

### Materials

- Garden gloves (1 pair per student)
- Hand forks and trowels (1 tool per student), placed in a 5-gallon bucket
- Additional larger tools such as spading forks, shovels, rakes, and/or Garden Weasels
- (1–2) 5-gallon plastic buckets for compost

### Preparation

- Identify garden bed(s) for turnips
- Check the compost pile to ensure that you have enough compost for this lesson. If not, purchase extra compost or worm castings.
- Place 5-gallon plastic buckets and 2 hand trowels by the compost bin.

## PROCEDURE

### Part 1: Aerate Soil

- As a class, gather in the garden. Arrange students evenly around the turnip bed(s) and distribute garden gloves. Draw a line in the soil down the middle of the garden bed. Instruct each student to mark a small “personal workspace” in the soil in front of them. Assist the group in determining proper spacing between students. When finished, the garden bed should be evenly divided into small sections.
- Demonstrate how to properly use hand tools to till the soil. Pass out hand forks and trowels and begin tilling. As students work, remind them to till the entire area their personal soil section. After a few minutes of tilling, allow students to trade hand tools and till for a little longer. When tilling is sufficient, collect hand tools.
- Arrange large garden tools over the garden bed, starting with forks and shovels and ending with Garden Weasels and rakes. Moving from left to right, introduce each garden tool and demonstrate how to properly use it. Beginning with the first tool, select a few students to use the tool to till the soil. After a few minutes, collect that garden tool and move onto the next one, selecting a new group of students to till the soil.
- As one group works, encourage other students to observe how the tool affects the soil. “Which large tools are the most effective at breaking up large clumps of soil? Which tools are best at digging deep? Smoothing?” When finished, collect large garden tools, reserving the rake for the next part.

### Part 2: Spread Compost

- As a class, visit the compost bin. Arrange students in a large half-circle around the compost bin. Remove the top of the bin and grab a large handful of newly added plant matter to display to the group. “As these plants decompose, they release valuable nutrients into the soil.” Open up the bottom drawer of the bin and display finished compost. “Over time, plants will break down into this – nutrient-rich compost that is ready for use!”
- Select two students to use the hand trowels to remove a few large scoops of compost from the bottom of the pile. Place compost in the bucket. Select two new students to do the same, cycling through students until both plastic buckets are halfway full. Select two volunteers to transport the buckets to the turnip bed(s).
- Arrange students evenly around the garden bed. Demonstrate how to evenly broadcast a handful of compost over the soil. Next, pass the first bucket of compost down the line. Instruct each student to broadcast a large handful of compost over the soil directly in front of them. When finished, collect buckets and demonstrate how to use a rake to blend compost into the soil. Select a few students to give it a try. Finally, demonstrate how to use the rake to smooth out the soil surface. Gather lesson materials and return to the classroom.

# Aerate Soil in Turnip Bed, Spread Compost

## Soil & Ecology

### ENGAGE

“Much of the food we eat is grown on large-scale farms. Given the abundance of land, farmers use machines such as tractors in order to help them prepare the soil and plant their seeds. In contrast, we don’t have to rely on machines. Instead, we can get by with basic garden tools and a little bit of muscle. Today we are going to use these tools to prepare the soil for planting. In addition, we’ll be adding a natural fertilizer to the soil – compost! Compost is an all-natural alternative to the synthetic fertilizers often used on large-scale farms.”

### Objectives

- Students will understand how to properly use garden tools
- Students will be able to compare the effectiveness of different garden tools at tilling the soil
- Students will compare the pros and cons of industrial and sustainable agriculture

### EXPLAIN

#### Industrial vs. Sustainable Agriculture

*Labor and Productivity* – The development of specialized agricultural machinery replaced the need for human labor and made it possible for farmers to grow on increasingly larger plots of land. Nowadays, most industrial farms rely on machines to do basic agricultural tasks such as tilling, planting, and harvesting. While some sustainable farms may also use machines, many small farmers use traditional hand tools and manual labor to get the job done. Basic farm tasks might be more physically taxing and take longer to complete, however, many farmers prefer such “old-school” methods for a variety of physical, emotional, and philosophical reasons.

*Nutrient Cycles* – Whereas industrial farmers often rely on synthetic chemical fertilizers to boost the soil’s nutrient content, organic farmers use a variety of natural methods to improve soil tilth and promote healthy nutrient cycles. Soil amendments such as compost, chicken manure, or worm castings are naturally nutrient-rich and help to sustain soil health over the long run. In contrast, industrial fertilizers often leech out of the soil and have to be re-applied yearly, at a great expense to the farmer.

*Environmental Impact* – Naturally, larger plots of land yield larger harvests, enabling farmers to feed even larger numbers of people. However, productivity comes at a cost. Industrial agriculture is a chemical-intensive enterprise, requiring numerous external inputs, such as chemical fertilizers and petroleum. Sustainable farmers, however, seek to work in harmony with the environment by mimicking the closed nutrient systems found in nature.

### ADDITIONAL CONTENT INTEGRATION *(see previous page)*

If you need to till more than one garden bed, divide students into two groups – one large group to work with hand tools and smaller group to handle the large garden tools. Assign each group a bed to work on. As you work, periodically switch students from the hand tool and large tool group. When finished, compare each group’s work. “Which tools were most effective? Which tools made the job easier?”

### Additional Materials

- No additional materials needed.

### EVALUATE

**Journal prompt:** Which garden tools did you use today? Which tools do you feel were the most effective at tilling the soil?