# Mapping Spreadsheet Calculator

This spreadsheet calculator requires Microsoft Excel™ version 2007 or newer.

The syntax of an Excel Spreadsheet for the Spreadsheet calculator is fairly simple but there are specific naming or labeling rules that are important to understand.



## Multiple Worksheets

There must be a worksheet for every permutation and combination of the conditionals. For example, if there are five crops, there will need to be five worksheets. As in the example above, one workbook can be created for each nutrient and that workbook can contain several worksheets - one for each different crop that might be needed.

## Conditionals

The block in blue is the *Conditionals* named range. It contains a row for every conditional that is defined for the workbook. The first column (Column *B*) is the name of the conditional and the second column (Column *C*) is the value of the conditional for this worksheet. These become the *RequiredConditional* properties of a *SpreadsheetCalculatorOption*. The *Spreadsheet.SelectOption* method will search each worksheet to find the one that has *RequiredConditional* values that match the *ActualConditional* values that have been set on the *SpreadsheetCalculator* class. The individual conditionals do not need to be named ranges, but the blue box must be explicitly named *Conditionals* and must be a sheet-specific name, not a workbook-specific name.

## Variables

The *Variables* named range is shown in pink. It must have three columns: a variable name, its value in the calculation (updated automatically by the calculator for each row of the dataset) and a unit-of-measure. For now, the input cells (where the *110*, *12*, and *150* are) should be single cell named ranges, with the name being the variable name (*K*, *CEC*, and *Yield*). This will change as an absolute requirement but will always be a recommended practice.

The *Units* fields have specific requirements. Acre, for example, must be spelled out as *acre* and not the common abbreviation, *ac*. *pH* is another in that its range must be named *pHw* to work properly.

Acceptable units for these variables are: *ppm*, *lbs per acre (st)*, *meq/100g*, *tons/acre*, *bu/acre*, and *none*. No other unit types or names will work. Select the one to use for the given variable. Below is a table of variables and their syntax:

| Variable | Range Name |
|---|---|
| B | B |
| Ca | Ca |
| Cu | Cu |
| CEC | CEC |
| ENR | ENR |
| Fe | Fe |
| K | K |
| Mg | Mg |
| Mn | Mn |
| NO3-1 | NO3_1 |
| NO3-2 | NO3_2 |
| OM | OM |
| *P1 | P_1 |
| P2 | P_2 |
| pHw | pHw |
| pHb | pHb |

| Variable | Range Name |
|---|---|

| | |
|---|---|
| Previous Crop | Previous_crop |
| S | S |
| **Yield | Yield |
| Zn | Zn |
| Years to build | Years_to_build |
| Soil Class (A-E) | Soil_class |

## Results

The *Results* named range is shown in green.  At this time, it has three required columns:  *result name, result value,* and *result unit.*   The value cell (the 110) should:

- Contain the formula used to calculate the value from the variables.
- Be explicitly typed as text, numeric, etc.
- If numeric, have a format defined that shows the number of decimal places, etc.

In the current implementation, the formula should use name range references for the variables, rather than cell references.   For example, IF (K < 151… rather than IF (C6 < 151…   This will change in a future build, but will always be a recommended practice.

The *Results* area has specific cell *Range* names required for the nutrients used in the calculator.  The units for the nutrient recommendations can be either lbs/acre or tons/acre. *UD_Rec* in the last row stands for the one User-Defined nutrient allowed in Agvance.   The table below displays those Range names:

| | |
|---|---|
| | |

| Nutrient | Range Name |
|---|---|
| N_Rec | N_Rec |
| P_Rec | P_Rec |
| K_Rec | K_Rec |
| Ca_Rec | Ca_Rec |
| Mg_Rec | Mg_Rec |
| S_Rec | S_Rec |
| B_Rec | B_Rec |
| Cu_Rec | Cu_Rec |
| Fe_Rec | Fe_Rec |
| Mo_Rec | Mo_Rec |
| Zn_Rec | Zn_Rec |
| Lime_Rec | Lime_Rec |
| CCE_Rec | CCE_Rec |
| UD_Rec | UD_Rec |

# Building a Spreadsheet

Label the worksheet tab by double-clicking the current name (ex. Sheet 1) and typing the equation name.

1. In the first cell, type *Conditionals:*
2. Type the conditionals into the rows below using one conditional per row.
   - For example:  Crop
3. In the adjacent column, enter the conditional values.
   - Example:  Corn
4. Select the cells that make up the conditional labels and values (*B2:C2* in the example below).



5. Choose the *Formulas* menu option and select **Define Name.**
   - If using Excel version previous to Office 2007, go to Insert | Name | Define
6. In the *New Name* dialog:



   - Name = Conditionals
   - Scope = *Worksheet name* (not "Workbook")
   - Comments = None
   - Refers to = Default
7. Select **OK.**
8. Select the first cell in a row below the *Conditionals* section.
9. Type *Variables:*
10. Type the variables into the rows below using one row per variable.
    - For example:  *K, CEC, Yield*
11. Leave the adjacent column empty for now as this will be where the variable value is entered.
12. In the next column, enter the unit-of-measure for each variable.
    - For example:  *ppm, meq/100g, bu/acre*
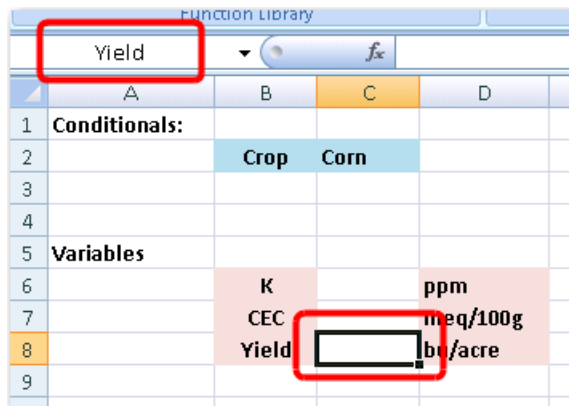13. Select the value cell adjacent to the variable label.

14. Choose the *Formulas* menu option and select **Define Names**.

15. In the *New Name* dialog:

   - Name = *variable name* (ex. K)

   - Scope = *Worksheet name* (not "Workbook)

   - Comments = None

   - Refers to = Default

16. Select **OK**.

17. Upon selecting the variable value cell, the name will be visible in the *Name* field of Excel instead of the cell name



like C8.

18. Repeat steps 14-17 for the remaining variables.

19. Select each/all variable value cell(s), right-click, and choose **Format Cells**.

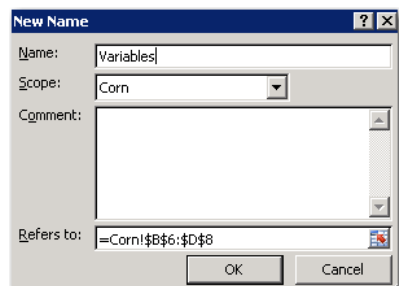20. Enter the *Category* and other information.

   - Example: For numeric data select, *Number*, two decimals.

21. Select the cells that make up the variable labels and values.



22. Select the *Formulas* menu option and choose **Define Names**.

23. In the *New Name* dialog:



   - Name = Variables

   - Scope = *Worksheet name* (not "Workbook)

- ○ Comments = None
- ○ Refers to = Default

24. Select **OK**.

25. Select the first cell in a row below the *Variables* section.

26. Type *Results:*

27. Type the results label(s) into the rows below using one row per result.

- ○ For example:  *K_Rec*

28. Leave the adjacent column empty for now as this will be where the results value equation is entered.

29. In the next column, enter the result unit.

- ○ For example:  *lbs/acre*

30. Select on the value cell adjacent to the results label.

| Results: | | | |
|---|---|---|---|
| | K_Rec | 110 | lbs/acre |
| | | | |

31. Select the *Formulas* menu option and choose **Define Names**.

32. In the *New Name* dialog:

- ○  Name = *result name* (ex. K_rec)
- ○ Scope = *Worksheet name* (not "Workbook)
- ○ Comments = None
- ○ Refers to = Default

33. Select **OK**.

34. Repeat steps 28-34 for each additional Result.

35. Select the result value cell(s), right-click, and choose **Format Cells**.

36. Enter the Category and other information.

- ○ Example:  For numeric data select, *Number*, zero decimals.

37. Select the cells making up the results labels and values.

| Results: | | | |
|---|---|---|---|
| | K_Rec | 110 | lbs/acre |
| | | | |

38. Select the *Formulas* menu option and choose **Define Names**.

39. In the *New Name* dialog:

**New Name** ? ☒
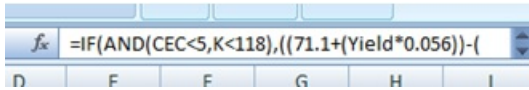
| Name: | Results |
| Scope: | Corn |
| Comment: | |

Refers to: =Corn!$B$14:$D$14

OK    Cancel

- Name = Results
- Scope = *Worksheet name* (not "Workbook)
- Comments = None
- Refers to = Default

40. Select **OK**.

41. Choose the result value cell and enter the equation in the *Formula Bar*.

$f_x$ =IF(AND(CEC<5,K<118),((71.1+(Yield*0.056))-(

42. Use the variable names (ex. CEC), not cell names like C6 in the equation.

43. Repeat step 42 for additional results.

44. Test the equation by entering values for the variables.

45. Repeat all steps for each additional worksheet.

46. **Save** the workbook.