

Recycling of different organic wastes through vermicomposting and evaluating their efficacy on yield and N uptake in sunflower (*Helianthus annuus* L.) crop.

Abstract

The soils of semi arid tropical regions are low in organic carbon, poor in fertility, and suffer from poor physical conditions such as crusting and hard setting tendencies. In India, huge quantity of recyclable rural and urban wastes such as vegetable and fruit wastes and remnants of crushed sugarcane (*Saccharum officinarum*) locally known as 'bagasse' are generated. These organic materials can easily be converted to high quality manure in combination with cattle dung using earthworms as bio-agents. In order to convert different organic wastes into relatively nutrient rich organic manures employing earthworms as bio-agents and to study the efficacy of the composts thus prepared with sunflower as the test crop, laboratory and green house studies were conducted at Central Research Institute for Dryland Agriculture, Hyderabad. Vermicompost employing *Eisenia foetida* was prepared using seven different combinations of organic wastes: i) sugarcane bagasse + cattle dung; ii) sorghum stover + cattle dung; iii) vegetable waste + cattle dung; iv) fruit waste + cattle dung; v) subabul + cattle dung and vi) mixture of all these + cattle dung in the ratio of 2:1 i.e., 2 parts of the feed source and 1 part of cattle dung on weight basis. The results indicated that the final compost materials were slightly acidic to neutral in reaction (pH 6.65 to 7.20). Electrical conductivity varied from 1.0 to 1.8 dS m⁻¹. Compost from subabul loppings recorded the highest N content of 25 g kg⁻¹ followed by mixed feed compost (24.0 g kg⁻¹). Mixed feed compost recorded the highest phosphorus (21.0 g P₂O₅ kg⁻¹) and potassium (6.3 g K₂O kg⁻¹) contents. The initial C: N ratios of the feed materials varied from 10.23 to 45.50 which were reduced to 8.40 to 19.82. The highest C: N ratio (19.82) was recorded in the compost prepared from sorghum stover + cattle dung, whereas, the lowest (8.4) was in subabul + cattle dung. The efficacies of the composts prepared were also tested under green house conditions with sunflower (*Helianthus annuus* L.) cv MSFH-8 as test crop using bulk red soils representing Typic Haplustalf of Hayathnagar series. Among sole composts, Mix-VC@ 50 kg N ha⁻¹ recorded higher yield of 5.44 g plant⁻¹ which was on par with urea @ 75 kg ha⁻¹. Conjunctive use of composts and urea gave higher seed yield than sole composts and sole urea at equivalent N level. The maximum stover yield (8.10 g plant⁻¹) was recorded with Mix-VC + Fert @ 25+ 25 kg N ha⁻¹. Conjunctive use of mix feed vermicompost and fertilizer (Mix-VC+ Fert @ 25+ 25 kg N ha⁻¹) recorded the highest N uptake (41.21 mg plant⁻¹) among all other treatments and was found most promising.

Keywords

Organic wastes, earthworm, vermicompost, *Helianthus annuus* L, soil fertility, Alfisol, semi-arid tropics.

