Winter Canola Water and Nitrogen Use in Low Rainfall Areas of Eastern Washington

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Fertility management of winter canola is more complex than spring canola due to its additional growth stages and potential markets of feed, food and fuel. In addition to the complexities of nutrition management, water use is of paramount concern to growers in the water-limited environment of the Pacific Northwest. Analyzing winter canola water and nitrogen (N) use can be approached throughout three growing seasons: vegetative growth (from planting to winter dieback), winter survival, and harvest season (spring regrowth to seed harvest). In the 2014 season, winter canola water and N use was monitored in variety trial plots seeded around August 20 in Okanogan and Pomeroy.

Fall 2014 water use in Okanogan and Pomeroy varied from 2-7 in., 15-20% of total water use. Canola at Pomeroy extracted water to at least 5 ft in the fall and used nearly all available water by harvest. In contrast, canola water use at Okanogan was relegated to the top 3 ft during fall, but moisture deeper in the soil profile was accessed during spring regrowth. Total water use was 12 in. at Okanogan and 22 in. at Pomeroy. Available water remained in the soil profile after harvest in Okanogan (Figure 1), possibly due to hardpan layers or subsoil nutrient restrictions. Canola grain yield was 2185 lb/acre at Pomeroy, which had greater soil water and N supplies than at Okanogan, which yielded 795 lb/acre. Water use efficiencies were 65 and 105 lb/ac yield per inch water used for Okanogan and Pomeroy respectively, similar to spring canola in the area. Total season unit N requirements were higher than current regional extension bulletin literature, at 26 lb N per 100 lb yield in Okanogan and 17 lb N per 100 lb yield in Pomeroy. N inefficiencies appeared to occur in the fall and winter seasons to a greater degree than the harvest season. Volatilization, immobilization, and ammonium fixation are potential N loss pathways.

Figure 2. Soil water profiles at Okanogan (left) and Pomeroy (right) in 2014-15 for selected sampling dates, compared to dry soil at permanent wilting point (dashed).