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# Evalution of Jeevamrutham (Organic Biofertilizer) for It's use in the Devising an Nutrient Medium for the Isolation of Bacteria

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**ABSTRACT**

Jeevamrutham is widely used Organic biofertilizer prepared with cow waste, gram flour and Jaggery by fermentation process. The study was aimed at physicochemical and microbiological analysis of jeevamrutham and also to evaluate it's use as a nutrient medium for isolation of bacteria. The Jeevamrutham prepared and subjected to physicochemical, and microbiological analysis. The filtrate of the Jeevamrutham was studied for its use as a Nutrient (Jeevamrut) medium for the growth of the bacteria.Total solid content of Jeevamrutham was found to be 100 mg/ml. The Standard Plate count (SPC) for Nitrogen fixers, for Phosphate solubilizing bacteria was found to be maximum on 6$^{th}$ day of fermentation. The SPC for Yeast and Molds was found to be maximum on 8$^{th}$ day. The study regarding the evaluation of Jeevamrut medium showed excellent growth of test Gram positive and Gram negative bacteria on Jeevamrut medium. The pigment producers showed same pigmentation pattern on Jeevamrut agar and on conventially used Nutrient agar. The cost of the Jeevamrut medium was calculated per 100 ml of medium and was found to be 60.27% less than that of commercially available media. The Jeevamrut medium is economical, all the ingredients are easily available, cheap and ecofriendly. The Jeevamrut medium can be a best option to use as a Nutrient medium for the cultivation of bacteria in the laboratory.

***Key words:*** *Jeevamrutham, Biofertilizer, Nutrient medium*

## Introduction

Jeevamrutham is Organic liquid, semisolid or dry biofertilizer made up of fermentation process of mixture of cow urine, cow dung, Jaggery and gram flour, babana peels carried out by soil microorganisms. It is a rich source of biomass, carbon, phosphorous, calcium and nutrients required for plant growth and development. It is used to increase the number of nitrogen fixing, phosphate solubalizing micro organisms in the soil in order to increase the fertility of the soil. Jeevamrutam when applied, increases the pH of acidic soil and decreases the pH in alkaline soil thus creates the favourable conditions for availability of maximum nutrients to plants from pH 6.5 to 7.8 (Kulkarni and Garglewar, 2019). Jeevamrutham can be applied in two forms, i.e. solid and liquid. Solid form is generally called as "Ghanjeevamrutam." Components of both the forms, i.e. liquid and solid and nearly same. It is a low cost preparation, all the ingredients are ecofriendly and easily available.

Bacteriological culture media plays important role in enrichment, isolation and cultivation of

bactertia. Nutrient culture media are commercially available but they are very costly. Microbiology students, researchers are continuously using the bacteriological culture media for their study, hence its requirement is on large scale. There is need for the design and development of low cost, cheap, alternative bacteriological media. Jeevamrutham is a fermented product consisting biomass and nutrients. Residual filtrate of the jeevamrutham can be used as an alternative source for the cultivation of bacteria. The Principal objectives of the present study were the physicochemical, microbiological characterization of the Jeevamrutham and evaluation of Jeevamrutham for its use as an Nutrient medium for the isolation and cultivation of bacteria.

## Materials and Methods

The jeevamrutham was prepared by adding 40 g of fresh cow dung, 100 ml of cow urine, 20 g gram flour, 25 g of jaggery, 20 g of banana peels and 10 g fertile soil as an inoculant. The mixture were stored in a cool place and away from sunlight. The mixture was stirred couple of time (10 min every time) for 10 days (Kaur, 2020).

**Physicochemical analysis of Jeevamrutham:** During fermentation everyday Colour, Odour, Temperature pH of Jeevamrutham was studied. Total dissolved solid content of the jeevamrutham was determined by Gravimetric method (Chellapandi, 2007).

**Microbiological Analysis of Jeevamrutham:** The succession of microflora of Jeevamrutham was studied from day 1 to day 10 of fermentation process by determination of SPC for bacteria, determination of SPC for yeast and moulds, determination of SPC for Nitrogen fixing bacteria and SPC for Phosphate soluabalizing bacteria (Chellapandi, 2007).

**Preparation of nutrient medium for the growth of bacteria using Jeevamrutham :** The filterate of 6 days old Jeevamrtham was diluted by adding equal amount of distilled water. The pH was adjusted to 7, 2.5 % Agar powder was added to it as a solidifying agent. This medium was sterilized by autoclaving at 121 $^0$C for 15 min. and then poured in sterile pertriplates. This media plates were labeled a "Jeevamrut" medium"(Gurav and Pathade, 2011)

**Evaluation of Jeevamrut medium for its use as a growth medium**

Ten common laboratory strains of bacteria were selected for the study viz., *Bacillus subtilis, Bacillus megaterium, Micrococcus luteus. Micrococcus roseus, Proteus vulgaris, Pseudomonas aeruoginosa, Escherichia coli, Serratia marcescens, .Klebsiella pneumonia* and *Azotobacter vinelandii.* The loopful suspension of 18 h. old culture of test organisms was streak inoculated (by four quadrant method) on Jeevamrutmedia and on Nutrient agar. All plates were incubated at room temperature (30 $^o$C) for 48 h. The growth on jeevamrut media plates were observed and compared with the growth on the nutrient medium. The growth of the organisms on the plate was evaluated on four point scale. Cost of the 100 ml Jeevamrut medium was also calculated and compared with the commercially available nutrient medium.

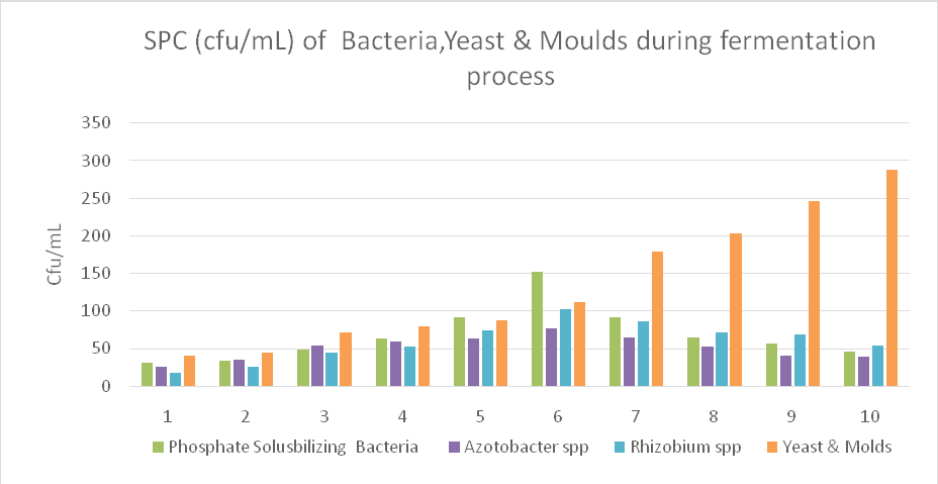



**Fig. 1.** Study of Succession of Microflora during Jeevamrutham fermentation process

## Results and Discussion

On sixth day of fermentation the color of jeevamrutham was found to be pale yelow. The odour was mild foul. The pH of jeevamrutham was found to be 8. The temperature was 28 $^0$C.

SPC for phosphate Solubalizing Bacteria *Azotobacter, Rhizobium* was found to be on increasing and found to be maximum on 6$^{th}$ day and from 7$^{th}$ day it went on declining. The microbiological quality of the Jeevamrutham was found to best from 5$^{th}$ to 8$^{th}$ days. Fermented Jeevamrutham during 5$^{th}$ to 8$^{th}$ day can be a good nutrient source for the growth of bacteria.

The results found were highly encouring, all the test organisms showed same pattern of growth on Jeevamrut medium and Nutrient medium. The luxuriant growth was observed in all four quadrants of the Jeevamrut plates. The growth of pigment producers showed same type of pigmentation on

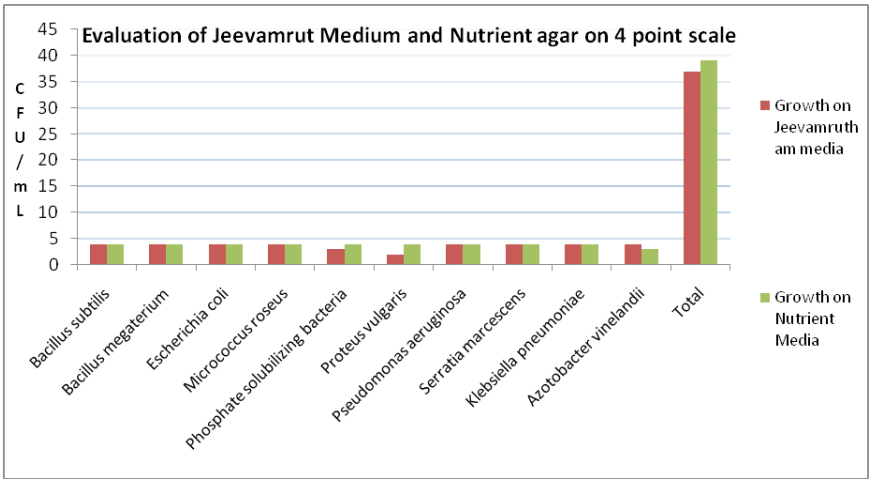
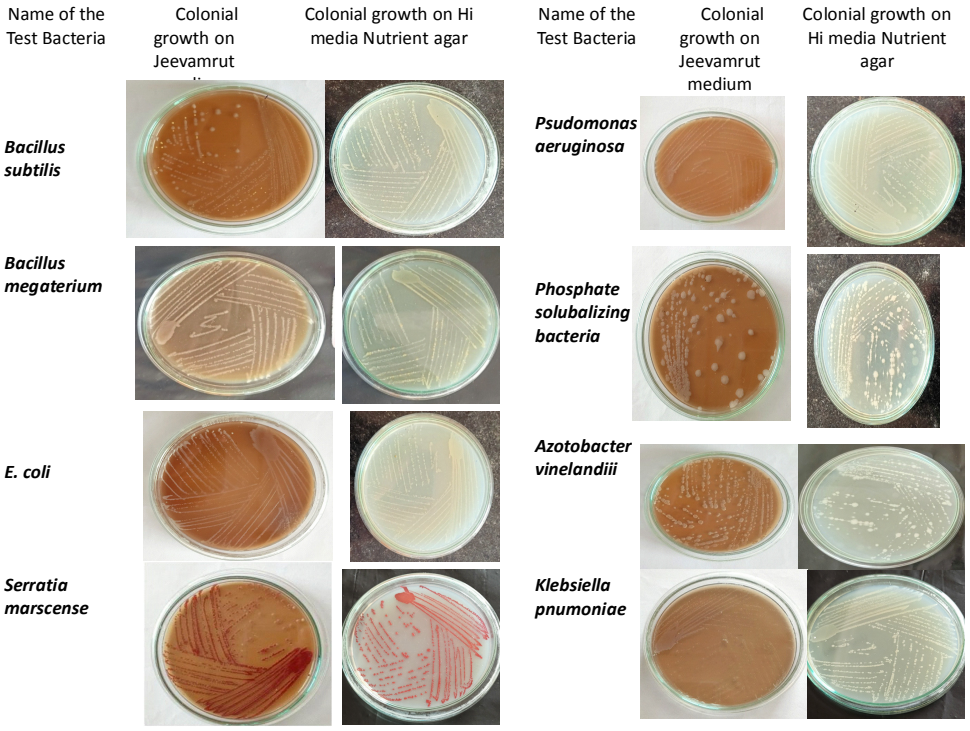



**Fig. 2.** Evaluation of Jeevamrut Medium and Nutrient agar on 4 point scale




**Photoplate 1.** Photograph showing Colonial growth of test bacteria on Jeevamrut medium and on Nutrient Medium

**Table 1.** Comparison of the Nutrients in Jeevamrutham and in microbiological culture media.

| Type of the Nutrient | Origin of different ingredients of common microbiological media Cruickshank *et al.*, 1975) | | | Comparative ingredients in Jeevamrut Medium |
|---|---|---|---|---|
| | Plant | Animal | Chemical (pure | |
| Carbon source | Sugarcane molasses, Beet molasses, cereal grains, potatoes | Milk, Meat | Sugars like Glucose, sucrose, starch, Lactose etc | Jaggery |
| Nitrogen source | Corn steep liquor, peanut granules, soyabean meal, yeast extract | Slaughter house waste/ meat extracts | Ammonium salts, nitrate urea | Gram flour, Cow waste |
| Growth factors | Vitamins, aminoacids | Meat and Yeast extract | Pure/ microbial source vitamins | Gram flour/ Microbial vitamins |
| Fatty acids as a antifaoaming agents | Sunflower oil, olive oil, cotton seed oil | Animal fat | — | Fatty acids Generated during the fermentation process |
| Water | - | - | Pure water | — |

Jeevamrut and Nutrient medium. The results indicating the the nutritive value of Jeevamrut medium. Ingredients used in the Jeevamrut medium are of agricultural origin. Cow dung and cow urine both are rich in amino acids, results in increasing the nitrogen percentage of organic fertilizer (Herran *et al* 2008). Jaggery contains potassium and sugar. Gram flour has odd level of amino acids chick pea seeds contains low fat level but are rich in glutathione, thiamine, niacin and minerals like calcium, magnesium, zinc potassium, ferrous and phosphorous (Boye *et al.*, 2010). Bannana peels are good source of phosphorous, potassium calcium, sodium. (Archibald, 1949). The Jeevamrutham consists of the components required to fulfill the requirement of natural media.

The colony Characters of the test organisms were also found to be same when grown on Jeevamrut media as compared with the Nutrient media. The cost of the Jeevamrut medium was calculated per 100 ml of 70.6 Rs which is 60.27% less than commercially available Nutrient medium.

## Conclusion

1. The Jeevamrut medium can be a good bacteriological medium. The Jeevamrut media with further modification and study can be used to cultivate other microbes such as Yeast, moulds and fungi.
2. The Jeevamrut medium is 60.27% cheaper as compared to Commercially available Nutrient media. All the ingredients are easily available, cheap and ecofriendly.
3. The Jeevamrut medium can be a best option to use as a Nutrient medium for the cultivation of bacteria in the laboratory.

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### Conflicts of Interests

The authors declare that there are no conflicts of interests

## References

Archibald, J.G. 1949. Nutrient composition of banana skins. *Journal of Dairy Science*. 32 : 969-971.

Boye, J., Zare, F. and Pletch, A. 2010. Pulse proteins: Processing, characterization, functional properties and applications in food and feed. *Food Research International*. 43(2) : 414-431.

Bridson, E.Y. and Brecker, A. 1970. Chapter III Design and formulation of microbial culture media. In: *Methods in Microbiology.* (Vol. 3, pp. 229-295). Academic Press.

Cruickshank, R., Duguid, J.P., Marmion, B.P. and Swain, R.H. A. 1975. Medical microbiology Vol. II. *The Practice of Medical Microbiology.* 12th Ed., Churchill Livingstone, Edinburgh, London.

Chellapandi, P. 2007. *Laboratory Manual in Industrial Biotechnology.* Pointer Publishers.

Deshmukh, A.M. 2001. *Media Stains and Staining Methods.* PAMA Publications, Karad, Maharashtra

Devakumar, N., Rao G.G.E, Shubha S, Imrankhan, Nagaraj and Gowda, S.B. 2008. Activates of Organic; Farming Research Centre. Navile, Shimoga, University of Agriculture Sciences Bangalore, 12 p.

Devakumar, N., Rao, G.G.E. and Shuba, S. 2011. Evaluation of locally available media for the growth and development of nitrogen fixing micro-organisms. *Proceedings of the 3rd scientific conference of ISOFAR Organic are life- knowledge for tomorrow, held on 28th September-01 october 2011, Korea*. pp. 504-509.

Devakumar, N., Shubha, S., Gowder, S.B. and Rao, G.G.E., 2014. Microbial analytical studies of traditional organic preparations beejamrutha and jeevamrutha. *Building Organic Bridges*. 2: 639-642..

Formulation of Bacterial Growth Media Using Coconut Coir. 2018. *International Journal of Applied and Pure Science and Agriculture.* 4(1) : 32–34. https://doi.org/10.22623/IJAPSA.2018.4006.OFC6F 9.

Formulation of Cost Effective Alternative Bacterial Culture Media Using Fruit and Vegetables Waste. 2018. *International Journal of Current Research and Review.* https://doi.org/10.7324/IJCRR.2018.1022

Gurav, M. and Pathade, G. 2011. Microbiological Media from Temple Waste: An Ecofriendly Approach of Waste Management. *Nature Environment and Pollution Technology.* ISSN: 0972-6268, 10(4): 629-632. 11.

Herrán, J.A.F., Torres, R.R.S., Martínez, G.E.R., Ruiz, R.M. and Portugal, V.O. 2008. Importancia de los abonos orgánicos. *Ra Ximhai: revista científica de sociedad, cultura y Desarrollo Sostenible*. 4(1) : 57-68.

Kaur, A., Jeevamrutham: An effective activator of soil microorganisms. justagriculture.in

Kulkarni, S.S. and Gargelwar, A.P. 2019. Production and microbial analysis of Jeevamrutham for nitrogen fixers and phosphate solubilizers in the rural area from Maharashtra. *IOSR Journal of Agriculture and Veterinary Science*, *12*, pp.85-92.

Kulkarni, S.W. 2002. *Use of Coconut Water Agar for the Growth of Actinomycetes from Ponds and Lakes of Barshi (Maharashtra)* (Doctoral dissertation, Dissertation, Shivaji University, Kolhapur, Maharashtra, India, 144-197).

Meena, S.E.S.S., Thiyagarajan, T.M., Chandaragiri, K. and Pannerselvam, S. 2003. Response of green gram to varied levels of panchagavya foliar spray. *Madras Agric. J*. 90(1-3) : 169-172.

Rodger B. Baird, Andrew D. Eaton, and Eugene W. Rice 2017. *Standard Methods for the Examination of Water and Wastewater.* APHA, Washington, DC, 23nd Edition.

Sayali Daptardar, Darshana Kankoshe, Shubhangi Salunke, Aman Dubey and Ashwini Rathod, 2018 Kitchen Waste Agar: A Novel Media For Fungal Cultivation, *IJCRT*. 6(2) : 389-393.

Sreenivasa, M.N., Nagaraj, M.N. and Bhat, S.N. 2010. Beejamruth: A source for beneficial bacteria. *Karnataka J. Agric. Sci*. 17(3) : 72-77.