resulted in planted winter canola acres again being down from the recent high of 51,000 acres in 2014 to 37,000 for 2016 (USDA-NASS, Mar. 31, 2016). Despite the reduced prospective acres, the WOCS team is forging ahead with outreach to continue educating PNW growers and crop consultants about the latest research to improve production. Several fact sheets published to kick off a WOCS-branded Extension publication series.

With a grant from Viterra, the WOCS Extension team has planned on-farm spring canola variety trials that are now being planted at three locations in eastern Washington: Davenport (WSU Wilke Farm), St. John (Eriksen farm), and Fairfield (Emtman Farms). There are six varieties, including Roundup Ready, Liberty Link, Clearfield (including a high-oleic), non-GMO hybrid, and a *Brassica rapa*. We are using grower equipment for most field operations and will be hosting field days at the plots. Stand establishment, soil water and nitrogen use efficiency, weed control, and yield will be measured. Keep an eye on our website calendar for upcoming events!

Do our Subsoils Provide Wheat and Canola Roots with Ample Nutrients During Grain Filling?

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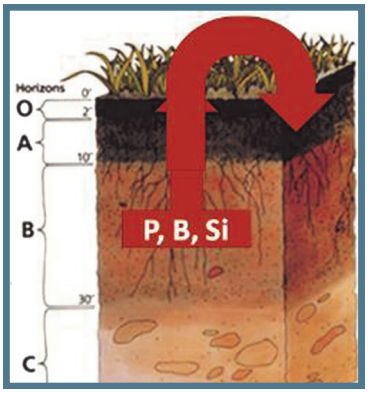
The inland Pacific Northwest (PNW) is blessed with deep soils capable of storing water and nutrients that crops can access throughout their life cycle. But 125 years of producing annual crops has extracted subsoil nutrients, and we now need to ask if there is a problem with subsoil deficiencies in soil-immobile nutrients. Are these deficiencies exacerbated by alkaline subsoil conditions? Typically, routine soil tests are only conducted on surface soil samples. This approach was developed for Midwestern and southern U.S., where summer rains replenish topsoil moisture, thereby sustaining shallow root uptake of topsoil nutrients. The PNW adopted the same approach, but does this make sense for us? Currently we only test for subsoil mobile nutrient forms (nitrate and sulfate), replenished with vertical infiltration of water that carry these anions during soil recharge. We decided to run soil tests on all root zone depths to begin assessment of subsoil fertility status. Here's what we found:



- Most annual dryland crops remove subsoil nutrients, and those that are not removed by grain harvest are returned to the soil surface.
- Many nutrients are not soluble enough to be carried back into the subsoil in high concentrations, and mainly remain in the surface soils that receive these nutrients. **Soil immobile nutrients include P, Zn, Mn, Fe, B.**
- Over years of crop extraction, these soil-immobile nutrients have reached very low levels, and high subsoil pHs render some of them rarer.
- But wheat and canola **root systems rely on subsoil water and nutrients** mid to late season as surface soils dry in our semi-arid climate.
- Topsoils dry out in our region and shallow roots become inactive. **Do our subsoils provide wheat and canola roots with ample nutrients during grain filling?**
- With our unique patterns of winter precipitation and dry summers, **improving subsoil fertility** may be crucial to achieving full soil productivity potential.
- What are ways to improve subsoil fertility? It will be tough. For example, deep phosphorus movement is only achieved when P fixation sites are saturated during P over-fertilization. However, organically bound nutrient forms are more mobile. Green cover crops, animal manures, biosolids, and perennial forages may all provide more organic compounds, such as organic acids, that solubilize soil-immobile nutrients.