2019 Corn Demonstration Plot – Part II – Stand Evaluation

Please see Plot – Part I – Planting for plot background.

Plant to Plant Variability Methods

Huron Tractor is evaluating the effect of tillage, planter speed and planter downforce on plant to plant variability. To quantify this effect we have measured spacing and developmental differences of 10 adjacent plants in the same row. These counts have been replicated for 4 planter rows, in 2 speed treatments, 2 downforce treatments and 4 tillage treatments. In total 96 locations were evaluated, accounting for 960 plants.

The best spacing uniformity that a commercial farmer can typically expect to obtain under normal production planting conditions is a standard deviation of 2 inches or less from average. A rough estimate can be made to estimate yield loss from non-uniform plant stands using this standard deviation measure. Research has concluded that for every inch of standard deviation 4 bushels/ac of corn will be lost. The simple calculation is: (4bu/ac) X (Standard deviation) = XYZ bu/ac loss

On a 1/1000th of acre for 30" rows, setup for 34,000 plants/acre you need 1 plant every 6". In a perfectly planted corn field where all the plants were 6" apart, the average spacing would be 6" and standard deviation would be 0. Below are various Estimated Scenarios and standard deviations:

Some results from our analysis in regards to plant stands can be seen below. Our target population was 38,000 plants per acre, consequently our spacing should be 5.5" on average in an ideal scenario.

Situation	50% of Plants	50% of Plants	Average	Std Dev	Yield Loss (bu/ac)
Ideal	6	6	6	0	0
Realistic	5	7	6	1	0
Extreme	1	11	6	5	20

A well-tuned planter operating at reasonable speed minimizes the Standard deviation of within-row plant spacing. Doubles can result in barren stalks, which can be considered another weed. Likewise, skips result in missing plants and consequently no yield potential.

We collected our data using pencil and paper due to the large data set, however, we did mark pins for our stand counts using the John Deere MyOperations App (Figure 1). This app is available for both android and iphone. The app allows you to drop flags that are viewable in the app, and in the John Deere Operations Center (Figure 2). These flags can be used for scouting or for marking important locations within a field. Photos can be attached to the flags, as well as text free-hand notes.

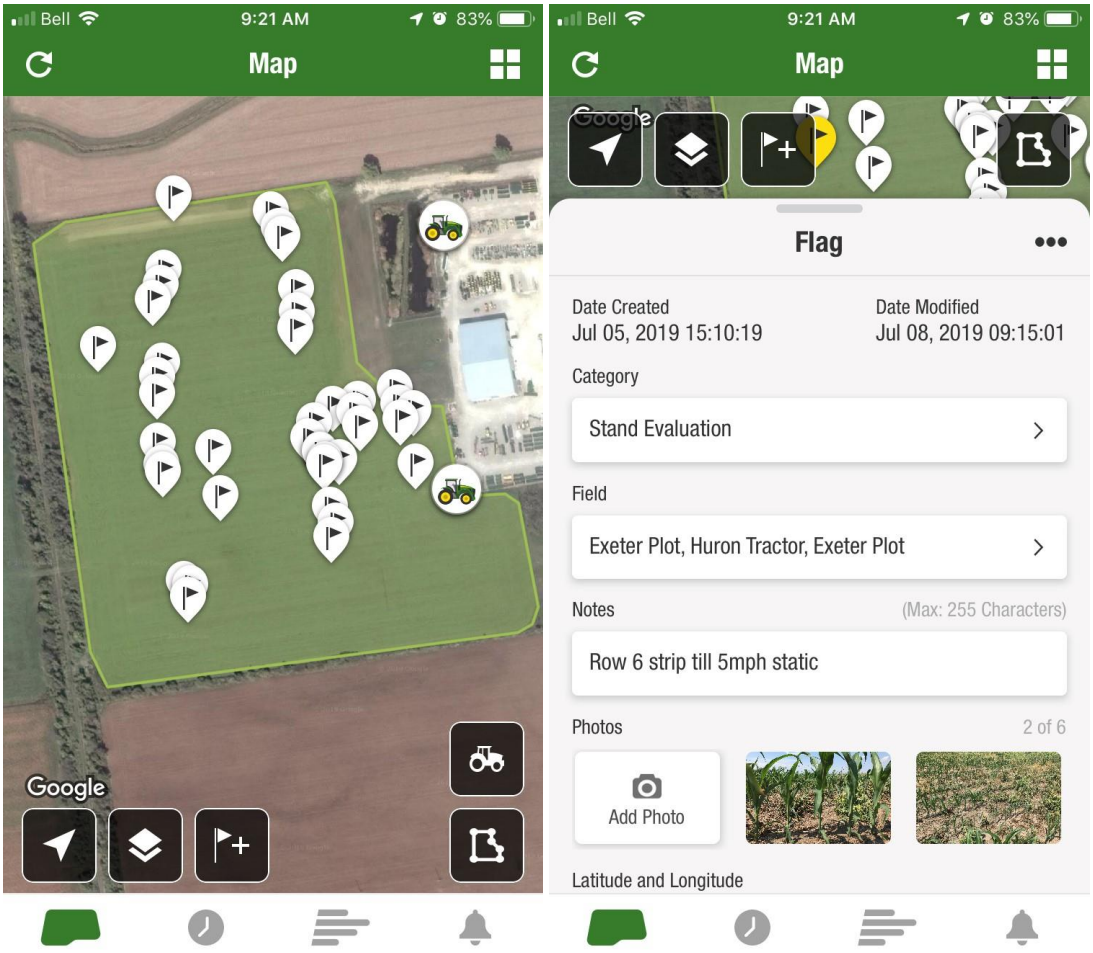

Figure 1: Flags feature shown in the MyOperations App

Figure 2: Flags feature shown in the Operations Center Website

Tillage Treatments

As visualized in Figure 1, the singulation was comparable among all tillage treatments, with slightly more doubles in the disc ripped tillage treatment. We have a significant number of skips in our strip tillage treatment (Figure 3), the average spacing was also 6.7”(Figure 5), when our target based on 38,000 seeds per acre was 5.5”. Based on field observations, this is likely more related to weed pressure than to planter performance. The large number of skips in the strip till treatment reduced our Good Spacing percentage. The strip tillage was also about 1 leaf stage behind the rest of the tillage plots due to the weed pressure (Figure 4 & Figure 7). Overall the estimated yield loss due to uneven spacing is greatest in strip tillage (5.9bu/ac), and least in the disc ripped tillage (1.4 bu/ac), see Figure 6.

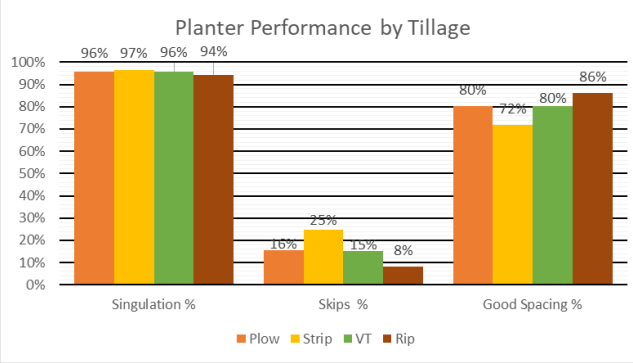

Figure 3: Planter performance by tillage. Percent singulation, percent skips and percent good spacing(plants within 2.5" of our targeted 5.5" spacing)

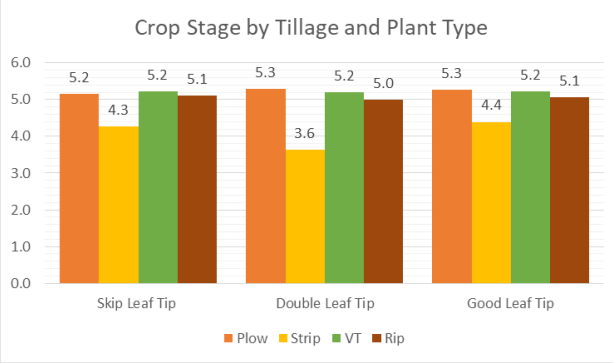

Figure 4: Crop 'V' growth stage of the various plant types (skips, doubles, good spacing), compared by tillage type

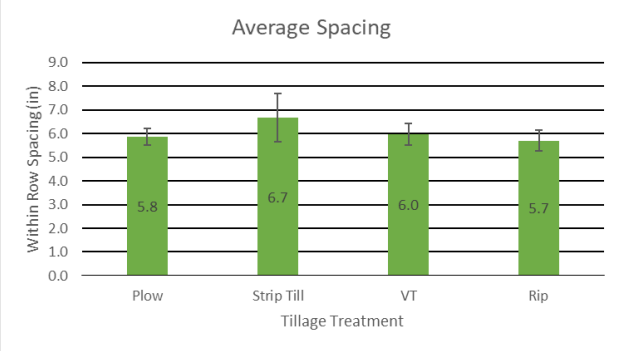

Figure 5: Average spacing of corn plants in each tillage treatment. For our target of 38,000, ideal was 5.5".

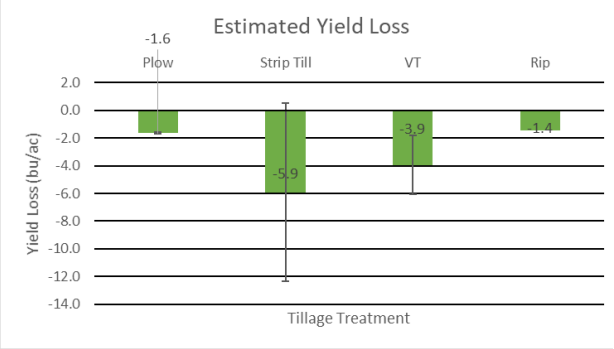

Figure 6: Yield loss expected due to uneven spacing in crop stand.

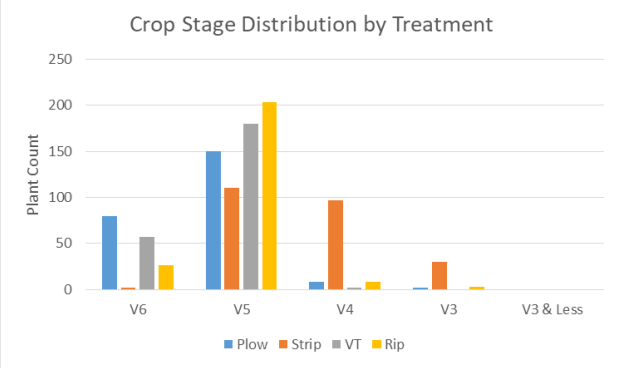

Figure 7: Crop stage distribution as related to tillage treatment

Speed Treatments

As visualized in Figure 8, the singulation was much lower in the 7.5MPH treatment when compared to 5MPH. The number of skips was comparable between the two treatments, consequently the speed had a great effect on doubles. Figure 10, shows the average spacing at 7.5MPH was 6.0" versus 6.1" in the 5MPH treatment, our target based 38,000 seeds per acre was 5.5". The two speed treatments were at similar crop growth stage, about V5 on average (Figure 9 & Figure 12). Overall the estimated yield loss due to uneven spacing is greatest in the 7.5MPH treatment (6.2bu/ac), and least in the 5MPH treatment (2.8 bu/ac), see Figure 11.

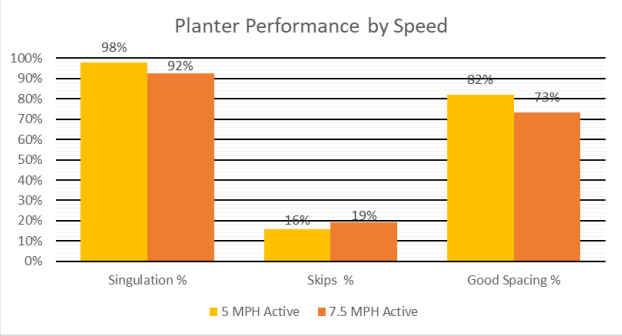

Figure 8: Planter performance by tillage. Percent singulation, percent skips and percent good spacing(plants within 2.5" of our targeted 5.5" spacing)

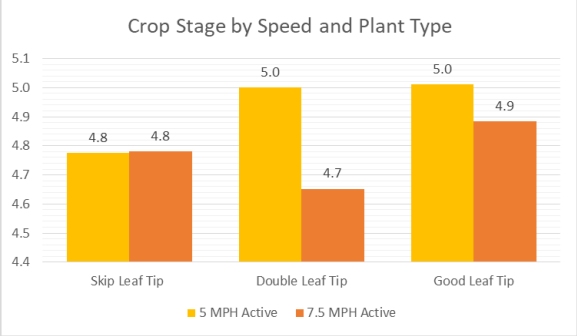

Figure 9: Crop 'V' growth stage of the various plant types (skips, doubles, good spacing), compared by tillage type

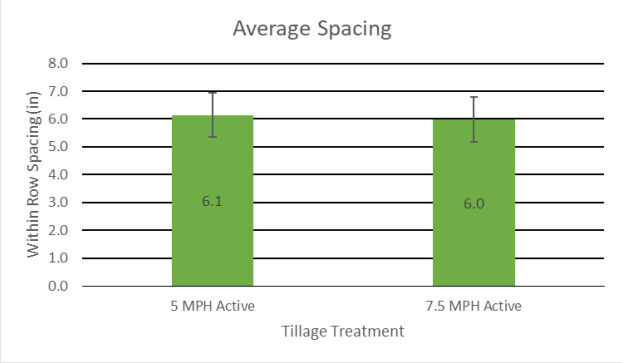

Figure 10: Average spacing of corn plants in each tillage treatment. For our target of 38,000, ideal was 5.5".

Figure 11: Yield loss expected due to uneven spacing in crop stand.

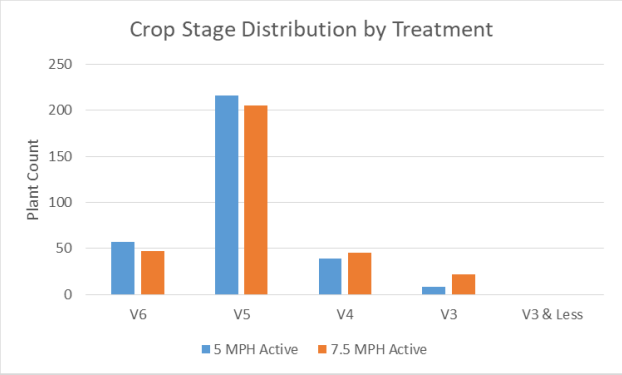

Figure 12: Crop stage distribution as related to tillage treatment.

Downforce Treatments

As visualized in Figure 13, the percent singulation, percent skips and percent good spacing was similar between the active and static downforce systems. Figure 15, shows the average spacing was also similar between the two treatments. The two downforce treatments were at similar crop growth stage, about V5 on average (Figure 14& Figure 17). Overall the estimated yield loss due to uneven spacing was about 3 bu/ac in both downforce treatments, see Figure 16.

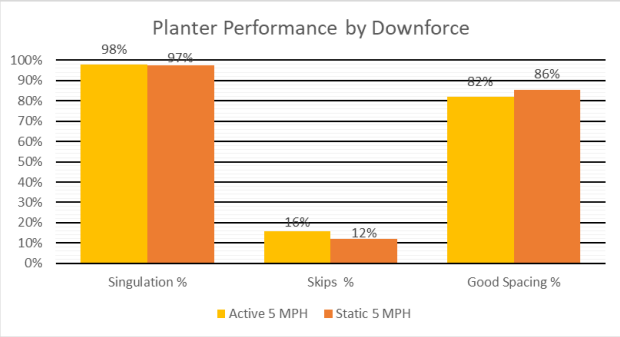

Figure 13: Planter performance by tillage. Percent singulation, percent skips and percent good spacing(plants within 2.5" of our targeted 5.5" spacing)

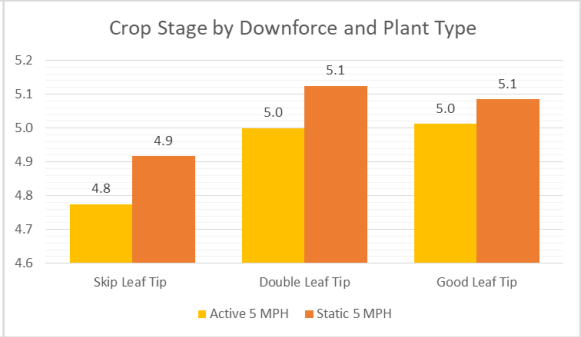

Figure 14: Crop 'V' growth stage of the various plant types (skips, doubles, good spacing), compared by tillage type

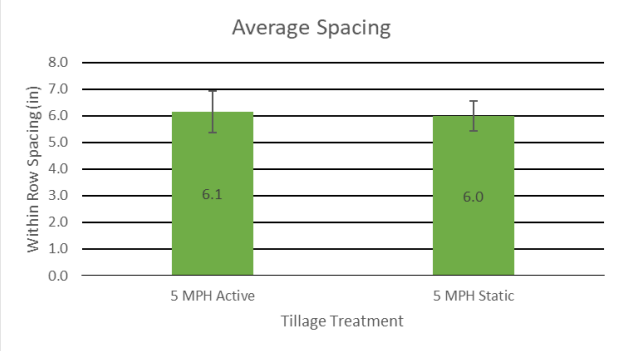

Figure 15: Average spacing of corn plants in each tillage treatment. For our target of 38,000, ideal was 5.5".

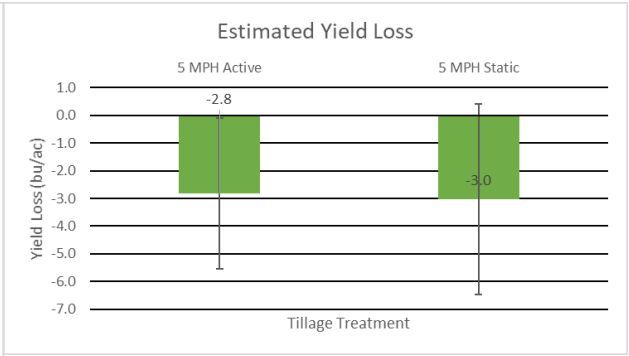

Figure 16: Yield loss expected due to uneven spacing in crop stand.

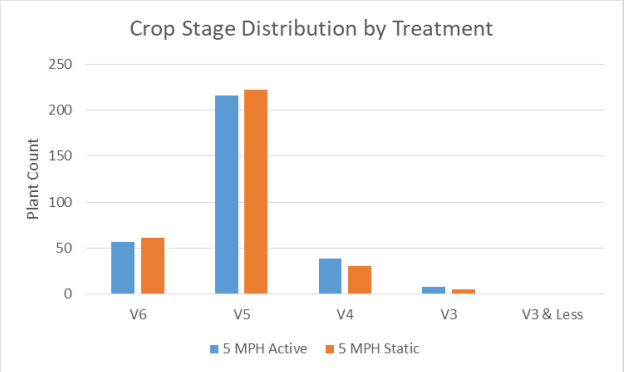

Figure 17: Crop stage distribution as related to tillage treatment.