



APPLICATION OF TANK SILT FOR IMPROVED PRODUCTIVITY FROM THE RAINFED RAGI SYSTEMS OF KARNATAKA

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Tank silt is a fine soil particle transported from the catchment area through surface runoff and soil erosion along with crop debris and deposited as sediment in the water spread area of the tanks constructed for rain water harvest. These sediments when get decomposed over the period become nutrient rich soil amendment loaded with organic matter with good physical properties. In fact, nutrient flow in the undulated plains or watersheds; especially the leaching of soil nutrient along the water stream and accumulation in natural or manmade barriers such as tanks, ponds, ditches, lakes, and rivers is a well-

documented phenomenon. Agricultural lands form major part of the catchment areas and contribute to the tanks' rainwater storage. Intermittent and high intensity rainfall during the monsoons causes heavy surface runoff and erosion of valuable nutrient rich topsoil from the surrounding agricultural lands. Siltation adversely affects the storage capacity of tanks in the long run. Hence, for the conservation and rehabilitation of traditional water tanks desilting is necessary that enables collecting and storing enough water for agriculture and the effective utilization of silt as a soil amendment in agricultural lands (Figure1).



Figure 1. (a) Desilting of water harvesting tanks using machine (b) Tank silt

THE BENEFIT OF TANK SILT

Application of tank silt to rainfed agricultural lands is an age-old traditional practice of south Indian farmers for filling eroded patches of their farmlands. In the southern districts of Karnataka, maintaining open compost pits in the farm and filling them alternatively with cattle yard waste and crop residues along with a layer of tank silt was a common practice till few years ago. This organic waste and tank silt when decomposed used to incorporate in the agricultural lands before the onset of monsoon to replenish the soil nutrients, improve the soil texture and moisture retention capacity. In a context where soil health is adversely getting affected due to the unscientific use of chemical fertilizers and the soil erosion process in dry lands incorporating traditional wisdom like of tank silt application and its scaling up will lead to better crop production. Chemical properties of soils applied with tank silt reportedly decrease soil pH and EC along with an increase in the soil organic carbon and other nutrients like nitrogen, phosphorus, potassium and micronutrients (Tiwari et al., 2014). Higher average of crop yield and drought resistant was also noticed in several part of Southern India (Sanjeevaiah et al., 2021).

IMPROVEMENT IN SOIL QUALITY WITH TANK SILT APPLICATION

Application of tank silt in agricultural lands improves the soil properties in many ways (Figure 2). Some benefits are as follows

- Tank silt application improves water holding capacity of soils.
- Application of tank silt along with FYM/ organic manures reduces the bulk density of soil. Also, production of organic acid during mineralization of organic materials reduces soil pH.
- Enhancement of soil organic carbon content.
- Incorporation of tank silt helps to improve soil's ability to retain nutrients and make them available to the crops. These soils used to be rich in available nitrogen, phosphorus and micronutrients.
- Tank silt is a good organic amendment hence, improves water-use efficiency in stress situations like drought and ensure good crop yield.

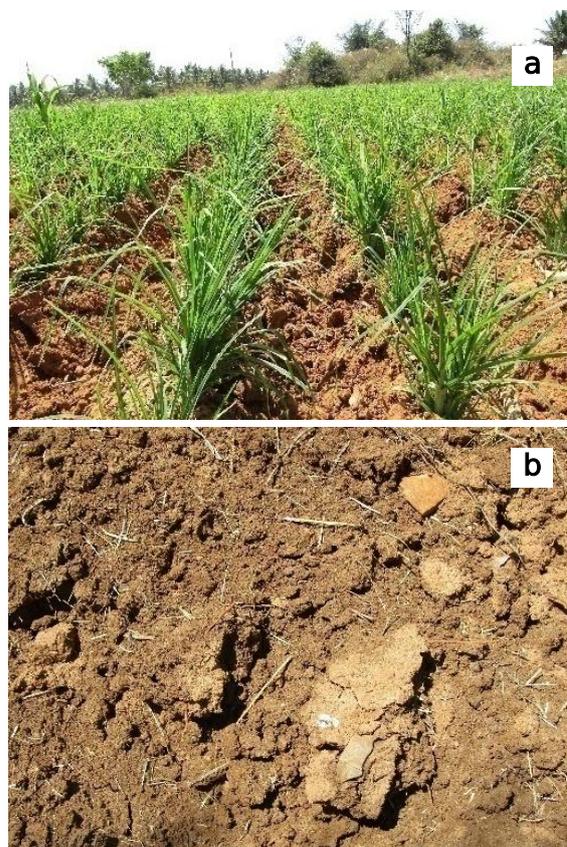


Figure 2. Improved (a) soil physical condition (b) soil aggregation



APPLICATION OF TANK SILT FOR ENHANCING YIELD IN RAGI CROP

Ragi (*Eleusine coracana* L), is an important staple food in many parts of India as well as the eastern and central Africa. It is an important cereal crop in Karnataka state and the main staple food consumed by the majority of the population in the south Karnataka. Hence, this crop is grown mostly in the marginal and small farmlands southern districts of Karnataka either as a pure crop or as an intercrop under rainfed as well as irrigated conditions (Figure 3). The average yield of the rainfed crop ranges from 1-1.5 t ha⁻¹, whereas the irrigated crop yields up to 4-5 t ha⁻¹. The fodder yield ranges between 3-9 t ha⁻¹ in the case of the late groups. Even though there was decrease in area under cultivation of ragi crop, the average production increased both in Karnataka and India (Krishnappa et al., 1998), might be due to the adoption of high yielding varieties and improves the soil health management practices by the farmers. Combining locally available and low-cost tank silt as a soil amendment for the ragi crop in dry zone of Karnataka would not only help to improve the soil nutrients but also reduce the cost of production (Table. 1).



Figure 3. Ragi crop in the farm fields of Karnataka

Table 1. Effect of tank silt in the seed yield of ragi crop

Crop	Average crop yield (q ha ⁻¹)		% Increase
	without tank silt	with tank silt	
Ragi (irrigated)	22.0	40.0	82
Ragi (rain-fed)	9.0	16.2	80

Source: Krishnappa et al. (1998)

Based on the experience of farmers using tank silt in ragi farming and the research report of Tiwari et al. (2014) application of tank silt improve soil quality and thus the yield from ragi crop in the following ways

- Incorporation of tank silt to ragi fields before the onset of monsoon neutralizes the chemical properties of soil and improves the quality and health of soils.
- Reduce the soil erosion and increase the water infiltration rate.
- High clay content of tank silt reduces the drainage capacity of the upland red gravelly soils and improves the water holding capacity.
- Tank silt mixed with FYM, vermicompost and other fertilizers ensures slow release of nutrients to the ragi.
- Tank silt improves the soil bulk density, porosity and aeration which help better root development and establishment of ragi in upland situation.
- Improve soil texture and water holding capacity helps the ragi to mitigate the drought.
- Unavailable form phosphorus and other micronutrients are converted to available form and easily taken up by the ragi roots.
- Clay- humus complex improve the micronutrients availability to the ragi plants and increase the grain productivity and soil quality.
- Good soil physical condition and increased biological activity improve the drought tolerances, yielding capacity and size of the grains.

CONCLUSION

Tank silt is a locally available and low-cost substitute for chemical fertilizer. Application of tank silt benefits to the dry land ragi growing soils. Tank silt improves the soil texture, water holding capacity, soil organic carbon status and soil fertility in the ragi cultivated areas. Tanks ensure equity, groundwater sustainability, trap valuable sediment for recycling and thus, play an important role in enhancing ragi productivity and profitability from rainfed farming of Karnataka.



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