

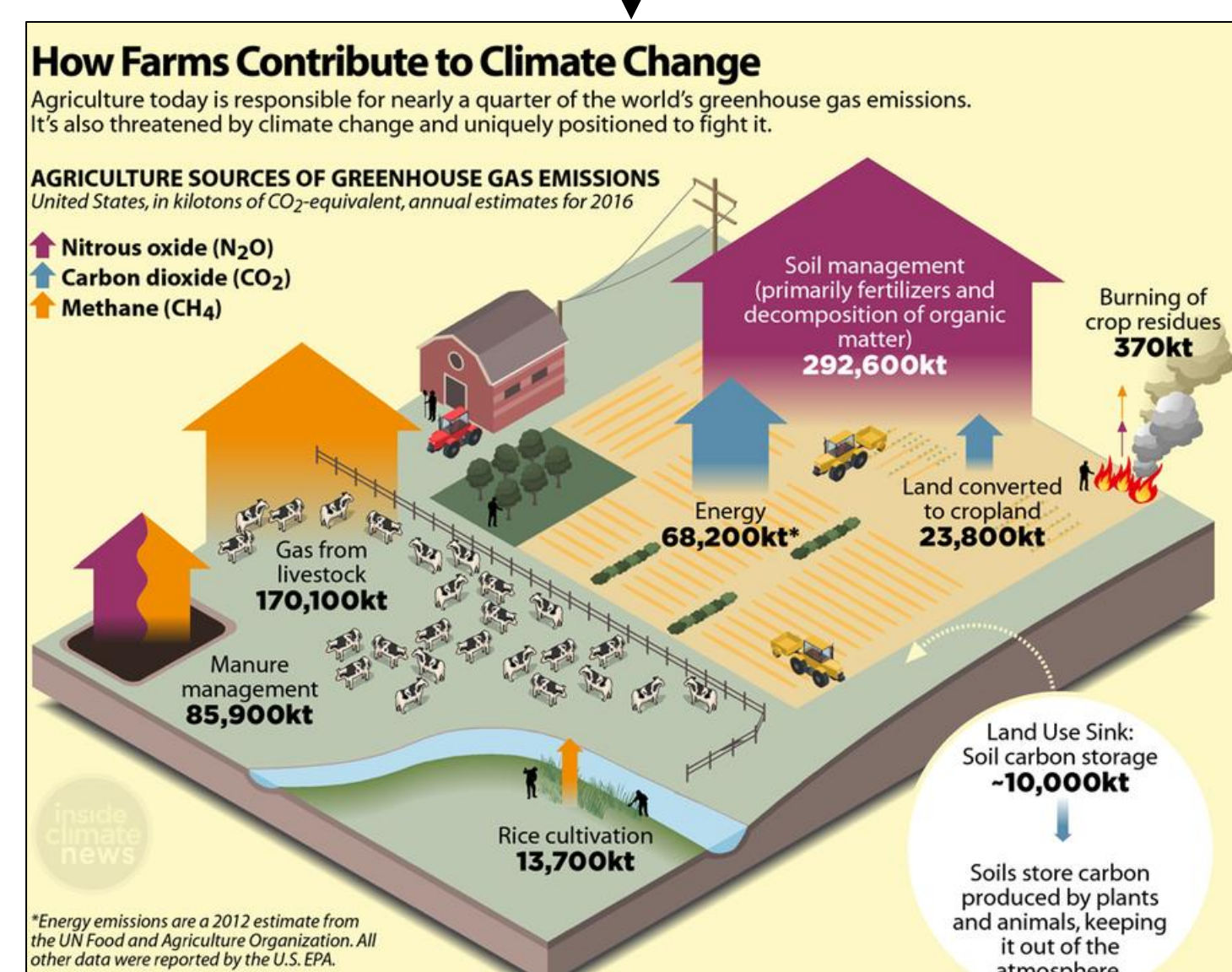
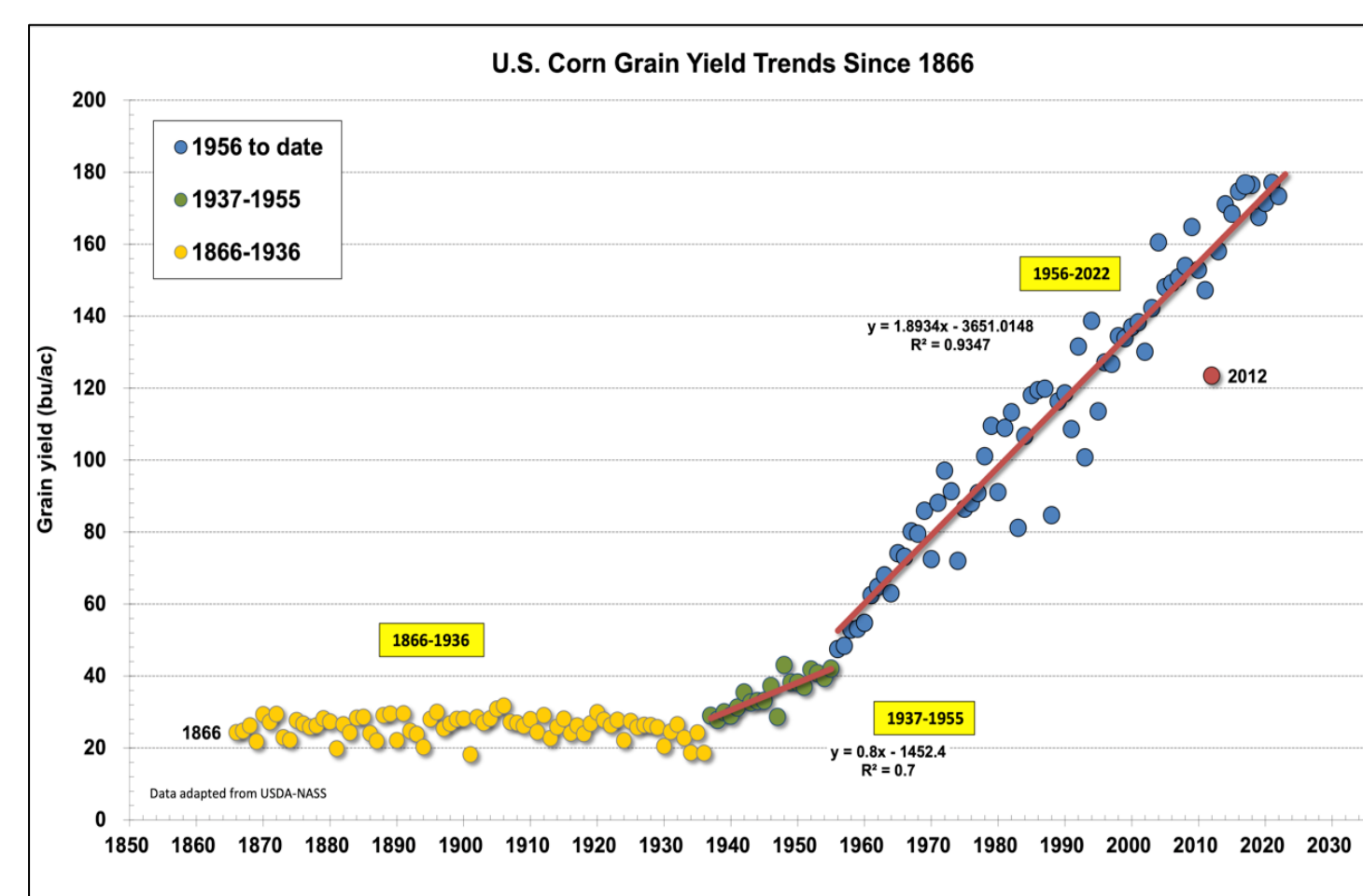
The Complement of Simulation Modeling Towards Improved Nitrogen Management

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OVERVIEW



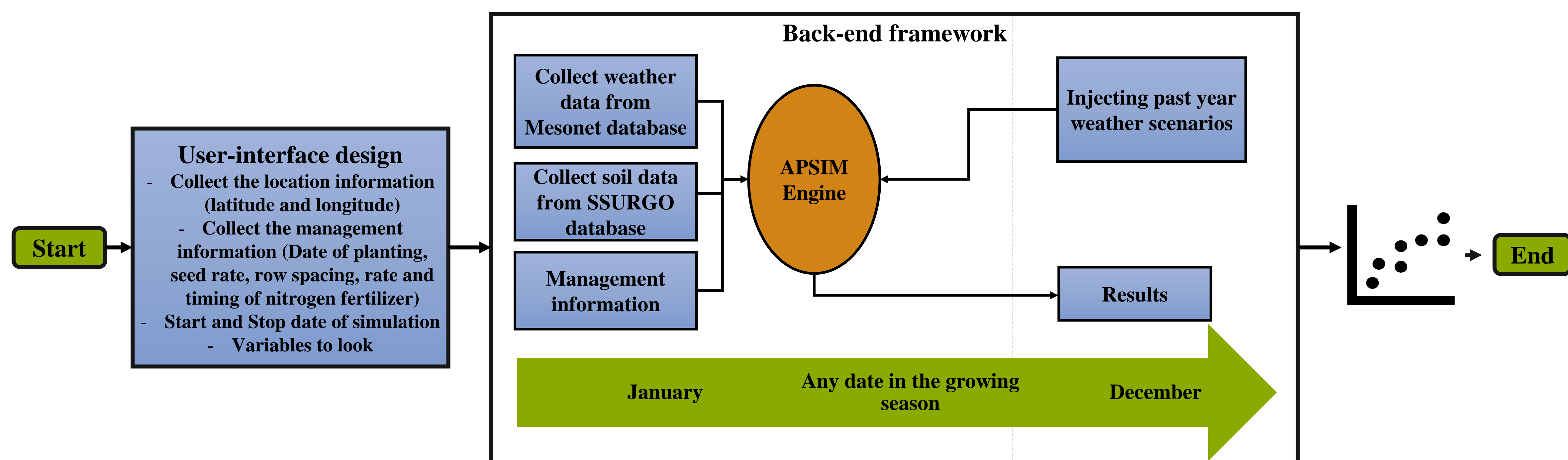
- Traditional methods of nitrogen management were based on field experiments and trails, which fail to consider different environmental and management scenarios, hence cannot be extrapolated accurately on larger scale
- Remote sensing methods are good alternative of them but has high input cost associated with them
- Field trails and remote sensing methods can have limited number of scenarios and cannot comment on environmental and economic sustainability
- Crop growth and yield are site and season specific, therefore adaptive management based on context are required
- Deploying crop growth models, such as APSIM could help in overcoming all the beforementioned limitations and can help in making adaptive decisions based on context and weather information

OBJECTIVE

To develop a decision-support tool for recommending the amount and timing of nitrogen fertilizer for corn fields based on management, soil, and weather information

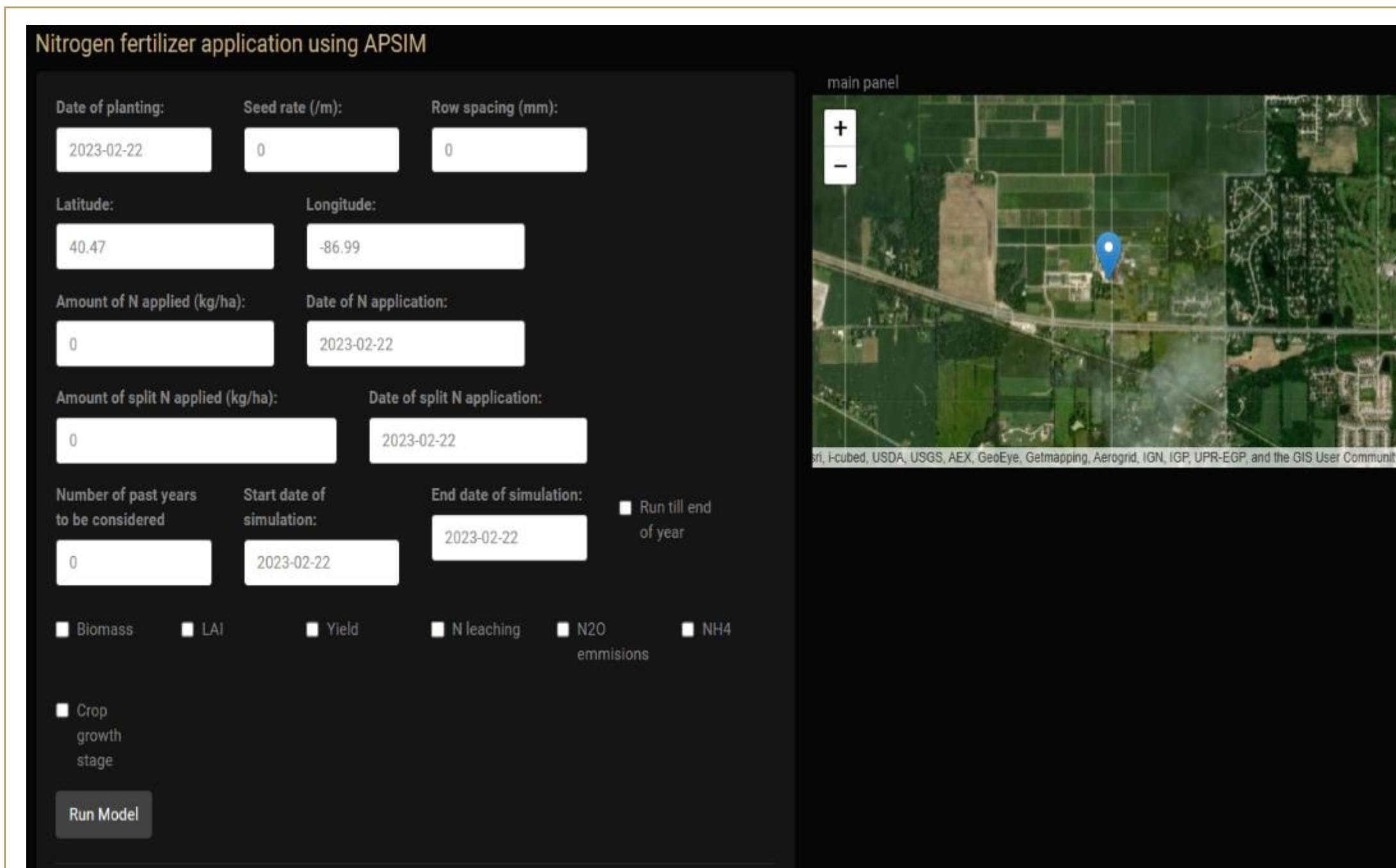
By integrating Agricultural Production System simulator (APSIM) with Shiny R

METHODOLOGY



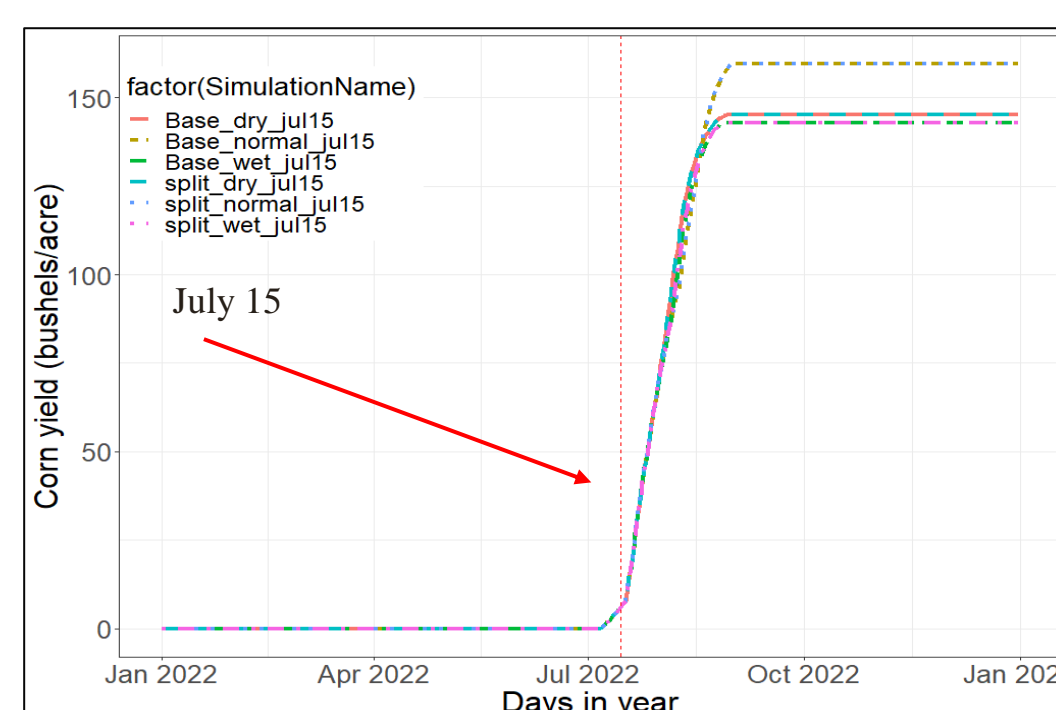
- Three weather scenarios (dry, wet, and normal) were setup with two different types of nitrogen treatments
- Two dates within the season (July 15 and August 15) were used as stopping dates for projecting future scenarios
- Treatment 1: starter fertilizer + side-dress of 300 kg/ha of Urea applied 28 days after planting
- Treatment 2: starter fertilizer + side-dress of 240 kg/ha of Urea applied 28 days after planting + 90 kg/ha of Urea applied 21 days after first application

RESULTS AND DISCUSSION

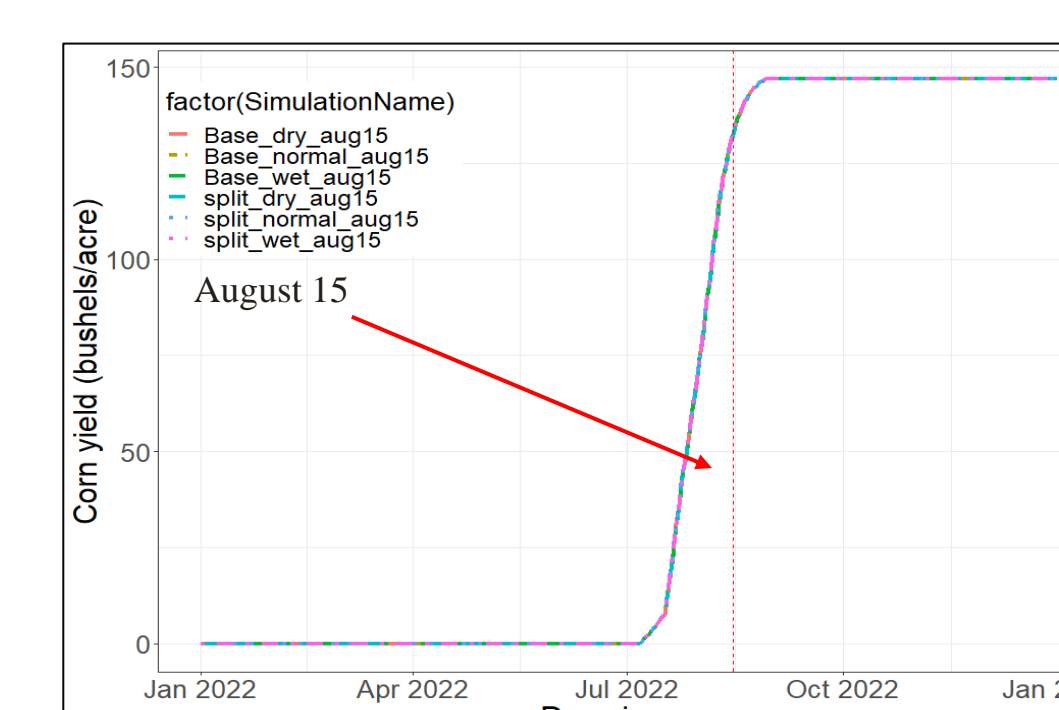


- Corn yield is greatly influenced by the interaction between nitrogen fertilizer application and the amount of rainfall during the growing season
- Excessive water and water stress conditions can substantially decrease corn yield
- Implementing decision-support tools for informed decision-making can considerably enhance corn yield and increase farmers profit
- Late-season fertilization does not have a significant impact on corn yield
- Contextual data plays a pivotal role in making informed decisions for the farm

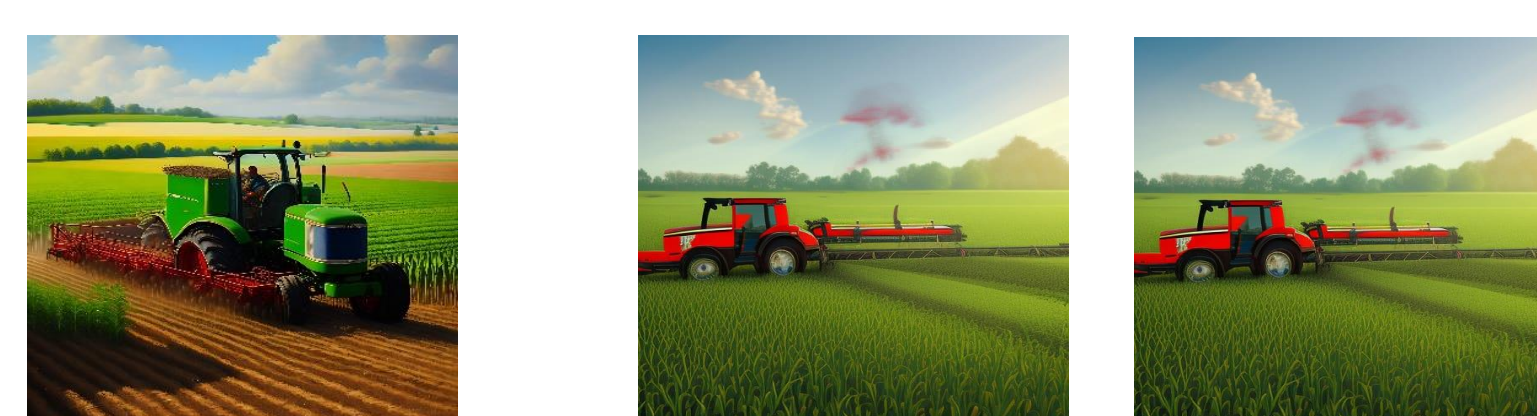
Projecting early in the season, provides us with the range of prediction outputs depending on the weather scenarios



*Entire amount of fertilizer applied at once
** Split of 80 percent as first and 30 percent in second side dress



Projecting later in the season, does not provide variations in the output, as the growing season almost comes to an end



Running till the end of season

January April 10 (planting) May 10, first side-dress* May 31, second side-dress** December

CONCLUSIONS

- Integrating crop growth models, such as APSIM, into a user-friendly interface enables farmers to make informed decisions for their field
- Decision-support tools could help farmers make adaptive decision for their field and farm based on their own field conditions rather than following the normal practices
- Fertilizing late in the season will not result in significant corn yield
- The amount of rainfall within the season plays a crucial role in corn yield, even when subjected to identical treatments
- Utilizing contextual data enhances farmers ability in making informed decision for their farm

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