

# ENVIRONMENTAL EDUCATION IN THE COMMUNITY GARDEN

## LESSON 7

### FERTILIZING FOR HEALTHY PLANTS

Which fertilizer sources strip the earth of natural resources? Are there better alternatives?

Chemical fertilizers that use forms of nitrogen, phosphorous, and potassium (N-P-K) at high levels above a 10-10-10 ratio are dumping synthetic nutrients into soil while damaging the microbial balance that is necessary to make nutrients in the soil available to plants. Growers who rely upon these chemical fertilizers end up turning the soil into a lifeless medium to hold the fertilizer briefly while it is immediately available to the plant. Without the benefits of life in the soil, frequent application of fertilizer becomes necessary to give plants nutrients.

Some gardeners believe that proper stewardship of the soil eliminates the need for applying even the organic version of these NPK fertilizers. However, in a community garden setting, we want to make sure that new gardeners enjoy a successful yield in their first year, while adding organic materials can take several years to repopulate a healthy soil ecosystem. The principle of organic gardening is to feed life in the soil rather than just the plants growing in it. When there is a need for fertilizers in a community garden plot, educating your gardeners about the most integrated fertilizing methods will benefit life in the soil for years to come.



Granulated kelp fertilizer.

### CHECK pH

The first step in identifying the best organic fertilizer will be to check soil pH to determine if the soil is acid or alkaline. If it is very acidic and gardeners are trying to grow vegetables, plants and bacterial life might benefit from raising soil pH. This can be done quickly by adding long-lasting forms of lime. Ground limestone lasts longest in the soil and also provides magnesium, but it is expensive and other forms of lime such as slaked lime, hydrated lime, and calcified seaweed can also be effective. Lime is best added in the spring a few weeks before planting.

Plant nutrients are best absorbed in the mid-range of pH. If soil is highly above or below that, adding lime or elemental sulfur can correct the pH, allowing plant nutrients to be better absorbed. A nutrient test without a pH test could convince a gardener to dump in more fertilizer than is needed when a pH adjustment is all that is necessary.

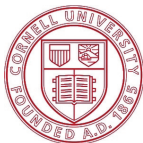
### ORGANIC FERTILIZERS

The process of photosynthesis requires air, sunlight, and water to provide sources of carbon, hydrogen, and oxygen. The overall health of a plant, however, requires additional nutrients and trace minerals. The major nutrients are nitrogen, phosphorous, potassium, magnesium, calcium and sulfur. Luckily, these elements are intricately related to microbial life in the soil. When that life is out of balance, however, organic fertilizers such as blood meal, bone meal, kelp, fish emulsion, potash, and earthworm castings can help build nutrients in the soil.

Plants also require a mix of trace minerals in smaller concentrations in the soil. These minerals include: iron, manganese, zinc, copper, molybdenum, and boron. Annual applications of organic materials and compost usually prevent deficiencies in these trace minerals, but can occur in some conditions if the soil becomes overly alkaline. An annual feeding with kelp meal or Azomite can also replenish any trace minerals in healthy soil.

Gardeners can find blended mixed of granulated and liquid forms of organic fertilizers that contain a spectrum of organic materials for a general feeding in a vegetable garden. Instruct gardeners to look for a label that says OMRI listed in addition to the word "organic" to ensure that the product will not harm soil biology. Frequent applications of worm compost tea, as described in Lesson 2, will also replenish nutrient supplies while building biological activity.

Overfertilizing, however, can be as detrimental to plants as underfertilizing. A surplus of fertilizer in the soil can upset electrical exchange between ions in the soil and can be as much of a stress for plants as underfertilizing. As with any stress on plants (such as nutrient loss, drought, or poor drainage), overfertilizing can attract pests such as aphids by putting out chemical signals that signify high nitrate levels in plant tissues. Gardeners should be conservative and judicious about applying granular fertilizers, while being careful to follow manufacturer instructions.



# ENVIRONMENTAL EDUCATION IN THE COMMUNITY GARDEN

## LESSON PLAN 7

### UNDERSTANDING FERTILIZER

#### OBJECTIVES:

Teach gardeners how different forms of organic fertilizers can give plants the nutrients they need while also feeding life in the soil.

Provide a basic understanding of how to look for nutrient deficiencies and correct them with organic fertilizers. Fertilizers should be used in tandem with compost and good gardening practices.

#### MATERIALS NEEDED:

Different examples of organic and OMRI listed fertilizers including granular, liquid, and isolated nutrient fertilizers such as blood meal and bone meal.

#### ACTIVITIES:

1. Show gardeners how read the nutrient descriptions on organic fertilizer, beginning with NPK ratios and discussing how many organic fertilizers include trace minerals and microbes.
2. Review main nutrients found in organic fertilizer treatments and how they support plant growth.
3. Demonstrate how to scratch or lightly work granulated fertilizers into the soil. Balanced organic granular fertilizer should be applied annually in the spring at the rate indicated on the package. Because granular fertilizers need to be dissolved to become available to plants, instruct gardeners to water thoroughly after applying granular fertilizers during the growing season.
4. Discuss best practices for applying mulch and ways to work compost and organic materials into top levels of soil
5. Demonstrate how to apply liquid fertilizers and compost teas in a community garden setting by using a watering can. Soil should not be too dry when applying liquid fertilizer, so explain to gardeners that they might want to water their plot first on dry days with clear water before applying liquid fertilizers. Also remind gardeners to apply liquid fertilizers early in the day or in the evening when foliar feeding (watering the leaves) to avoid scorching.

#### REFERENCE:

Hamilton, Geoff. *Organic Gardening*. DK Publishing, New York, 2011.

#### ESSENTIAL PLANT NUTRIENTS:

**Nitrogen** is responsible for growth of a plant's leaves and shoots, nitrogen helps give plants their green color with chlorophyll and is essential to building plant proteins. Deficiency is common in poorly structured soil and after digging in unrotted organic material. Nitrogen deficiency results in yellowed leaves, stunted growth, and susceptibility to insect attack. Nitrogen levels can be amended by scratching in a high nitrogen source such as dried blood meal.

**Phosphorous** facilitates strong root growth, particularly in root vegetables. Deficiency leads to undeveloped roots, stunted growth, and a blue color on the leaves. A light application of bone meal fertilizer will increase phosphorous levels in the soil. Bone meal can also be added to plant holes when transplanting larger plants and seedlings.

**Potassium**, often referred to as potash, promotes flowers and fruit development and is key to a plant's ability to process carbohydrates and proteins. Potassium deficiencies result in low yields due to poor fruiting and flower production, stunted overall plant growth, and yellowing around the edges of leaves. Leaf discoloration can also turn to brown scorching and a bronze or blue discoloration. Rock potash reintroduces available potassium and can remain in the soil for long periods.

**Magnesium** balance can be affected by high levels of potassium, so gardeners should be cautious about over applying potash. Magnesium deficiency can lead to yellowing along leaf veins, as magnesium is involved in chlorophyll production. An application of kelp meal, liquid seaweed or compost tea replenishes magnesium. Lightly digging compost into the soil in the fall will also balance magnesium levels.

**Calcium:** Calcium deficiencies are not as common as other elements, but do result in problems with fruiting and development of young plant tissue. Blossom-end rot in tomatoes results from a plant's inability to uptake calcium even when it might be available in the soil. Use of organic materials and compost generally alleviates any calcium deficiency, though some gardeners advocate adding crushed egg shells.

**Sulfur** is rarely deficient in well-managed soil that is high in organic matter. It is necessary for a plant's protein building process, and deficiencies result in general yellowing and stunted growth. A light dusting of gypsum (calcium sulfate) helps improve sulfur levels and increase aggregation in heavily clay soil.

