



AN EXTENSION MANUAL ON COMPOST FOR SUSTAINABLE CROP PRODUCTION



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FOREWORD

Agricultural intensification is very necessary for increased crop productivity. In the same vein, maintaining a sustainable crop growing environment is very essential under threatening climatic conditions. The poor physical conditions of soils in Ghana result in the rapid leaching of nutrients beyond the reach of plant roots. Soils in Ghana are also generally low in organic matter. In addition, intensive cultivation of crops with little or no replacement of nutrients results in high nutrient removal, resulting in nutrient mining and subsequently soils poor in plant nutrients. This results finally in low soil productivity. However, research has shown that improving soil organic matter through the application of compost has the potential to address these challenges. During the regional and national RELC meetings conducted across the country in 2017, the lack of information on organic amendments such as compost was identified as a major challenge which needed immediate attention.

The Modernizing Agriculture in Ghana (MAG) Project funded by Global Affairs Canada is therefore partnering CSIR-Soil Research Institute by providing funding in developing this communication material to build capacity and help transfer improved soil nutrient management technologies for sustainable and increased crop production.

The use of soil amendments such as compost to improve the physical and chemical state of the soil results in increased crop productivity. Practices outlined in this extension manual on compost and how it is produced, when adopted would go a long way not only to improve soil productivity but more importantly, result in environmental sustainability.

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1.0 WHAT IS COMPOST?

It is any organic residue/material or combination of organic residues/materials that have been partially decomposed or transformed to a state rich in plant nutrients. It is an organic fertilizer

2.0 IMPORTANCE OF COMPOST

- It is a rich source of plant nutrients
- It increases soil organic matter levels
- It helps soil retain more plant nutrients (reduces leaching)
- Improves soil structure
- Improves soil quality
- Improves microbial activity in soil
- Improves biodiversity in soil
- It helps to keep soil pH at optimum levels
- It aids in reducing soil erosion
- It helps in controlling weeds, pest and diseases
- Helps farmers improve productivity of their lands and income

3.0 MATERIALS NEEDED TO MAKE COMPOST

(i) Plant materials, (both dry and green)

- Weeds, grasses and any other plant materials cut from inside and around farm fields.
- Organic wastes from cleaning grain, cooking and cleaning the house and compound,
- Crop residues: stems, leaves, straw and chaff of all field crops from threshing grounds and fields after harvest.
- Garden wastes – old leaves, hedge trimmings, grass cuttings, etc.
- Dry grass, hay and straw left over from feeding and bedding of animals.
- Dropped leaves and stems from almost any tree or shrub.

(ii) Animal materials

- Dung and droppings from all types of domestic animals.
- Chicken droppings are important to include because they are rich in nitrogen.
- Sludge and urine from animals and people.

(iii) Water

- Enough water is needed to wet all the materials and keep them moist,
- Materials should not be made too wet so that they lack air and thus rot and smell
- Too little or too much water negatively affect good compost making.
- Water does not need to be clean like drinking water.
- Source of water could be from rain, waste, stream.

Note: Avoid using water contaminated with lubricants and heavy metals

4.0 FACTORS THAT AID COMPOST MAKING

- *Micro-organisms:* (fungi and bacteria) and smaller animals (worms, insects) help to turn waste materials into mature compost.
- *Air:* The arrangement of the composting materials should allow for good aeration for the decomposers to effectively function.
- *Heat:* Decomposition of organic wastes produces heat. Compost needs to be kept hot and moist so that the plant and animal materials can be broken down quickly and thoroughly.

5.0 COMPOST PREPARATION METHODS

There are several ways of preparing good and rich compost. These include the pit or trench methods, heap methods, plastic bag method, etc. Choice of method depends on prevailing conditions and availability of materials.

6.0 COMPOST PREPARATION PROCEDURE

In preparing compost, several steps are followed in a chronological order. A typical example is the pit method using rice straw, wood ash and poultry manure as available materials

Step 1: Site Selection

- Select a location, preferably closer to where the compost is to be used
- Select a site (s), preferably under shade.
- Smaller lots of compost piles are better than one huge pile.
- Bigger piles require extra labour to convey compost to points of application.

Step 2: Making Trench/Pit:

- Dig a trench or a pit using any available tool - hoe, mattock, etc. (*see photo 1*)
- The trench can measure about 3m long and 1.5-2m wide.
- The depth will depend on quantity of material available to be composted.



Photo 1: Digging a trench or pit for compost

Step 3: Handling of Compost Materials:

- Chop material (rice straw) to be composted into pieces (*see photo 2*).
- Weigh the materials (rice straw and poultry manure) in a ratio of 3:1.
- Wet the materials overnight, preferably in sacks.
- Remove wet materials and allow any excess water to drain off the following day.



Photo 2: Chopping of compost material into pieces

Step 4: Laying of Materials in Pit/Trench:

- Arrange the materials (rice straw and poultry manure) in layers in the trench or pit (*see photo 3*)
- Fill the trench to about 30 cm with the plant material
- Add 10 cm layer (divide full length of a cutlass six times) of poultry manure.
- Add a handful of wood ash.
- Repeat the process till all the materials are used.
- The pile can be built up to one cutlass length high.
- Insert a wooden pole of about 2 meters long to monitor temperature changes as composting progresses



Photo 3: Arrange materials into layers

Step 5: Treatment of Trench/Pit:

- Cover the trench/pit with a thin layer of any plant material. E.g. banana, plantain, palm fronds, large leaves (*see photo 4*).
- Water compost pile every 3 to 5 days, depending on the environmental conditions
- After 3-4 weeks open and turn the compost (bottom materials should be moved to the top)
- This could be done by moving the composting materials into an adjacent pit/trench
- For rice straw this should be done once.

Note: For saw dust (hard wood) compost which takes more than 8 weeks to decompose, turning should be done at least twice.



Photo 4: Covered composting material

Step 6: Compost Harvesting

- Depending on the materials, compost will be ready in 4 weeks for softer materials and up to 10 weeks for hard materials (e.g. sawdust)
- Feel the temperature of the wooden pole as a sign of matured compost (*see photo 5*)
- Cold temperature signifies matured compost.
- Compost can be allowed to stay in the pit until it is needed.
- In case the material will not be used immediately protect it from rain.



Photo 5: Feeling the temperature of wood to determine maturity

Examples of Compost made from different materials



Photo 6: Rice straw compost



Photo 7: Saw dust compost



Photo 8: Poultry manure compost

Note:

- ***In areas where digging a pit may not be possible, compost can be made using plastic bags/sheets (see photo 9)., boxes, barrels, heaps***
- ***The material is periodically turned over as done for the pit until compost is ready***



Photo 9: Compost making using plastic bags/sheets

7.0 APPLICATION OF COMPOST

- Compost may be applied in several ways depending on the crop.
- For field crops such as cereals, legumes, roots, tubers, compost should be broadcast and worked into the soil
- For vegetables, compost may be applied as band placement or spot placement relatively close to the crop or as mulch

- Compost can also be applied by placing the compost material directly into the planting hole
- Depending on the quality of compost, apply an average of 2 - 4 tons per hectare for effectiveness and good results.

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