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## Manure improvement options for smallholder farmers in the Savannahs of West Africa

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### Abstract

Efficient management of manure is critical for sustaining crop production and improving efficiency of livestock production in mixed crop-livestock smallholder farms. Manure storage is a hot-spot of greenhouse gas emissions and soil pollution through eutrophication. The effects of oil cakes and manure storage methods on nutrient losses during composting were evaluated at three locations: Nyankpala in Ghana, Zaria in Nigeria and Maradi in Niger. Eight management options were tested at each location by fortifying manure with locally available oil cake and composting it in pits or heaps. Plastic sheets were used to either cover heaps or line pits. The storage of manure in heaps or pits and fortification with oil cake had no effect on N and P losses during composting at all locations. The use of plastic sheets to cover heaps or line pits significantly reduced N losses from 29 – 67 % to 5 – 30 % and P losses from 25 – 37 % to 2 – 20 % at Nyankpala and Zaria but had no effect on nutrient losses at Maradi. Although the fortification of manure with either groundnut cake or cotton seed cake increased the N content of the manure by 45 % to 130 %, the high cost of these oilcakes precluded their use as compost additives. The low cost of acquiring shea nut cake made it the most suitable compost additive. The findings of the study provide locally available options to reduce nutrient losses from manure with heap and line pits and low cost composting additives to improve the fertiliser value of manure on smallholder farms.

**Keywords:** Composting, manure storage, nitrogen losses, oil seed cake, plastic sheets