

Application techniques and quantities

Manure can be applied in holes, in furrows or can be spread and incorporated. Application in the holes or furrows is preferred to spreading since the manure is not usually enough and if applied in holes and furrows, the crop has the benefit of maximizing nutrient capture from localized application.

Spreading of farm yard manure in the field should be done in a single day, otherwise, great loss of nitrogen will be incurred, especially if left uncovered in the field. The best time for FYM application is when there is sufficient soil moisture, just before planting time. Application of FYM in a dry soil causes loss of nitrogen. After uniform distribution of FYM in the field using hand tools, such as a spade or fork, it should be covered with soil by ploughing to the recommended depth on that same day. The depth of manure covering with soil depends on soil type and climatic conditions. In a dry conditions on light soils, (sandy to loam soil texture), the depth should be at least 20-22 cm. In heavier textured soils in moist to humid climatic conditions the depth should be less, typically 12-14 cm.

The amount of FYM applied should be based on crop type/variety, expected yield and soil type. The exact rate of application should be obtained from a nearby Agricultural research station. If research data is not available, the following recommendation can be applied. For field crops, the rate of FYM should not be less than 5 tons per ha; with the other nutrients provided by application of chemical fertilizers.

The optimum rate may vary between 8-10 t/ha. However, when FYM is the only fertilizer source available, it should be applied at rates between 4 and 12 tons per hectare.



Cattle in shed for better manure collection



Making the manure heap



Bringing the manure to the field

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SUSTAINABLE LAND MANAGEMENT PROGRAM (SLMP)

Manure Management



Implemented by: **giz** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Introduction

Manure is an important source of nutrients. The Use of manure is a well-established nutrient and land management practice undertaken by smallholder farmers in Ethiopia.

Though use of manure is a well-established, many farmers still underestimate the value of animal manure. In many places, farmyard manure is commonly left around the homestead. It is not recognized as an important source of nutrients and organic matter. In some areas with limited fuel sources, dried manure is often used as a cooking fuel. By burning farmyard manure, large quantities of organic matter and nutrients are lost from agricultural systems.

Manure is a valuable source of organic matter as well as major soil nutrients such as nitrogen (N), phosphorous (P), potassium (K), calcium (Ca), sulphur (S), and magnesium (Mg). It can also be a source of micronutrients such as boron (B), copper (Cu), chlorine (Cl), nickel (Ni), cobalt (Co), iron (Fe), manganese (Mn), zinc (Zn), and molybdenum (Mo).

Quality of manure

The quality of manure depends on what the animals have eaten. If they have been fed with poor-quality forage or being grazed on poor soils, the manure will be of poor quality. If they have been fed good-quality feed, the manure will be rich in nutrients.

The type of animal also influences its quality, because different species of animals eat different things. In general, manure from poultry is of better quality than manure from goats and cattle. It is possible to enrich cattle manure by mixing it with manure from other types of animals.

Manure	% water	% N	% P ₂ O ₅	% K ₂ O	% CaO
Farmyard	38 - 54	0.5 –2.0	0.4 –1.5	1.2 –8.4	0.3 –2.7
Cattle	34 - 40	1.7 –2.0	0.5 –3.7	1.3 –2.5	0.9 –1.1
Sheep	40 - 52	1.5 –1.8	0.9 –1.0	1.4 –1.7	0.9 –1.0
Poultry	10 - 13	2.3 –2.5	2.3 –3.9	1.0 –3.7	0.6 –4.0

Another factor which affects quality is storage and handling. Manure storage and handling practiced by smallholder farmers is sometimes poor. If manure is stored in the open and exposed to rain, many of the nutrients will be washed away. Nutrient and carbon losses during manure storage vary substantially, depending on cattle and manure management. Nitrogen losses for example may vary from less than 10% to about 90%. Nitrogen losses tend to be lower for more compact and anaerobic manure storage systems.

Good quality manure

- No undecomposed materials are visible
- No smell
- Dry

Poor quality manure

- Bad smell
- Whitish in colour
- Materials such as the leaves and stems are visible
- Wet
- High temperature

Improved manure management

The following management options are helpful to consider for improvement of manure quality:

- Manure in cattle shed should be removed regularly and heaped outside. After removal of manure from the cattle shed, the manure should be stored while covered for about 2 to 3 months to facilitate maturity. This decomposition period will depend on

the bedding material used. The longer the material takes to decompose, the longer the maturity period of the manure.

- Quality of manure can be improved through feeding a high quality combination, such as straw/elephant grass and *Sesbania sesban* / *Calliandra* / *Leucaena* to animals.
- To improve both the quality and quantity of manure, farmers should be encouraged to prepare compost. Composting is a way to use manure that will increase its value, kill parasites and weed seeds, and decrease the volume of waste. It can also help to stabilise the nitrogen.
- In order to minimise nutrient losses, the farmyard manure should be protected from sun, wind and rain. This can be done by covering the manure heap with polythene film. Farmers can use locally available covering materials or shades to improve manure storage conditions. Storing manure in pits is particularly suitable for dry areas and dry seasons.

In areas with limited fuel sources, dried manure is used as a cooking fuel. An alternative fuel source can be created by planting trees for firewood as living fences.

Since many farmers do not own animals, nor have access to animal manure, growing animal feed and integrating livestock into the farm will not only provide milk, meat and other animal products, but also animal manure for improved crop production.