Innovative Device Counts Corn Stalks In Experimental Fields

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Agricultural businesses that develop and market corn seed varieties typically use high school students or other unskilled labour to walk their experimental fields counting corn stalks. The information is useful in determining important seed qualities and planter efficiency. This tedious task often leads to significant counting errors and inconsistencies.

To improve the process of counting corn stalks and gather other important information from agricultural fields, University of Illinois agricultural engineer Tony Grift developed an innovative device that eliminates the need for manually counting plants. Mounted with laser transmitters and an onboard computer, the machine allows for corn stalk counting to be accomplished with greater ease and enhanced accuracy.

"In experimental corn fields, an important performance indicator is the number of plants that emerge as a proxy for seed germination rate," said Grift. "Another important factor is the spacing between plants and the presence of 'doubles'. Doubles are caused by dual seeds that have dropped close together, resulting in two inferior plants rather than a single, full-grown plant. Consistent spacing and the absence or presence of doubles can serve as a quality measure of a planter."

The corn stalk counter is built on a tricycle-style frame and employs a laser-based photo-interruption mechanism. Two sensor arrays, each capable of generating four laser beams, are mounted on the sides of the machine. The distance between the centers of the sensor arrays is 75 cm, which is typical spacing between rows for Midwestern crops. The left and right sensor arrays can be moved up and down to accommodate plant sizes. The machine is powered by a 12-volt battery, and a dual power converter provides power for an onboard computer and 15-inch flat panel monitor.

As the corn stalk counter is manually driven down rows of corn, the laser beams are intercepted by the plants and information is recorded on the number of corn stalks, corn stalk diameters, plant spacing, and driving speed.

"By knowing the spacing between plants, it is possible to detect plants that are growing undesirably close together. To thin the population, the system could be used to identify the first plant in existing doubles and mark them for removal," Grift said.

The corn stalk counter has proven its abilities in the laboratory and is scheduled for testing in the field. Additional potential uses for the groundbreaking device are also being investigated.

"Since the machine measures plant diameter, it can potentially be used to determine how large the plants are and their potential biomass yield," Grift said. "In future developments, the system could be adapted and installed on a harvester to monitor biomass yield for corn stover, Miscanthus, switchgrass, and other agricultural biomass grown for bioenergy uses." Δ