MISSISSIPPI STATE UNIVERSITY EXTENSION

Calculating Fertilizer Rates from Soil Test Results for Commercial Vegetable Production

Environmental concerns, conservation of resources, and the costs associated with fertilizer application make efficient nutrient management an important practice for commercial vegetable production. Nutrients are a major crop production factor as they are critical for optimum yield and high fruit quality. An adequate supply of nutrients during the growing season improves plant growth and can reduce susceptibility to diseases.

Generally, crop-specific nutrient or fertilizer application rates are based on soil testing. Regular soil testing is essential for effective nutrient management in vegetable crop production. Results from soil tests allow growers to tailor fertilizer applications to crop needs, avoid unnecessary inputs, and prevent nutrient losses. By guiding precise, science-based nutrient management decisions, soil testing supports higher productivity, improves economic returns, and promotes environmentally responsible vegetable production.

To convert nutrient recommendations from soil test results to the actual amount of fertilizer needed, the following materials are required:

- Soil test results with nutrient recommendations
- Fertilizer that contains the nutrient of interest (for example, K = potassium)
- Weighing balance or scale
- Calculator
- Buckets

Following is a step-by-step practical guide for calculating fertilizer application rates from soil test results.

Step 1

Collect soil samples 4–6 weeks before planting season and send them to the lab for nutrient analysis. Learn how to submit a soil sample to the Mississippi State University Extension Soil Testing lab. You may also drop off soil samples at your local county MSU Extension office.

Step 2

Soil test results are usually received within 2–3 weeks after submission. Study the soil test results to identify the nutrient recommendation for your desired crop (for example, 180 pounds of potassium per acre).

Step 3

Identify your fertilizer source and determine the nutrient concentration or composition of the fertilizer to be used. Fertilizer nutrient compositions are generally provided on the fertilizer bag or container. Examples of inorganic and organic fertilizer sources and their respective nutrient compositions are provided in Table 1.

Table 1. Example nutrient concentrations commonly found in various inorganic fertilizer sources.

Fertilizer	Nutrient Composition
Ammonium nitrate	34% nitrogen
Calcium nitrate	15.5% nitrogen, 19% calcium
Diammonium phosphate	16% nitrogen, 46% phosphorus
Monopotassium phosphate (MKP)	52% phosphorus, 34% potassium
Nitrate of soda potash	15% nitrogen, 14% potassium
Potassium chloride (muriate of potash)	60% potassium
Potassium nitrate	13.75% nitrogen, 44.5% potassium
Sodium nitrate	16% nitrogen
Urea	46% nitrogen

Step 4

Identify the area or the total planted row length to be fertilized. In most cases, soil test results for commercial vegetable production are reported per acre. Because your farm size may be more or less than 1 acre, you need to adjust the recommendation to fit the total area or row length of crops to be planted. To do this, you need the row spacing for the vegetable crop of interest. Table 2 gives common bed spacing for major vegetable crops.

Table 2. Standard bed spacing (space between rows) and corresponding linear feet of bed in 1 acre for various vegetable crops.

Crop	Row Spacing (ft)	Total Linear Bed Feet per Acre
Cabbage	2	21,780
Sweetcorn	2.5	17,424
Pea, potato, sweetpotato	3	14,520
Strawberry	4	10,890
Cantaloupe	5	8,712
Tomato, pepper, eggplant	6	7,260
Watermelon	8	5,445

Step 5

Calculate the linear bed feet (LBF) based on the row spacing. Once the bed or row spacing for the desired crop is identified, the next step is to calculate the total row length (in feet) for the desired crop in an acre.

$$\text{LBF} = \left(\frac{\text{Total square feet per acre}}{\text{Crop bed or row spacing}} \right)$$

Using tomato as an example:

$$\text{LBF} = \left(\frac{43560 \text{ ft}^2 / \text{acre}}{6 \text{ ft}} \right) = 7260 \text{ ft per acre}$$

Step 6

Calculate the amount of fertilizer needed per 100 feet of row, following the example below for tomato. You may adapt the information below based on your crop of interest.

- Crop: tomato
- Bed spacing: 6 ft (from Table 2)
- Fertilizer recommendation: 180 lb/acre of potassium (from step 2)
- Fertilizer source and nutrient concentration: Muriate of potash, 60% potassium (from Table 1)
- Linear bed foot per acre: 7260 ft (from step 5)

First, calculate the amount of fertilizer per foot of planted crop row using the formula below, and then multiply the result by 100 to get the amount of fertilizer per 100 feet.

$$\textit{Total fertilizer amount per foot of crop row} = \frac{\left(\frac{\textit{Fertilizer recommendation}}{\textit{Linear bed foot per acre}} \right)}{\left(\frac{\textit{Fertilizer nutrient concentration}}{100} \right)}$$

For the example tomato crop above:

$$\textit{Total fertilizer amount per foot of crop row} = \frac{\left(\frac{180 / \text{acre}}{7260 \text{ ft} / \text{acre}} \right)}{\left(\frac{60}{100} \right)}$$

Total fertilizer amount per foot of crop row = 0.041 lb

Multiply the result in the step above by 100 to get the total amount of fertilizer for 100 feet of tomato row.

0.041 × 100 ft = 4.1 lb of fertilizer

Step 7

Weigh the fertilizer amount calculated in Step 6 and apply it evenly across the field area or total row length to be planted. To improve nutrient-use efficiency and crop performance, this fertilizer amount may be divided into two or three applications, applied at different crop growth stages. To do this, put half of the fertilizer out at planting, then one-fourth 4 weeks later, and one-fourth 3 weeks after that.

Following these steps will help to accurately calculate your fertilizer inputs for efficient use and cost savings. For more information, contact your local county MSU Extension office.

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