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Microbial analysis of jeevamrutha prepared from different cow breeds of desi and cross cow breeds cow dung and cow urine

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ABSTRACT

A laboratory experiment was conducted on shelf-life of jeevamrutha at Zonal Agricultural and Horticultural Research Station (ZAHRS), Brahmavar, Udupi. In this study three different desi breeds *viz*., Malnad gidda, Gir, Sahiwal and three different cross breeds *viz*., Holstein Friesian (HF), Jersey and crossbred Jersey, cow dung and cow urine were collected aseptically and separately to prepare Jeevamrutha, after preparation of Jeevamrutha from 1st day to 15th days samples were collected (daily) and enumerated the general microorganisms *viz*., bacteria, fungi and actinomycetes with their respective media. Among the desi and cross cow breeds jeevamrutha, desi cow breeds jeevamrutha contains higher microbial population compared to cross cow breeds jeevamrutha. In desi cow breeds jeevamrutha, Malnad gidda cow breed jeevamrutha contains the maximum microbial population. In general, the highest microbial population was noticed between 7th to 9th days after preparation (DAP) of jeevamrutha in all the cow breeds. Hence, it's considered as a best time for the application of jeevamrutha to soil to improve the soil organic carbon.

KEY WORDS: *Jeevamrutha*; *Organic carbon*; *Desi breeds*; *Cross breeds*

1. Introduction

The cost of inorganic fertilizers is increasing enormously to an extent that they are out of to reach small and marginal farmers. Use of inorganic fertilizers and insecticides, the population of beneficial organism's decrease and natural regeneration of nutrition in the soil cease (Rama and Naik, 2017; Dakshayini *et al*., 2016; Reddy *et al*., 2015). Soil becomes barren and soil fertility decreases. The use of fermented liquid manures in such situation is, therefore practically a paying proposal. Application of these organic liquid formulations will enhance the soil microbial activity and population to a larger extent. This in-turn has a positive effect on growth and yield of crops. Similarly, Subhash Palekar is one of the progressive farmers of Maharashtra, India; in his workshop on Philosophy and Technology of Zero Budget Natural Farming (ZBNF) he used a new biodynamic formulation termed jeevamrutha prepared from desi cow dung and cow urine. The desi cow or indigenous breed of cows is the backbone of ZBNF. For centuries, dung and urine from desi cows have been used in farming. Although the milk productivity of Indian cow breeds is low, they are very useful in production of cow dung and urine which will have a very high beneficial property. According to Subhash Palekar, one gram of desi cow dung contains 300

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to 500 crore beneficial effective microbes as against 50 to 70 lakh microbes in cross bred cow dung. Hence, Cross bred jersey and Holstein Friesian (HF) cows should not be used in ZBNF (Palekar, 2006). 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; they are *Azotobacter*, *Acetobacter*, *Azospirillum* (nitrogen supplier), *Pseudomonas* (phosphorus-solubilizer) and *Bacillus silicus* (potash-solubilizer) and others. Once jeevamrutha was incorporated to soil, these organisms are well activated and maintain the soil productivity. Manjunatha *et al.* (2009) reported that the use of jeevamrutha (indigenous species cow dung and cow urine, pulse flour, jaggery, rhizosphere soil solution) treated organics, improves the physico-chemical and biological properties of soil (Arpitha and Dakshayini, 2024), besides improving the efficiency of applied farmyard manure. They also confirmed that the potential of jeevamrutha is to supply materials and to act as food support for beneficial microbes.

2. Material and Methods

A laboratory experiment was conducted at Zonal Agricultural and Horticultural Research Station (ZAHRS), Brahmavar, Udupi.

Three desi cow breeds (Malnad Gidda, Gir and Sahiwal) and three cross cow breeds (Holstein Friesian (HF), Jersey and cross Jersey) were selected for the experiment.

2.1 Preparation of Jeevamrutha

All the cow breeds cow dung and cow urine was collected aseptically and separately to prepare Jeevamrutha, A standard procedure was used to prepare Jeevamrutha (Palekar, 2006); 1.25 kg of cow dung, 1.25 lit. of cow urine, 250 g of pulse flour, 250 g of jaggery, one handful of soil and 25 lit. of tap water were used to prepare 25 lit. of jeevamrutha. All the ingredients were mixed in a plastic bucket; the mouth of the bucket was covered with gunny cloth and the bucket was kept in the room temperature for 15 days. Each day the content was mixed thoroughly with a wooden stick and the sample was collected in a sterile polythene bottle to analyse the microbial population.

2.2 Microbial analysis

The biological properties such as total microbial population of bacteria, fungi and actinomycetes were analysed (Rama *et al.*, 2015). The method advocated for the enumeration was serial dilution and plate count technique with appropriate 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 at 10^6, 10^4 and 10^3 dilutions respectively and the plates were incubated at 28 ± 2 ºC.

2.3 Statistical analysis

The data obtained from experimentation were statistically analysed using completely randomized design (CRD). The statistical analysis was done by using WASP: 2.0 (Web Agri. Stat Package 2) statistical tool (www.icargoa.res.in/wasp2/index.php) and mean

were separated by Duncan Multiple Range Test (DMRT).

3. Results and Discussion

The total microbial population *viz*., bacteria, fungi and actinomycetes, were significantly influenced by different storage days (1st day after preparation to 15th days after preparation). The pronounced increase in microbial population during ageing is clearly evident from Table 1, 2 and 3.

The higher microbial population were noticed in desi cow breeds jeevamrutha compared to cross cow breeds jeevamrutha. In desi cow breeds, maximum bacterial population were noticed in Malnad Gidda breed jeevamrutha (90.33×10^6/ ml of jeevamrutha) and the next best was Gir breed jeevamrutha (79.33×10^6/ ml of jeevamrutha). Among cross cow breeds, higher bacterial population were recorded in HF cow breed jeevamrutha (20.66×10^6/ ml of jeevamrutha), at 7th DAP of jeevamrutha. The population was gradually increased in the middle of storage (1st DAP to 7th DAP) and further decreased gradually (8th DAP to 15th DAP) in jeevamrutha, similar trend was observed in fungal population (Table 1 and 2).

Actinomycetes population was maximum on 9th DAP of jeevamrutha in all the desi breeds, however jeevamrutha prepared with Malnad Gidda (20.33×10^3/ ml of jeevamrutha) recorded the highest population of Actinomycetes compared to all other desi breeds of jeevamrutha at 9th DAP (Table 3). Radha and Rao, (2014) also reported the slow growth of actinomycetes in freshly prepared fermented liquid organic formulation compared to bacteria and fungi population. Devakumar *et al*. (2014) observed

Table 1: Bacterial population of Jeevamrutha prepared from dung and urine of different cow breeds

Days After Preparation	Bacterial population in Jeevamrutha (CFU × 10^6 per ml of Jeevamrutha)					
	Malnad Gidda	Gir	Sahiwal	HF	Jersey	Cross jersey
1	40.33^{h}	35.66^{i}	32.00^{jk}	10.33^{h}	9.66^{i}	7.66^{h}
2	48.33^{g}	38.00^{i}	33.00^{ij}	12.66^{g}	11.33^{h}	8.66^{g}
3	57.33^{f}	48.66^{h}	35.66^{hi}	13.66^{f}	12.66^{ef}	9.66^{e}
4	61.66^{e}	56.33^{g}	38.33^{h}	14.66^{e}	13.66^{d}	10.33^{d}
5	77.33^{bc}	62.33^{ef}	55.66^{d}	16.33^{d}	15.33^{c}	12.33^{c}
6	86.66^{a}	72.33^{b}	68.00^{b}	18.66^{b}	16.33^{b}	14.33^{b}
7	90.33^{a}	79.33^{a}	77.33^{a}	20.66^{a}	18.33^{a}	16.33^{a}
8	81.33^{b}	69.33^{bc}	62.33^{c}	18.66^{b}	15.33^{c}	12.33^{c}
9	73.33^{cd}	67.33^{cd}	51.00^{e}	17.66^{c}	13.33^{de}	10.33^{d}
10	70.00^{d}	64.33^{de}	49.33^{ef}	15.33^{e}	12.33^{fg}	9.33^{ef}
11	65.33^{e}	59.66^{fg}	47.00^{fg}	13.66^{f}	11.66^{gh}	9.00^{fg}
12	51.00^{g}	47.00^{h}	46.00^{g}	12.00^{g}	11.00^{h}	7.66^{h}
13	49.33^{g}	35.00^{i}	35.33^{hi}	10.66^{h}	9.66^{i}	6.33^{i}
14	29.33^{i}	29.66^{j}	29.00^{k}	10.33^{h}	9.33^{i}	6.00^{ij}
15	19.66^{j}	13.00^{k}	13.00^{l}	10.00^{h}	9.00^{i}	5.66^{j}

Note: Means with same superscript, in a column do not differ significantly at P=<0.05 as per Duncan Multiple Range Test (DMRT).

Table 2: Fungi population of Jeevamrutha prepared from cow dung and cow urine of different cow breeds

Days After Preparation	Fungi population of Jeevamrutha (CFU × 10^4 per ml of Jeevamrutha)					
	Malnad Gidda	Gir	Sahiwal	HF	Jersey	Cross jersey
1	10.00^{j}	9.66^{h}	7.33^{h}	5.66^{j}	6.00^{h}	5.00^{l}
2	16.33^{i}	14.66^{f}	12.00^{g}	6.33^{ij}	7.66^{g}	6.33^{k}
3	20.66^{ef}	19.66^{d}	17.66^{e}	7.00^{hi}	8.00^{g}	7.00^{j}
4	25.66^{c}	23.66^{c}	22.66^{c}	8.00^{g}	10.00^{f}	7.66^{i}
5	27.66^{b}	26.66^{b}	25.66^{b}	9.66^{f}	11.33^{e}	8.33^{h}
6	29.33^{a}	28.33^{a}	27.33^{a}	10.00^{f}	12.00^{e}	10.00^{f}
7	30.66^{a}	29.33^{a}	26.33^{ab}	15.33^{b}	15.66^{c}	13.33^{c}
8	25.66^{c}	24.66^{c}	22.33^{c}	17.00^{a}	18.00^{b}	15.00^{b}
9	23.66^{d}	20.00^{d}	19.66^{d}	14.66^{b}	18.66^{ab}	15.66^{a}
10	22.00^{e}	18.33^{e}	17.66^{e}	13.00^{c}	19.00^{a}	13.66^{c}
11	19.00^{gh}	18.00^{e}	17.33^{e}	12.66^{cd}	15.66^{c}	12.00^{d}
12	19.33^{fg}	15.66^{f}	15.66^{f}	12.00^{d}	14.66^{d}	11.33^{e}
13	17.66^{hi}	12.33^{g}	11.66^{g}	11.00^{e}	11.66^{e}	9.00^{g}
14	11.00^{j}	7.66^{i}	7.33^{h}	8.00^{g}	10.00^{f}	7.66^{i}
15	9.66^{j}	5.33^{j}	4.66^{i}	7.66^{gh}	9.66^{f}	5.00^{l}

Note: Means with same superscript, in a column do not differ significantly at P=<0.05 as per Duncan Multiple Range Test (DMRT)

Table 3: Actinomycetes population of Jeevamrutha prepared from dung and urine of different cow breeds

Days After Preparation	Actinomycetes population of Jeevamrutha (CFU × 10^3 per ml of Jeevamrutha)					
	Malnad Gidda	Gir	Sahiwal	HF	Jersey	Cross jersey
1	6.66^{i}	4.33^{k}	4.00^{i}	4.00^{g}	4.00^{hi}	1.00^{k}
2	8.66^{h}	6.33^{j}	4.66^{h}	5.00^{f}	4.66^{fg}	1.66^{j}
3	10.33^{g}	8.33^{h}	5.33^{g}	5.66^{e}	5.00^{f}	5.66^{g}
4	12.33^{f}	11.33^{f}	6.66^{de}	7.33^{d}	6.00^{e}	6.66^{f}
5	13.33^{e}	12.66^{e}	7.00^{d}	8.00^{c}	7.66^{c}	9.00^{e}
6	14.00^{e}	13.66^{d}	9.00^{b}	9.66^{a}	9.33^{ab}	11.66^{c}
7	16.66^{c}	15.33^{c}	9.33^{ab}	10.00^{a}	9.66^{a}	11.33^{c}
8	19.33^{b}	18.33^{b}	9.66^{a}	8.66^{b}	9.00^{b}	13.66^{b}
9	20.33^{a}	19.33^{a}	7.66^{c}	7.00^{d}	7.00^{d}	15.00^{a}
10	15.66^{d}	13.66^{d}	6.33^{ef}	6.00^{e}	6.66^{d}	10.00^{d}
11	13.66^{e}	13.33^{de}	6.00^{f}	5.66^{e}	6.00^{e}	6.33^{f}
12	10.33^{g}	10.00^{g}	5.00^{gh}	4.00^{g}	4.33^{gh}	5.33^{g}
13	8.66^{h}	7.33^{i}	4.66^{h}	2.66^{h}	3.66^{ij}	4.33^{h}
14	8.33^{h}	6.66^{ij}	3.00^{j}	2.00^{i}	3.33^{j}	4.66^{h}
15	5.33^{j}	4.33^{k}	1.66^{k}	1.66^{i}	2.00^{k}	3.66^{i}

Note: Means with same superscript, in a column do not differ significantly at P=<0.05 as per Duncan Multiple Range Test (DMRT)

higher colony forming units of bacteria, actinomycetes, fungi and nitrogen fixers in Jeevamrutha at 7th DAP. Babu (2011) reported that uncountable rate of *Bacillus*. The higher microbial population of these liquid organic formulations made them as a potent source to maintain soil fertility and to enhance the nutrient availability by helping in faster decomposition of bulky organic manures (Kumar *et al*., 2023; Shilpa *et al*., 2015).

The over-all results reviewed that; the highest microbial population were observed between 7th to 9th days after preparation of jeevamrutha. Hence, it's considered as a best time for the application of jeevamrutha, out of six cow breeds, jeevamrutha prepared with Malnad Gidda showed maximum microbial population compared to other cow breeds jeevamrutha. These microbes help to improve the plant growth by different mechanisms such as fixing of atmospheric nitrogen, solubilization of unavailable form phosphorus, potassium, zinc, organic matter decomposition *etc*., and also improve the soil fertility by increase with soil organic carbon.

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5. Reference

Arpitha P S and Dakshayini G. 2024. Exploring the impact of biofertilizers on Tomato crop growth and yield: A comprehensive research study. *Current Innovation in Agriculture Science* **1**(1): 63-70

Babu S K. 2011. Microbial profile of value-added products from cow dung used for organic farming. *M.Sc. Microbiology dissertation, University of Calicut* pp. 54.

Dakshayini G, Reddy I B and Kammar S C. 2016. Evaluation of the Efficient Phosphate Solubilizing Bacteria on Growth of Chick Pea under Green House Condition. *Advances in Life Sciences* **5**(2): 662-666.

Devakumar N, Shubha S, Gouder S B and Rao G G E. 2014. Microbial analytical studies of traditional organic preparations Beejamrutha and Jeevamrutha. In: Rahmann, G and Aksoy, U (eds.), Building Organic Bridges. *Proceedings of the 4th ISOFAR Scientific Conference Istanbul, Turkey* pp. 13-15.

Kumar Naik A H, Shivanand G, Govinda K, Anantha Rama A, Divyajyothi U, Sujatha S and Pallavi M. 2023. Performance of maize (*Zea mays*) + field bean (*Dolichos lablab*) intercropping system under natural, organic and conventional farming practices. *The Indian Journal of Agricultural Sciences* **93**(9): 1007-1012. Doi: https://doi.org/10.56093/ijas.v93i9.136842

Manjunatha G S, Upperi S N, Pujari B T, Yeledahalli N A and Kuligod V B. 2009. Effect of farm yard manure treated with jeevamrutha on yield attributes, yield and economics of sunflower (*Helianthus annuus* L.). *Kar. J. Agril. Sci.*, **22**(1): 198-199.

Palekar S. 2006. Three-day workshop on Philosophy and Technology of Zero Budget Natural Farming, Organized by the Karnataka

Rajya Raitha Sangha (KRRS) and HasiruSene. Arsikere, Hassan (Dist), India. Available online. http://srinidhifarm.com/zerobudgetfarming.php.

Radha T K and Rao D L N. 2014. Plant growth promoting bacteria from cow dung based biodynamic preparations. *Ind. J. Microbiol*. pp. 1-6.

Rama A A, Mahadevaswamy K, Naik N and Kuruber A R. 2015. Influence of Efficient Strain of PSB on Growth and Yield of Maize (*Zea mays* L.) Under Black Cotton Soil Condition. *Journal of Pure and Applied Microbiology* **9**(2): 1179-1184.

Rama A A and Naik L K. 2017. Effect of Biocontrol Agents and PGPRs on Growth and Yield of Okra under in vitro Condition. *Mysore J. Agric. Sci.* **51**(2): 347-353.

Reddy I B, Chaithra B M, Kammar S C and Dakshayini G. 2015. Studies on effect of PGPRs and organic matter on growth and biomass of *Morinda citrifolia* L. *Trends in Bioscience* **8**(23): 6728-6730.

Shilpa M E, Latha B, Dakshayini G, Vikas H M and Srikantaiah M. 2015. Effect of microbial inoculants on growth and yield parameters in sunflower (*Helianthus annuus*). *Journal of Pure and Applied Microbiology* **9**(3): 2591-2596.

Vanaja R, Srikanthamurthy H S, Ningappa K, Shivakumar, Nagaraju B, Ningaraju, Shashidhara, Doddappa, Vijay A R, Shivanna M, Obanna N, Pandu A C, Rama S, Sandhya M, Veena P and Suma S. 2009. *Sustainable Agricultural Practices, Green Foundation, Bangalore* pp. 52.