

## Utilizing Energy Beets for Saline Soil Remediation in North Dakota

Mike Ostlie, Jasper Teboh, and Justin Berg

Over the last couple years, research has been conducted at the Carrington Research Extension Center to determine the value and practicality of planting energy beets into saline regions. The results from our saline demonstration site indicate that the energy beets can still be productive at soil salinity levels as high as an EC of 8. This ushers in the idea of using energy beets in rotations for both soil health and economic aspects. Crops such as wheat and corn see significant reductions in productivity under EC values near 4 and soybeans are among the worst performers in a saline environment. Poor crop performance in a saline environment can cascade the salt effect in future years. By introducing energy beets into the rotation, their deep tap roots and inherent salinity tolerance will draw down the water table and provide the soil with a chance to recuperate, provided the environment remains suitable for lowering the water table.

In 2013, a farm-scale energy beet project was established in an unproductive region of a local producer's field. Roughly 16 acres of energy beets were planted once the soil conditions were dry enough to support the planting operation, which occurred on June 20. This date is well beyond what a seasoned sugarbeet producer would consider a safe venture. However, it was important to establish the energy beets into areas we are attempting to remediate, and in realistic planting scenarios; meaning that many saline regions will not be suitable for planting until quite late in the planting season. Yet, the energy beets established vigorously and maintained turgidity throughout the extremely dry conditions experienced during the summer months. The result was a 25 ton/ac yield with most of that production being used for livestock feed in an adjoining study.



**Farm-scale industrial beet project.**

In a related study, energy beet planting date and method were examined in an effort to understand opportunity costs associated with planting later and with alternate methods. One question in the experiment was to determine if broadcasting and incorporating the seed would be effective compared to using a planter. This would be a strategy for planting beets in an area that would not support seeding equipment but may be able to support light tillage implements. While none of the planting dates were technically early for sugarbeet planting, the study was able to accomplish the goal of investigating the yield loss from late planting dates. The final planting date for this study was the same date as the farm-scale project listed above. The targeted plant population for this study was 50,000 established plants. This study was conducted in non-saline conditions.



**Establishment of industrial beets with a broadcast May 24 planting date, July, 2013.**

At each planting date, there was a drop in yield from broadcasting the seed versus planting (Table 1), although the difference was slight with the earliest planting. There was no difference in yield between late-May and early-June planting date for planted treatments. There was also no difference between the broadcasted treatments at the two latter planting dates. One important difference between the planted and broadcast treatments was the planting depth. The planted treatments were placed at 1" while the broadcast treatments were placed at 0.5" (just as it would be with a light incorporation). Since the summer was so dry after the two latter planting dates, the broadcast seed likely did not have enough moisture to successfully establish at the shallower depth. In fact, with the last planting date the energy beets didn't emerge until after a light rain in mid-July.

**Table 1. Stand establishment and yield of energy beets at different planting dates and methods.**

| Planting Date <sup>1</sup> | Planting Method | Stand<br>plants/ac | Yield<br>ton/ac | Yield<br>lb/beet |
|----------------------------|-----------------|--------------------|-----------------|------------------|
| early                      | seeded          | 47045              | 23.8            | 1.03             |
| early                      | broadcast       | 53304              | 20.3            | 0.87             |
| mid                        | seeded          | 55757              | 22.2            | 0.87             |
| mid                        | broadcast       | 21882              | 7.8             | 0.66             |
| late                       | seeded          | 38115              | 17.4            | 0.93             |
| late                       | broadcast       | 23313              | 9.6             | 0.92             |
| LSD (0.05)                 |                 | 14544              | 3.6             | 0.41             |

<sup>1</sup> Planting dates were May 24, June 7 and June 20; harvest date was October 21.

With the information from Table 1, we can now calculate the cost of planting the farm-scale energy beets on June 20 versus an earlier planting date. The difference between the last planting date and the date two weeks prior is roughly 27.6 percent. Assuming this difference would be the same at each location, the farm-scale beets could have reached just under 32 tons/ac. This date still occurred in early June. In many years, the saline regions are fit for planting in early June, providing an opportunity to achieve excellent yields in areas that may otherwise remain fallow.