Research

Agriculture must continually find a balance between productivity and environmental sustainability. Mechanized field equipment operations (tillage, planting, chemical application, harvest) have the capacity to help or hinder these objectives. Dr. Hanna’s research focuses on developing ways for field equipment to enhance productivity and environmental stewardship as machinery interacts with crops and soils. Applied research is accompanied by field days, conferences, and other outreach activities with the agricultural industry.

Chemical application

Off-target spray movement (drift) results in less efficacious use of product and potential undesirable environmental consequences. Application parameters such as sprayer configuration and ambient air conditions impact drift potential. Applied research is investigating possible equipment solutions to reduce drift while maintaining spray efficacy for the targeted pest.

Energy

Diesel fuel used for crop production is a significant input cost for growers. Methods to manage or reduce this cost improve profitability and lessen use of non-renewable fuel. Unique machinery applications are tested in applied research along with methods to reduce energy consumption while maintaining overall productivity.

Nutrient application

Precision nutrient application across the swath is still just a goal for materials such as anhydrous ammonia and manure. Because of application equipment inaccuracy, many farmers tend to over-apply, wasting money and degrading the environment.

Tillage/planting

Soil resources can be improved or degraded by the actions of tillage tools and equipment tracks. The effects of reduced- and no-tillage systems on soil and plants are being evaluated. The effects of high axle loads (manure tankers, grain carts) on soil compaction/crop yield are also being assessed.

Harvest

The operation of field machinery affects crop quantity and quality. In turn, evolving cultural developments (e.g., row spacing) and quality demands from end users affect optimum machine design and operation. For those reasons, projects have evaluated narrow-row cornheads and mower/conditioner designs.