POTATO PLANTER SPEEDS
HOW DO THEY AFFECT STAND & PRODUCTION

by
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Over the past four years I have watched potatoes being planted in Alberta, and I feel that growers are not concerning themselves with planters and planter speeds. All growers have foremen and laborers. Sometimes these laborers are not as experienced as we would like them to be. How do you expect to get improved yields if you start out wrong? Yet it is amazing how many people do start out that way. Then we have the grower who says "I know my employee is traveling too fast down the field, but I don't want to hurt his feelings by telling him to slow down, as he may just leave and I won't have anyone to plant my potatoes". What can we do to solve some of these problems? One question for growers to ask themselves is "Did I tell my employees that they have to have a certain number of acres planted in X number of days?" Growers should be realistic about the number of acres they can expect to have planted daily, as excessive speed will result in improper plant stand.

Good seed is very important as Willy has outlined in his talk, but if you don't place it in the ground where it should be, good seed then does not do what it should be doing. Good seed will not be totally effective if it is improperly planted.

In 1967 Dr. William T. Andrew, of the University of Alberta, made detailed investigations into the reasons for poor plant stands. Ten fields in the Edmonton area were surveyed and the counts ranged from 37% to 76%, an average stand of 59%. These surveys were carried out by Dr. Andrew until 1969, and unfortunately our plant stands haven't improved since then. This is what prompted us to go into planter speed surveys in 1972. We intend to study planter speeds, seed piece size, and plant stand count again this year, and hope to make the growers more aware of the importance between planter speeds and plant spacing and good plant stands.

The most recent Plant Stand Survey was carried out in 1971, as follows: Using a 50 foot rope marked off into feet and inches, and walking a distance into the field, stretching the rope out to the 50 foot mark, I marked the existing plants on the survey sheet, and also could tell from this the number of spaces in that 50 foot row.

If the grower was present he would choose the row, and we would come up with the same number of plants in any field he wanted to check. In other words, the pattern seemed to be consistant - the same number of plants and the same number of spaces in any portion of the fields checked. The summary of the 1971 Plant Stand Survey indicates that the optimum plant stands just did not exist in the greater percentage of the fields.

Some potato planters were putting out sufficient seed pieces to yield a 100% stand, but unfortunately were planting two to three pieces per hill. Because of this, 31% of the seed pieces were misplaced, and 19.6% of the seed pieces were missing.

Fields in the Plant Stand Survey totaled 62 - which gives a representative picture of fields in Alberta, and the plant stands thereon.

It was suggested by Dr. W. T. Andrew, of the University of Alberta, that with a two and four row planter, we take two or more spots in the field instead of just one. For a four row planter, I took 4 - 100 foot rows in one spot, and moved a quarter of the distance into the field, and took a plant count of four more rows, one hundred feet in length. For a two row planter we went through the same procedure, only the count was 2 - 100 foot rows. We then had a distance of 800 feet of row, for a four row planter, and 400 feet for a two row planter.

I found that the seed piece spacing, or planter spacing, I had on my seed piece size survey sheet, was never the same as the plant stand count spacing. The spacing was regular, especially in smaller acreages, which were done with 2 row planters and slower planting speed.

Fields that were checked were found to have 10% of seed pieces missing and 19% of plant population in the wrong location. To find the reason for any apparent gaps, I dug in the row and found there were no seed pieces. Where plants were stunted or small, I found slivers underneath, or soft rot.

Under "wrong spacing" on our sheets we noted the plants that were not in the correct location. Many times you would find as many as 2 or 3 seed pieces under one plant, and I found as many as 6 seed pieces under some plants. I'm sure that a lot of the problem is the planter, and the speed with which the seed is planted.

PLANT STAND SURVEY 1971

				REASON FOR MISSES (% of Total)						
AREA	% Stand	Seed Pieces Missing	Mis-Placed	Weak	Sliver	Soft Rot	Rhiz-octonia	Black Leg	Dry Rot	No Eye
Southern Alberta	79%	49.6	20.5	20.0	3.3	3.0	2.7	.4	.3	.1
Central & Northern	82%	50.9	15.9	16.7	6.3	7.0	2.6	-	-	.4
Province	80%	50.0	19.6	19.3	3.9	3.8	2.6	.3	.2	.1

The plant stand ranged from 48% to 108%. The main reason for poor stands is that there were no seed pieces planted. The next most important reason is that the seed pieces were misplaced. It is obvious then, that the main reason for poor stands is mechanical. 69.6% of the time poor stand can be attributed to the fact that a seed piece was not planted or was planted in the wrong place.

We feel we should have the results of three year's planter speed surveys before we present any conclusive findings. Unfortunately, the three year data is not available yet. However, as a result of the tests we have done to date, we feel safe in saying that planters are doing a better job of planting at the lower speeds.

I would like to show you a few slides of the device we used in checking planter speeds. It's simply mounted on the left hand side of the tractor frame, and held in place with two bolts. The little wheel runs on the front tire regardless of tire size. There is a seven foot cable attached to the gear box on the wheel that runs on the tire. The hook up is very similar to a truck or car speedometer.

Three reasons for using this type of device are:

1. It is easier to read than most tachometers.
2. Some tractors are not equipped with tachometers or the tachs are not working properly.
3. Tachs on tractors don't compensate for slippage.

During the 1972 growing season one of our objectives was to discover the relationship between planter speed and plant stand. Our plan was to check planter speeds in as many fields as

possible during the planting season. In checking the planters for speed, we would drop off two stakes at 50 foot intervals, then increase the speed and drop off two more stakes, again at 50 foot intervals. I went through this procedure three times with each planter. Then I would go back and accurately place the stakes 50 feet apart by measuring the distance between stakes.

The next step, uncovering two 50 foot lengths of row for each of the speeds checked, was the part that took a little work. In other words, for each planter, whether it was two row or four row, two 50 foot lengths of row were checked. Each test consisted of 300 feet of row. On uncovering the seed pieces, I was pleasantly surprised to note that the average seed piece size was larger than in the 1971 planting season. I would like to think that this was the result of the work the Commission has been doing.

To get back to our test - the seed pieces uncovered were counted in each separate trial, and recorded. This way I determined at which speed a planter was operating most efficiently. This also gave a grower some indication as to whether he had a mechanical problem other than speed.

When I was checking planter speeds I came across two growers who had only 50% stands. With one grower the problem was speed. With the other grower, it was faulty picker fingers. Luckily this was caught before the whole crop was planted in that manner.

In one field tested at 4 m.p.h. there were 26 seed pieces missing in 50 feet of row. The intended plant spacing was 11-1/2 inches. That's approximately a 50% stand. When speed was reduced to 2.5 m.p.h. there were only 5 seed pieces missing in 50 feet of row. Using this example let's do a little arithmetic to get some idea what speed is costing. If row spacing is 3 feet and plant spacing is 1 foot, then each plant occupies 3 X 1 = 3 sq. ft. Since there are 43,560 sq. ft. per acre, a 100% stand would have 14,520 plants. Assuming that some plants will not reach maturity for various reasons, e.g. disease, cultivated out, drowned out, etc., then there should be about 14,000 plants per acre. Each plant should yield 2 lbs. of potatoes. Then yield would be 14,000 X 2 = 28,000 lbs. or 280 cwt. or 14 tons per acre. If plant stand is only 50% your yield will only be 140 cwt. per acre.

Suppose the average price of potatoes if $5.00 per cwt. bin run -

280 cwts. @ $5.00 =	$1,400.00
140 cwts. @ $5.00 =	$ 700.00
	$ 700.00

In other words excessive planter speed has already cost $700.00 per acre. Is that good enough reason to slow down?

My second objective was to determine whether accurate spacing had any bearing on yield. I replanted two of the 50 foot rows (previously uncovered) - replacing small seed pieces with 1-1/2 - 2 oz. seed pieces, spacing the seed pieces, as the planter was set. That is, if the planter was set to plant at 12", I planted the pieces 12" apart. If the planter was set to plant at 11", then I placed the pieces 11" apart. Seed pieces were re-covered and then marked so they could be found at the time of harvest, and dug up to be compared with two other rows in the same field.

Three different fields were checked in the above manner.

Test rows were dug in the early part of September. The first rows showed: Two - 50 foot rows that were hand-planted yielded 265 lbs. Rows spaced by planter yielded 227 lbs., showing a yield difference of 38 lbs. Now perhaps 38 lbs. doesn't sound like much, but if this is totaled over an acre, it comes to 1848 lbs. per acre, or nearly one ton per acre. That's a lot of potatoes!

At $100 per ton, (process price) you have lost $92.40 per acre. If your operation is 150 acres, then you have lost, by poor seed spacing, $13,875.00. In other words, if you had spaced correctly, you would have gained $13,875.00. Keep in mind that this is only one year's test.

The results of the second test were very similar to the first. The yield on the two test rows was 224 lbs., while the planter rows (3 rows over) yielded 193 lbs. - a difference of 31 lbs. The surprising part of this test was in the planter rows. There were 34 lbs. of culls in the two rows not accurately planted, yet in each case they were fertilized the same and watered the same as the test rows. The rows planted by myself and the grower yielded only 22 lbs. of culls, or 35% less culls than the planter rows.

My final two hand-planted test rows yielded only 145 lbs. The planter rows on each side of the two hand-planted rows yielded 129 lbs. of potatoes - a difference of 16 lbs., which isn't as much as the other test plots, but it does show that you are still losing a profit by improper spacing. For example, using the lesser amount of the test plot rows, on the fresh market, based on today's price, you have lost $162.00 per acre, which is $24,300 on a 150 acre operation - and that's a heap of profit!

Several Things Potato Growers Need to Do

1. Properly adjust the planter

   Replace bent, broken, or worn out picks; service the machine so that it operates smoothly, as it was intended to operate.

2. Insist on, and get, properly sized seed

   Cut your seed as near as you can to 2 ounces. Eliminate as many undersized seed pieces and slivers as possible.

3. Operate the planter in the manner and at the speed that will plant one seed piece per hill, and space the hills the desired distance apart.

REMEMBER - SPEED KILLS - and speed in this instance can kill your chances of getting 100% of the potential your operation is capable of giving.