1. The user selects a crop
   * Crop is selected from the list of 15 crops given in crop coefficients excel file. Dropdown is required.
2. Enter planting date and harvest date
   * A calendar date picker is needed here.
3. The crop growth period should be divided into 4 stages.
   * Crop coefficient or Kc is just a constant, as an index of crop growth
   * The stages A-B, B-C, C-D and D-E will be calculated by ‘% season B’, ‘%season C’ and ‘%season D’ from the excel file.
   * The formula to calculate intermediate dates is =planting date+%season/100\*(harvest date-planting date)
   * So to calculate B,C and D dates, you will use %seasonB, %seasonC and %seasonD respectively.
4. Crop Coefficient values for that crop should be selected and displayed based on the date selection and growth stages.
   * Once the crop is selected, crop coefficients(Kc) in the form should be populated from the KcB, KcC, KcD and KcE given in crop coefficients excel file.
5. For example, I chose Corn, it should pick up the Kc curve for corn and display on the graph with dates and period.
6. ETc is actual evapotranspiration, which is a measure of water evaporated from soil surface and water transpired (evaporated) from plant surface. ETo is a reference ET value that you get from a weather station for grass and you multiply it with Kc to get the actual ET (ETc) for that crop.
   * **ETc = ETo\*Kc** [ETo for future dates will be based on the historic 5 year average of that date. For now, you can just use last year’s value instead of doing average ]
7. ETc replacement option: for the sections on Kc curve, use 100% default for B and C, and 70% for D. These should be auto-filled but the user should be allowed to change them.
   * ETc replacement is the percent of water you need to apply after water is lost through ET. The basic concept is you need to replace the water that is lost to keep the plant alive.
8. Set irrigation date
9. Check for precipitation for that date.
10. If precipitation is expected (based on 5 year average), display message saying “Precipitation is expected. Would you still like to continue?” and the user can still continue.
11. Enter Irrigation Type: Choose between flood, furrow, sprinkler, drip.
    * Just a method to capture what kind of irrigation method they use.
12. Enter System Efficiency: Allow the user to enter between 50-100%
    * Since there will be leakage, seepage of water, it is never a 100% efficient system.
13. If the efficiency is less than 100%, add that to irrigation amount required. For example: if the efficiency is 80%, then apply 20% higher.
14. For irrigation amount in inches:

**Water Required = sum of daily ETc from Planting date to irrigation date – (sum of past irrigations +precipitation)+ {(sum of daily ETc from Planting date to irrigation date – (sum of past irrigations +precipitation)}\*(100-efficiency)/100]**

**Irrigation Amount required=Water required\*ETc Replacement/100**

1. For unit conversion of inches to pump-hours, we need to enter the pump discharge rate which is usually in gallons/min.

Formula: inches >> gallons

1 inch (assuming acre-inch) = 27154 gallons

If pump discharges 30 gallons/min, in one hour is 30\*60=1800 gallons/hour

Pump-hours for 1 inch required will be:

(1/60\*30)\*27154 = 0.91 hours

For 3 inches of water, pump-hours required will be 0.91\*3 = 2.73 hours.

**Pump-hours Required= (Irrigation Amount in inches \*27154)/(pump discharge rate in gal per min\*60)**

1. Submit/Okay button
2. One graph with two parameters:

Water Ratio: Total irrigations applied/Total ETc on a timeline

* Cumulative daily values

1. The Kc curve should be displayed on a graph with respective dates and ETc replacement values.
2. Add another graph to plot weather data. Only high and low temp and precipitation.
3. Please note that you ll have to save the past irrigations in a database to calculate future irrigation values.
4. The user should be able to go back and see how much irrigation was applied and on what date. (Doesn’t need to be on front end for now.)

