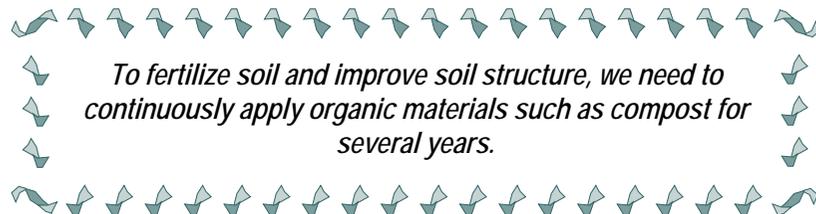


⇒ Nutrient content of compost widely differs according to the kind of materials used in composting. A ripe compost made from rice straw and chicken manure with a 2 – 4 t/ha rate of application can contribute about 3 – 5 kg N/ha, 2 – 4 kg P<sub>2</sub>O<sub>5</sub>/ha and 7 – 14 kg K<sub>2</sub>O/ha. Thus, compost application would reduce amount of inorganic fertilizer to be applied.

#### Example of nutrient content in manure and compost

Materials	Moisture	C/N Ratio	Content on sample, % (kg/lt)				
			P2O5	K2O	CaO	MgO	
Chicken manure	20%	8:1	2.8% (1.3)	5.1% (35.7)	3.1% (27.9)	12.7% (127)	1.8% (18)
Rice straw	70%	20:1	0.4% (1.2)	0.2% (1.0)	0.4% (3.6)	0.1% (1.0)	0.1% (1.0)

Source: S. Fujiwara, "How to make and use the compost" (2003)



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## MAKING AND USING COMPOST - Theory and Practices -



**Environmental and Productivity Management  
of Marginal Soils in the Philippines  
(EPMMA)**



A Technical Cooperation Project  
between the Bureau of Soils and Water  
Management and the Japan  
International Cooperation Agency



## WHAT IS COMPOST?

**C**ompost is a rich, friable and soil-like material made from farm wastes, crop residues, grass clippings, green manure crops, fallen leaves, vegetables, kitchen refuse, animal manures and other decomposable materials.

Composting is the process of breaking down these organic materials by means of soil organisms to produce biologically stable products that can act as slow-release sources of plant- available nutrients, thereby improving the nutrient status and the biochemical and physical properties of the soil.

Thus, compost improves soil quality by acting as soil conditioner and provides lasting benefits because it is environment-friendly.

Composting materials are readily available right in the farm. Thus, farmers can easily prepare the compost, providing a cheaper, healthier alternative to expensive commercial fertilizers.

## WHY IS THE COMPOST PROCESS NEEDED?

Generally some organic materials emit organic-acids or phenols, some of which are harmful to crops. And when too much raw organic materials are added to the soil, organisms compete with the crop for nitrogen, since rapid decomposition of organic material by organisms in the soil needs more nitrogen.

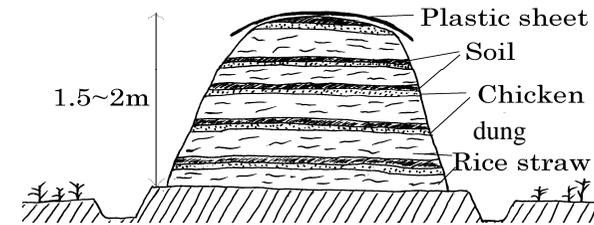
Many harmful substances to crops on easy to decompose organic materials are broken down by the composting process.

## BENEFITS OF USING COMPOST

Generally, compost or humus is widely used as a soil amendment to improve soil structure, to provide plant nutrients, and to support living organisms. Specifically, compost provides the following benefits:

### 1. Improves the soil fertility, soil tilth and soil structure

Compost improves the fertility of the soil. Drainage of the field is also improved because it promotes better aeration, thus the soil becomes easier to plow. It increases the soil's ability to hold water and nutrient retention of light and sandy soils, and improves soil texture by increasing the drainage of heavy clay soils. It makes the soil a more favorable medium for the development of root systems of growing plants.



3. Spread about 20 cm of rice straw at the bottom of a 2m x 2m pile. Add on top about 2-3 cm of chicken manure. Then, add another layer of about 1 cm soil. Water the layers until the materials are evenly moist.
4. Repeat step 3 until 5-6 layers have been prepared.
5. Cover the top of pile with plastic sheet to keep moisture and to prevent pile from washing out nutrients by rainfall.
6. After 1 week, check if the pile is still moist. If drying of the pile occurs, apply water by means of a sprinkler.
7. After 2-3 weeks, turn the compost pile, mixing the layers. Repeat this procedure after 5-8 weeks, or until temperature of pile is less than 35°C.
8. Observe if the materials have turned dark brown to black. If the whole pile is totally decomposed, harvest the ripe compost. If decomposition is uneven, remove only the decomposed portion and leave the others behind until fully decomposed.

## USING COMPOST

The use of a good and healthy compost is fundamental to upland farming practices. Generally, vegetable crops need compost for good growth.

By producing compost from available waste materials, farmers can reduce cost of farm production.

⇒ Recommended rate of compost application ranges from 2 t/ha – 4 t/ha every year for upland field.

Table 2. Examples of Nitrogen sources materials and Carbon sources materials and their estimated C/N

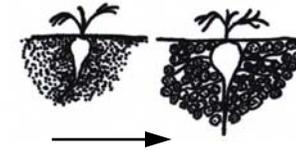
Nitrogen (N) sources	C/N Ratio	Carbon (C) sources	C/N
Grass clippings	12-25:1	Rice straw	60:1
Pig manure	17:1	Dried leaves	50-90:1
Chicken manure	20:1	Chipped branches	400:1
Cattle manure	20:1	Rice hull	80-100:1
Peanut straw	20:1	Sawdust	200-600:1
Kitchen scraps	10-15:1	Sugarcane trash	120:1
Legumes	13:1	Corn stubbles	55:1

## HOW TO MAKE A COMPOST

Composting is easy and very simple. Any mixture of material can be put into a compost pile. Table 2 provides a list of materials which are good sources of C and N.

1. Select a well-drained, elevated area for composting. The size of the area will depend on the volume of materials to be used.
2. Gather needed materials:
  - ⇒ Rice straw (or *Carbon sources* such as corn stubbles, etc.) - 100 kg
  - ⇒ Chicken manure (or *Nitrogen sources* such as Rice bran, etc.) – 50 kg
  - ⇒ Soil
  - ⇒ Water
  - ⇒ Plastic sheet

## Change of soil structure



### 2. Supplies nutrients for crops

Compost contains macro and micronutrients. Compost can supplement inorganic fertilizer as source of nutrients for crops. The nutrients are released to plants when they are needed, thus it acts as a slow-release fertilizer. Farmers can save on fertilizer cost by using compost.

### 3. Supports living soil organisms

Applying compost can increase population of soil organisms such as nematodes, fungi, bacteria and earthworms which are responsible in breaking down complex organic materials in the soil into forms which could be taken up by the plants.

### 4. Improves the buffer capacity of the soil

Compost increases the buffer action of soil against acidity or alkalinity by having higher amounts of organic matter. The soil with a higher amount of organic matter has a higher soil buffer action.

### 5. May provide biological control to certain soil pests and diseases

Proper application of compost may control pests and diseases in plants. However, precautionary measures should be exercised in preparing compost. Healthy, disease-free plant materials should be used. Proper heating up of the compost pile must be observed to ensure that the produced compost is free of pathogens.

## ADVANTAGES AND LIMITATIONS OF COMPOST

There are several advantages and limitations of using compost as shown in Table 1. It should be remembered that there are no perfect fertilizers for farmers. That is why we must know the different characteristics of chemical fertilizers, commercial organic fertilizers and compost.

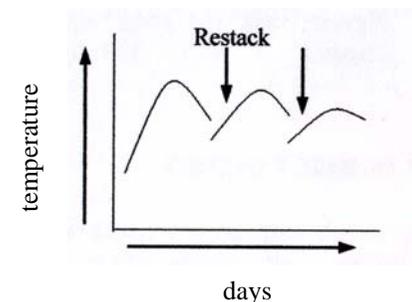
**Table 1: Advantages and Limitations of Using Chemical Fertilizer, Commercial Organic Fertilizer and Compost**

Fertilizer	Advantages	Limitations
Chemical Fertilizer	<ul style="list-style-type: none"> <li>* Specified nutrient composition</li> <li>* High content of nutrients</li> <li>* Contains guaranteed nutrient content analysis</li> <li>* Nutrients are readily available for crop</li> <li>* A variety of formulation can be obtained and is readily available</li> <li>* Easy to handle</li> </ul>	<ul style="list-style-type: none"> <li>* Expensive, thus increases the cost of production</li> <li>* "Fertilizer burn" of crops occur when fertilizer placement is not suitable</li> </ul>
Commercial organic fertilizer	<ul style="list-style-type: none"> <li>* Slow release of nutrients</li> <li>* Commercially available and convenient to transport</li> <li>* Provides humus or organic matter which are not supplied by chemical fertilizers</li> <li>* No danger of "fertilizer burn"</li> </ul>	<ul style="list-style-type: none"> <li>* Nutrient composition varies and difficult to control nutrients for crops</li> <li>* Lower content of nutrients compared to chemical fertilizers</li> <li>* Bulky; large amounts of material are needed</li> <li>* Expensive</li> </ul>
Compost	<ul style="list-style-type: none"> <li>* Improves soil physical structure</li> <li>* Contains various micro-nutrients</li> <li>* Slow release of nutrients</li> <li>* Provides humus or organic matter which are not supplied by chemical fertilizers</li> <li>* Organic materials to be used are readily available in the farm or backyard, which can be blended or mixed to increase the nutrient content</li> <li>* Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>* Contains low percentage of nutrients (N, P and K)</li> <li>* Tends to induce nutritional deficiency in the plants</li> <li>* Variable nutrient content</li> <li>* Usually bulky and inconvenient for transport</li> <li>* Laborious to make</li> </ul>

## PROCESS OF COMPOSTING

- ⇒ Composting is primarily a biological process. It is important to keep the microorganisms happy.
- ⇒ The microorganisms need optimum moisture, air and a good proportion of *Carbon* and *Nitrogen sources* to decompose organic materials into forms that could be made available to the plant.
- ⇒ Many organic materials abound in the farm for use in composting.
- ⇒ Composting can be conducted by either aerobic (with oxygen) or anaerobic (without oxygen) methods. Aerobic composting is generally preferred because it is faster and easier to manage. It also provides greater pathogen reduction because **higher temperatures** are attained (It must be over 60-65°C in 3 days). Anaerobic composting is slower, because under this condition, activities of decomposers are depressed as the supply of oxygen diminishes.

**Decomposition stage and change of temperature in compost making**



- ⇒ **Nitrogen (N) sources** such as legumes, green leaves, vegetables, kitchen - refuse and animal manures could be easily decomposed because of their high moisture and nitrogen content.
- ⇒ **Carbon (C) sources** such as rice hull, rice straw, sawdust, dried grasses and coir dust are generally dry and slow to decompose. Ideal proportions of both nitrogen-rich and carbon-rich materials should be mixed together for faster decomposition.
- ⇒ The optimum C:N ratio for rapid composting is **20-30:1**.
- ⇒ Sufficient moisture is **50-60%** to speed up the decomposition process.

