



Precision Planting in Wheat

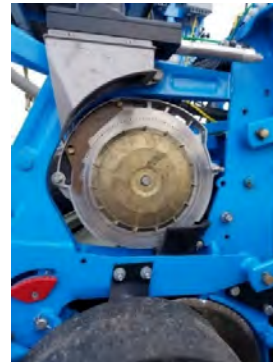
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- **Problem:** Conventional seed drill currently used to plant wheat can result in non-uniform seeding depth as well as within-row seed spacing causing poor germination, crown root development, tillering, and reduced yield potential.
- **Hypothesis:** Uniform spatial distribution of plants resulting from precise placement (i.e. improved singulation and uniform seeding depth) of seed can lead to increased resources use efficiency, reduced plant-to-plant competition, and improved plant health; resulting in low input cost and increased yield.
- **Objective:** Design a crop canopy structure (using row spacing x seeding rate x variety) that can maximize light interception early in the season and lead to higher yield and lower input cost.
- **Methods:** Research plots were planted at MSU campus and Tuscola county in 2017-18 and 2018-19 seasons using a precision planter (Monosem 4NG) with 4 row spacings (5", 7.5", 10", and 15") and a seed drill (7.5" row spacing), using 4 seeding rates (ranging from 0.5 million to 2.4 million seeds/acre) each year.



Conventional drill with rotating gear that "spills" seed into the drop tube



Precision planter with vacuum that picks up individual seeds and drops one seed at a time down the drop tube

Preliminary Results

- Precision planter ensured more uniform seeding depth compared to the seed drill, leading to uniform plant development. This could lead to increased fungicide efficacy.
- Seed-to-seed spacing was more consistent in plots planted with precision planter, resulting in uniform tiller development compared with the drilled plots which had higher variability.
- Canopy closure was achieved faster in 5" spacing and was similar to 7.5" spacing, but delayed in 10" and 15" row spacing across all seeding rates. Seeding rate of 1.3 million seeds/acre closed canopy at similar rate to 1.85 and 2.4 million seeds/acre but faster than 0.75 million seeds/acre across all row spacings.
- Wheat yield in 5" row spacing and 1.3 million seeds/acre did not differ from 7.5" or 10" spacing and 1.85 or 2.4 million seeds/acre, but was higher than 15" spacing and 0.75 million seeds/acre.
- Wheat varieties differing in leaf angles might respond differently to variation in row spacing and seed rate.



5" spacing



7.5" spacing



10" spacing



15" spacing



Narrow & wide leaf angle