

AVISON, BRYAN R.* and PETER J. REGITNIG, Lantic Inc., 5405 – 64th Street, Taber, Alberta, T1G 2C4. **Management of unharvested sugar beet in Alberta.**

ABSTRACT

During the 2009 sugar beet harvest, extremely low temperatures persisted from the 8th to the 14th of October with temperatures dropping as low as -13.9°C (7.0°F). Day time highs did not rise above freezing for 5 days during this period resulting in extensive root injury. Long term beet storage was not an option, since damaged root tissue did not exhibit healing from frost injury. Beets were harvested on a controlled basis and processed within a few days of delivery. The end result of this frost event was that significant sugar beet acreage remained unharvested in Southern Alberta in 2009. Seed bed management of these unharvested sugar beet fields was a concern for many growers.

A strip trial with 3 different tillage treatments replicated 4 times was initiated at the Lethbridge Irrigation Development Centre on November 26, 2009 to evaluate seed bed management options for unharvested sugar beets. Sugar beet leaves were not defoliated prior to any of the tillage treatments in this trial and the canopy was also left intact where tillage was not performed. A 3pt hitch mold board plough, set to a working depth of 10 inches (25 cm), was used for the *Fall Plough* treatment. A visual assessment concluded that 95% of sugar beet roots were incorporated in the soil from the fall plough operation. The *Fall Plough* treatment was then harrow-packed to consolidate the loose soil after ploughing. A tandem disk was used for the *Fall/Spring Disk* treatment, with one pass in the fall and spring. Fall sugar beet root incorporation was estimated at 25% with the tandem disk. Soil samples taken on November 26, 2009 revealed nitrate nitrogen levels of 14 lbs ac⁻¹ at the 0-6" depth, 22 lbs ac⁻¹ at the 6-24" depth and 14 lbs ac⁻¹ at the 24-48" depth. Soil samples from 0-6 inch depth produced NaHCO₃ P levels of 10 lbs ac⁻¹. At the 6" depth, pH=7.4 while OM=2.9%.

On May 26, 2010 the strip trial was planted to CWRS wheat, at a seeding rate of 120lbs ac⁻¹, using a Conserva-Pak[®] Air seeder with a hoe type opener set on 9" shank spacing. Planting direction was parallel to the sugar beet rows and nitrogen and phosphorus were applied during the planting operation at a rate of 120 lbs ac⁻¹ and 40 lbs ac⁻¹, respectively. Achieve[®] (tralkoxydim) and Thumper[®] (bromoxynil + 2,4-D) were applied on July 9th, 2010 to control grassy and broadleaf weeds. Tilt[®] 250E (propiconazole) fungicide was applied at the emerging flag leaf stage to control stripe rust.

Nitrogen mineralization and conversion to NO₃⁻ N was highest in the *Fall/Spring Disk* treatment as soil samples taken on July 14, 2010 revealed 135 lbs ac⁻¹ NO₃⁻ N at the 0-12" depth and 89 lbs ac⁻¹ at the 12-24" depth. *Fall Plough* treatment NO₃⁻ N levels were 84 lbs ac⁻¹ in each of the 0-12" and 12-24" depths. NO₃⁻ N levels in the *Zero Tillage* treatment were 42 lbs ac⁻¹ at the 0-12" depth and 84 lbs ac⁻¹ at the 12-24" depth.

On August 25, 2010, in preparation for harvesting individual treatments, a brush (flail) mower mounted on a Bob Cat[™] created a 60 inch (1.5m) pathway between treatment strips. Wheat harvest, using a WinterSteiger Plot Combine with a 1.5m wide straight cut header, was completed on October 15, 2010. The combine traveled perpendicular to the direction of the tillage treatment strips yielding 4 samples for each individual strip. Sampling for this strip trial took place in a well drained area of the test field; however, it is noted that very wet conditions persisted until later in the growing season in 2010. Wheat samples collected from each plot were

weighed, moisture tested and stored for protein analysis. Immediately following the harvest operation, plot area measurements were taken for accurate area calculation.

Data from four samples was averaged to provide a single yield and protein value for each tillage strip. Tillage strips were analyzed using a randomized complete block design with 3 treatments and 4 replications. Average irrigated wheat yield adjusted to 13.5% moisture was 94.4 bushels/acre for *fall ploughed* strips, 99.8 bushels/acre for *fall/spring disked* strips and 98.1 bushels/acre for strips with *zero tillage* and direct seeding. Wheat protein was 11.3% for *fall plough*, 10.9% for *fall/spring disk* and 11.3% for the *zero tillage* treatment. None of the wheat yield or protein values were significantly different between treatments. Soil nitrate levels in different treatments in this experiment did not appear to affect wheat yield or protein content; however, results in 2010 may have been impacted by very wet soil conditions in southern Alberta that were not typical of more average growing seasons. In this strip trial, the absence of tillage when sugar beets were left unharvested did not result in any detrimental effects to wheat yield or protein content the following year.