Perennial solutions to annual problems?

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Society is demanding more sustainable bioenergy and agricultural systems, but farmers who could provide both do not have sufficient information to confidently change from the status quo. This presentation will present results of novel modelling assessments that indicate the agriculturally dominate state of Iowa, USA, could achieve nearly half of state water quality improvement targets simply by converting highly unprofitable parts of corn/soybean fields to switchgrass (*Panicum virgatum* L.) using a precision conservation approach. Further, this approach would meet nearly 1% of federal billion-ton biomass targets, while improving the overall farm economy. Implementing precision conservation, however, requires high-quality land and crop data, as well as widespread adoption of modern agricultural equipment. In the interim, steady markets for biomass could increase whole-field adoption of perennials with improved ecosystem services. I will describe current progress with miscanthus (*Miscanthus × giganteus* Greef et Deu.) in Eastern Iowa, where it is being grown on >800 ha for heat and power generation, under 10-yr contracts that provide a stable market. I will also provide results from the Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS) project, the first replicated chronosequence miscanthus field trial. LAMPS is elucidating the way nitrogen demand in this perennial crop changes with crop age, with implications for other perennial grasses as well as long-term crop sustainability. We integrate research results to generate new understanding that farmers, lenders, and industry stakeholders need to assess the risk and resilience of bioenergy and agricultural systems.

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