Soil Health for School Garden Workshop
Why Soil Health?

Soil is a living resource that should be prioritized, conserved, nurtured, and protected! It looks different and acts different depending on climate, microclimates, water, sun, parent material, plants, etc--because it's alive!

The school garden as a living laboratory to teach children about its importance (through investigation based learning), so that they can then apply it elsewhere in their lives.

Resource: Unlock the Secrets of the Soil: Dig a Little, Learn a Lot (USDA-NRCS)
SOIL HEALTH

Four Principles

● **MINIMIZE DISTURBANCE:**
  Manage soils more by disturbing them less

● **MAXIMIZE SOIL COVER:**
  Keep the soil covered as much as possible

● **MAXIMIZE CONTINUOUS LIVING ROOTS:**
  Keep plants growing throughout the year to feed the soil

● **MAXIMIZE BIODIVERSITY:**
  Use plant diversity to increase diversity in soil

Resource: [NRCS Fact Sheets](#) - See “Principles for High Functioning Soils for 1 pager
**4 Principles of Soil Health**

1. **Do Not Disturb**
   Minimize disturbance

2. **Discover the Cover**
   Keep the soil covered

3. **A Radicle Idea**
   Keep a live root in soil as many days as possible

4. **Diversity is Key**
   Feed the soil with diversity, diversity, diversity
DO NOT DISTURB

MINIMIZE DISTURBANCE

- Low till in spring
- Cut plants at base in fall (and mulch in place!)
- Leave perennials for the bugs (and winter interest)
DO NOT DISTURB

MINIMIZE DISTURBANCE
DISCOVER THE COVER

MAXIMIZE SOIL COVER

- Cover Crops
- Compost
- Leaves
- Mulch
- Straw (Hay is for Horses!)
- Manure
DISCOVER THE COVER

MAXIMIZE SOIL COVER
A RADICLE IDEA

MAXIMIZE
CONTINUOUS LIVING ROOTS

● Crops Relay (1st planting, 2nd planting)
● Perennials
● Cover Crops
A RADICLIE IDEA

MAXIMIZE
CONTINUOUS
LIVING ROOTS
Cover Crops

- Conserve water
- Suppress weeds
- Increase nutrient cycling
- Prevent weathering

Winter Rye

Hairy Vetch

Austrian Winter Pea

Fava Bean
DIVERSITY IS KEY

MAXIMIZE BIODIVERSITY

- Crop rotation
- Perennials
- Native/Pollinator Plants
DIVERSITY IS KEY

MAXIMIZE BIODIVERSITY
**CROP ROTATION**

Grow diverse crops and increase soil organic matter and biodiversity!

- **Legumes**: Beans, peas, lentils, clover
- **Roots**: Carrots, onions, beets, garlic
- **Fruits**: Tomatoes, cucumbers, squash
- **Leaves**: Spinach, lettuce, corn, broccoli

- **Tomatoes** ➔ **Spinach** ➔ **Radishes** ➔ **Peas**
Soil Health
Amendments

Where to get Amendments:
● Green Leaf Garden Center (Bend)
● Moonfire and Sun (Bend)
● Eastside Nursery (Bend)
● Cascade Garden Center (Bend)
● Wintercreek (Bend)
● Landsystems Nursery (Bend)
● Aspen Ridge (Redmond)
● Clearwater Native Plant Nursery (Redmond)
● Earth’s Art (Redmond)
● Schillings Garden Market (Tumalo)
● Sisters Rental (Sisters)
● Sisters Forest Products (Sisters)
● C & C Nursery & Landscape (Sisters)
The Manure Exchange Program

- Connects farmers with excess manure to local gardeners
- Recycles nutrients to the soil
- Prevents eutrophication and ammonia toxicity in local water systems

Manure Exchange Facebook Group
Questions about soil health?

Erin Kilcullen:  
ekilcullen.dswcd@outlook.com

Denise Rowcroft:  
denise@envirocenter.org

Local mural painted by Vivi Design Co.
Soil Health and Native Plants

For example, their more developed root systems are adaptations that help them to survive our dry summers and wet winters, while simultaneously reducing erosion and filtering pollutants. Native wildlife, in turn, are adapted to use our native plants for food and shelter. Soils are some of the most complex ecosystems on Earth, containing nearly a quarter of the planet's biodiversity. Pesticide-intensive agriculture and pollution are driving factors in the precipitous decline of many soil organisms, such as ground beetles and ground-nesting bees. They have been identified as the most significant driver of soil biodiversity loss in the past decade.

https://www.scientificamerican.com/article/pesticides-are-killing-the-worlds-soils/?fbclid=IwAR23ywYhJnu7Pih1KW9gIyuqZIl4SSVgT2B28gcaHaPOjM0mGdO46luSPxQ
Imperiled Pollinators

Issues Threatening Pollinators

*Habitat Loss
*Pesticide Use
*Invasive Species
Climate Change
Disease

Scientific American article on pesticide damage to soil
Pollinator Habitat

- Plant Native Plants
  - Continuous bloom
  - Variety of colors and structures
  - Blocks of similar species
  - Add Keystone species

- Go Pesticide-Free

- Create Nesting Habitat
  - Leave the Leaves
  - Save the Stems
  - Embrace Bare Ground

Suggested Plant List for Central Oregon Native Pollinators
Further Reading: OSU - Enhancing Urban and Suburban Landscapes to Protect Pollinators
**Keystone Species**

A species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically.

**Further Reading:** *Nature’s Best Hope* by Douglas Tallamy

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### Central Oregon Keystone Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of Butterfly &amp; Moth species that use as host plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willow (Salix sp. - native species only)</td>
<td>312</td>
</tr>
<tr>
<td>Chokecherry (Prunus virginiana)</td>
<td>240</td>
</tr>
<tr>
<td>Quaking Aspen (Populus tremuloides)</td>
<td>227</td>
</tr>
<tr>
<td>Alder (Alnus incana)</td>
<td>210</td>
</tr>
<tr>
<td>Ponderosa Pine (Pinus ponderosa) and Lodgepole Pine (Pinus contorta)</td>
<td>199 -</td>
</tr>
<tr>
<td>Shinyleaf Ceanothus (Ceanothus velutinus)</td>
<td>93</td>
</tr>
<tr>
<td>Serviceberry (Amelanchier alnifolia)</td>
<td>81</td>
</tr>
<tr>
<td>Hawthorn (Crataegus douglasii)</td>
<td>58</td>
</tr>
<tr>
<td>Red-Osier Dogwood (Cornus sericea)</td>
<td>51</td>
</tr>
<tr>
<td>Greenleaf Manzanita (Arctostaphylos patula)</td>
<td>51</td>
</tr>
<tr>
<td>Bitterbrush (Purshia tridentata)</td>
<td>33</td>
</tr>
<tr>
<td>Mountain Mahogany (Cercocarpus ledifolius)</td>
<td>24</td>
</tr>
<tr>
<td>Rabbitbrush (Chrysothamnus viscidiflorus)</td>
<td>1</td>
</tr>
</tbody>
</table>
Native Pollinator Plants for Your School

**Firecracker Penstemon**  
(Penstemon eatonii)  
Early season bloomer  
Tubular flower structure

**Sulfur-flower Buckwheat**  
(Eriogonum umbellatum)  
Mid-season bloomer  
Umbrella-like, cluster flowers

**Blanketflower**  
(Gaillardia aristata)  
Late-season bloomer  
Composite flower structure

**How to plant these species:** Find a sunny spot. Dig a hole twice as wide as the pot and a bit deeper so that when you rest the pot in the hole, the soil level of the plant will be just a bit lower than the surface. This allows for moisture to drain towards the base of the plant and the roots. Refill the hole. Water. That’s it! Kids love to plant!!
Questions about Native Pollinator Plants?

Email Basey Klopp:

PollinatorPathwayBend@gmail.com
Engaging Students

1) Explore:
   Soil Ecosystems, Worms, & Mycelium

2) Investigate:
   Seeds, Roots, & Cycles

3) Experiment:
   Soil Composition, Nutrients, & Plant Growth

4) Apply:
   Amendments, Organic Matter, & Habitat
Soil Health with Students looks like:

- Investigating soil ecosystems
- Composting
- Learning about plant roots
- Cultivating plant diversity
- Planting Perennial Plants
- Amending the Soil
- Rotating Crops
Key Messages for Students

**Elementary:** Understanding “The What” by
- Building a personal connection to soil and understanding soil to be a living thing
- Hands-on practices in cultivating and valuing soil

**Middle School:** Understanding “The Why” by
- Having students start thinking about systems and interdependence.
- Learning about soil ecosystems and their intricate relationships.

**High School:** Understanding “The How” by
- Identifying local soil health issues and creating their own solutions
- Experimenting through comparative studies
Educational Resources

Soils4Teachers (Soil Science Society of America)
- K-12 Lesson Plans
- Videos
- Ask-A-Scientist
- Additional website just for students/kids
- Free classroom resources

Starting With Soil (Center for Ecoliteracy)
- iPad App (ages 7-9)
- Interactive/simulated gardening
- Focus on soil as living system

Digging Deep K-8
- Soil Health Lesson Set for School Gardens
- K-8
- Tualition Soil & Water Conservation District
Questions about engaging students?

Email Kaci Rae Christopher:
Kaci.Rae.Christopher@gmail.com
Soil My Undies

How Healthy is Your Soil? Take the Challenge to Find Out!

1. Plant a pair of new, cotton underwear in the site you’re curious about. Don’t forget to mark the spot you planted!

2. Wait at least 60 days. This gives your soil microbes time to do their magic!

3. Send us a photo and a little info about your operation to orinfo@ncs.usda.gov and we’ll put your undies on the map!

bit.ly/soilundies

USDA is an equal opportunity provider, employer and lender.
Garden for Every School
Garden Grants

$500 - $1500 grants available
Application info online
Application Due Friday December 10th
Thank You!

CONTACT INFO:

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