

## Using Useful to Usable (U2U) Tools for an Introductory Agronomy Course

Trevor J. Frank and Bruce J. Erickson

*Department of Agronomy, Purdue University, West Lafayette, IN 47907*

**Objective:** This lab was constructed to provide introductory Agronomy students with a knowledge base of farming technology and available agricultural decision-making tools. Students will learn available technology for predicting climate variability, growing degree days, nitrogen fertilizer rates, cover crop selection, and market outlook. Additionally, students will gain insight on how to incorporate large-scale data for on-farm decision-making. This lab serves as a supplement for the Purdue Agronomy 105 curriculum in precision farming.

**Useful to Usable:** This project was developed with several collaborating universities on the basis of enhancing the usability and up-take of climate information and bolstering Extension capacity to address agro-climate concerns. This site has climate-based tools to assist Corn Belt farmers and Ag advisors with decisions related to purchasing, marketing, and activity planning throughout the crop growing cycle.

**Set-Up Instructions:** Open a web browser and go to this link: [www.AgClimate4U.org](http://www.AgClimate4U.org). Click on Decision Dashboard.

**AgClimate View:** Click on AgClimate View<sub>DST</sub>. Select your location by map, zip code, city, or county. Select the weather station of your choice (you can use the Purdue Agronomy Center for Research and Education (ACRE) facility, your home farm, or another location you'd like to see data from). Click on the Climate Data tab to see historical temperatures and precipitation. You can minimize certain data on the graph by clicking on the item you wish view on the graph legend.

Location Chosen: \_\_\_\_\_

List the month with the highest maximum temperature on your farm for the following years:

1980 \_\_\_\_\_ 1990 \_\_\_\_\_ 2004 \_\_\_\_\_ 2012 \_\_\_\_\_

List the month with the lowest minimum temperatures on your farm for the following years:

1985 \_\_\_\_\_ 1990 \_\_\_\_\_ 2000 \_\_\_\_\_ 2009 \_\_\_\_\_

List the top three years and the amounts in which your farm received the highest amounts of precipitation:

\_\_\_\_\_

Now, click on the Climate Average tab to view 30-year averages for temperatures and precipitation. List the average temperature for the following months on your farm:

January\_\_\_\_\_ April\_\_\_\_\_ July\_\_\_\_\_ October\_\_\_\_\_ December\_\_\_\_\_

State the month where, according to the graph, your farm has received the most climate variation \_\_\_\_\_. How many degrees was the variation? \_\_\_\_\_ In what years were the max and min temperatures the most variable (furthest apart)? \_\_\_\_\_ and \_\_\_\_\_.

Click on the Yield Trend tab to see historical crop yields and yield trends near your farm. Notice the corn yield trend has been increasing since 1980. List several reasons why this is occurring:

\_\_\_\_\_

How did your county yield averages compare to the corn yield trend line in the following years? (List the difference in bushels and indicate whether the difference is positive (+) or negative (-).)

1991\_\_\_\_\_ 1999\_\_\_\_\_ 2003\_\_\_\_\_ 2012\_\_\_\_\_ 2013\_\_\_\_\_

Lastly, click on the Comparison tab to combine weather (temperature, precipitation, GDD, and SDD) and crop yield data.

Pick the year where your area's corn yield was lowest: \_\_\_\_\_. Min. Temp.: \_\_\_\_\_

County Bushels: \_\_\_\_\_

Pick the year where your area's corn yield was highest: \_\_\_\_\_. Max. Temp.: \_\_\_\_\_

County Bushels: \_\_\_\_\_

Describe any correlation with temperature and corn yield that you see:

\_\_\_\_\_

**Corn Growing Degree Days (GDD):** Go back to the Decision Dashboard and click on Corn GDD<sub>DST</sub>. Select your location by map, zip code, city, or county and click "Create GDD Graph." At the top of the graph, choose a reasonable corn planting date for your farm.

When is your area's last average freeze in the spring? \_\_\_\_\_

When is your area's first average freeze in the fall? \_\_\_\_\_

What do these values indicate about corn planting in your area?

\_\_\_\_\_

How many growing degree days are needed for corn silking to occur on your farm? \_\_\_\_\_

What date is silking estimated to occur on your farm? \_\_\_\_\_

What is the estimated date for your corn to reach black layer? \_\_\_\_\_

What is the estimated date range for your corn to reach black layer? \_\_\_\_\_

If your corn reaches black layer in the time frame you just listed, how many growing degree days are needed based on GDD averages? \_\_\_\_\_

How did 2013 GDD data compare to average GDD data across years? \_\_\_\_\_

How does 2014 GDD data compare to average GDD data across years? \_\_\_\_\_

Next, project the rest of this year's GGD units. Will you (or did you) be harvesting earlier, on time, or later than last the average GDD data across years? \_\_\_\_\_

Lastly, click on the Animations tab. Watch the GDD animation for 2013.

**Probable Fieldwork Days:** Go back to the Decision Dashboard and click on Probable Fieldwork Days<sub>DST</sub>. This tool was developed by the Food and Agricultural Policy Research Institute (FAPRI). Enter your name and email address. Check the box next to probably field work days and click submit. Click on the download in the center of the chart to bring up the Excel file. Click on enable editing in Excel if prompted to do so. Choose central Illinois as your state and region, since Indiana is not yet available. Choose the implement of your choice. Adjust the implement width, speed, and field efficiency. Indicate how many acres are to be covered and how many hours per day will be worked. Lastly, choose your start and end dates, days worked in a week, and hours in field per day. The graphs and tables will display the probability that the work can be completed within a given time period and the number of acres that can be covered by a given date.

How probable (%) is it that you will finish your field work by your selected end date?

\_\_\_\_\_

How would this tool be useful to producers in the Midwest? \_\_\_\_\_

**Corn Nitrogen Rate Calculator:** Go back to the Decision Dashboard and click on the Iowa State University Corn Nitrogen Rate Calculator. Choose your state and region. Apply UAN (28%) to your field if nitrogen costs .50\$/lb. N and the corn price is \$5.00 per bushel. This will calculate your MRTN, or maximum return to N. This is when the N rate is where the economic net return to N application is maximized. The maximum yield indicates the yield where application of more N does not result in yield increase.

What is your MRTN? \_\_\_\_\_

What range of pounds N/acre is your MRTN range? \_\_\_\_\_

What is your % of maximum yield at this rate? \_\_\_\_\_

**Nitrogen Watch:** Go back to the Decision Dashboard and click on Nitrogen Watch developed from the University of Missouri. Click on Nitrogen Watch 2014. Click on April 27<sup>th</sup> for the Midwest and view the accumulated precipitation chart. Is your farm in a “danger” area for this month? \_\_\_\_\_. How about for June 29<sup>th</sup>? \_\_\_\_\_. Lastly, click on the date closest to today and check for “danger” zones. Overall, how does your farm’s area compare to the rest of the Midwest? \_\_\_\_\_. What are some benefits and disadvantages to this tool?

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**Cover Crop Decision Tool:** Go back to the Decision Dashboard and click on the Cover Crop Decision Tool authored by the Midwest Cover Crops Council. Click on the Cover Crop Decision Tool-Field Crops. Select your state and county, cash crop, and estimate planting and harvest dates. Then, select field drainage information and choose Goal #1 of your cover crop. This could be nitrogen scavenging, fighting weeds, etc. Choose another goal if desired. A gray window should come up under the dates on the chart showing cover crops that may or may not provide reliable establishment in the fall.

Choose your top two cover crop species you will plant: \_\_\_\_\_  
Why did you choose these species? \_\_\_\_\_  
How could this tool benefit farmers in the Midwest? \_\_\_\_\_

### Market Outlook & Newsletters:

1. Go back to the Decision Dashboard and click on the 2014 Crop Market Outlook authored by Chard Hart at Iowa State University and download the PowerPoint. What is the national average corn yield this year? \_\_\_\_\_. Soybean yield? \_\_\_\_\_. How many millions of acres were planted to corn in 2014? \_\_\_\_\_ 2010? \_\_\_\_\_. How many millions of acres were planted to soybeans in 2014? \_\_\_\_\_ 2010? \_\_\_\_\_. Describe any major crop market shifts in the past years:

\_\_\_\_\_  
\_\_\_\_\_.

Did Indiana have record high corn yields in 2014? \_\_\_\_\_ Soybeans? \_\_\_\_\_.

Which country produced the most corn in 2014? \_\_\_\_\_ Soybeans? \_\_\_\_\_.

Where did the U.S. export most of its corn crop in 2014? \_\_\_\_\_ Soybeans? \_\_\_\_\_.

2. Go back to the Decision Dashboard and click on the Pest & Crop Newsletter link authored by Purdue Extension under University Extension Newsletters/Information. View the latest version of the newsletter and describe at least two pest issues that producers need to be aware of currently:
  
3. Click on the Weekly Weather and Crop Bulletin on the Decision Dashboard. This bulletin is authored by several national agricultural departments. Read the Indiana State Agricultural Summary and list a few key concepts to take-away from the update:
  
4. Choose one additional resource under the “Agro-Climate Reports” header on the Decision Dashboard and describe what you learned:

***Feel free to explore the website further and take advantage of other useful climate and agricultural-based decision tools.***

**Please fill out the following based on the exploration of these tools:**

1. Overall, how useful do you think these tools are?
2. Was there any one tool that you feel wasn't useful to your farm?
3. Which tool did you feel provided the most useful information? Why?
4. Are you likely to use this tool on your own farm for any reason? If yes, please describe.
5. Does this website provide you with a better understanding of useful farming technologies?
6. Please describe any improvements you would recommend for the Decision Dashboard on the U2U website: