Int.J.Curr.Microbiol.App.Sci (2022) *11*(05): 144-147

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 11 Number 05 (2022)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2022.1105.018

Biochemical analysis of *Amrut jal*

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Keywords

Organic farming, bio-fertilizer, Amrut jal, pH, NPK, microbial count

Article Info

Received:
02 April 2022
Accepted:
26 April 2022
Available Online:
10 May 2022

A B S T R A C T

The nation's largest challenge in the future years will be to supply safe food for the country's rising population. In this context, organic farming, which is a comprehensive production management method for maintaining and strengthening the agro-ecosystem, has acquired widespread acceptance as a viable alternative. Hence, the present study was conducted to study the physico-chemical and biological properties of one such bio-fertilizer - *Amrut jal*. *Amrut jal* is a "bioenhancer" prepared by fermenting a mixture of cow dung, cow urine and jaggery substrate. The present research work measured the concentration of N,P,K and pH in the given sample of *Amrut jal*, along with total microbial count, and derived relevant analyses from it. The result shows increased microbial population, nitrogen, potash, phosphorus. The pH was found to be slightly acidic.

Introduction

The nation's largest challenge in the future years will be to supply safe food for the country's rising population; however current usage of chemical fertilizers and pesticides threatens it. Growing and the excessive use of chemical fertilizers and pesticides, particularly after the Green Revolution in India, has had a negative impact on the environment and human health; In India, 51% of food commodities are contaminated with pesticide residues and out of these, 20% have pesticides residues above the maximum residue level values on a worldwide basis. It has been observed that their long-term, low-dose exposure is increasingly linked to human health effects such as immune-suppression, hormone disruption, diminished intelligence, reproductive abnormalities, and cancer. In this light, problems of pesticide safety, regulation of pesticide use, use of biofertilizer and biopesticides, are some of the future strategies for minimizing human exposure to pesticides. With unbalanced use of fertilizers, particularly excess in nitrogen and phosphate fertilizers, the concentration of vitamin C is reduced in addition to an increase in nitrate and cadmium concentration. This is also a severe danger to soil health and affects agricultural yields, both qualitatively and quantitatively (Atouyi *et al.*, 2011). Similarly, long-term usage of chemical fertilizers on the same soil can cause soil

degradation and the loss of important soil microbes. In this context, organic farming, which is a comprehensive production management method for maintaining and strengthening agro-ecosystem health, has acquired widespread acceptance as a viable alternative to conventional food products that provides safe food for human consumption.

This farming system relies on green manures, crop rotations, crop residues, animal manures, biofertilizers, bio/botanical pesticides rather than synthetic fertilizers, pesticides, and growth regulators. *Amrut jal* is one such bio-fertilizer.

Amrut jal (*Sanskrit:अमृत जल*) means "elixir of immortality" in Sanskrit. It has remarkable powers when properly prepared and applied. *Amrut jal* is used in a variety of ways, including foliar spray, soil application with irrigation water, seed or seedling treatment, etc.

Organic farmers apply a 1 percent dosage in foliar spray. It enhances crop biological efficiency and fruit and vegetable output quality. It also boosts soil fertility. It is very essential to develop a strong, workable and compatible package of nutrient management through organic resources for various crops based on scientific facts, local conditions and economic viability. Thus, the current research was aimed to study and examine the biochemical composition of *Amrut jal* and derive relevant analyses from it.

Materials and Methods

Preparation of *Amrut jal*

For preparation of *Amrut jal*, fresh cow dung: cow urine: water @ 1:1:10 - proportions (cow dung and cow urine should preferably be of indigenous cow's origin) were mixed with 100 g of jaggery and kept the mixture for 3-days for fermentation.

During fermentation, the mixture was stirred twice daily, preferably during the morning and evening hours by using a wooden stick/ladle. Organic input thus obtained after 3-days of fermentation has 10% concentration considering proportion of cow urine used for the purpose as against the quantity of water added to prepare *Amrut jal*. Following steps were taken to prepare 20L of concentrated *Amrut jal*:

(1)Make a fine paste of 2 liter cow urine and 2 kg fresh cow dung in a tub. (II) Add 100 gm paste of Jaggery to it and mix properly. (III) Transfer the mixture to a bucket containing 20 liters of water. (IV) Stir the mixture 12 times clockwise and 12 times anti-clockwise. (V) Cover the bucket and stir thrice a day as in step IV. (VI) After 3 days l.e. 4" day transfer the mixture to the tank, and *Amrut jal* is prepared.

Physico-chemical and biological parameters

Sample was drawn after 6th day. The pH of the sample was measured using a pH meter. Major nutrients such as nitrogen, phosphorus and potassium present in *Amrut jal* were estimated by standard procedures. Total microbial count was estimated using Total Viable Count (TVC).

Results and Discussion

Amrut jal is a dark black color odor liquid. The results of biochemical analysis of the present experiment are presented in tables 1-2. The data indicates *Amrut jal* as a potential source of nutrients for plants. A plant needs over 30 different elements for its growth/formation of leaves, stem and fruits. In the present experiment three major elements nitrogen (N), phosphorus (P) and potash (K) were measured in total.

The perusal of table 1 reveals a significant concentration of nitrogen in the provided sample of 500 ml, with the majority of the nitrogen coming from urea contained in cow urine. According to Syrett (1962), nitrogen sources are used for cellular growth as well as a storage material, permitting its accumulation in an organic form.

Table.1 Physico-chemical Properties of *Amrut jal*

S. No.	Parameters	Results	Units
1.	Nitrogen (N)	21.96	%
2.	Phosphorus (P)	14.2	%
3.	Potassium (K)	14.12	%
4.	pH	6.78	-

*Sample Size : 500 ml

Table.2 Biological Properties of *Amrut jal*

S. No.	Parameters	Results	Units
1.	TVC (Total Viable Count)	3×10^8	cfu/ml

*Sample Size : 500 ml

Other nutrients, such as phosphate and potassium, were also identified in considerable amounts in the sample, at 14.2 percent and 14.12 percent, respectively. Further Nyakpa *et al.,* (1988) states that the optimal availability of N, P, and K nutrients for plants can increase the amount of chlorophyll, an increase in the amount of chlorophyll will increase the activity of photosynthesis which results in more assimilation. The results of photosynthesis are also used in the respiration process which will produce energy used for the formation of carbohydrates, proteins and fats in the formation of new cells. In addition Potassium also plays a role in assisting the transportation of assimilates. The NPK ratio is 1.5:1:0.9, as seen in the table, as opposed to the ideal ratio of 3:2:1.

The low pH of the medium may be attributed to the synthesis of organic acids by microbes, as well as the presence of urea and uric acid in cow urine.

The total microbial count in the given sample is shown in Table 2. It reveals a high microbial content in the sample. The availability of microorganisms might be due to the combined effect of low pH, and addition of jaggery as substrate for their growth.

Acknowledgment

Laboratory assistance for conducting the experiment was provided by Pious Laboratories Pvt. Ltd., 113/1 New Bijalpur, Indore 452012 (M.P.).

Future Prospect

To study growth and development of Tomato *(Solanum lycopersicum)* under foliar application of *Amrut Jal* as organic source of nutrient.

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How to cite this article:

Archit Malviya. 2022. Biochemical analysis of *Amrut jal*. *Int.J.Curr.Microbiol.App.Sci.* 11(05): 144-147. doi: https://doi.org/10.20546/ijcmas.2022.1105.018