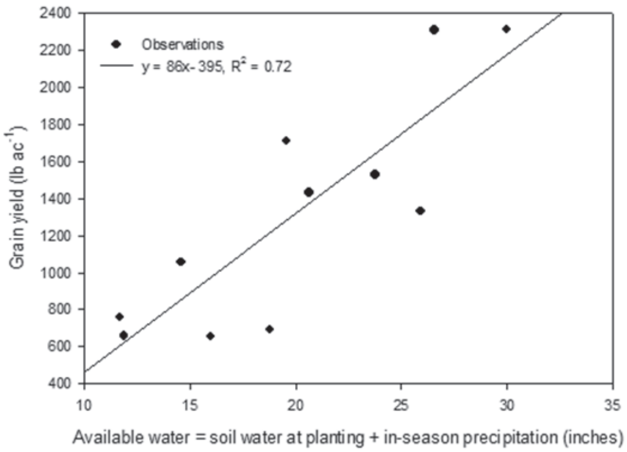

Figure 1. Available water vs spring canola yield over 11 site years.

roots are sensitive to ammonium based fertility, and we have excellent examples of root dieback from ammonia toxicity from seed or deep banded Nitrogen (N). We also have observed 30 to 130 lbs N/A vegetative N uptake during this first phase if canola is seeded late summer and plants have ample moisture and heat units to establish, using 6 inches of total moisture. In phase II, winter survivability will be affected by general plant vigor supported with balanced soil fertility, variety traits and residue management. In phase III, yield potential of a good stand of winter canola or spring canola is correlated with moisture availability (Fig. 1) and economic N supply requirements correlate with yield (Table 1). Residual soil N and estimates of N mineralization contribute to fertilizer N as a summation of total N supply. Canola is an aggressive crop that scavenges soil N, but requires a high N supply per unit of yield.

Table 1. Total N supply requirements for spring canola yield potentials.

Yield Potential (lb Gw/A)	600	1200	1800	2400	3000
Total N Supply (lb Ns/A)	110	140	175	205	235
UNR (lb Ns/100 lb Gw)	19	12	10	9	8
NUE (Gw/Ns)	Low--à High				

Be alert to potentially high soil N supply when following fallow with canola compared to lower N supply following wheat. We observed an average of 183 lb soil N/A following fallow compared to 69 lb soil N/A following wheat. When soil N supply is high and yield potential is low due to low available water, little fertilizer N will be required (Fig. 2). But when yield potential is high, total N supply requirements will also be high, and fertilizer N requirements will also be higher.

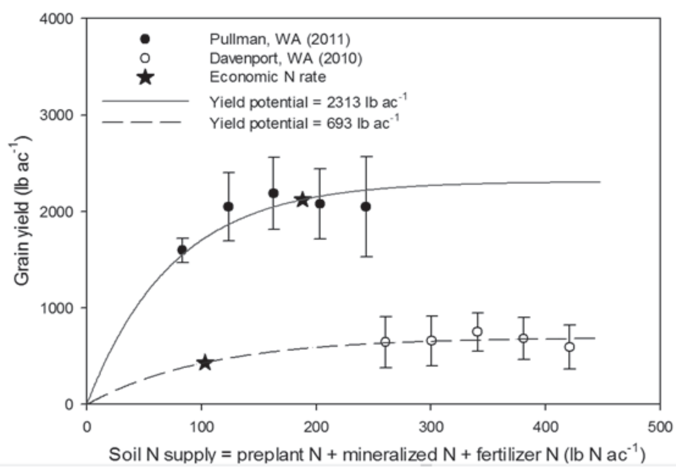

Figure 2. Examples of low yield potential, high N supply at Davenport in 2011 vs. lower N supply, high yield potential at Pullman in 2011.

Subsoil Quality: Chemical and Physical Factors

TAYLOR BEARD AND WILLIAM L. PAN
DEPT. OF CROP AND SOIL SCIENCES, WSU

Subsoil quality is an important factor in cropping systems due to the effects on root system growth and development, nutrient and water availability, and therefore crop yield and quality. When compaction occurs in the subsoil it can cause roots to grow laterally instead of through the soil profile (Fig. 1). The surveying of multiple sites throughout Washington has led to the conclusion that there are two soil pans within a typical profile (Fig. 2). The first pan can be found anywhere from 2-8" below the surface. This pan has been termed the rodweeding layer and is the result of long term tillage. The second pan can be found anywhere from 9-15" below the surface. This pan has been termed the glacial pan and was formed during the Missoula floods. Soil pH affects the availability of Silicon (Si) within the soil. More acidic pH allows the Si to become available in the soil solution while higher pH levels cause Si to be adsorbed to soil particles. High amounts of Si have been linked to soil pan formation. Silicon amounts can be influenced by many factors including crop type. Grass crops such as wheat can accumulate up to 10 times as much Si as broadleaf crops. Figure 3 shows penetrometer data collected from two sites and the effects of these relationships.

Future research will continue to look at subsoil quality and possible management tools to decrease soil compaction.

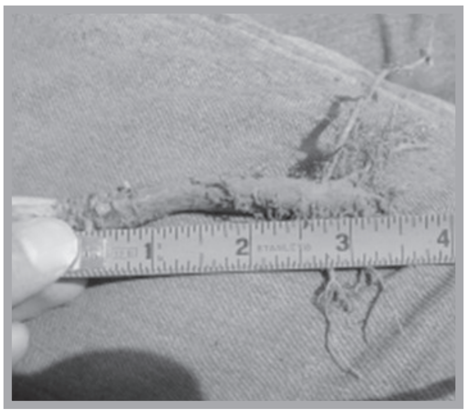

Figure 1. J-hooked canola root. J-hooking begins approximately 2.5" below the surface.

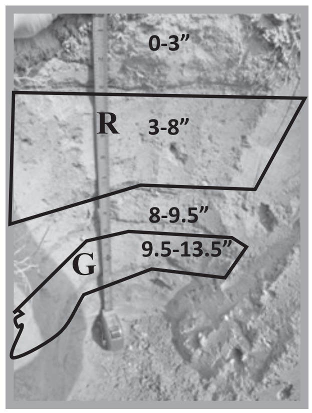

Figure 2. Soil pit displaying the impacts of management and soil formation processes. Total depth of pit was approx. 17". R= rodweeding layer, G=glacier layer.

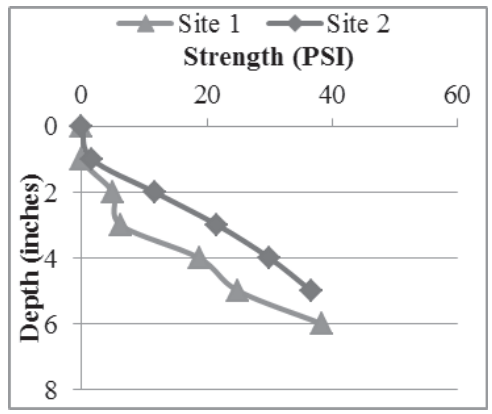

Figure 3. Penetrometer data for two sites.

Winter Canola Water Use in Low Rainfall Areas of Eastern Washington

MEGAN REESE[1], BILL PAN[1], FRANK YOUNG[2], AND WILLIAM SCHILLINGER[1]
[1]DEPT. OF CROP AND SOIL SCIENCES, WSU; [2]USDA-ARS

An on-farm winter canola seeding date trial was initiated in the summer of 2013 in Ritzville. Clear differences in fall water use due to planting date were observed. Unfortunately, this study was terminated due to excessive winter-kill. More fall water use and increased crown height correlated to higher winter mortality (Fig. 1).

For the 2014 season, winter canola water use patterns were monitored in variety trial plots seeded around August 20 in Okanogan, Pomeroy, and Asotin. At all sites, water use was highly correlated to biomass production, Nitrogen (N) uptake, and growing degree days in a linear fashion. In terms of an extraction pattern, winter canola at Pomeroy did not utilize water stored at 4 feet until about 2 months after planting, first using water in the top 3 feet of soil. By early November, winter canola was extracting water down to 5 feet, while fall precipitation began to recharge the top foot. Fall growth and water extraction then ceased, allowing winter precipitation to fill the entire profile. This pattern was also observed in the 2013 Ritzville study. Okanogan, however, had very little extraction and it was confined to the top 3 feet of the soil profile. Okanogan canola used 3.26 inches of available water over the fall growing season. Pomeroy had a much higher initial water content than Okanogan, along with more soil nitrogen, which contributed to increased biomass accumulation and therefore more water use. At the Asotin site, soil depth was highly variable, and this factor largely