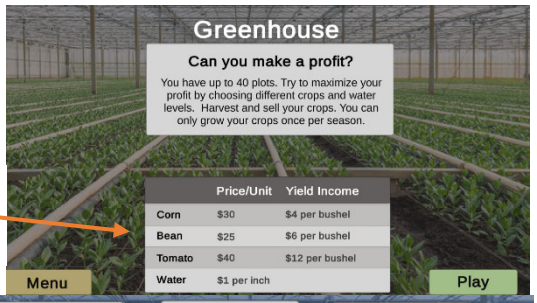
Greenhouse Game Instructions:

Go to the website https://stat2games.sites.grinnell.edu and select the **Greenhouse** tab.
Then watch the video tutorial and then click the **Play Greenhouse** button.
This site may take a few seconds to load.

- Enter a **Player ID** and a **Group ID**. Any combination of alpha-numeric characters will work. *Note that this ID will be public on the web, so do not use your actual name for a PlayerID.*
- Click the **Level 1** button:

This will bring you to the **Menu** page. There are several options that you can choose from. Here we will focus on how to play Level 1.

> **Level 1 Goal:** Experiment with crops and water to determine the best yields and profits.



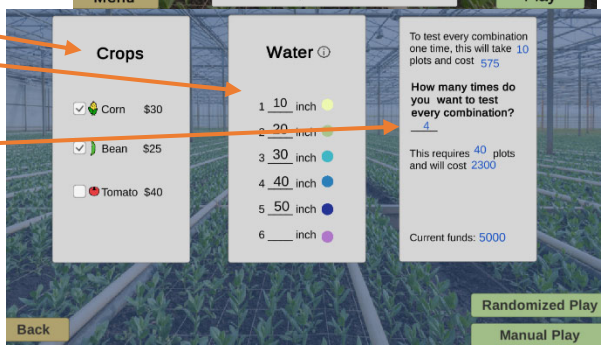
Level 1 settings

Crop: Choose any combination of Corn, Bean, and/or Tomato
Water: Try at most 6 different water levels (any integer between 0 and 60).

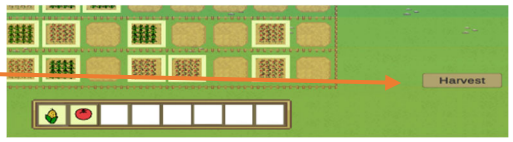
How many times to test each combination of crop and water? A maximum of 40 plots can be used at once.

Randomized Play randomly assigns crops and water to random plots.

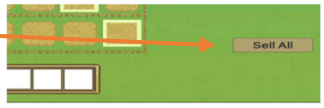
Manual play allows players to manually move crops and water to each plot.



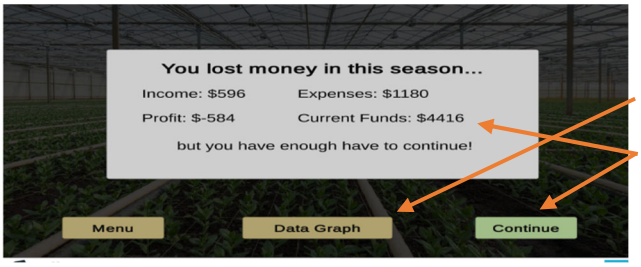
If randomized play was selected, you will see the crops grow. Press **Harvest** to harvest the crop.



Press **Sell All** to sell all the crops.



Using the Level 1 settings, your income, expenses, and profits will be calculated.



Make sure you view the graph to find any patterns in your data.

If you have enough funds, you can continue to play for another season.

Greenhouse Variable Descriptions:

Variable Name	Type	Description
GameNumber:	Integer	Each game is assigned a unique game number
Date	Date	The date and time the game was played. It has a Year/Month/Day/Hour: Minute format.
PlayerID	Categorical	Any alpha-numeric term used for each player
GroupID	Categorical	Any alpha-numeric term used for each player or group. Often instructors ask all students in the class to use the same GroupID
Potential response variables		
Profit	Quantitative	Profit made on a particular plot
Yield	Quantitative	The number of bushels of produce that was grown on a plot
Money	Quantitative	The money that the player currently has (calculated each season)
Potential explanatory variables		
Crop	Categorical	The crop planted in each plot (corn, beans, or tomatoes)
Water	Quantitative	The amount of water applied to a plot
Nitrates	Quantitative	The amount of nitrates that exist within each plot.
Level	Categorial	Level of the game
Season	Categorial	The number of times a player chooses to play a game at a particular level
Plot	Quantitative	Each of the 40 plots is numbered
PriorHarvest	Categorial	The crop planted in the plot the prior season
SellPrice	Quantitative	The amount the player earns for selling a bushel of a particular crop
BuyPrice	Quantitative	The expenses related to purchasing seeds for each plot
PesticidesAdded	Quantitative	Ignore this variable – not yet incorporated into the game
Insects	Quantitative	Ignore this variable – not yet incorporated into the game
Finished	Categorial	Ignore this variable – not yet incorporated into the game

Sample student handouts, instructor notes, and research activities are available here:
https://drive.google.com/drive/folders/1UyMtxFthjD57UyssqUL1poXbmlRxl1ZM

Sample online activities are available here:
https://dataspace.sites.grinnell.edu/greenhouse1.html

Page 1: Using simple linear regression to model how water influences corn yields

Challenge: How much water is needed to make the most profits when growing corn?

Page 2: Comparing more advanced regression models.

Page 3: Multivariate regression models.

Challenge: Designing a study to determine how to optimize yields based on combinations of water, nitrates, and crops.