



Fertilizers in the Vegetable Garden

Gardeners frequently want recommendations about the strength of fertilizer to use for different crops which have specific requirements for nitrogen (N), phosphorous (P) and potassium (K). These are two different, but related, issues.

First, a *shotgun* recommendation can cause problems over time. For example, a commonly suggested N rate is two and one-half pounds of N per 1,000 sq ft. This can be provided with 25 lbs. of 10-10-10 or 50 lbs. of 5-10-10 per 1,000 sq ft. The 10-10-10 will also provide two and one-half pounds of P and K. The 5-10-10 used at the 50 lb. rate will provide two and one-half pounds of N, and twice as much (5 lbs.) of P and K. The 5-10-10 formula is often used where P and K are low and the 10-10-10 where these elements are sufficient. This may work well for a few years, but over time, excesses (or deficiencies) of some nutrients are likely to occur.

This can be further complicated if significant amounts of other materials such as compost are used. Compost and other organic materials release nutrients more slowly than soluble fertilizers, but over a period of years, significant levels of some nutrient elements can build up so that additional application is not needed. In fact, continued use of compost can lead to excessively high amounts of certain nutrients. Of particular concern are nitrogen (N) and phosphorous (P). Nitrogen can leach into drinking water and have serious health effects. Phosphorous is not a health issue, but it can move into ponds, streams and lakes, causing excess algal and other vegetative growth. This impairs water quality and, when this material dies, fish may be killed as oxygen is consumed by microbes that break down the dead material. In addition, excess levels of some nutrients can be toxic to plants or inhibit the uptake of other nutrients.

The only way to properly manage nutrient levels is to test the soil periodically. You can buy a kit and do this yourself or have it tested by a laboratory such as the one at the University of Massachusetts. For prices and instructions on how to take a sample, go to www.umass.edu/soiltest. Soil samples should be representative of the garden area. Ten to twelve (more if you like) sub-samples should be randomly taken through-out the garden. These should consist of slices of soil from the top down to a depth of seven or eight inches. The sub-samples should be mixed together into a composite, from which you take a final sample of about a cup. It is wise to air dry the sample on a nonabsorbent surface such as an old dinner plate. If you have multiple gardens or a garden is not fairly uniform, separate composites should be tested for each area. It should be sufficient to test the soil every three to five years, unless you are making big changes and want to monitor progress.

The goal of a soil management program should be to have nutrients in the *high* (optimum) range and organic matter between 5 and 8%. If nutrients fall far below this range, growth and or quality may be impeded. If levels are above this range, you may have problems with excesses as mentioned above. Fortunately, the high range is broad and you can add nutrients when levels are near the lower end and avoid adding them when they are near the top. If you slip down a

little into the *medium* or up into the *very high* (excessive) range, it is no serious problem, but you should take appropriate action (or no action, if in excess).

If you need to omit a nutrient for a few years, ask for a material(s) that will provide the appropriate nutrients. Remember that all inputs, including compost as well as bagged fertilizer, add nutrients to the soil - some just work faster than others. Standard soil tests work well for all nutrients but N. This is because N tends to be at its highest in the summer when it is being released from organic matter. By testing in mid summer, you can get a good idea of how high all the nutrients are, including N. Be sure to dry the samples so the N level remains constant.

Although it is generally a good idea to maintain nutrient levels in the high range, there are some crops that have an especially high requirement for certain nutrients. Carrots and beets and, to a lesser extent, tomatoes, will use a great deal of K if it is available. They will produce a good crop if K is in the high range, but it doesn't hurt to add an extra pound or so per 1,000 sq ft of this nutrient to these crops unless it is already in the very high range. This requires buying some special fertilizer. This may appeal to some gardeners who like to do everything they can to achieve the best possible yields, while others like to keep it simple. The choice is yours!

Disclaimer -The most reliable information was included that was available at time this information was compiled. Due to constantly changing laws and regulations, UMass Extension can assume no liability for recommendations. The pesticide user is always responsible for the effects of pesticide residues on their own crops, as well as problems caused by drift from their property to other properties or crops. **Always read and follow all instructions on the label.**

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