EVALUATING OPERATOR FEEDBACK ACCURACY OF ROW-GUIDANCE SYSTEMS WITH GPS

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ABSTRACT

Experienced agricultural equipment operators were used to compare three commercially available GPS-based row-guidance systems to the industry standard, foam markers, for parallel-swathing applications. Guidance systems were selected to represent the range of current technology and operator feedback interfaces available. Interfaces included a single row of LEDs to indicate positional error; two parallel rows of LEDs, one row to indicate positional error and the other row to provide feedback on the angle between the desired positional vector and the actual velocity vectors (i.e. how quick the operator is reacting to the positional error); and a graphical LCD screen display to indicate positional error.

An RTK receiver and base station were used to provide centimeter-accuracy positional data for the guidance units, removing concerns associated with biasing one guidance system over the other due to DGPS position errors. Driver accuracy results based on the RTK-GPS positional data were used to compute overlap and skip areas as well as off-track distance errors.

There was no significant difference between the performance of the different GPS-based systems; however, drivers using the foam markers had more overlap and skip. This indicated that a driver's accuracy improved when using GPS-based guidance systems. Statistically, GPS guidance systems did not differ; however, mean values indicated that drivers were less accurate using the graphical display than the lightbars. Vehicle ground speed did not statistically influence operator accuracy; however, mean values indicated that high speeds had greater mean errors than slow speeds, and a learning curve was not distinguishable between passes.

Keywords: Precision Agriculture, GPS, Guidance Systems, Parallel Swaths