# EXECUTIVE SUMMARY

## EVALUATION OF BLUEFIELD SEEDING SOLUTIONS

## SEED SENSING TECHNOLOGY

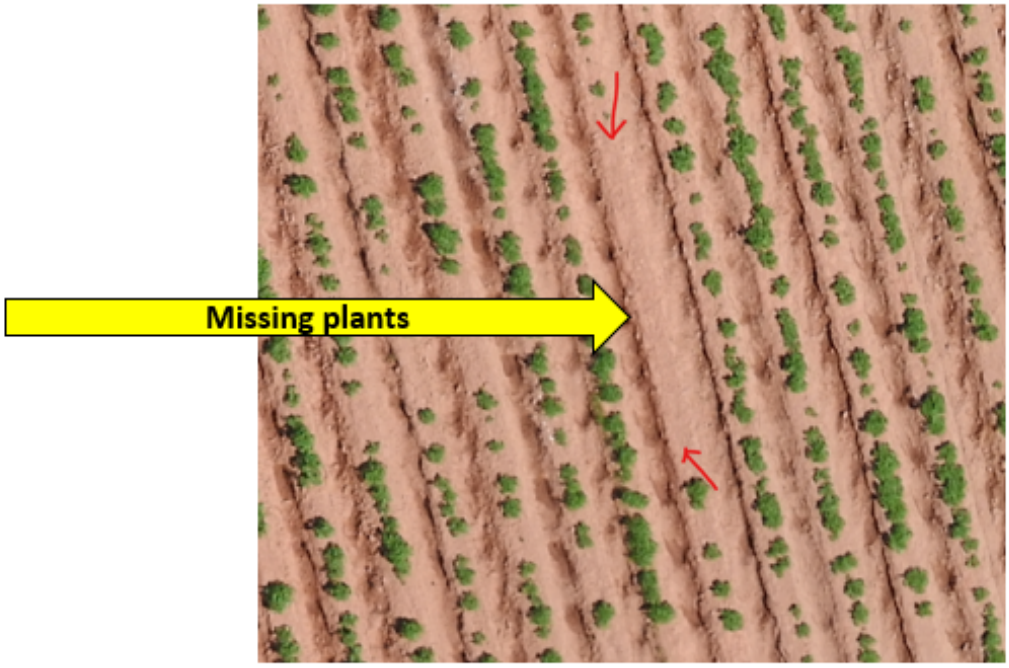
**Bluefield Seeding Solutions Inc. (BSSi) initiated development of a bolt on press wheel application to potato planters in 2013. This technology provided potato farmers with the opportunity to plant their crop at higher speeds while maintaining/improving seed placement accuracy. Recent evolution of the concept includes the addition of Seed Sensing Technology (SST) in the press wheels that provides users with real time seed placement information as the planter seeds the potato crop. This real time feedback of the sets' actual placement in the furrow enables the operator to continually maximize the planter's seed placement performance. Also, giving the operator the opportunity to substantially increase planting speed without sacrificing seed placement accuracy. Detecting issues in real time limits the risk of compromising planter performance which can result in long runs without seed or less than uniform seed placement.**

**This technology allows for more efficient fertilizer placement relative to the seed piece. By having more of the seed ideally spaced, the amount of nitrogen that each plant will have access to will be more uniform. This is conducive to increasing marketable yield and as well as improving nitrogen efficiency. Also, by reducing the amount of misses and decreasing the gaps between plants provides better nitrogen efficiency per acres by eliminating the wasted nitrogen branded in the furrow at those locations. Each seed lot to be planted on potato farms is a definitive amount regardless whether it is precut or not, meaning it is not endless. As seen in the photo below (taken from this on farm trial of the planter without SST) it is very hard to eliminate this wasted Nitrogen that was banded there for those plants without the real-time feedback of the SST. The acreage of this particular seed lot will be extended by the amount of these misses. Ultimately, placing the sets/seed more accurately in the furrow relative to the nitrogen fertilizer that has been brand or spread for that particular location (single plot for each plant) will immediately reduce wasted nitrogen (not used by plants) and enables potato farmers to fine tune the nitrogen requirements for each potato crop's end usage/market, resulting in less crop cullage.**

**Genesis Crop Systems Inc and Evan MacDonald *Precision Agronomist* initiated a series of field trials in commercial potato fields in Prince Edward Island, Canada in spring 2022 to identify the potential value proposition to adopters of this advanced precision ag device.**

**Experiment activities involved comparison of two Grimme 6 row planters: one with the SST system installed; the other without and operated at varying speeds. Trials were conducted at five unique sites featuring the Caribou (2), Clearwater (2) and Ranger Russet varieties. In row seed spacing was 9, 15.5 and 13" for the three varieties, respectively.**

**Data collected included plant accuracy, crop yield, economic value and environmental assessments of nitrogen use efficiency and $CO_2$ emissions associated with planting.**




**Plant spacing was more consistent, there were fewer skips and average plant size was larger in 4/5 fields in the trial with SST vs non-SST. In those 4 fields, there was statistical significance at 95 %. This was measured over 1000's of plants in each field – so a very large sample size.**

**Note the areas where the planter did not place seed. This results in inefficient use of all crop inputs applied and unnecessary loss of nitrogen fertilizer via $N_2O$ emissions into the atmosphere and $NO_3$ leaching downward into the soil profile.**

***Based on current PEI potato processing and fresh potato crop values*** **- While operating at similar speeds and using a base price of $15.00/cwt for processing and current market price for fresh, the SST system on average increased crop value by $309 and $679/acre for the two market outlets, respectively. The SST system produced higher yields of tubers in the 7-13oz size fraction which receives higher value in the fresh market. Although current PEI processing contracts do not provide incentives to growers for increasing yield of this size fraction, most French fry contracts in western North America do.**

**When the SST system was compared to the other planter operating at a slower ideal speed, yields and economic values differences were less evident but the SST system increased crop value by $30 and $110/acre for the two market outlets, respectively AND allowed for planting at 36% faster ground speeds, thus improving overall**

**efficiency of the planting operation and a reduction in overall fuel consumption during the planting process.**

***Based on estimates provided by John Deere Operations*** **Center - utilizing similar sized tractors operating at 3 and 4 mph and assuming similar planter drag weights, the SST system would plant 8.7 acres per hour operating at 4 mph vs the non-SST planter at 6.5 acres at 3 mph. Considering current diesel prices at +/-$2.25/liter, the SST system utilizes approx. 22L/acre vs 27L/acre for the non-SST system. This represents savings to the farmer of $11.25/acre for fuel cost and equally important, a reduction of 13 Kg/acre in $CO_2$ emissions. On a 600 acre farm enterprise, fuel savings could approach 3000L ($6750) and $CO_2$ emissions could decrease 7800Kg.**

**Investigators also considered crop use efficiency from a nitrogen use perspective. In this case the SST system increased the efficiency of N application by 2.8%, 2.5% and 4-6% for marketable yield, total yield and crop value based on crop usage, respectively for lbs of N applied/acre.**

**Updated January 14, 2023**