Directions for Using the Fertilizer Cost Tool

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Introduction

Finding the lowest price fertilizer combination that meets the nutrient requirements of a field can sometimes be difficult. Agronomists give recommendations for the pounds of N, P, and K required while the available fertilizers have different percentages of a given nutrient and may contain two or more nutrients. The only 100% accurate way to find the lowest price fertilizer combination is to use a linear programming approach. The spreadsheet tool described here uses the built in solver of Excel to correctly calculate which combinations of fertilizers will meet the nutrient requirements of a field.

Before using this tool, the solver tool of Excel must be enabled. This is usually only something that needs to be done once. If your solver is not enabled, directions for doing so are available from either https://support.office.com/en-us/article/Load-the-Solver-Add-in-612926fc-d53b-46b4-872c-e24772f078ca?ui=en-US&rs=en-US&ad=US&fromAR=1 (for Windows) or from https://support.office.com/en-us/article/Load-the-Solver-Add-in-in-Excel-2016-for-Mac-d7a34027-56bf-4569-9b42-45a624c3e774 (for Macs).

Home page

The home tab is where most of the user inputs are. Any place with a blue cell is available for user input. There are three input areas: the box with the list of fertilizers in the upper left hand corner, the fertility requirements just to the right, and in the list of scenarios there is a place to add application costs. The other cells are read only.

Big box in upper left corner

A default list of fertilizers is listed and can be expanded by adding more to the list. Prices should be updated by the user to reflect current and local prices. The 'Use or not' checkboxes are used to control whether Excel should include that particular fertilizer in the mix. Uncheck the box if a fertilizer should be excluded. Check a box if that fertilizer should be a candidate for a fertilizer in the low cost mix. Any blank lines in the fertilizer list should have the corresponding checkbox NOT checked.

The minimum lbs. and the maximum lbs. are optional inputs if for some reason the use of that particular fertilizer is either restricted or required. Leaving these two cells blank will default to a minimum 0 pounds and a maximum 1,000 pounds.

Smaller box to the right

The required row is the minimum pounds of N, P, and K required to meet the fertility needs of that crop. This is a required row. The maximum row is optional and is used if there is a need to limit the applied amount of N-P-K. If left blank, this row defaults to a maximum of 1,000 pounds

Finding the minimum cost fertilizer combination

After making any worksheet change, the red "Find Minimum Cost" button needs to be pressed to re-solve for the correct fertilizer combination. The solution is given with the fertilizers to use, the pounds of each of those fertilizers, and the cost of each of those fertilizers. The other solution box is how many pounds of each nutrient are applied. The pounds applied is most likely the pounds required. However, there may be situations where the pounds applied of a nutrient is more than needed. The cost per unit (i.e., nutrient cost per pound of N, P, or K) is based on first calculating the nitrogen price per pound of N and then calculating P based on the remainder. There may be times when this calculation is incorrect. However, it does not affect the answer to the minimum cost fertilizer combination. Adding any fertilizers that have all 3 nutrients will not correctly calculate a cost per unit.

Scenarios

This bottom section allows the user to store the solution as a possible scenario to consider. Once Excel has calculated a solution, press the blue "add scenario" button to put the quantities of those fertilizers into the table. Different solutions can be generated by using the constraints available in the main table in the upper left hand corner. For example, once the first solution is identified, just unclick the "use" checkbox to get a new solution that doesn't use that particular fertilizer. Once all the possible solutions are added to the table, What-If analyses can be run by adjusting fertilizer prices. As the scenario table only stores the quantities, changing prices only affects the total cost of that option.

Fertilizer list page

If any additional fertilizers are added, the N, P, and K percentages need to be added on this page. Do not add to the list of fertilizers here as this list comes from the Home page.