Fortified Compost Network

Compost-making is a very important topic among FORMAT members and they have taken the lead in processing organic resources as nutrient inputs to soil. Fortified composting was undertaken in seven locations across Kenya, including Busia, Embu, Kiambu, Kisumu, Kitale, Mombasa and Nairobi. Composting organic materials with low nutrient contents and undesirable physical properties into organic fertilizers poses a particularly difficult challenge to the composting network.

A fortified composting field day held in Busia.

Nine "under-utilized" organic materials were identified for composting at different locations by several cooperators: maize stover and sugarcane waste (ARDAP, Busia and Manor House Agricultural Centre, Kitale); tea dust, rice straw and husk (Organic Africa, Embu); coarse crop-dairy farming residues (Kenyan Smallholders Advancement Group, Kiambu); water hyacinth (COLIDEF, Kisumu); seaweed, coconut husks and *makuti* waste (Jamii Humanist Centre, Mombasa); and domestic and market wastes (City Park Environmental Group, Nairobi). A protocol for fortified composting was prepared and used to train participating cooperators on the composting process. Field days were organized at all the sites to facilitate sharing and transfer of knowledge among farmers, extension and NGO workers on fortified compost preparation skills, the importance of compost quality and to further emphasize the processing of locally-available organic materials into soil amendments. An exhibit and a presentation on fortified composting were given at all the eight countrywide events to educate participants on this technology. A television documentary on fortified composting was co-produced by FORMAT and broadcast on Kenyan television.

A simple procedure for fortifying organic residues. Low quality organic materials such as maize stover or wheat straw require fortification with nutrient rich additives and biological catalysts before they can be readily composted. A procedure for fortifying such organic materials follows:

1. Chop the residues into 30-45 cm pieces in order to increase their surface area where necessary.
2. Spread the chopped material in five successive layers 30 cm high by 2.0 m wide into windrows 5-25 m long (» 100-500 kg in each layer respectively).
3. At every 30 cm layer, evenly broadcast 0.75-3.75 kg DAP in respect to the length of the windrow (or any other nitrogen-bearing fertilizer) for fortification to lower the C:N ratio.
4. Apply 1.0 kg of organic soil uniformly as a "starter inoculant". Farmyard manure, sugarcane mill filter mud or pond sediments are suitable materials for this purpose.
5. Apply 20 litres of water at the same height to enhance dissolution of fertilizers and to moisten the stover for microbial activity.
6. Repeat steps 1 to 5 until the 25 m windrows are 1.5 m in height

Compost characteristics. Compost quality relies mostly on the nature of the organic materials used for production and the management practice during the composting process. The important physical properties of materials intended for composting are particle size and moisture content. Particle size affects oxygen movement into and within the pile, as well as microbial and enzymatic access to the substrate. Proper balance in the particle size should be maintained. If too large, the organic materials should be chopped into smaller pieces. On the other hand if too small, the organic materials should be mixed with a bulking agent (e.g. wood chips or tree bark). The optimum moisture content for composting is 40 to 60%. Too much water interferes with oxygen accessibility slowing down the rate of composting, while too little hinders diffusion of soluble molecules and microbial activity.

Harvesting compost from coconut wastes and seaweed in Mombasa.

The appearance of the harvested fortified compost is related to the organic resources used in its preparation. Farmers can easily tell the difference in colours and texture. Several discernible characteristics could be used to judge maturity and quality of these composts including texture, colours, smell and biological activity. Biological activity is a useful indicator of compost maturity.

The presence of macrofauna in maturing compost, particularly earthworms and grubs, serves as an indication of the stage of compost maturity because time is required for these invertebrates to re-colonize the substrate after it cools down. When compost texture is considered, coarse materials become finer over time until a fine, loamy material is produced. Changes in the colour of the compost can also tell its quality and maturity. The chemical composition of fortified and conventional composts prepared by the project appears below.

Initial material	fortification	nitrogen	phosphorus	potassium
		--------- kg per ton ----------		
maize stover	none	13	2	13
	DAP	21	3	19
sugarcane tops & leaves	MPR	23	5	7
	DAP	27	8	10
rice straws	none	19	6	28
	DAP	22	9	25
highland farm wastes	EM	27	15	20
	DAP	30	21	34
coastal farm waste	none	13	3	9
	DAP	18	4	11
market waste	none	27	16	46
	DAP	35	19	50

MPR: Minjingu Rock Phosphate; EM: Effective Micro-organisms