitted in the near future to, other possible sponsors.

Name (List PI#1 first)	Supporting Agency and Project #	Total \$ Amount	Effective and Expiration Dates	% of Time Committed	Title of Project
<b>Current:</b>					
Long, D.S., Reardon, C.L., Williams, J.D	USDA,ARS (in house), Project Number:  2074-21610-002-00-D	Salary support PI, technicians; operations, research	10/2013-10/2018	30%	Cultural practices and cropping systems for economically viable and environmentally sound oilseed production in dryland of Columbia Plateau
Reardon, C.L.	USDA-ARS Headquarters-funded Postdoctoral Research Associate Program	140,000  Post doc salary (Ann Klein)	10/2016-10/2018	40%	Fumigation potential of Brassicas on wheat rhizosphere communities
Reardon, C.L.	Washington Oilseed Commission	\$5000	June 1, 2017- May31, 2018	10%	Value-added rotational benefits of canola: Microbiology at the root
<b>Pending</b>					
Strauss, S.L. Inglett, P. Reardon, C.L.	NIFA-AFRI, Bioenergy, Natural Resources, and Environment, Sustainable Agroecosystems: Functions, Processes and Management	\$442,102	10/2017-09/2021	10%	Impact and utilization of biological soil crusts in agroecosystems