

Managing Nitrogen for Winter Canola

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Currently, the yield-goal method is used to estimate nitrogen (N) rates for canola. In another words, N rate is determined based on unit N requirements (UNR), which is N requirement for a unit yield. A 12 site-year research study conducted across rainfall zones in WA found that approximately 7 to 17 lbs N per 100 lb seed yield is required for spring canola (UNR=7 to 17). In general, the higher the yield potential, the lower the UNR. When spring canola is grown in higher yield potential areas, it develops more vigorous root systems that allow greater access to soil nitrogen and water. Since winter canola yield potential vary substantially across rainfall zones, it is important that we provide the right UNR for farmers for winter canola.

We conducted a N response study on 7 site-years across rainfall zones of WA and OR in 2016-2018. The treatments included N rates from 0 to 200 lbs/acre and N application timing including spring, fall, and split (50% in spring and 50% in fall). A uniform rate of ammonium sulfate was applied for all treatments. We found that approximately 5 to 7 lb N per 100 lb seed yield is sufficient for winter canola across all rainfall zones (UNR=5 to 7). Notably, however, when soil test N is higher than 100 ppm in the 6-foot depth, yield response to additional N fertilizer application is unlikely in winter canola, and this agrees with the study for spring canola. Therefore, farmers should determine N rate based on yield goal, UNR, and soil test.

Timing of N application affects N use efficiency, N availability to winter canola, and yield (Fig. 1). Spring application is a better practice than fall application in areas with high leaching potential, such as fields located in intermediate and high rainfall zones and sandy soils. In the high rainfall zone, if soil test N is higher than 100 ppm in fall, no fertilizer N application is needed; if soil test N is low, 30 lbs/acre N as starter is recommended and apply the remaining N in spring. Fall or splitting N applications between fall and spring in the low rainfall zone are good practices. Split application results in better yield in irrigated systems.

Canola seed quality is significantly affected by N management. Higher N availability leads to higher seed protein concentration. Typically, the higher the seed protein concentration, the lower the seed oil concentration (Fig. 2). Timing of N application also affects seed oil concentration, mainly as a result of the timing effect on N availability. For example, in the 7 site-year research, we found that winter canola seed oil concentration was lowest with spring N application in a field located in the high rainfall zone. For that same field, the next lowest oil concentration was the split applications between fall and spring, followed by fall application.

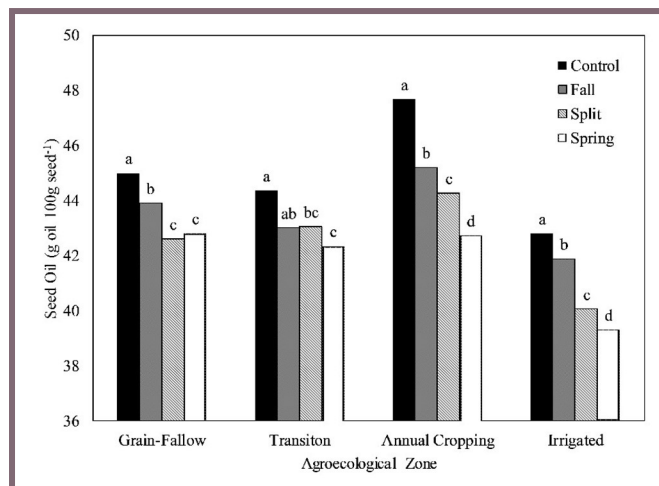


Figure 1. The relationship between average seed oil concentration and timing of N application for the different rainfall zones. Seed oil concentration marked by different letters above the bars are significantly different within each rainfall zone.

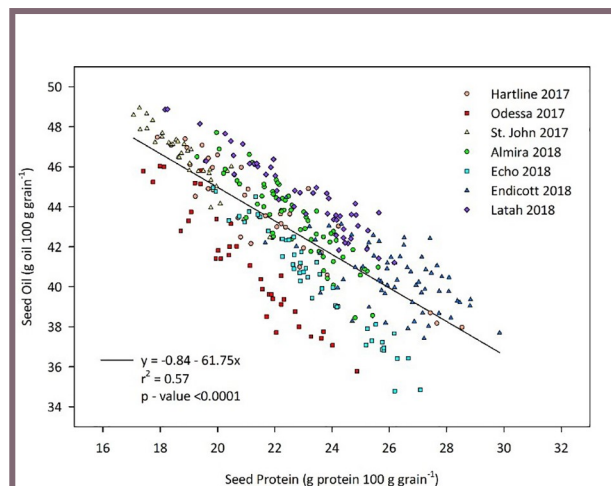


Figure 2. The inverse relationship between winter canola seed oil and protein concentration. Data points represent all treatment combinations from seven sites in the 2016–2017 and 2017–2018 crop years.