



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2016; 2(6): 411-412
www.allresearchjournal.com
Received: 26-04-2016
Accepted: 27-05-2016

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Exploitation of liquid bio fertilizer for green revolution

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Abstract

A bio fertilizer is a substance which contains living microorganisms which when applied to seeds, plants and soil colonizes the growth by increasing the supply or availability of primary nutrients to the host plant. Liquid bio fertilizer is increasingly available in market as one of the alternatives to chemical fertilizers and pesticides. One of the benefits from bio fertilizers is a contribution from population of microorganisms available. This work focuses on the production of liquid fertilizer from vegetable waste, tea waste and from wheat flour and jaggery. Also one of the liquid bio fertilizer 'panchagavya' had been prepared from five products of cow. In these work it is shown that liquid bio fertilizers can overcome the problems of carrier based bio fertilizers. *Bacillus spp* and *streptococcal spp.* were isolated from various bio fertilizer samples.

Keywords: Liquid bio fertilizer, shelf life, *Bacillus spp.* and *streptococcal spp.*

1. Introduction

Bio fertilizer is defined as a substance, containing living microorganisms which colonizes rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrient and/ or growth stimulus to the target crop, when applied to seed, plant, or soil (Vessey, 2003) [1]. The bio fertilizer are natural fertilizers which are living microbial inoculants of bacteria, algae, fungi alone or in combination and they augment the availability of nutrients to the plants. The use of bio fertilizers in preference to chemical fertilizers, offers economic and ecological benefits by way of soil health and fertility of farmers. Bio fertilizers add nutrients through the natural processes of Nitrogen fixation, solubilizing phosphorus and stimulating plant growth through the synthesis of growth promoting substances. Crop yield can be increased by 20-30% if bio fertilizer are used properly. Bio fertilizer can also protect plants from soil borne diseases to a certain degree. The need for the use for bio fertilizer has arisen, primarily for two reasons. First, because increase in the use of fertilizers leads to increased crop productivity, second, because increased usage of chemical fertilizer leads to damaging soil texture and raises other environmental problems. Therefore, the use of bio fertilizer is both economical and environment friendly.

As the population growing at a fast rate, the agro based products should also increase. With the agro based product, fertilizer industries are bound to grow, as it is one of the major components for increasing food production. At present there is a shortage of about three to four million tons of fertilizer. As the disadvantages of chemical fertilizer are becoming more apparent, farmers are slowly but surely turning towards organic fertilizers. With increasing demand, availability of organic fertilizer from one or two sources is not adequate. To meet the increasing demand many viable options as possible have to be explored. In the present study five different liquid bio fertilizers are prepared from very cheaper raw materials which are available in our day to day life and are pollution free. After preparation the potency test had been done on plants.

1.1 Panchagavya liquid bio fertilizers

Panchagavya is an organic product recommended for crop improvement in organic agriculture (Sangeetha and Thevanathan, 2010) [1]. Panchagavya means "mixture of five products (cowdung, cow urine, milk, curd and ghee) of cow. Of these the three direct constituents are cowdung, cow urine and milk; and two derived products are ghee and curd. It has been used in traditional Indian rituals throughout history.

It is also called cowpathy treatment based on products obtained from cows used in Ayurvedic medicine and of religious significance for Hindus.

2. Materials & Methodology

2.1 Sampling site: The samples were randomly collected from village Hingni Bk. located in Akola region. The samples were jaggery, wheat flour, cowdung, cowurine, milk, curd, vegetable waste, tea waste, distilled water, etc.

5 different liquid bio fertilizers were prepared from vegetable waste, tea waste, cowdung and cow urine, jaggery and wheat flour and panchagavya (cow dung, cow urine, milk, curd and ghee.) these liquid bio fertilizers were kept under observation for one month and after one month potency test had been done to find the efficiency of liquid bio fertilizer. The Liquid bio fertilizers prepared were as follows:

1. Panchagavya liquid bio fertilizer
2. Tea waste liquid bio fertilizer
3. Vegetable waste liquid bio fertilizer
4. Jaggery and wheat flour liquid bio fertilizer
5. Cowdung and cow urine liquid bio fertilizer

2.2 Observation table

Table 1: pH of all liquid bio fertilizers before and after one month

Liquid biofertilizers	pH before one month	pH after one month
Panchagavya	5.6	5.6
Jaggery & wheat flour	3	4
Tea waste	6	6
Vegetable waste	6	5
Cowdung & cowurine	7	7

Table 2: This table shows Nitrogen, Phosphorus and Potassium contents in all 5 liquid bio fertilizers

Tests Samples	Nitrogen (N)	Phosphorus (P)	Potassium (K)
Panchagavya	1.4%	0.08%	0.5%
Jaggery & wheat flour	2.85%	2.2%	3.7%
Tea waste fertilizer	2.95%	2.7%	0.7%
Vegetable waste	2.53%	2.2%	2.5%
Cowdung & cowurine	3.45%	4.5%	-

3. Result and Discussion

The liquid bio fertilizers were produced from raw materials and the physical factors were noted down. Chemical analysis had also been done in which Nitrogen (N), Phosphorus (P) and Potassium (k) contents were estimated from samples. Figure 1 shows the pH of liquid bio fertilizer before and after one month. For tea waste liquid bio fertilizer the study correlates with Gurav and Sinalkar, 2013, who reported the pH same as that found in my study. Figure 2 shows the nitrogen, phosphorus and Potassium content in all samples. The Phosphorus, Nitrogen and Potassium content found in this study for panchagavya correlates the standard results of panchagavya. The organisms from above study found in all liquid bio fertilizer were bacillus spp. (*Bacillus subtilis*, *Bacillus megaterium*) and *Streptococcus bovis* had also been found. These results show that the liquid bio fertilizers are more convenient than carrier based bio fertilizers. In addition, no carrier is needed for Liquid bio fertilizers, which will save cost. Therefore, the liquid bio

fertilizer products could be promoted as low- cost and long shelf- life products.

4. Acknowledgement

Author expresses her sincere thanks to Dr. A S Pethe for her valuable guidance and the Director for his kind permission to publish this paper.

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