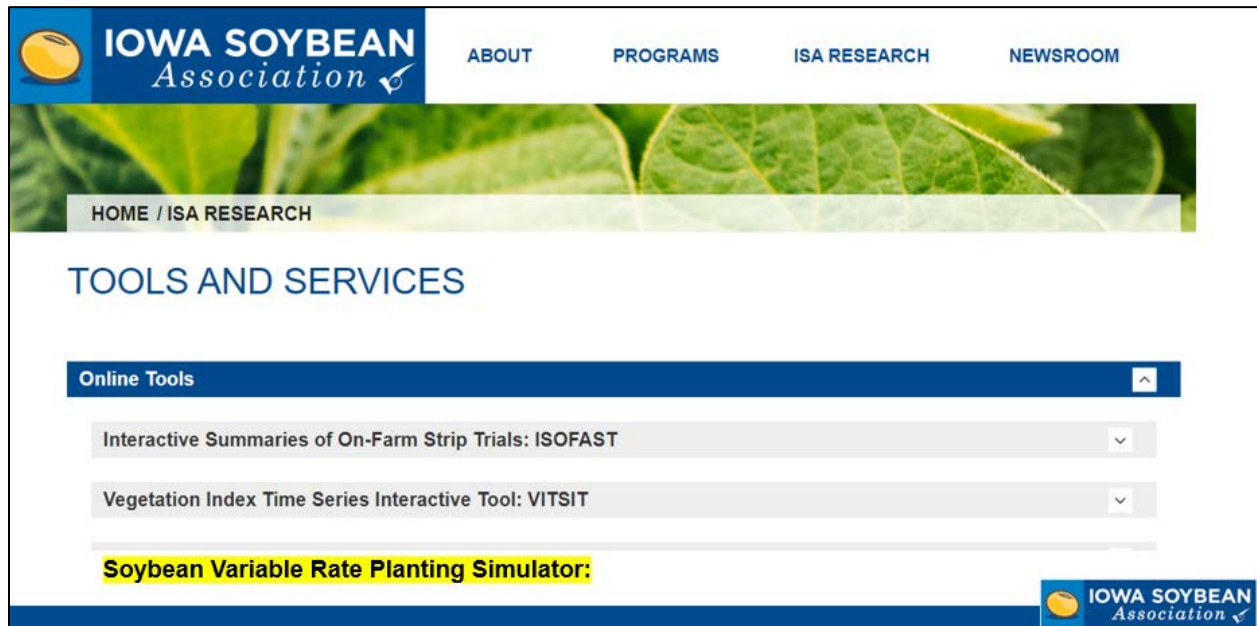


# Soybean Variable Rate Planting Simulator

## User Manual



### Accessing the Simulator

Log onto the Iowa Soybean Association website.

[www.iasoybeans.com](http://www.iasoybeans.com)

Select ISA Research > Tools and Services > Online tools > Soybean Variable Rate Planting Simulator

You will then be redirected to: [analytics.iasoybeans.com/cool-apps/SoybeanVRPsimulator/](http://analytics.iasoybeans.com/cool-apps/SoybeanVRPsimulator/)

### Uploading & Aggregating Yield Data

**NOTE:** User must have access to three years of soybean yield data in a shape file format (.shp, .shx, .dbf, .prj). Move all three years of yield data into a single folder, right click > send to > compressed zipped folder.

**Step 1.** In the tool select Browse..., then navigate to the compressed zipped folder > open  
The tool will then begin uploading the yield data.  
The bar below Browse... will indicate when the Upload is complete

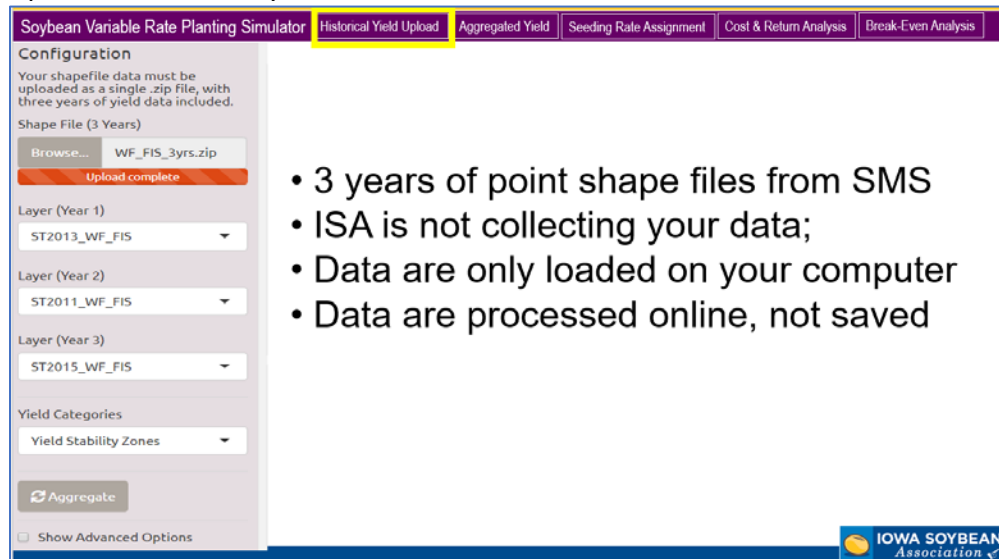
**Step 2.** Once Upload is complete, select **Aggregate**

A popup box in the bottom right corner will appear indicating that aggregation is occurring. Once finished, the raw and aggregated yield data will appear.

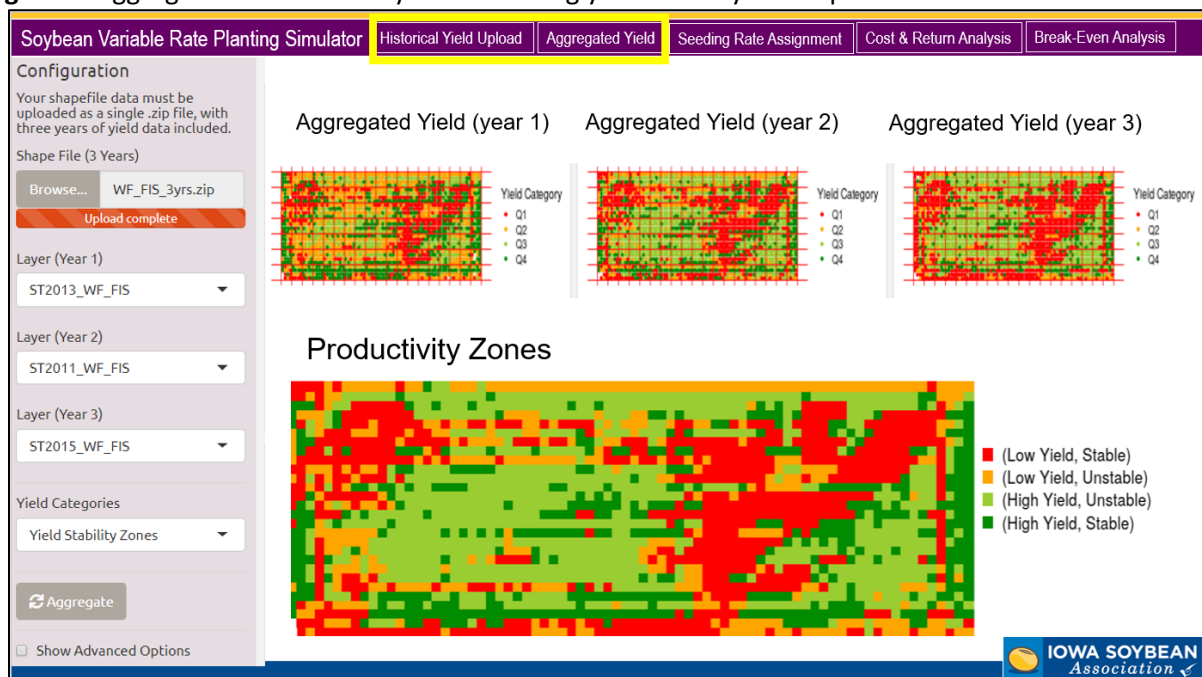
**Optional.** Show Advanced Options

The user can adjust the grid size and number of points within each grid.

**Figure 2.** Upload of historical yield data.



**Figure 3.** Aggregation of historical yield data using yield stability zone option.



## Seeding Rate Assignment (sd/ac)

### Step 3. Select the seeding rate Assignment tab in the top menu bar

There are three Common Uniform Seeding Rate (CUSR) data sources to **choose** from:

1) *ISU Data Source*

This data source allocates seeding rate recommendations according to Iowa cropping district. This data source applies recommendations from an Iowa State University published study, *DeBruin et al. 2008*

2) *Midwest Data Source*

This data source provides three CUSR's to choose from, the seeding rate chosen should be based on yield environment. A low yield environment will require a higher seeding rate, and vice versa for a high yield environment.

This data source applies recommendations from a midwestern seeding rate study, *Carciochi et al. 2019*

3) *User Defined*

This data source uses a user indicated seeding rate. This is intended to be the common seeding rate that has been applied to this field in the past.

**Figure 4.** Options for selecting common uniform seeding rates.

The screenshot displays the 'Soybean Variable Rate Planting Simulator' interface with the 'Seeding Rate Assignment' tab selected. It shows three distinct panels for selecting a Common Uniform Seeding Rate (CUSR):

- Panel 1 (ISU Data Source):** Features a dropdown for 'ISU Data Source', a dropdown for 'Iowa Cropping District' set to '1,5', and a resulting 'Rate Chosen: 139000 sd/ac'.
- Panel 2 (Midwest Data Source):** Features a dropdown for 'Midwest Data Source', a dropdown for 'Seeding Rate' set to '96500', and a resulting 'Rate Chosen: 96500 sd/ac'.
- Panel 3 (User Defined):** Features a dropdown for 'User Defined', a 'Seeding Rate' slider set to '130,000' (with a range from 80,000 to 320,000), and a resulting 'Rate Chosen: 130000 sd/ac'.

## Cost and Return Analysis

### Step 4. Input economic variables to run the cost and return analysis.

**Select** which yield category to adjust seeding rates (**Low** or **High**)

**Input** a grain price (\$/bu). **Input** the CUSR seeding cost (\$/ac)

**NOTE:** The simulator will default to a **15%** seeding rate increase that will result in a **12%** yield increase. **For example**, when **low** yield category is selected, *Corassa et al. 2018*, indicates that a **15% seeding rate increase** in low yield category areas can result in a **12% yield increase**. The user can adjust % seeding rate change and % yield change to run different economic scenarios.

### Expected Yield Gain in Selected Yield Category

- The simulator will calculate approximate field size.
- The simulator will calculate approximate size (ac) and average yield (bu/ac) of the selected yield category.
- Applying the economic variables, the simulator will calculate the expected yield gain in selected yield category.

### Additional Seed Cost

- The simulator will calculate the additional cost (ac) due to the adjusted seeding rate using the input seed cost and CUSR.

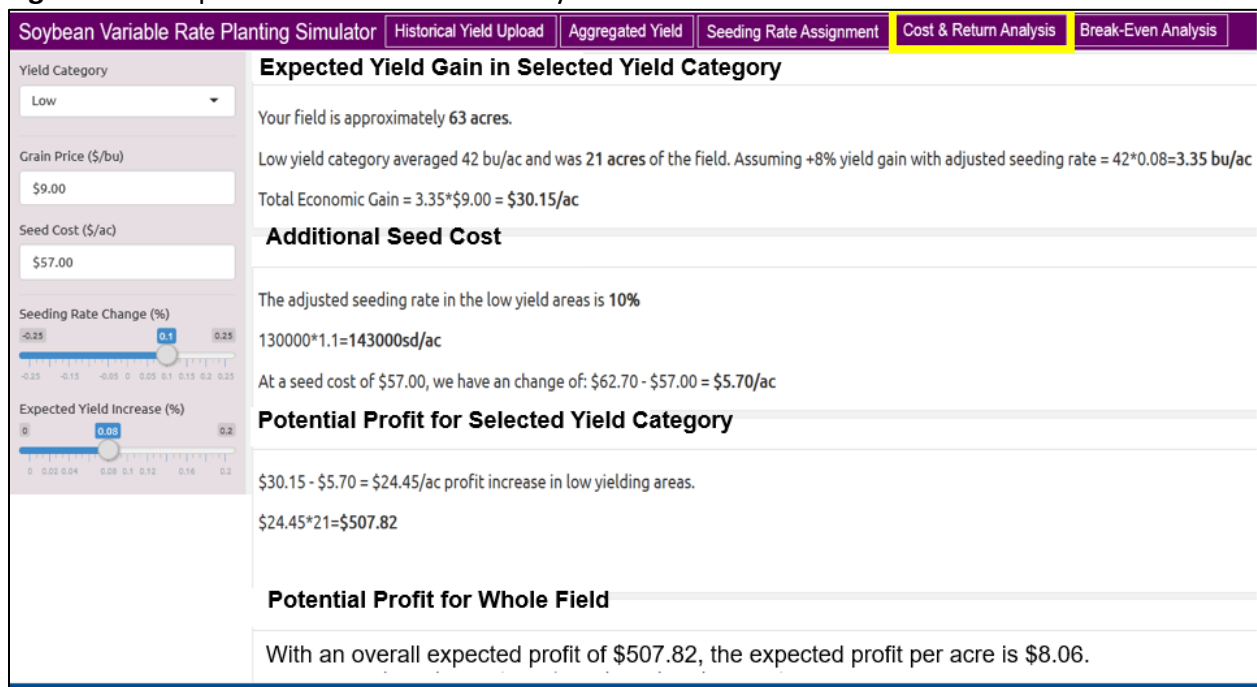
### Potential Profit for Selected Yield Category

- The simulator will subtract the Additional Seed Cost from the Expected Yield Gain in Selected Yield Category, then multiply by the total yield category area.

### Potential Profit for Whole Field

- The simulator calculates whole field profit per acre by dividing the Potential Profit for Selected Yield Category by the whole field area.

**Figure 5.** Example of Cost and Return Analysis



## Break-Even Analysis

This analysis indicates the minimum return necessary to pay for using variable rate technology.

**Step 5.** Adjust economic variables:

**Enter soybean grain price (\$/bu)**

**Enter** costs associated with using variable rate seeding technology

Add an item for each cost: **Equipment, hardware, software, time, Rx development, advisor**

**Enter** total estimated cost of soybean production, **excluding** seed costs.

**Note:** This will default using ISU estimates

## Break-Even Yield Response

- The simulator will indicate the needed yield increase to justify the additional cost associated with variable rate seeding.

## Break-Even Soybean Cost or Price

- The simulator will calculate the necessary soybean price to cover the cost of variable rate seeding and total production costs.

**Figure 6.** Example of Break-Even Analysis

Soybean Variable Rate Planting Simulator	Historical Yield Upload	Aggregated Yield	Seeding Rate Assignment	Cost & Return Analysis	Break-Even Analysis
<div><div><div>Soybean Price (\$/bu) \$9.00</div><div>Add Variable Rate Cost</div><div><div>Item 1</div><div>VRT Equipment Costs</div><div>Cost (\$/ac) \$2</div></div><div>Total Soybean Production Cost (excl. seeds) \$370.00</div></div><div><div>Cost for VRT Prescription and Technology</div><div>Total Soybean Production Cost without Seeds (default ISU Cost Estimates)</div></div></div>					
<b>Break-Even Yield Response (Yield Increase Needed to Cover the Cost of Extra Seeds)</b>					
With a seed cost of \$57/acre, a break-even response is 0.86					
<b>Break-Even Soybean Price (Price of Soybean to Cover the Cost of Extra Seed and Total Production Cost)</b>					
With extra cost of \$7.70/acre in seed and yield increase 8% and the cost of soybean production of \$370/acre, a break-even soybean price is \$8.35/bu					
