

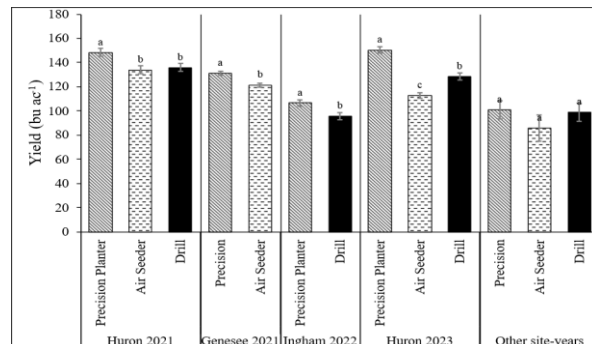


Innovative Wheat Planting Strategies

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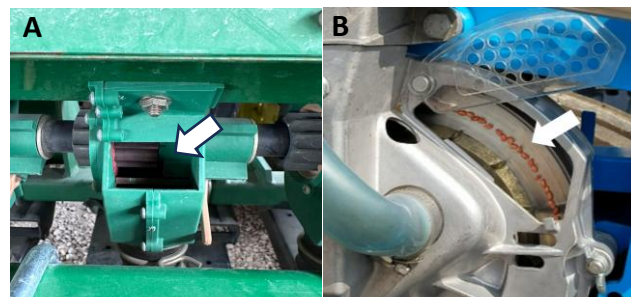
- **Overall goal:** Build a system-level approach to maximize resource capture (light, water, nutrients), profits, achieve higher yields, and lower annual input costs for wheat growers.
- Combine variety (genetics) with management for your environment (G x E x M interactions).
- This can be achieved by optimizing various planting strategies such as seed placement accuracy, row spacing, seeding rate, as well as selection of ideal wheat varietal canopy.

- **Timely planting** is critical. **Manage other crops** in the system accordingly (e.g., soybean).
- When to start planting? Soon after hessian fly-safe date (as a rule of thumb). Magnitude of yield penalty with later planting depends on weather.
- **How much seed** to use (seed/acre and not bu/ac): lowest for Sept plantings (≤ 1.0 million/ac) and increase with planting delays to early/mid Oct. (1.2 – 1.4 m/ac) and after mid-Oct (≥ 1.6 m/ac).

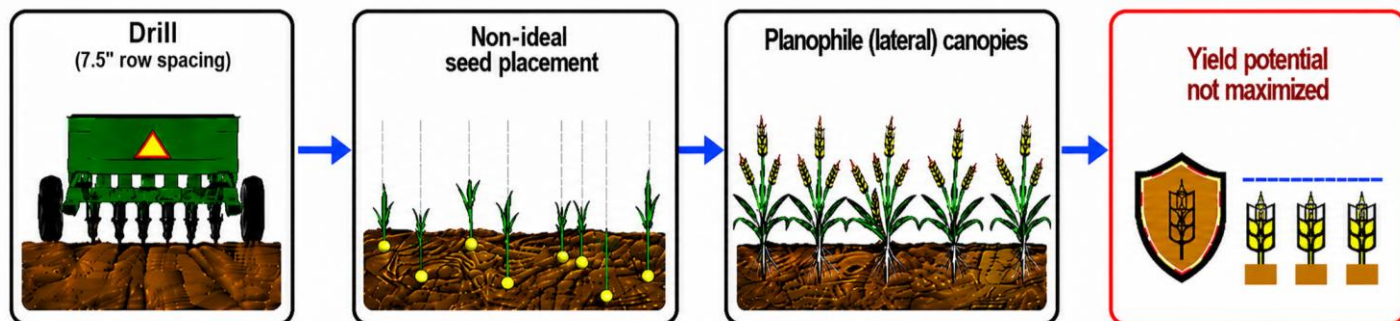
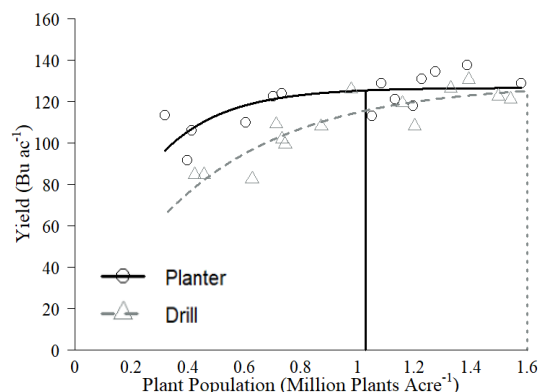


On-farm research with planting methods over 3 years (2021-2023) at 17 site-years in Michigan

- **Planting methods.** Our past work has shown minimal yield loss with faster planting technology such as broadcast incorporation, compared to the grain drill.
- Our data from on-farm trials showed the benefits of **narrow row spacing** (5-inch) in combination with **precision planting**, with 8–33% yield increase over drill (7.5-inch rows) across all responsive site-years.
- Lower variability in seeding depth and spacing, increased/uniform tillering, faster canopy closure led to improved yields.
- Plant population (and seeding rates) to achieve maximum yield was lower in precision planting, showing potential for **cost savings**.
- Precision planting systems also showed 36% reduction in vomitoxin in a location with high head scab pressure.



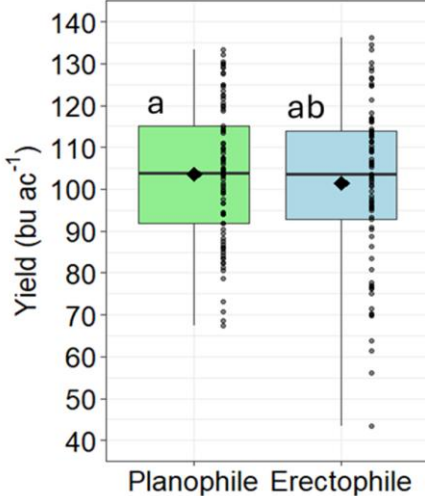
(A) Grain drill: volumetric metering system; (B) Precision Planter: vacuum-driven precision metering



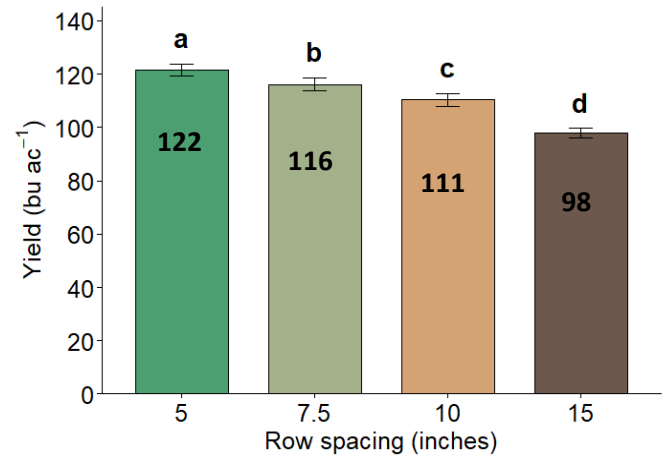
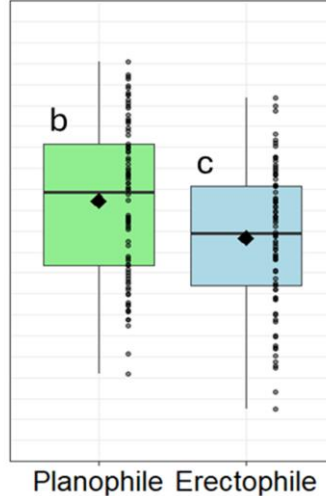


Planophile (lateral) and erectophile (upright) varieties (ABOVE);
Yield impacts of canopy types across planting date (BELOW)

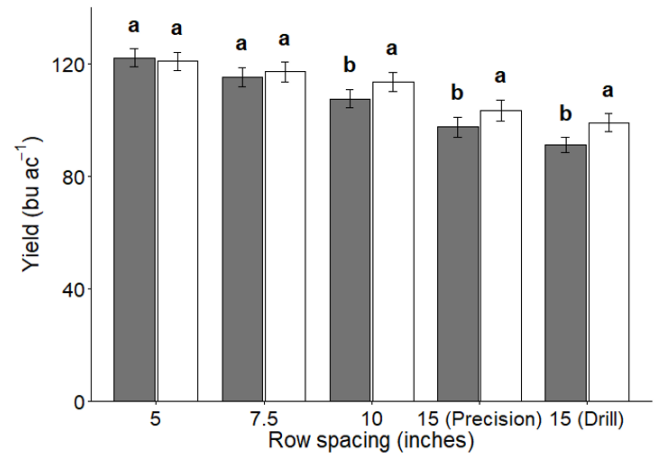
Optimal Planting



Late Planting

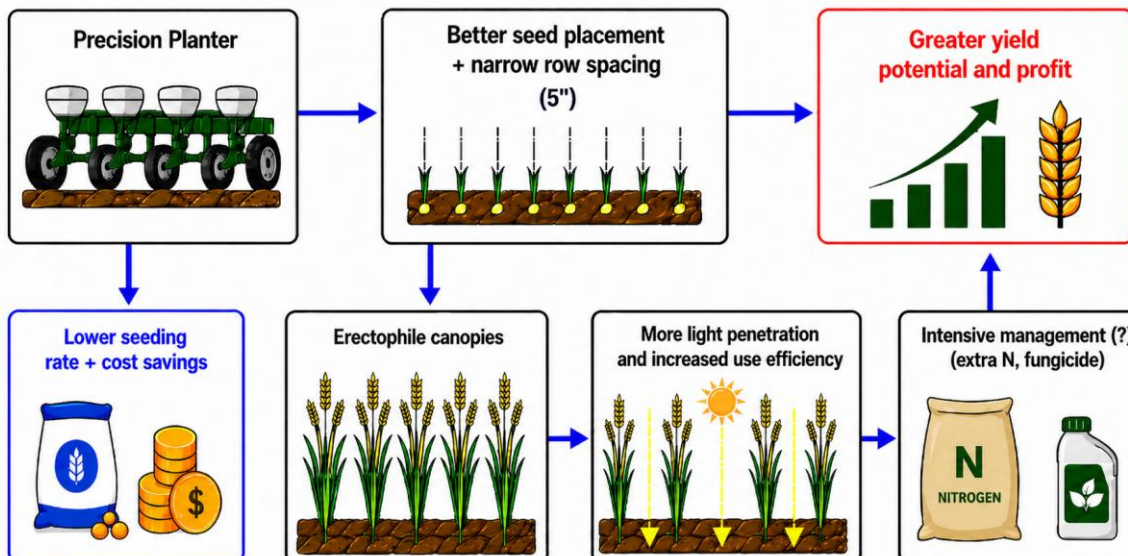


Canopy type ■ Erectophile □ Planophile



Yield across row spacings and canopy type
(2 varieties each) compiled from 3 Michigan site years.

- Growers can take advantage of winter wheat varieties differing in **canopy types**, ranging from planophile (lateral) to erectophile (upright) with wide variation in tiller angle.
- **Erectophile varieties** are not suited for low yield environments such as late plantings or wider rows. They are more beneficial in high-yield systems (such as early planting, narrow rows, intensive management), where deeper light penetration helps sustain photosynthesis throughout the canopy. They also fit well in a **relay intercropping** wheat-soybean system.
- **Planophile varieties** are better suited to lower yield environments (e.g., late planting, wider rows, low stands), where rapid canopy closure is needed to capture light and suppress weeds.



Additional benefits of this system includes weed suppression and moisture conservation, but their effectiveness must be further studied, along with role of narrow rows vs precise seed placement