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High Speed Planting Technology

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Abstract

Iowa State University (ISU) recently completed a five-year study of high-speed planter equipment in corn and soybeans. The study utilized a 12-row planter equipped with the Precision Planting SpeedTube high speed planter system and a 24-row planter equipped with the John Deere ExactEmerge high speed planter system (Figure 1). Both planters utilized individual row hydraulic downforce and were tested using a side-by-side strip trial experimental design. Each planter was used on approximately 400 acres per year. Additionally, a third planter with a standard drop tube seed delivery system was included in select fields for seed spacing comparisons.

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Iowa State University (ISU) recently completed a five-year study of high-speed planter equipment in corn and soybeans. The study utilized a 12-row planter equipped with the Precision Planting *SpeedTube* high speed planter system and a 24-row planter equipped with the John Deere *ExactEmerge* high speed planter system (Figure 1). Both planters utilized individual row hydraulic downforce and were tested using a side-by-side strip trial experimental design. Each planter was used on approximately 400 acres per year. Additionally, a third planter with a standard drop tube seed delivery system was included in select fields for seed spacing comparisons.

Figure 1. Seed delivery system for Precision Planting SpeedTube (left), John Deere ExactEmerge (right). Photos courtesy of Precision Planting and John Deere.

Crop yield, particularly in corn, may be influenced by seed singulation and spacing. The most significant yield losses occur when 'skips' occur at the planter meter, which result in no seed being planted. This creates a total yield loss for that potential plant. Overplanting with doubles or crowding plants through poor singulation will also cause reductions in yield. As a general rule of thumb, a standard deviation of two inches is acceptable for well-maintained traditional planters and will result in minimal yield impacts in corn. Both high speed planters tested showed consistent and distinctive corn spacing at all speeds tested (Figure 2). Traditional drop tube planters exhibited a noticeable trend in reduced spacing consistency when speeds increased from 5 to 10 miles per hour.

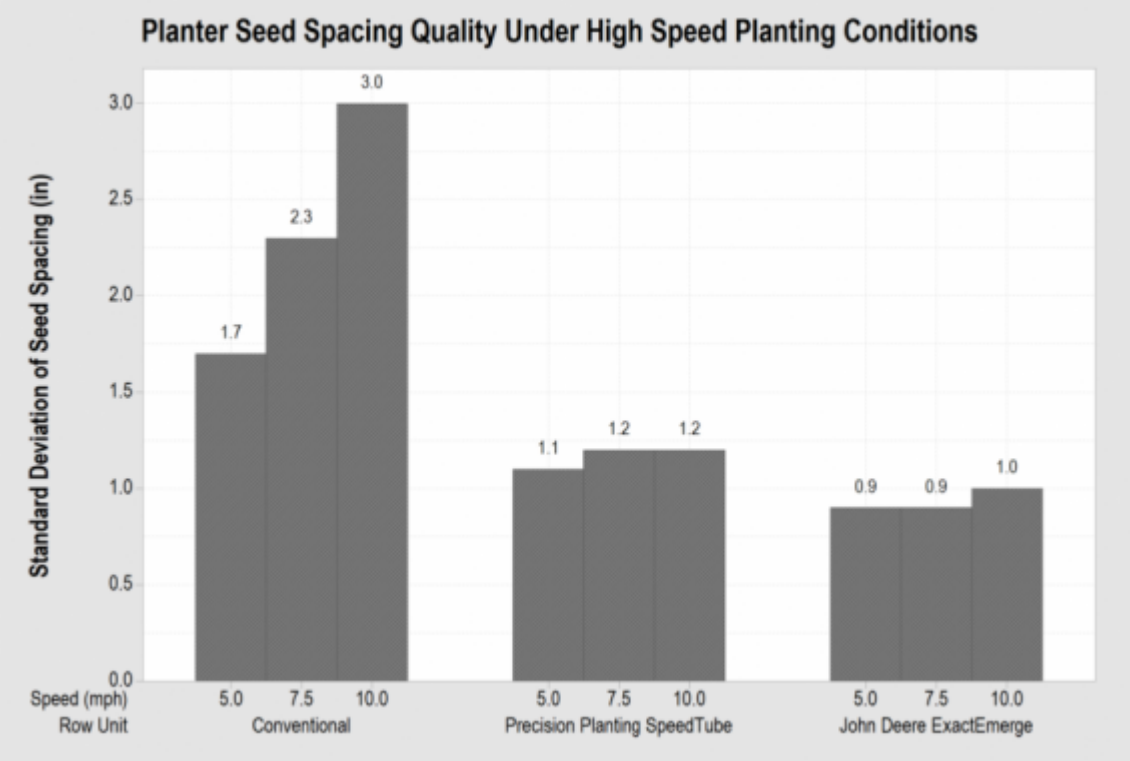

Figure 2. Summary of corn spacing uniformity for conventional and high-speed planting systems. High speed planter systems maintain high quality placement uniformity independent of planting speed and eliminate the risk of yield reductions from seed spacing in corn.

Downforce and closing wheels

High speed planting will require increased row unit downforce and increased closing wheel force due to the increased planter travel speed. The exact settings for each system will be dependent on your field conditions and spring tillage practices. In general, expect 20-40 pounds of increased downforce margin and one additional notch in the closing wheel pressure when planting at speeds over 8 mph.

As expected, increasing planter speed resulted in a direct improvement in planter productivity. In the majority of field conditions, we found 8-9 miles per hour to provide a good balance of increased productivity with excellent seed singulation and placement and minimal challenges associated with row unit bounce or loss of ground contact.

Considerations for Soybeans

Improved soybean singulation with high speed planters did result in improved survival rate of soybeans. On average, the *ExactEmerge* planter produced soybean survival rates of 84% as compared to survival rates of 77% for the *SpeedTube* planter (Figure 3). Experiments showed that the difference in survival rates correlated with the increase in planted doubles and triples with the *SpeedTube* design and the increased death rate of these crowded plants. All soybeans in this trial were treated with fungicide prior to planting. Improvements in soybean survival rates offer a direct opportunity to reduce seed input costs and achieve an equivalent at harvest population.

High speed planting of large soybeans did create some challenges with the Precision Planting seed delivery systems. The *SpeedTube* seed delivery tubes were susceptible to plugging when planting large soybeans (2,750 seeds/pound or less) at rates exceeding 100 seeds/sec. This corresponds to a maximum speed of approximately 7 miles per hour when planting 160,000 seeds/acre in 30 inch rows. No plugging issues were observed in the *ExactEmerge* planter when planting the same seed size due to the differences in the seed delivery system design.

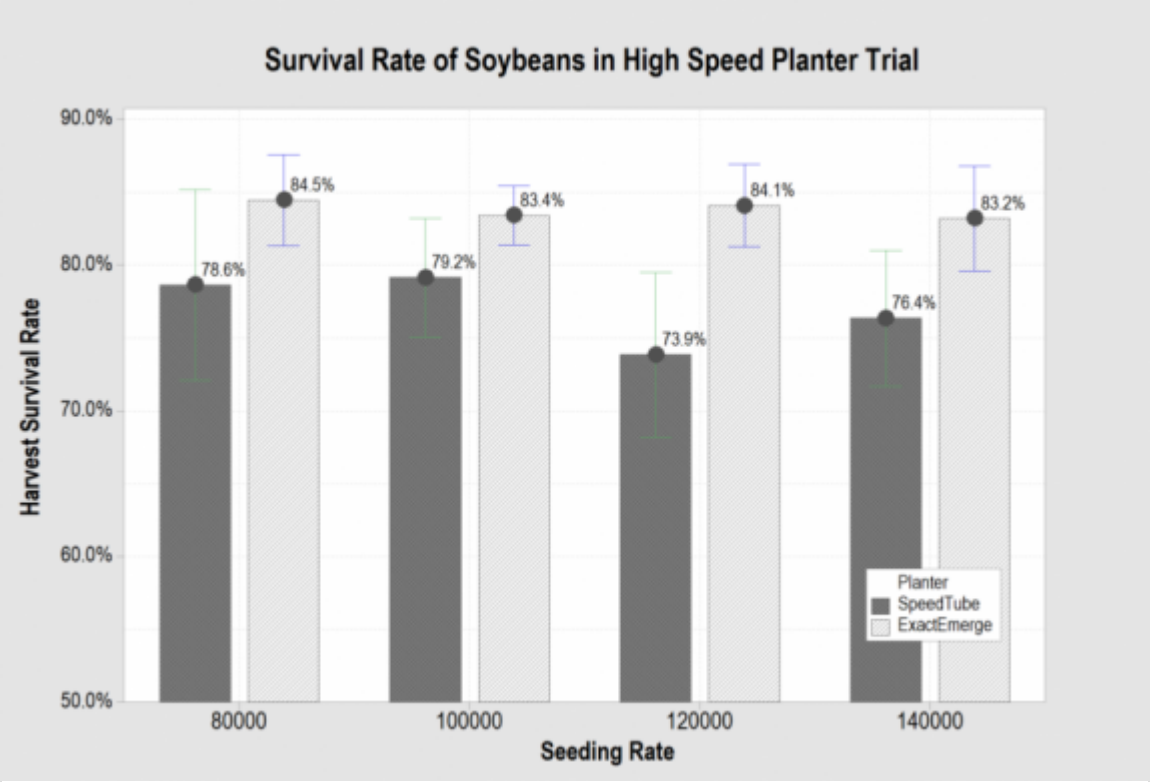

Figure 3. Summary of soybean survival rate comparison between high speed planter technologies. High speed planters that provide true singulation of soybean will have a higher soybean survival rate due to reduced seed doubles and plant crowding.

Conclusions

Two high speed planting systems were evaluated as part of a five-year, field scale study on planting system performance. Both systems demonstrated excellent corn singulation and spacing at speeds up to 10 miles per hour and confirmed the manufacturer advertised performance expectations. High speed planting can significantly increase daily planting productivity which will allow more crop to be planted during tight planting windows.

Category: Equipment and Machinery

Tags: high speed planting planting planting equipment seed spacing

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Ryan Bergman is a Program Coordinator in Ag Technology at Iowa State University where he is part of a 20+ person research team focusing on precision agriculture, big data, telematics, data analytics, aerial imagery, and ag machinery automation. Ryan has received both his bachelor's and mas...