Soil III - care and sustainability

Introduction

The role of soil in agriculture and the life of the planet as a whole cannot be underestimated. Too often, farmers and gardeners adopt practices that damage the soil’s health and fertility and promote soil erosion.

This lesson will focus on raising awareness on agricultural practices that promote good soil stewardship. The core message is that in order to grow healthy and nutritious food in a sustainable way, the soil must be cared for and nurtured.

Learning Objective

Provide an overview of the importance of soil stewardship and guidelines for sustainable, organic soil care.

Learning Outcome

- Participants will learn about vital functions of soil and understand steps they can take to care for the soil in their own garden.
- Participants will be prepared to demonstrate and teach methods of soil care.

Materials

- flipchart or blackboard
- chalk or markers
- samples of organic soil improvers
ground is as important to plants as the environment above ground.

Ask the students to recall what they can from the unit on soil structure. Ask them about functions the soil provides.

**Soil functions**

- Soil supports and anchors the plants.
- It provides plants with water and nutrients. By increasing the water-holding capacity of soil, water is preserved and less irrigation is needed.
- Healthy soil is rich in varied life. It provides a habitat to countless organisms, continuously decomposing and transforming organic matter into important nutrients.
- Through the transformation of organic matter into more stable forms rich in carbon, the soil acts as a carbon sink. Maintaining this soil capacity for carbon absorption helps reduce the impact of climate change.
- Over-used and disturbed soils are less productive because of the loss of structure and top soil. They also release large amount of carbon in the atmosphere, contributing to global warming. This is often the case in Afghanistan.

Soil that supports abundant plant life maintains a beneficial balance of gases with the atmosphere and supports healthy life in the soil.

**Principles of organic soil care**

1. **Nourish the soil** – Bulky organic soil improvers feed the microorganisms responsible for soil structure and fertility. The main purpose is to increase the organic matter content of the soil.

2. **Minimize walking** – A compacted soil is airless, it is difficult for roots to penetrate and a poor environment for soil-living creatures.

3. **Minimize soil turning and tilling** to preserve soil structure.

4. **Cover soil with plants or mulch** to protect soil structure.

5. **Manage nutrients carefully** – More problems are caused by over-fertilizing than under-fertilizing.

**Adding soil improvers**

- Low fertility soil improvers can be extremely effective in maintaining soil fertility, because they provide better structure for increased microbe activity, and water dissolved nutrients are more easily released.

- Kitchen and garden residues and animal

---

<table>
<thead>
<tr>
<th>Bulky organic soil improvers</th>
<th>Fertility rating*</th>
<th>Mulch</th>
<th>Dig in</th>
</tr>
</thead>
<tbody>
<tr>
<td>bark, fine grade</td>
<td>low</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>compost, garden</td>
<td>medium</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>compost, municipal</td>
<td>low</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>compost, worm</td>
<td>high</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>hay</td>
<td>medium</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>leaf mold</td>
<td>low</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>manure, animal</td>
<td>medium to high</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>spent mushroom compost</td>
<td>medium</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>commercial products</td>
<td>variable</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(composted manures,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plant wastes, food wastes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prunings, shredded greens</td>
<td>low to medium</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>prunings, shredded woody</td>
<td>low</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>straw</td>
<td>low</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>wood chips, coarse bark</td>
<td>low</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

*Referring particularly to nitrogen
manure are usually composted before adding to garden. Composting stabilizes the plant nutrients they contain, makes them easier to apply, and makes them safer.

- All soil improvers can be applied as mulch. Most can also be incorporated into the soil in the top 15-20 cm, where good structure is most critical and microbial activity more intense.
- Medium and high fertility materials are better applied in spring and summer (or at the beginning of the growing season, depending on the hemisphere), since their nutrients will be partly wasted in winter when plant growth is minimal.

**Maximum yearly application rates**

Many problems can be avoided by a careful nutrient management. We do not want to waste nutrients and leak them in water bodies. The aim is to efficiently direct them to nourish our plants.

- **High-fertility soil improvers:** up to one full wheelbarrow per 5 m² (in a layer of about 5 mm).
- **Medium-fertility soil improvers:** up to two full wheelbarrows per 5 m².
- **Low-fertility soil improvers:** can be applied in greater quantity and more frequently. As mulches, up to 15 cm layer for lightweight materials and about 10 cm for heavier or densely packed down materials (i.e. leaf mold).

### Set up a demonstration plot.

Divide the plot divided into three sections.

1. Prepare **section 1** with a **high fertility additive** (e.g., raw compost or pure manure)
2. Prepare **section 2** with a **medium fertility additive** (e.g., kitchen scraps compost).
3. Prepare **section 3** with no compost
4. Plant the same seeds in each plot and observe as the season progresses.

### Follow up activities

On a tour of the demonstration farm, check for variation in soil. Point out what happens to the soil in the passageways. Compare it to what happens in planted and covered beds. Have the student touch the soil with and without mulch cover.

### Assessment questions

1) List as many soil characteristics as you can.
2) Why is soil important for plants?
3) How would you improve and sustain the soil in your garden?
4) Where do plant nutrients in the soil come from?
5) How do we add organic matter to the soil?
6) Why is the soil pH important?
7) How do we use manure?
Parts of this factsheet are adapted from University of Maryland Extension, Home and Garden Information Center-
http://extension.umd.edu/hgic

This document is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of University of Maryland and do not necessarily reflect the views of USAID or the United States Government.

Developed by Sophia Wilcox and Becky Ramsing

The University of Maryland, College of Agriculture and Natural Resources programs are open to all and age, sex, color, sexual orientation, physical or mental disability, religion, ancestry, or national origin, marital status, genetic information, or political affiliation, or gender identity and expression.

i From The Encyclopedia of Organic Gardening – Rodale Press