

Organic Agriculture Integration in Basic Education Curriculum

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Properties of Soil Rich in Organic Matters

GRADE LEVEL: Grade IV

SUBJECT: Science and Organic Agriculture

TOPIC: Characteristics of the Different Types of Soil and Properties of Soil with Organic Matters

PREREQUISITE: The pupils should have already a background lesson taken up during the Grade three.

DURATION: 2 sessions

I. LEARNING OBJECTIVES

A. Science objective

Compares and contrast the characteristics of the different types of soil using a chart.

B. Organic Agriculture objective

Identify the properties of soil rich in organic matters.

C. English

Organic Agriculture objective- Define and describe technical terms of soil.

(For English Integration)

II. MAIN CONCEPTS & SKILLS

1. Soil- is a loose rock particles mixed with remains of decayed plants and animals called humus.

* Three kinds of soil (Please refer to appendix A)

a. **Sandy soils** are rough soil. They are white and gray in color. There are plenty of spaces between soil particles so it cannot hold plenty of water and nutrients. They have no humus.

b. **Clay soils** are finest soil. They are red in color. They can hold much water but dries very slowly. They are sticky when wet and hard when dry. They have little humus.

c. **Silt soil** feels like flour. It forms into a ball that easily breaks apart. If you squeeze it between your thumb and fingers, it will not form ribbons.

2. **Soil rich in organic matters** is the broken down or decomposed by bacteria, fungi, and other tiny organisms that live in soil. It provides nutrients for plants. Organic matter improves the soil. It is best for growing crop. It holds enough water and air needed by the plant. (Please refer to appendix B)

3. **Living soil** is a soil that has more living organism like bacteria, fungi and nematodes. Which some of these organisms actually serve a positive role. Many fungi serve to breakdown and process

dead organic matter.(**Please refer to Appendix C**)

4. **Soil water-holding capacity:** A clearly important characteristic of a soil is its ability to hold

water. One problem with a coarse sandy soil is that water (and nutrients) is rapidly lost from the soil. One of the important qualities of Soil Organic Matter is that it helps retain water.

MATERIALS NEEDED

- Real sample and pictures of different types of soil (**Please refer to appendix D**)
- Real sample and picture of soil rich in organic matters (**Please refer to appendix D**)

III. PROCEDURES

A. Preparatory Activity:

1. Review: What are the types of soil?
2. Motivation: Do you know where soil comes from? Show two small rocks. Rub them against each other. Are there bits of rocks falling?
3. (**Indicate unlocking of difficulties**)
 - a. Soil- is a loose rock particles mixed with remains of decayed plants and animals called humus.
 - b Sandy soils- are rough soil. They are white and gray in color. There are plenty of spaces between soil particles so it cannot hold plenty of water and nutrients. They have no humus.
 - c. Clay soils- are finest soil. They are red in color. They can hold much water but dries very slowly. They are sticky when wet and hard when dry. They have little humus.
 - d. Silt soil- feels like flour. It forms into a ball that easily breaks apart. If you squeeze it between your thumb and fingers, it will not form ribbons.
 - e. Soil rich in organic matters- is the broken down or decomposed by bacteria, fungi, and other tiny organisms that live in soil. It provides nutrients for plants. Organic matter improves the soil. It is best for growing crop. It holds enough water and air needed by the plant. (**Please refer to appendix B**)
 - f. Living soil- is a soil that has more living organism like bacteria, fungi and nematodes. Which some of these organisms actually serve a positive role. Many fungi serve to breakdown and process dead organic matter.
- e. Soil water-holding capacity- A clearly important characteristic of a soil is its ability to hold water. One problem with a coarse sandy soil is that water (and nutrients) is rapidly lost from the soil. One of the important qualities of Soil Organic Matter is that it helps retain water.

B. Developmental Activities

1. Presentation:

What is inside this pot?

2. Pupils Activities

Divide the pupils into four groups. Give instructions and perform the following activity by group.

(Indicate time limit in the activity)

Activity 1
(15 minutes)

Divide the pupils into 4 groups. Each group observes the different types of soil that place in the 3 pots. Pot A (Sandy soil), Pot B (Clay soil), and Pot C (Silt soil). Each pot should be observed by seeing and let 2 members of each group will touch the soil to identify the texture and characteristics of the soil for 1 minute in every pot. The first one to observe in Pot A is group 1 after 1 minute they will proceed to pot B and group 2 will observe to pot A until the 4 groups finished to observe. Each group should complete the the table in **appendix E Table 1**.

Each group will present the result of their discussions. Other members of the class will ask questions after each presentation.

Discussion: The Teacher discuss the main concepts and skills. Then ask the following questions to the pupils.

- What are the three types of soil?
- What are the characteristics of Sandy soil?
- What are the characteristics Silty soils?
- What are the characteristics of clay soil?

Indicate up to what session 1 and session 2

Session 2

Indicate time limit of activity ()

Activity 2
(Done in 10 minutes only)

Let the four groups to go out inside the classroom to observe three areas. The teacher should label the 3 areas prepared. Area #1 (soil that no plants/grasses grown), Area #2 (soil that few plants/grasses grown), Area#3 (soil with garbage being decomposed). Then each group should go around observing what living organisms they have seen in three different areas. Each group should complete the table in **appendix E Table 2** while doing their activity.

Guide for Pupils:

- What are the properties of soil with rich in organic matters?

Each group will present the result of their discussions. Other members of the class will ask questions after each presentation.

C. Analysis: What type of soil is best for growing plants? Why?

D. Generalization/ Abstraction:

What are the characteristics of the different types of soil? How do they differ?

E. Application: Water holding capacity activity. (Please refer to appendix F for picture guide)

(Done in 20 minutes)

The teacher prepares 4 plastic L water bottles that being cut the bottom of each and 4 kinds of air dry soil (weighing 600 gm): a.) silt soil b.) Clay soil c.) Sandy soil d.) Soil rich in organic matter. Ask four pupils to place each type of soil in the inverted bottles. Suspend inverted bottle above plastic cups (hanging by twine from pole). Take a plastic cup and fill it full of water; then add it to the soil in each bottle. Do some other activity and return when water has passed completely through all samples. If one of the bottles has absorbed all the water, but none has passed through into the cup, you will need to add water, the same to each four samples (in order to be able to compare the results at the end.) After all samples have drained completely, line up the cups side- by-side and compare the results. The pupils should observe carefully and answer the question that follows.

Questions:

1. Which of the soils holds the most water?
2. What factors do you think are responsible for holding more or less water?
3. How can you best improve the water-holding capacity of your soil?
4. Why is water-holding capacity important?

Achieving the Objectives

Objective	This is achieved by
To compare the characteristics of the different types of soil.	Using chart of the characteristics of different types of soil. Using Real soil of different types of soil.
To identify the properties of soil with rich in organic matters.	Hands on activity of the pupils and their observations.

IV. Assessment

Group the pupils in 4 groups.

Each group identifies one farmer using organic fertilizer for an interview. Furthermore, the group shall determine the profile of the farmer:

Guide question for an interview: (Please see in appendix G)

1. Who is the farmer being interview?
2. What did they do to enhance the soil fertility?
3. What kind of fertilizer did the farmer use?
4. Make a list of organic fertilizer did the farmer use?
5. What are the benefits of organic agriculture?

V. Assignment: (Extension Ideas)

Each group will conduct investigative research by farmer. Make a report on the result of the interview next Monday.

RESOURCES

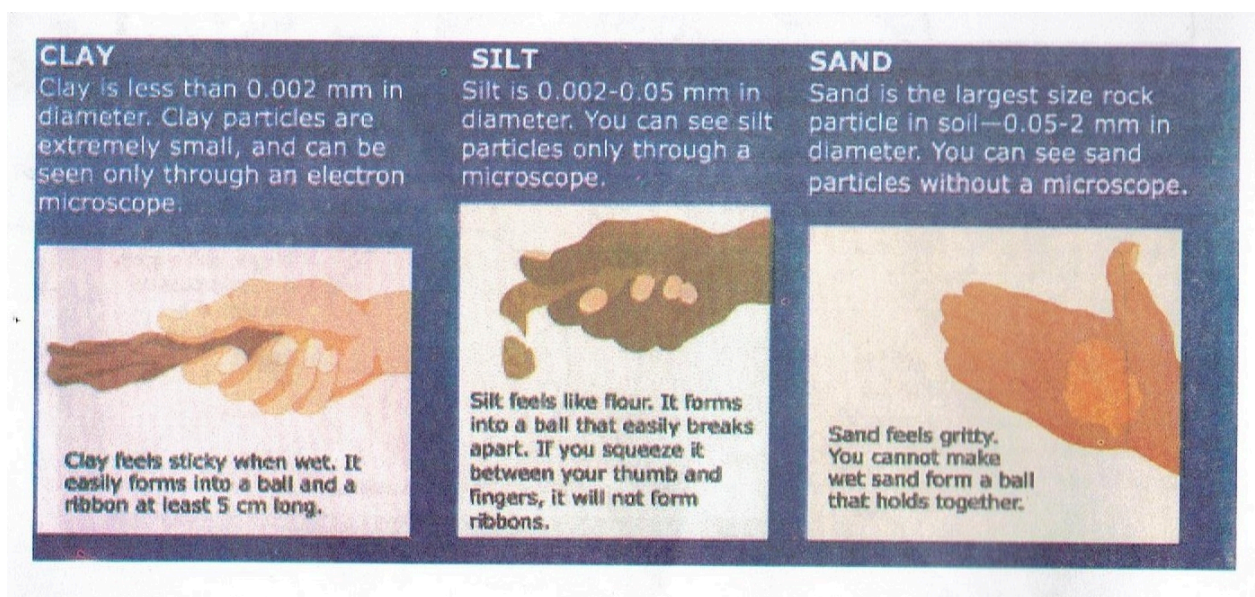
K to 12 Curriculum Guide page 21

Resource Manual on Integrated Production and Pest Management (IPPM) in Rice, pages 5 to 7

Lesson Plan in Science 3 Based on RBEC 2007 Edition pages 224 to 227.

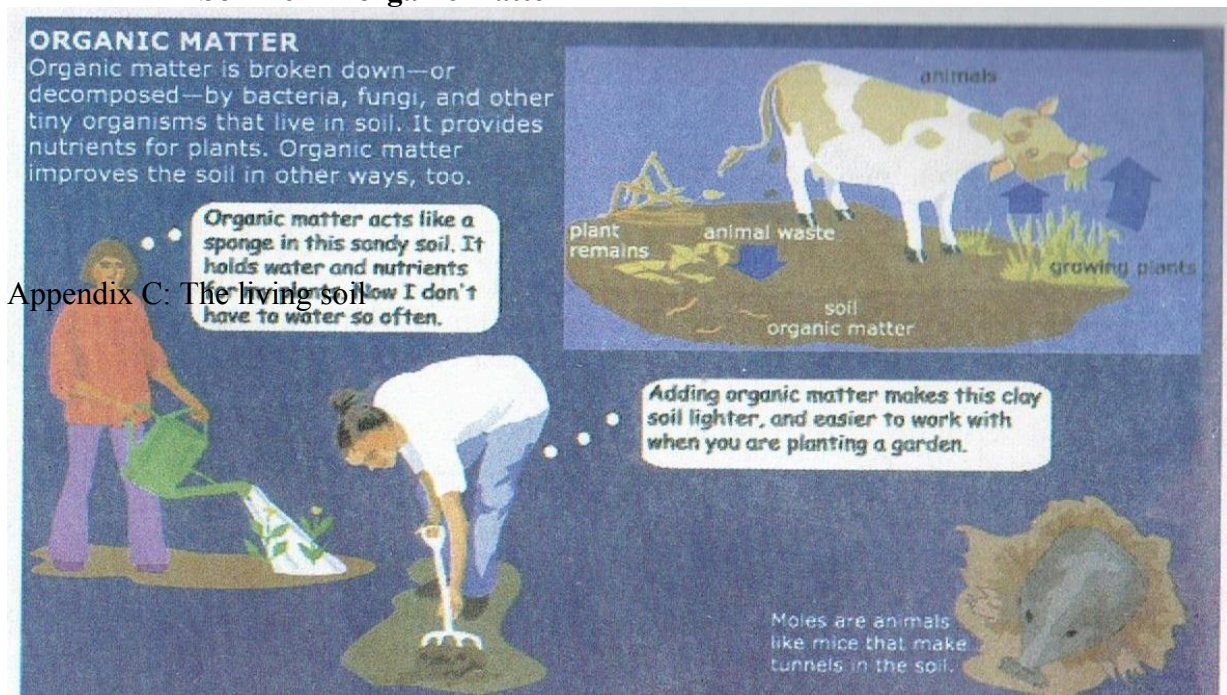
Appendix A

Resource Manual on IPPM in Rice
World Education Philippines, Inc.
Three types of soil



Appendix B

Resource Manual on IPPM in Rice
World Education Philippines, Inc.
Soil rich in organic matter



Appendix C: The living soil

G. Organisms in the Soil System

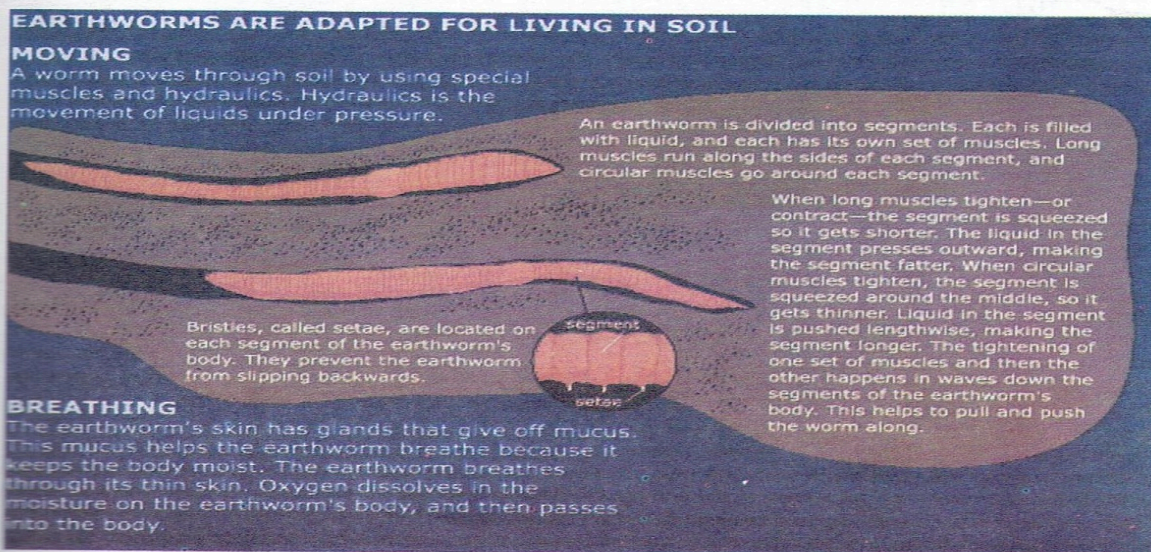
“Feed the Soil and Let the Soil Feed the Plant”

1. Soil Microorganisms: Farmers’ “friends”

The majority of soil-living organisms are bacteria, fungi and nematodes. While some of these organisms cause diseases to crops, majority of these organisms actually serve a positive role. Many of the fungi serve to breakdown and process dead Organic Matter (OM) into smaller-and-smaller components. These organisms are called **saprophytes**. Many of the bacteria serve a useful function in transforming nutrients into forms that are easily absorbed by the plant roots. Still others, both fungi and bacteria, may act as predators and parasites that help protect the plant roots from being attacked by diseases and pests. Thus, just like in the above-ground system, there exist “friendly” organisms that can help farmers fight pests and natural enemies in the soil system.

Plant roots also encourage soil aggregation. Roots pushing through the soil, together with dead roots, which cause cementing, help to form soil aggregates. Grasses and grains are particularly effective in promoting good soil structure, owing to the extensive network of their root system.

2. Earthworms: Their Role in the Living Soil



Appendix D: Pictures of different types of soil
(For Teacher's Reference)



Soil Rich in Organic Matter

http://www.search.ask.com/search?&apn_dtid=%5EBND406%5EYY%5EPH&d=406-394&atb=sysid%3D406%3Aappid%3D394%3Auid%3D5a1f6a1e0417df6d%3Auc2%3D95%3Atyp ekbn%3DU9092%3Asrc%3Dhmp%3Ao%3DAPN10645A&shad=s_0048&p2=%5EAG6%5EBND406%5EYY%5EPH&apn_ptnrs=%5EAG6&o=APN10645A&lang=en&gct=hp&q=types+of+soil&tpr=10&ctype=pictures&imgsize=all&safeSearch=on&imgDetail=true

Appendix E. The pupils answer and complete the table.

Table 1

Types of Soil	Characteristics	Texture
Sandy		
Clay		
Silt		

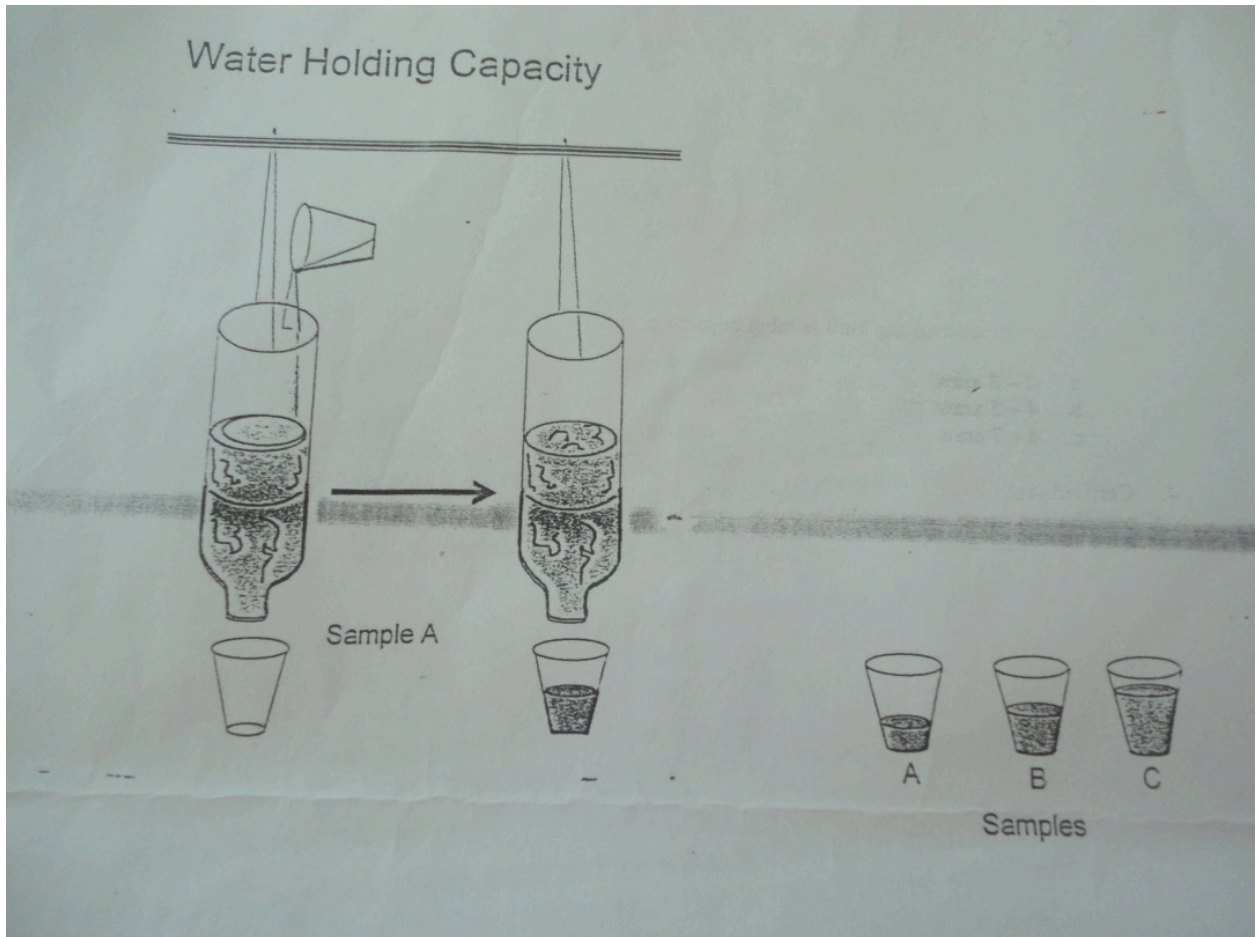
Table 2

Areas being observed	List of living organisms seen in different areas
Area #1 (soil that no plants/grasses grown)	
Area#2 (soil that few of plants/grasses grown)	
Area#3 (soil with garbage being decomposed)	

Appendix F:

Picture of water-holding capacity

(For teacher's reference)



Appendix G:

Guide question for an interview

1. Who is the farmer being interview?
2. What did they do to enhance the soil fertility?
3. What kind of fertilizer did the farmer use?
4. Make a list of organic fertilizer did the farmer use?
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Prepared by:

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Teacher I

