Bluefield Seeding Solutions Seed Sensing Technology Evaluation

Background:

In 2022 and 2023 several trials were conducted to evaluate Bluefield Seeding Solutions Inc. (BSSI) press wheel (PW) and seed sensing technology (SST) versus conventional potato planting systems. PW technology is a bolt on system that aims to improve planter accuracy by capturing the seed immediately after it's released by the planter and applying slight downward pressure to prevent forward movement of the seed piece. SST integrates with PW to detect seed placement and provides real-time feedback to the operator via an in-cab display. This technology can eliminate the need for manual digs behind the planter to inspect planter performance.

Steve Watts P.Ag., owner of Genesis Crop Systems, and Evan MacDonald M.Sc, P.Ag., owner of Contour Consulting, were contracted to carry out field trials on two farms and ten fields in central and eastern Prince Edward Island (P.E.I.) over two years. Treatment areas were large and total study area was over 57 acres between all sites.

Methodology and Results:

In each field, planters equipped with PW technology planted strips two planter passes wide alongside conventional planters without PW technology traveling the same speed. Drone imagery was captured soon after emergence and was analyzed using Geographic Information Systems (GIS) and machine learning (ML) software to measure plant size, and plant spacing of every emerged plant in each trial. This method of potato emergence assessment has been tested versus manual ground-based measurements and is proven to be 97% accurate. The benefit of drone-based analysis vs manual measurements is sample size. Hundreds of thousands of plants can be captured in minutes using a drone, vs traditional assessment on the ground which captures information from a few plants, typically assessed in convenient locations near the laneway.

In addition to drone-based data capture, consultants dug four ten-foot strips per treatment to assess yield characteristics. These digs were graded out for marketable yield and size profile as well. Although yield is the top consideration for every farmer, it is impacted by many factors, not just planter performance. Finding statistically significant differences with a small sample size (which is variable within treatments) is difficult. That proved to be the case in these trials, as yield results for 2022 were positive for PW vs conventional, and in 2023 they were negative. There were no statistically significant differences between treatments. One main consideration here is that in each ten-foot strip harvested, the consultants ensured the same number of plants were dug. This factor eliminates evaluation of one of the main benefits of PW technology, which is more accurate and consistent seed spacing.

Drone-based analysis showed that PW technology resulted in more accurate and consistent plant spacing in ten out of ten sites compared with conventional planters. PW equipped planters had less gaps (gap identified as anything larger than 20 inches between emerged plants) in eight out of ten sites compared with conventional planters. These results come from over 400,000 plants counted over all trials in 2022 and 2023. This significant sample size provides more confidence in understanding PW performance vs ten-foot strips, which represent a small percentage of each treatment area.

Gap Analysis:

Paying closer attention to gaps, we can understand some of the economic and environmental implications of each treatment. These could be considered “misses” or “skips”, but it is important to note that a gap is only what was visible from the specific day that the drone flew over each site. Nonetheless, in terms of timing, it is an apples-to-apples comparison as treatments were planted with the same variety at the same time.

PW treatments had, on average, 421.7 less gaps per acre vs conventional planters. This number equates to approximately 2.9% less misses than a conventional planter. This is consistent with what BSSI has found on experienced farms that have implemented PW and SST. Translating this to a 1000 ac farm, this equals 421,700 more gaps with a conventional planter. The average gap size was 30 inches. Assuming a plant on either end of that gap takes up six inches of space, this leaves an estimated gap size of 18 inches. 421,700 * 18 inches = 7,590,600 inches of gaps. This equates to approximately **47.5 ac** of area on a 1000 ac farm without a plant growing to take up fertilizer and other applied products. This could have significant economic and environmental implications for a farm. Greenhouse gas emissions should be considered based on these findings.

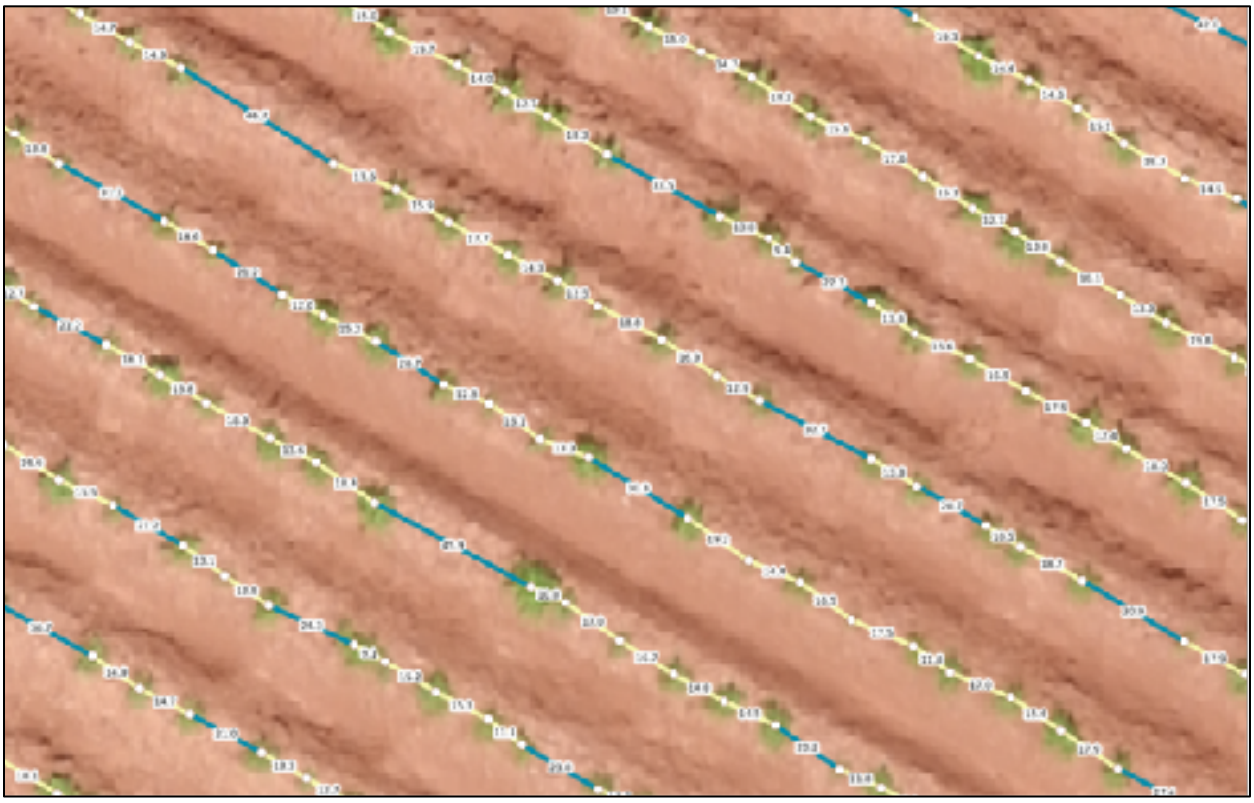

Image from drone-based analysis showing plant spacing in one of the trials. Blue lines are gaps. Spacing is indicated in inches above each line.