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Deciphering the micro floral population and nutrient condition of cow dung and urine in order to develop natural farming inputs (Ganajeevamurtha and Jeevamrutha)

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ABSTRACT

The development of Ganajeevamrutha and Jeevamrutha, two natural farming additives, required the identification of an effective combination of cow dung and cow urine. In this study, cow dung and urine samples were taken from desi cows (Gir) and cross breeds (HF) and analysed for total bacterial, fungal, actinomycete population, and nutritional status (N, P and K). In terms of bacterial population (50 x 10^6 cfu/g of sample), fungal population (29 x 10^4 cfu/g of sample), actinomycetes population (9.3 x 10^3 cfu/g of sample), and nutrients status (N (0.532 percent), P (0.173 percent), and K (0.182 percent), samples from desi cow dung had a higher number of microflora population. As a result, it is regarded as the desi cow dung and urine is ideal cultural material for preparing Ganajeevamrutha and Jeevarutha.

Key words : *Cow dung, Cow urine, Natural farming inputs*

Introduction

In our country, farming and agricultural cultivation were done using the customary age-old manner, with cow dung, among other things, functioning as manure. As the world's population grew, so did the need for more food crops. As a result, the green revolution enhanced agricultural output through increased fertiliser and pesticide application, improved irrigation, soil management regimes, and crops, as well as large land conversions (Tilman *et al.*, 2002). Increasing the use of pesticides in agriculture is like giving our soils steroids. It not only depletes the land, but also puts the farmer in debt. However, there is rising concern that agricultural intensification will result in large-scale environmental degradation and productivity loss in the long run. Negative environmental implications include soil deterioration, increased greenhouse gas emissions, pesticide accumulation, and decreased water availability and quality.

Indeed, agricultural intensification is regarded as one of the most serious threats to global biodiversity (Convention on Biological Diversity, 2010). As a result, Natural Farming is the only solution to an ever-increasing challenge (NF). 'Natural farming' is farming that is in harmony with nature and does not utilise chemicals. The ZBNF's discoverer, Subhash Palekar, contributed various ideas, principles, and approaches. Zero-budget farmers use mulching, soil protection techniques, natural pesticides, and fertilisers. ZBNF's key inputs include crop rotation,

green manures and compost, biological pest management, and mechanical cultivation.

The dung and urine of the cow are essential in preparing *Jeevamritha* and *Ganajeevamrutha.* The cow breeds found in the study are cross bread and desi cow. According to Subhash Palekar, one gram of desi cow dung contains 300 to 500 crore beneficial effective microbes as against 50 to 70 lakh microbes in cross bred cow dung. The aim and objective of this study was to enumerate micro floral population and major nutrient status from cow dung and cow urine, using microbial techniques. This result helps in preparation of gannajevarutha and jeevamrutha. Vanaja *et al.* (2009) stated that jeevamrutha is a plant growth-promoting substance containing beneficial microorganisms that provides the necessary nutritional requirement for growth and yield of a crop.

Cow dung was used as major ingredient for the preparation of jeevamrutha. It contains numerous microorganisms viz., *Azotobacter*, *Acetobacter*, *Azospirillum* (nitrogen supplier), *Pseudomonas* (phosphorus-solubilizer), *Bacillus* silicus (potash-solubilizer) and others. These organisms are well active and maintain soil productivity after jeevamrutha was put into the soil. According to Manjunatha *et al.* (2009), the application of jeevamrutha treated organics increases the physico-chemical and biological properties of soil, as well as the efficacy of applied farmyard manure. They also confirmed that jeevamrutha has the ability to supply resources and act as a food source for beneficial microorganisms.

Materials and Method

A fresh (morning) and dry (randomly) Cow dung samples and cow urine samples were collected in a sterile container and aseptically brought to microbiology laboratory of the college of horticulture, Sirsi for the further analysis. A sample collected from the cow was routinely fed with locally available green fodder along with the silage and crop residues.

Microbial analysis

The biological properties such as microbial population of bacteria, fungi and actinomycetes were analysed. The method adapted for the enumeration was serial dilution and plate count technique with suitable medium. Enumeration of microbial population was carried out using Nutrient agar for bacteria, Martin's Rose Bengal Agar (MRBA) for fungi, Actinomycetes selective media for actinomycetes.

Macro nutrient analysis

The micro floral and macro nutritional status of the samples was examined, and N, P, and K were determined using standard procedures. The nitrogen content was determined using the Microkjeldhal (Jackson, 1991) method, the phosphorus content using the Olsen method, and the potassium concentration using a flame photometer.

Statistical analysis

The experimental data were statistically analysed using a completely randomised design (CRD). The

a. Desi cow **b. Cross breed cow**

Plate 1. Cow dung and cow urine samples collected from Desi cow, Gir and Cross breed, HF.

results of the cow dung and urine analysis are expressed as the mean of three replicates with standard error of mean.

Results and Discussion

In two distinct cow dung and urine samples, the complete microbial community, including bacteria, fungi, and actinomycetes, was examined. Among the two samples of cow dung and cow urine, desi cow dung had the highest number of bacterial population (50 x 10^6 cfu / g of sample), fungal population (29 x 10^4 cfu / g of sample), and Actinomycetes population (9.3 x 10^3 cfu / g of sample). Total bacterial (22 x 10^6 cfu / g of sample), fungal (10 x 10^4 cfu / g of sample), and actinomycetes (7.1 x 10^3 cfu / g of sample) populations were found to be the highest in desi cow urine samples (Table 1). Cow dung microflora comprises a diverse range of bacteria such as - *Bacillus*, such as lactobacillus as central endospore generating bacillus, some cocci, fungus, and yeast such as Saccharomyces (Sharma and Singh, 2015).

Cow dung also consist of beneficial microflora, predominantly bacilli, lactobacilli, cocci and some identified and unidentified fungus and yeast as reported by Muhammad and Amusa, (2003). However, the use of microflora from cow dung for phosphate solubilization and plant growth enhancement (Swain and Ray, 2006), cellulase production (Bai, 2012 and Hong, 2015), enzymatic activities (Vijayaraghavan, *et al.*, 2016), methanogenic bacteria (Pradhan and Gireesh, 2012), antibiotic resistance strains (David and Odeyemi, 2007), antibiotic suspect (2014).

According to the total microflora of cow urine, the desi cow urine had a higher microbial load when compared to cross breed. This could be because the desi cow has more probiotic activity in the lower part of the gut and the presence of different types of microorganisms such as *Lactobacillus plantarum, Lactobacillus casei, Lactobacillus acidophilus, Bacillus subtilis, Entrococcus diactylactis, Bifio bacterium* and yeast (Ware *et al.*, 1988). There is evidence to support the antifungal and antiseptic qualities of fresh cow dung and urine. This might be as a result of the microorganisms in the excrement releasing antibacterial substances (Sharma and Singh, 2015).

The macro nutrient content (nitrogen, phosphorous, and potassium) in cow urine was analyzed by

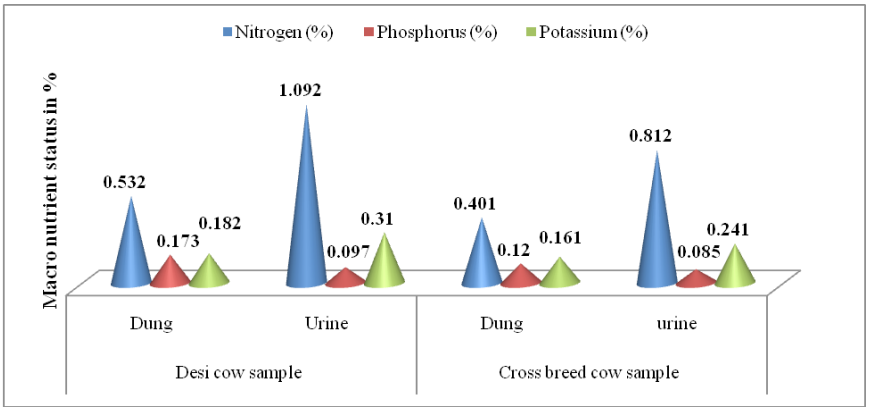

Fig. 1. Macro nutrient status of cow dung and urine in desi cow and cross breed

Table 1. Microbial characteistics of cow dung.

Sl.No	Parameters	Colony forming unit per gram of sample	
1	Microbial status of cow dung	Desi cow	Cross breed cow
	Total bacteria	50x10^6	35x10^6
	Total Fungi	29x10^4	15x10^4
	Total actinomycetes	18x10^3	9.3x10^3
2	Microbial status of Urine	Desi cow	Cross breed cow
	Total bacteria	22x10^6	18x10^6
	Total Fungi	10x10^4	6x10^4
	Total actinomycetes	7.1x10^4	5x10^3

All the values are arithmetic mean of three replicative observations.

Plate 2. Preparation of Ganajeevamrutha and Jevvamrutha

Ganajeevamurtha preparation

1. 100 kg cow dung,
2. 100 grams of farm soil,
3. one-kilogram jaggery,
4. one-kilogram gram flour,
5. ten liters of cow urine,
6. mix all these things.
7. Spread this manure in the shade for 48-50 hours and cover it with jute sack.
8. This compost can be used for 6 months.

Jevamrutha preparation

1. 200 liters of water in the barrel.
2. Add 10 kg Desi Cow Dung
3. 5 liters to 8 liters Desi Cow urine
4. 2 kg black jaggery
5. 2 kg Gram Flour
6. 1 kg Soil taken from the land
7. The mixture needs to be stirred a couple of times (10 mins every time) in a day.

standard protocols, and the result revealed that, among the cross breed and desi cow breed, desi cow breed has recorded highest nutrient content (N (0.532 %), P (0.173 %)and K (0.182) (Fig. 1).

Conclusion

From the results of total micro floral population (Table 1) and macro nutrient (N, P and K) status of cow dung and cow urine (Fig. 1), desi cow dung and urine are further, used in the preparation of Ganajeevamrutha and Jeevamrutha. These formulations contribute to increase plant growth through several methods such as atmospheric nitrogen fixation, solubilization of inaccessible forms of phosphorus, potassium, zinc, organic matter decomposition, and soil fertility through increasing soil organic carbon.

Future line of work

*Shelf life study of the formulation (Jeevamrutha and Ganajeevamurtha) prepared from desi cow dung and urine is too tested.

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