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Research Paper :

Enrichment of compost by bio inoculants and natural mineral amendments

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ABSTRACT

The experiment was conducted at Dry Farming Research Station, Targhadia (Gujarat) to study the effect of bio inoculants (Compost culture, PSM and *Azotobacter*) and natural amendments (rock phosphate and iron pyrite) on nutritional composition of compost. The samples were drawn after 30, 60 and 90 days after composting. The organic carbon and C/N ratio decreased during maturation of the compost irrespective of treatments. At 90 days, minimum organic carbon (20.46 %) and C/N ratio (9.39) was recorded with incorporate RP + MI + urea + Pyrite @ 5% on weight basis (T_6). Irrespective of treatments the total content of N, P, K S and micronutrients (Fe, Zn, Mn, Cu) were increased with advancement in maturity period of composting and their highest values were observed with RP @ 1 % P_2O_5 + MI (compost culture-*Azotobacter*, PSM) @ 500 g/t + urea @ 0.5% + Pyrite @ 5 % on weight basis of crop residues.

Key words : Farm waste decomposition, Resource management, Bio inoculants and natural mineral amendments

Recently, agriculture is highly dependent on inorganic fertilizers and chemicals, though their use increase pollution of soil, water and environment resulted in health hazards. Chemical fertilizer is costly also, therefore, use of inorganic fertilizer should be controlled and simultaneously, nutrient need of crop have to be meeting through organic and biological activities. Organic manures like FYM have been scare. Recycling of different organic waste as composted manures would be good source of organic manures. Even if, 50 % of these residues are used as animal feed, the rest can be recycled for their beneficial effect on soils and plants. Two handicaps common to all bulky manures are their low nutrient content and large volume. It is needed to upgrade the nutrient content and to hasten the composting process, so that materials of better quality can be obtained in less time. In the above context, the present study was carried out to confirm the potentiality for nutritionally enriched phospho-sulpho-nitro compost from a mixture of various crop residues and organic waste by incorporating low grade rock phosphate, pyrite and other organic inputs along with bioinoculants.

MATERIALS AND METHODS

The experiment was conducted at Dry Farming Research Station, Targhadia (Gujarat) in cemented tank having 110 cm x 65 cm x 50 cm (L x W x H) dimension kept under shed made up of wooden poll and gunny bags/ cereal fodder for protection against sun light. The tank was filled with mixture of various farm residues / waste including straw / stalk of sesame, castor, pigeonpea, pearl millet, sorghum, pulses, cotton etc., remained after animal feeding and weeds. The waste materials were chopped into small pieces of 5-6 cm using chaff cutter. Crop residues were filled up in the tank layer by layer of 10-15 cm along with adequate moistening by water. Cow dung slurry was added after every layer. The tank was watered frequently to maintain adequate moisture (60-70% of maximum water holding capacity) for proper activities of micro organisms. After complete filling of tanks, materials were covered by murrum and soils to check the evaporation losses and to maintain proper temperature. To provide aeration uniformly, the partially decomposed material was brought out from tank after 30 and 60 days. After proper mixing, the same was refilled with adequate moistening. Cow dung slurry was also added during filling. Compost culture and PSM was added in order to enhance the decomposition process. *Azotobacter* culture @ 500 g/t of material was incorporated during first turning also. During every turning (30 and 60 days) and also at final stage (90 days), representative samples of compost from each tanks were taken, dried and analysed for their organic carbon as well as total N, P, K, S as described by Jackson (1973) and cationic micro nutrients (Fe, Zn, Mn, Cu) by standard procedure (Lindsay and Norvell,1978).

The treatment involved during composting were: T_1 : Crop residues (CR) Traditional method, T_2 : CR + Rock phosphate equivalent to 1 % P_2O_5 on weight basis of crop residues (RP), T_3 : CR + Microbial inoculants (MI) @ 500 g/t of crop residues, T_4 : CR + RP + MI, T_5 : CR + RP + MI + Urea (N @ 0.5%) and T6 : CR + RP + MI +