No Till Notes: No Till Edible Beans

By Mark Watson, Panhandle No Till Educator

Edible beans have been viewed as a crop in our area which would be difficult to place into a no till crop production system. Our local research team at the UNL Panhandle Research Center has been working on the challenges that no till edible beans would present. There have also been several local producers who have been adapting no till crop production practices that facilitate the production of no till edible beans. Through some trial and error and "out of the box thinking" we have designed a production system that allows us to no till edible beans successfully. I thought I would share with you our no till edible bean production system that we use on our farm.

First off I want to point out this is a work in progress. Although I am satisfied with our production of no till edible beans, there is always room for improvement. There are aspects of our production system we will try to improve upon.

I'll start off with yields and irrigation use. Our yields this year ranged from 33-45 bushels per acre, or 2000-2700 lbs./acre. Our water use was from 4.5 inches per acre on our Keith silt loam soils to 7.5 inches per acre on our valent fine sand soils. Our 2000 lbs./acre yields were on the silt loam soils. This field had significant hail damage on Sept. 1, with field loss estimated at 25% and an additional 7% loss at harvest due to water damage so the beans could be upgraded to number 1 beans. We lost roughly 33% of the crop to the storm. Our beans which yielded 2700 lbs. were on the valent fine sand soils which had no hail damage.

With the no till crop production system we were able to produce good yields with relatively low irrigation water use. Our low water use on the silt loam soils was due to the fact these soils store more water that the valent fine sand soils, 2.2 inches per foot compared to .96 inches per foot for the valent fine sand soil. We also had more residue on the soil surface in the silt loam soils which helped prevent soil moisture evaporation. Our rainfall during the growing season from June-September was 7.65 inches, one half inch below normal for this time period. 5.1 inches of the total came from the middle of August until the middle of September. Prior to these rains we were well below normal.

No Till Notes: No Till Edible Beans—Planting

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Our rotation on our farm is winter wheat, corn, and edible beans. Edible beans following corn presents some challenges due to the nature of the corn stubble. The advantage of following corn in the rotation is weed control. Generally speaking it is relatively easy to control weeds in this rotation. Good sanitation following the winter wheat crop along with good weed control in the corn eliminates a lot of opportunities for any weed species to thrive in this rotation. This leads to relatively easy weed control in the edible beans.

Our initial herbicide application of glyphosphate occurs before bean planting. The closer we can time this to bean planting the better for weed control. As long as the field remains relatively clean up to planting time, one application of glyphosphate will provide a clean seedbed to plant the edible bean crop into. If necessary, we may use 2 applications of glyphosphate if there is early season weed pressure in the field.

We have grown no till edible beans for 3 years now, and have changed our row spacing each year. We have planted our edible beans in 30 inch, 7.5 inch, and 15 inch row spacings. We initially started with 30 inch row spacings using our standard planter. This worked well for us the first year although it was hard to gauge yield since we had 2 different hail storms that year and had yields of only 1,600 lbs./acre. We had heard that narrower row spacing showed improved yields. We also knew narrower row spacings would provide improved weed control due to better crop canopy.

Our second attempt at no till edible beans was with our grain drill planting the beans in 7.5 inch rows. We did see a jump in yield, up to 2,400 lbs./acre. We also planted the beans at a heavier seeding rate, planting about 120 lbs./acre, or approximately 135,000 plants per acre. We also had excellent weed control in the narrower row spacing. Late season weed control can be a problem in edible beans, but we had good weed control due to the heavy crop canopy in the narrower rows. The disadvantage we found was a consistent stand throughout the field. In areas of the field our stand was somewhat poor which lead us to rethink our planting equipment.

This year we decided to split the difference and plant the beans in 15 inch rows using a split row planter. We liked the narrower row spacing for yield and weed control, but wanted to use a planter instead of a drill to achieve a more consistent stand throughout the field. We were very satisfied with the stand we achieved, weed control, and felt we did see a yield increase with the narrower row spacing.

Our plant population we chose was 110,000 plants per acre, or approximately 90 lbs. of seed per acre. In 30 inch rows we planted 85,000 plants per acre and felt we should increase this to 110,000 plants per acre in the 15 inch rows.

No Till Notes: No Till Edible Beans—Herbicides

I want to start off by wishing everyone a safe and very Happy Holiday Season!

Our herbicide program for the edible beans is very similar to a conventional tilled program for edible beans. We may even use less herbicide than conventionally grown edible beans in some respects. The big advantage with a no till crop production system for edible beans is the residue on the soil surface. Heavy amounts of residue really help in weed control and water use efficiency once the crop is established.

As I stated in a previous article, we have a burn down with glyphosphate prior to emergence of the bean crop. If the field stays relatively clean, we may delay this application until after the beans are planted, but before bean emergence. Any earlier use of glyphosphate in the spring is only done if we have significant weed pressure in the field. Generally, only 1 burn down is required provided that we have had good weed control in prior cropping rotations.

We haven't been using any pre-emergence herbicides with our edible beans. With a timely application of glyphosphate prior to emergence, along with a timely application of our post emergence herbicide, we haven't felt there was a need for any pre-emergence herbicide.

For a post emergence herbicide we have used Raptor-Result with crop oil in our earlier herbicide program. We had excellent weed control with this herbicide application, but also felt we may have had excessive crop injury.

We switched our post emergence herbicide application to Basagran-Result with a nonionic surfactant instead of crop oil. We may have given up a slight amount of weed control, but felt we also had less crop injury. I would talk to your local crop consultant to develop this type of herbicide program for your fields.

We haven't used any herbicides other than a glyphosphate burn down followed by a post-emergence herbicide application. If a grass weed or a volunteer corn problem develops in the field there are numerous grass herbicides to choose from to control these types of weeds. Make sure these grass herbicides won't affect wheat production if you plan to follow the bean crop with winter wheat.

We haven't felt the need for any use of a desiccant prior to bean harvest. The bean crop appears to dry down evenly enough that a desiccant herbicide application hasn't been required. There may be an advantage to using a desiccant herbicide in order to facilitate a clean field to plant winter wheat into in a more timely fashion. We sometimes follow bean harvest with a glyphosphate burn down prior to wheat planting if necessary.

No Till Notes: No Till Edible Beans—Harvesting

Harvesting edible beans without disturbing the soil by direct harvest has been the biggest challenge in no till edible bean production. The University of Nebraska has tried several methods including flex heads with lifters and air reels, draper heads, stripper heads, row crop heads, and swathing equipment to place the beans in windrows to be picked up later. All of these heads have had varying degrees of success depending upon field condition, plant architecture, and crop condition.

On our farm we have been using our stripper header to harvest the beans. We also tried a flex head with lifters and an air reel, but felt the stripper head did a better job of getting the beans that were lower on the plant stem. We also like the fact that the stripper head leaves the plant stems intact and standing which makes for better wind erosion control and will also catch more snow during the winter months.

The University of Nebraska has conducted studies of plant architecture with the stripper heads. Their findings and results we have seen on our farm indicate a plant structure with a high amount of vines which grows low to the ground appears to have less harvest loss than the more upright plants. Harvest loss ranged from 1.5 bushels per acre to over 10 bushels per acre. The more upright bean structure had the higher field loss. We have observed the same field loss on our farm. Our lowest field loss has come with beans that have the type 3b architecture. We have tried more upright beans of 3a or 2b and had higher harvest loss.

We have also found we need to harvest the beans at higher moisture content. We have very few splits at harvest when the beans are in the 15% moisture range. As the beans get drier, our splits go up during the harvest.

We also seem to get some dirt in the beans with the stripper header. We run the stripper head teeth about an inch above the soil surface. The teeth occasionally hit the soil surface in uneven ground. We plan to purchase a head height control system which will help to keep the head more uniform in height on uneven ground.

No Till Notes: No Till Edible Beans—Fertilizer

I would like to wish everyone a very safe and Happy New Year! Agriculture has many difficult and varying challenges as we move from year to year, but each year we have much to be thankful for while producing an abundant food supply for our country and the world.

In previous articles I have talked about several aspects of our no till edible bean production practices. On our farm this year we planted the edible beans in 15 inch rows using a split row planter. We planted a population of 110,000 plants per acre. We use a pre-plant or pre-emergence burn down with glyphosphate for early season weed control. Our post-emergence herbicide application has been a Basagran-Raptor combination with a nonionic surfactant.

In this article I wanted to visit with you about our fertility program. An important first step in designing a fertility program is to sample the soil. We sample our soils at a depth of 0-8 inches for all nutrients and organic matter. We also sample our soils at a depth of 8-36 inches for residual nitrogen only. We feel using these 2 soil sample depths allows us to get an accurate assessment of our soil's nutrient availability for the plants. We sample at these depths for all our crops including the edible beans. We have used a spade to dig 3-4 foot deep in our edible bean fields and found actively growing bean roots at these depths so we feel we need to find out how much residual nitrogen there is at this depth and use that nitrogen in our fertility program.

The University of Nebraska recommends around 110-120 lbs. of nitrogen be available for top yields in edible beans. We use the soil sample to determine how much nitrogen and phosphorous is available, and apply additional fertilizer as needed. Other micro nutrients such as zinc or sulfur may be needed.

If we need additional nitrogen, we apply ours in a liquid solution of 32-0-0 with our sprayer. It is important to apply this during cool air temperatures with the soil surface dry to minimize any loss of nitrogen due to volitization. A timely ½ inch of rain after application is needed to move the nitrogen into the soil.

We applied our phosphorous directly with the seed as a starter fertilizer. Our residual phosphorous in the soil is relatively high, so our phosphorous rates applied were relatively low, applying 10 lbs of phosphorous per acre. We diluted this solution with water and applied about 6 gallons per acre, with the solution being 3 gallons of 10-34-0 and 3 gallons of water. We didn't observe any seedling damage using this method.