

Soil Health Blitz

Training Workbook



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INTRODUCTION

Welcome to the Soil Health Blitz Training Workbook! As a farmer, you know that soil is a critical resource for your crops. Healthy soil can improve crop yields, reduce the need for expensive inputs like fertilizers and pesticides, and contribute to a more sustainable farm operation. That's why understanding soil health is so important.

This workbook is designed to provide you with knowledge on key practices promoting soil health. By the end of this workbook, you will be able to define soil health, learn about principles of soil health, practices promoting soil health, and identify visual indicators of soil health. Activities and worksheets have also been included to help with self-assessment of your current knowledge and apply what you learn to your farm. This workbook will equip you with the knowledge to help you improve your soil health and ultimately achieve a more sustainable and productive farm operation.

WHAT IS HEALTHY SOIL?

Healthy soil is soil that can sustain soil biodiversity while maintaining water and air quality and supporting human health. Healthy soil can support the growth of different types of plants and promote the existence of a large diversity of living organisms that perform important soil functions.

ACTIVITY 1

List 5 different types of living organisms found in healthy soil.

1. _____
2. _____
3. _____
4. _____
5. _____



WHAT ARE THE PRINCIPLES OF SOIL HEALTH?

Healthy soil satisfies five principles:

1. **Maximum soil cover:** Soil is covered by crop residues or cover crops are growing at any given time.
2. **Minimal disturbances:** Land preparation involves reduced or minimum tillage and the applied soil cover controls weeds.
3. **Supporting diversity of plant species:** Ensures plants exploit nutrients from different soil layers at different times and living organisms derive food from diverse sources.
4. **Cycling nutrients and ensuring nutrient balances:** Organic resources such as manure derived from livestock, household wastes, and crop residues can be used to supply back nutrients.
5. **Managing soil water/drainage:** Aims to eliminate in-field flooding and runoff while at the same time focusing on in situ water harvesting to allow water capture for crops.

ACTIVITY 2

Read each scenario from 1 to 5 below and choose a suitable principle of soil health from the options (A to E) given below each case:

1. Ngabo Niyibizi employs a rotational grazing system to maintain healthy plant growth, where she moves her goats between different fields. She also collects their droppings and uses them to create manure, which serves as a nutrient-rich source for her soy farm. On her farm, she uses organic inputs from decomposed kitchen wastes and ensures that crop residues are left on the farm.
 - A. Maximum soil cover
 - B. Minimal disturbances
 - C. Supporting plant diversity
 - D. Nutrient cycling
 - E. Managing soil water

2. Fatima ensures that she never removes crop residue on her fields after harvest to maintain healthy soil and improve crop yields. This helps protect the soil from erosion, retain moisture, and suppress weed growth. Additionally, Fatima has started using crop residue as mulch by spreading it over her soil to provide additional coverage and protection. By doing so, she can maintain the health of her soil and achieve better crop yields..
 - A. Maximum soil cover
 - B. Minimal disturbances
 - C. Supporting plant diversity
 - D. Nutrient cycling
 - E. Managing soil water

3. Gonzalez promotes a diverse and healthy ecosystem on her farm. She practices crop rotation and ensures her agroforestry trees are well maintained. To ensure maximum productivity from her farm, she intercroops her sorghum crop with legumes. She plants cover crops during the off-season to further prevent soil erosion and improve soil health.
 - A. Maximum soil cover
 - B. Minimal disturbances
 - C. Supporting plant diversity
 - D. Nutrient cycling
 - E. Managing soil water

4. Imran Khan recently bought a direct seeder for his farm. His goal is to plant crops without tilling the soil. This will help him to reduce erosion, conserve soil moisture, and save labor costs.
 - A. Maximum soil cover
 - B. Minimal disturbances
 - C. Supporting plant diversity
 - D. Nutrient cycling
 - E. Managing soil water

5. Kizza Matovu practices minimum soil disturbance, keeps his soil covered, and has different crops on his farm. He makes sure that hardpans are broken on his farm. On his sloping farm, he has constructed terraces. During seasons of below-average rainfall, he constructs zai pits to help trap runoff water.
 - A. Maximum soil cover
 - B. Minimal disturbances
 - C. Supporting plant diversity
 - D. Nutrient cycling
 - E. Managing soil water

VISUAL INDICATORS OF SOIL HEALTH

You can be your own soil health doctor. Check for the following symptoms to assess the health of your soil:

1. **Crop color:** Healthy soil should produce dark green crops.
2. **Crop yield:** Sick soil yields low crop yield.
3. **Living organisms:** More living organisms indicate healthy soil.
4. **Soil color:** Dark soil is an indicator of healthy soil.
5. **Soil hardness:** Soft soil promotes soil life by allowing for the interaction of roots, organisms, water, and air
6. **Weeds:** Different weeds indicate different nutrient levels. Wondering jew, blackjack, and amaranth are indicators of healthy soil. However, poverty grass, Mexican marigold, or striga indicate unhealthy soil

ACTIVITY 3

Take pictures of different areas of your farm and analyze the visual indicators of soil health. Write down your observations and reflect on areas where improvement is needed.

INDICATOR	OBSERVATION
Crop color:	
Crop yield:	
Living organisms:	
Soil color:	
Soil hardness:	
Weeds	

REFLECTIONS:





PRACTICES PROMOTING SOIL HEALTH

» **Conservation agriculture:**

Involves reduced soil disturbance, maintaining soil cover, and implementing crop rotations to preserve soil structure and promote sustainable practices.

» **Integrated soil fertility management:**

This refers to the use of soil fertility management practices that include improved varieties, organic inputs including farmyard manure, biochar, and compost, proper use of inorganic fertilizer combined with GAPs (i.e., proper spacing, timely planting, weeding, pest, and disease control, etc.) and adapting these practices to local conditions, e.g., addressing acidity. ISFM aims to maximize the use efficiency of the applied nutrients to increase crop productivity and often combines organic and inorganic fertilizers for best results. Additionally, micro-dose inorganic fertilizers from the right source, right rate, right time, and right place (4R-stewardship).

» **Agroforestry:**

Integrates trees into agricultural production, such as combining them with crops and animals. In agroforestry, trees are integrated into agricultural production, i.e., crop and livestock production. Trees can be planted on farm boundaries or inside the farm. When planted along farm boundaries, trees can help to break strong winds, which may cause lodging, thus reducing crop production. Leguminous agroforestry trees such as sesbania and Calliandra can be planted on the strips across sorghum fields and pruned at the end of the cropping season.

» **Pit cultivation:**

Involves digging pits and applying well-composted manure or other organic matter to improve soil fertility and increase moisture retention.

» **Soil and water conservation:**

Refers to establishing structures that prevent nutrient loss and promote rainwater infiltration in the soil.

ACTIVITY 4

Draw a map of your farm and identify areas where you can implement each of the above practices.

A large, empty rectangular box with a thin brown border, intended for drawing a farm map. The box is centered on the page and occupies most of the lower half of the page.

OTHER AGRONOMIC PRACTICES IN SORGHUM PRODUCTION

To promote the health of your soil during sorghum cultivation, there are several practical application practices that you can follow. These good agronomic practices can help support soil health from the time you prepare the land until your produce is ready for market. Let's take a closer look at some of these practices:

» **Land preparation:**

Timing is key. Prepare the land to a fine tilth before the onset of rainfall. Use rippers or direct seeders to minimize disturbance and promote soil health.

» **Planting:**

Proper timing is important to optimize moisture and avoid pest and disease attacks.

» **Seed selection:**

Buy your seeds early and choose a variety that is specific to your area and season. Select seeds that are resistant to challenges affecting sorghum production in your area.

» **Proper spacing:**

Each environment, season, and cropping system requires specific spacing to reduce competition for growth resources. For the contracted farmer, monocropping and spacing 60 cm x 20 cm is recommended.

» **Thinning:**

Eliminate weak and pest-infected plants through thinning. Move healthy plants to spaces where seeds didn't germinate if soil moisture allows.

» **Weed management:**

For proper weed management, two weeding phases are recommended. Weeds are pests, so remove them on time to avoid competition with crops. They also harbor pests. Always manage weeds before they develop seeds.

» **Pest and disease management:**

Timely pest attack diagnosis is one of the important control strategies to overcoming pest damage. Use integrated pest management (IPM) strategies involving biological, cultural, and inorganic pest control methods to reduce losses induced by pest attacks.

» **Harvesting and post- harvest processes**

To ensure safety and quality, it is crucial to harvest sorghum when the grain is mature to avoid deadly Aflatoxin contamination and prevent grain loss or deterioration. Store the harvested panicles in clean containers to prevent soil contamination. Before threshing, ensure the grain is thoroughly dry to minimize damage. Threshing can be done manually or with mechanized options. If the grains are not dry after threshing, they should be spread on a clean surface for additional drying.

» **Storage**

To ensure grain quality, implement appropriate storage practices, which include avoiding mixing with previous harvests, keeping bags away from walls and soil, maintaining cleanliness and ventilation, regularly dusting grains, occasionally exposing them to the sun to reduce moisture, and utilizing alternative pest control methods when necessary. Regularly monitor stored grains for pests, mould growth, or moisture, and promptly take necessary actions to preserve grain quality. For contracted farmers, timely delivery of harvested grains to the aggregator is of utmost importance.



ACTIVITY 5

Think about how you can apply these practices to your farm. Fill out the worksheet below with your plans for implementing these practices and any notes you may have.

PRACTICE	PLAN	NOTES
LAND PREPARATION		
PLANTING		
SEED SELECTION		
PROPER SPACING		
THINNING		
INTEGRATED SOIL FERTILITY MANAGEMENT		
PEST AND DISEASE MANAGEMENT		
HARVESTING AND STORAGE		



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