Maximizing Performance of Sugarbeet Planters and Harvesters and Row Spacing Considerations

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Maximize Performance of Your Sugarbeet Planter

Most new sugarbeet planters currently sold in the U.S can space seed with sufficient accuracy to achieve maximum sugarbeet yield — if properly maintained and operated. Have your metering unit evaluated on a good planter test stand. If your planter has a seed drop tube such as on the Deere MaxEmerge series or the Case-NH ASM series, have these tested on a test stand also. The University of Nebraska tested over 170 sugarbeet planters with over 1800 individual row units during 2002, 2003, and 2004 in four states. Of those planter row units tested both before and after inspection, 86% required one or more new parts to achieve satisfactory seed spacing accuracy. Nearly 75% of all the sugarbeet planters tested were Deere MaxEmerge series models. Over 25% of the Deere MaxEmerge planter units tested required new seed tubes to achieve acceptable seed spacing accuracy. Worn seed tubes also affect side-to-side seed placement and depth control. It is difficult to visually identify a seed tube that needs replacement – an accurate planter test stand is the best method.

Check all components of the planter drive system to assure smooth, non-jerky, rotation of the metering unit. Bad bearings, loose couplings, out-of-line chain sprockets, and chains with tight links will cause non-uniform rotation of the metering unit and poor seed spacing. Also check furrow opening disk blades for excessive wear and correct contact. A distinct “V” shaped furrow is necessary for consistent seed depth.

Perhaps more than any other crop production implement, the sugarbeet planter requires annual inspection and testing to assure maximum performance.

Maximize Performance of Your Sugarbeet Harvester

A successful sugarbeet harvest operation depends on many factors. We have limited control over some of those factors, such as an early frost that kills the sugarbeet leaves, or excessive precipitation during harvest. But we can influence harvest performance with other factors including consistent root size, defoliator operation, and harvester operation.

A uniform sized root in a high plant population will facilitate defoliating, scalping, and harvesting. If roots alternate between large and small, tall and short, it is very difficult to remove all the leaves and petiole material without some root breakage and excessive field loss of the larger roots. Good planter seed spacing, high field emergence, and suppression of disease and insect pests will help establish uniform root size.

Large weeds at harvest time may require two defoliation operations, cause harvester plugging
and other problems, and increase tare. Spend your weed control budget on early season weed control and not at harvest.

Yield revenue lost during harvest is often caused by the defoliating operation. If petiole or leaf material is left on the root, recoverable sugar per acre will decrease. One very general rule is that 1 in. of green left on the roots will reduce the grower price by $1/ton with a quality contract. If too much of the crown or top of the root is removed with excessive scalping, root yield is lost, again unnecessarily reducing grower revenue. The goal is to remove all green petiole and leaf material and a scalped section no more that 1½ in. in diameter at the top of the root. Defoliator flails in good condition and operating at the correct drum speed are necessary. But the most important defoliating issue is almost always field speed. Keep field speed at or below 3 mph to achieve removal of petiole, to uniformly scalp, and to minimize broken roots or roots knocked out of the row. Several excellent studies in grower fields have shown that grower revenue decreases with field speeds above 3 mph.

Sugarbeet harvesters also need proper maintenance and operation to maximize crop return. And as with defoliators, field speed has been shown to influence revenue per acre. Harvesters from several manufacturers were compared in Red River Valley growers’ fields at several field speeds during two years. Little difference was found among harvester models for field loss or yield when the harvesters were properly adjusted. However, field speed of 4 mph improved grower revenue by $56/A compared to 6 mph in one year of the study when soil conditions were considered ideal. This difference was caused by increased broken tails, increased tare, and difficulty staying on the row at 6 mph. Harvester field speed should be 4 mph or less for best performance.

Other harvester issues include wear on lifter wheels, wheel spacing at the pinch point, position of the lifter wheel pinch point, centering of the row finder, depth of the lifter wheels, and wear of the scrolling on the grab rolls. Each of these often depends on field conditions.

In a University of Nebraska harvest loss study of 45 growers’ fields conducted over three years, the average field loss was 0.7 ton/A. The fields with the three highest field losses had 3.9, 2.2, and 2.1 ton/A loss, primarily caused by sliced roots and large broken tails. In all three cases the operators were unaware of the high losses since the sliced roots and broken tails could not be seen unless soil was removed from the dug row area. To minimize harvester field loss and root damage, the operator must intentionally make frequent observations for sliced or broken tails in the bottom of the row left by the lifter wheels, and for roots with excessive bruising or broken tails in the truck. Remember, only two small 2 lb roots which would be about 4 in. diameter at the large end, or equivalent root parts, lost by the harvest process per 100 ft of one 22 in. row amounts to ½ ton/A unnecessary field loss.

Sugarbeet Row Spacing — Narrow Rows?

For years, researchers have studied yield response of a wide range of sugar beet row spacings. Almost all of these studies have shown that sugarbeet yield increases as row spacing decreases to about 12 in. Practical production issues have led U.S. producers to settle on two primary row spacings — 22 in. and 30 in. — while most western European producers are using 18 in. or 20
in. rows. Several individual U.S. growers have recently converted all or part of their sugarbeet acreage to 15 in. or 11 in. row spacing with reported increased yield but with new equipment and management issues.

In 2003 three Nebraska growers cooperated with industry partners to produce a total of 230 acres of 18 in. row sugarbeets and compare to their standard 30 in. row systems for sugarbeet yield and other production issues. Four fields under center pivot irrigation were split with part of each field in 18 in. rows and part in 30 in. rows. The growers did all operations with both row spacings except the 18 in. crop was custom planted with a 12 row planter and custom harvested with a 6 row defoliator and 6 row harvester. Within an individual field there were different field operations and equipment used for the 18 in. and 30 in. crop so there were other production differences between 18 in. and 30 in. in addition to row spacing. The fields were machine harvested and yields were determined from contract records. Neither row spacing had a substantial yield advantage in any of the four fields, and when all four fields were averaged together, root yield and sugar yield were very similar for both row spacings. The 18 in. row crop had a slight advantage for percent sugar.

To accompany the 30 in. vs. 18 in. row sugarbeet comparison in growers’ fields, the University of Nebraska compared sugarbeet yields in both row spacings in replicated field strips in 2004 and 2005. Similar tillage and weed control practices, and similar planting and harvesting equipment were used for both row spacings. Averaged over two years, this study showed that 18 in. rows improved percent sugar by nearly 1% and root yield by 2 ton/A compared to 30 in. rows.

So, why the difference between results in growers’ fields and results in University replicated field strips, and why have growers not adopted rows narrower than 22 in.? My answer to both questions is that changing from 30 in. rows, or even 22 in. rows, to 18 in. rows is like raising a different crop. The change to 18 in. rows requires a major commitment and a different line of equipment including tractor and sprayer wheel spacing and tire width; planter; cultivator; defoliator; and harvester. There are issues of very straight guess rows, very narrow tires, more skilled driving, and lack of clearance between row units of the planter and harvester for 18 in. rows. It has taken years for growers to develop specific crop management strategies and an equipment line for 30 in. or 22 in. rows, and it will take a similar effort to develop the same level of productivity with 18 in. rows. The practical production issues of 18 in. row sugarbeets may not be worth the proven potential yield advantage compared to 30 in. rows for some growers. A more practical alternative for growers currently in 30 in. rows might be to switch to the more common 22 in. row width.