



2021

Research Protocol



Artificial Intelligence Derived Management Recommendations for Soybean

Our Goal: To compare yield and profitability of your current soybean cropping systems with AI recommended systems on your farm.

Identification of optimum cropping systems at the field level is the ultimate objective of farmers. This research can evaluate the effectiveness of emerging AI-based tools that guide farmer’s decisions and ultimately affect their overall income. An AI tool was created using machine learning and large databases and has the potential to identify thousands of possible cropping systems a farmer can choose for a single field and then optimizing a cropping system for the greatest yield or for greatest profitability. The tool estimates yield by accounting for field location, soil type, weather conditions and several management practices.

WHAT WE NEED FROM YOU:

- Information about your typical soybean management and changes you are able to do to that system
- Fill out the attached form and return to us prior to the planting season
- Plant soybean in three management systems similar to plot layout shown below
- Harvest the plot using a well calibrated yield monitor
- Provide the data and management information to us

WHAT WE WILL DO FOR YOU:

- Calculate two management systems for your specific field: One for high yield and one for high profit
- Analysis of the data from your farm
- Protect the confidentiality of your yield data
- \$500 honorarium for your efforts

SUGGESTED PLOT LAYOUT

The following is an example treatment design for a three-management system comparison. A total of 3 replicates needs to be harvested for this trial.

NOTE: Yield from the full header width needs to be obtained for each treatment strip shown below.

| | | |
|----------------------|-------------------------|-------------------------|
| Replication 1 | Typical cropping system | Yield from header width |
| | AI Max yield system | Yield from header width |
| | AI Max profit system | Yield from header width |
| Replication 2 | AI Max yield system | Yield from header width |
| | AI Max profit system | Yield from header width |
| | Typical cropping system | Yield from header width |
| Replication 3 | AI Max profit system | Yield from header width |
| | Typical cropping system | Yield from header width |
| | AI Max yield system | Yield from header width |

To get involved with this research, please contact us!

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Grower:

Information of field and typical management used.

| Input | Typical cropping system EXAMPLE | Can you make changes? <u>If yes, list additional options/ranges you can apply</u> EXAMPLE | <u>YOUR</u> typical cropping system | Can you make changes? <u>If yes, list additional options/ranges you can apply</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------------------------------|---|--|--|---|--------------|------|-----|---|--------------|------------------------|-----|---|--------------|------------------------------------|-----|---|-----|------|-----|---|-----|------------------------|-----|---|-----|------------------------------------|-----|-------------------------------|---|--|--|
| 1. Approximate GPS coordinates | 43.695, -88.258 | ----- | | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Soil type (choose from: silty loam, clay, silty clay, sandy loam, clay loam, silty clay loam, loam, loamy sand, sand, silt, sandy clay loam) | silty loam | ----- | | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Is there subsurface drainage in the field | no | ----- | | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Irrigation | no | ----- | | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Previous crop | corn | ----- | | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Tillage (choose from: Conventional, Reduced, No-till) | Conventional | ----- | | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Use of foliar fungicide Also report cost of product + application | No | Yes \$/ac:20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. Planting date (approximate) | May 15 th | Earlier and Later | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. Row spacing (inches) | 30 | 15, 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. Seeding rate (seeds/ac) | 150,000 | Any rate between 80,000 and 300,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. Variety trait, seed treatment, maturity combinations. Choose Combo from 1 to 6 and maturity: <table border="1" data-bbox="94 1121 594 1528"> <thead> <tr> <th>Combo</th> <th>Trait</th> <th>Seed treatment</th> <th>RM Maturity group</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Conventional</td> <td>None</td> <td>Any</td> </tr> <tr> <td>2</td> <td>Conventional</td> <td>Fungicide+ Insecticide</td> <td>Any</td> </tr> <tr> <td>3</td> <td>Conventional</td> <td>Fungicide+ Insecticide+ Nematicide</td> <td>Any</td> </tr> <tr> <td>4</td> <td>GMO</td> <td>None</td> <td>Any</td> </tr> <tr> <td>5</td> <td>GMO</td> <td>Fungicide+ Insecticide</td> <td>Any</td> </tr> <tr> <td>6</td> <td>GMO</td> <td>Fungicide+ Insecticide+ Nematicide</td> <td>Any</td> </tr> </tbody> </table> | Combo | Trait | Seed treatment | RM Maturity group | 1 | Conventional | None | Any | 2 | Conventional | Fungicide+ Insecticide | Any | 3 | Conventional | Fungicide+ Insecticide+ Nematicide | Any | 4 | GMO | None | Any | 5 | GMO | Fungicide+ Insecticide | Any | 6 | GMO | Fungicide+ Insecticide+ Nematicide | Any | Combo 5 – 1.5 MG \$/bag:50 | Combo/RM:1 - 1.2 \$/bag:35 Combo/RM:3 - 1.6 \$/bag:41 Combo/RM:4 - 2 \$/bag:48 Combo/RMy:6 - 2.1 \$/bag:56 | | Combo/RM: \$/bag: Combo/RM: \$/bag: Combo/RM: \$/bag: Combo/RM: \$/bag: |
| Combo | Trait | Seed treatment | RM Maturity group | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Conventional | None | Any | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Conventional | Fungicide+ Insecticide | Any | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Conventional | Fungicide+ Insecticide+ Nematicide | Any | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | GMO | None | Any | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | GMO | Fungicide+ Insecticide | Any | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | GMO | Fungicide+ Insecticide+ Nematicide | Any | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12. Nitrogen rate (in lbs N/ac) Also report cost \$/lb N | 0 lbs N/a | 100 lbs N/a 0.35 \$/lb N | | _____ lbs N/a \$ _____ per lb N | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Economic analysis will be performed based on cost estimates above and soybean price. What is the estimated soybean selling price? | | | | \$ _____/bu | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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