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Utilization of Liquid Manures: A Comparative Study of Panchagavya, Fish Amino Acid, Egg Amino Acid, and Vermiwash

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A B S T R A C T

Liquid manures are organic fertilizers derived from natural sources, which have gained significant attention due to their potential to improve soil health and enhance crop productivity. This study aims to provide an overview of four commonly used liquid manures, namely Panchagavya, Fish Amino Acid (FAA), Egg Amino Acid (EAA), and Vermiwash, and compare their effectiveness as sustainable alternatives to traditional chemical fertilizers. Here we discuss about

Keywords: panchagavya , fish amino acid , egg amino acid , vermiwash

1. Panchagavya

Panchagavya is an organic product which promotes growth and provide immunity in plant system, having five cow based ingredients. It helps in quality yield increase in crops. It promotes both shoot and root growth. Physico-chemical properties of Panchagavya revealed that they possess almost all the major nutrients, micro nutrients and growth harmones (IAA & GA) required for crop growth. Predominance of fermentative microorganisms like yeast and lactobacillus might be due to the combined effect of low pH, milk products and addition of jaggery/sugarcane juice as substrate for their growth.

The low pH of the medium was due to the production of organic acids by the fermentative microbes as evidenced by the population dynamics and organic detection in GC analysis. Lactobacillus produces various beneficial metabolites such as organic acids, hydrogen peroxide and antibiotics, which are effective against other pathogenic microorganisms besides its growth. GC-MS analysis resulted in following compounds of fatty acids, alkanes, alconol and alcohols.

1.1 Ingredients for the production of panchagavya (30L)

Sl. No	Ingredients	Quantity
1.	Cow dung	7kg
2.	Cow's ghee	1kg
3.	Cow urine	10 L
4.	Water	10 L
5.	Cowmilk	3 L
6.	Curd	2 L
7.	Tender coconut water	3 L
8.	Jaggery	3 kg
9.	Fully ripened poovan Banana	12 No.s

Preparation:

- In a container, add cow dung and cow ghee on the first day and stir it well.

The container should be kept in shade and covered with a mesh cloth.

- After 3 days, add 10 L cow urine and 10 L water to the prepared mixture.
- On the 15th day, add all the remaining ingredients and stir well.
- The panchagavya will be ready to use on the 30 th day.
- The mixture should be stirred well both in the morning and evening every day.

Dosage:

30 mL panchagavya diluted in 1 L water can be used as foliar spray or for basal application.

Precautions

- Keep the container under shade.
- Stir the contents twice a day both in morning and evening.
- The panchagavya stock solution will be ready after 30 days.
- Do not mix buffalo products
- Cover the container with a wire mesh or plastic mosquito net.

1.2 Nutrient content of panchagavya

S. No	**Parameter**	
1	pH	3.7 to 3.8
2	Nitrogen	1.28%
3	Phosphorous	0.72%
4	Potassium	2.23%
5	Organic Carbon	17.45%

2. EGG AMINO ACID

Egg amino acid is made with egg lemon and jaggery. It is a nutrient mixture which promotes plant growth, flowering, and fruit set. It helps to solve calcium deficiency in crops . egg amino acids have emerged as a valuable and innovative bio-based product, contributing significantly to the advancement of organic farming methods. Derived from eggs, this natural and biodegradable solution contains a rich array of essential amino acids, making it a potent organic fertilizer and plant growth promoter. With its ability to improve soil fertility, enhance crop productivity, and bolster plant resistance to stressors, egg amino acids have become a key component in the pursuit of ecologically responsible and high-yielding agricultural practices. This introductory paragraph aims to explore the benefits and applications of egg amino acids in organic agriculture, shedding light on how this eco-friendly alternative is revolutionizing the way we nurture and cultivate crops.

2.1 Ingredients for the preparation of egg amino acid (20L)

S.no	Ingredients	Quantity
1.	Eggs	15 No.
2.	Lemon	25 kg
3.	Jaggery	3 g

LEMON

EGG

2.2 Preparation:

- Add eggs to the prepared container.
- Extract lemon juice from the lemons and add it to the container with eggs in such a way that eggs are completely immersed in lemon juice extract. Seal the container air tight.
- After 15 days, the eggs will be dissolved in the lemon juice extract. Stir it well and add equal amount of cooled molten jaggery to the solution.
- After 30 days, the mixture can be sieved and ready to use in the field.

2.3 Dosage:

4 mL egg amino acid diluted in 1L water can be used as basal application or foliar spray

3. FISH AMINO ACID

It is made of fish and jaggery. It is rich in nitrogen content and promotes plant growth. It also has insect repellent properties. This innovative agricultural solution offers a range of remarkable benefits. Firstly, it focuses on increasing soil fertility and enriching nutrients, creating a loose soil structure that fosters the thriving biomass of microorganisms and earthworms, thereby ensuring a healthy and sustainable soil environment. Secondly, it actively promotes the growth of crop roots and leaves, resulting in enhanced photosynthesis and overall crop development. The impact on yield is equally impressive, with an expected increase of 10% to 40%, providing farmers with higher productivity. Furthermore, the method positively affects crop quality, allowing for an extended harvest period and improved long-term storage capabilities without compromising freshness and nutritional value. Moreover, the solution strengthens crops' resistance to various challenges, making them more adept at withstanding pests and diseases. For specific pest issues, it can even serve as an effective repellent against rice bug and pod bugs when sprayed at a recommended dilution rate of 15-20 mL per liter of water. Altogether, this comprehensive approach empowers farmers to cultivate healthier crops, foster sustainable agriculture, and meet the demands of a growing population.

3.1 Ingredients for the preparation of fish amino acid (30L)

S. No.	**Ingredients**	**Quantity**
1.	Fish(sardine)	30 kg
2.	Jaggery	30 kg

FISH

JAGGERY

3.2 Preparation:

All parts of fish including guts, bones and head can be used for the preparation of egg amino acid. Fish is cut into small pieces and added into a large container,1 Kg in each layer. After each layer of fish, add a layer of shredded jaggery. After adding them layer by layer, leave some space before sealing the container air tight. After 30 days, the container can be opened and sieved which will be ready to use

3.3 Dosage .

4mL fish amino acid diluted in 1 L water can be used for basal application or as foliar spray.

3.4 Nutrient content:

Fish amino acid fertilizers have an NPK ratio of 4:1:1. High in nitrogen (N) and low in phosphorus (P) and potassium (K). It also contains trace elements and secondary nutrient elements like calcium and magnesium.

4. VERMIWASH

Vermiwash, a brown, odorless liquid fertilizer that is produced from vermicompost rich in amino acids, vitamins, nutrients like nitrogen, potassium, magnesium, zinc, calcium, iron and copper. When applied to plants, vermiwash is a quick nutrient supplier to the plants and also acts as an organic pest and insect killer .

4.1 Preparation

Vermiwash can be easily made at home. Depending on the waste generated in home or farm, barrels or plastic drums of 50- 250 kg capacity may be selected. A hole is made on the side of the barrel near the bottom and a plastic tap can be fixed to drain out the collected vermiwash. Inside of the drum where tap is fixed, a net is to be provided to prevent clogging from organic wastes. Inside the barrel, a screen with holes punctured in it (made of metal or any other suitable material) is placed at about 30 cm height from the bottom of the barrel. Care has to ensure that the tap connected is fitted below the punctured screen. Bricks or suitable structures may be provided to hold the screen in position. Coconut husks are placed inside the barrel (over the punctured screen) in a layer with the concave side facing upwards. Organic wastes and cow dung in the ratio 1:2 is to be put inside the drum. The top of the drum has to be covered while ensuring proper aeration. For this green nets or shade nets can be used. The unit is to be kept in an area where rainwater and sunlight are not falling on it directly. After two-three days, earthworms can be introduced.

In Kerala, the African Nightcrawler (Eudrilus eugeniae) is identified as the best species of earthworm for effectively degrading any type of organic wastes. About 500 numbers are sufficient for degrading 50 kg organic wastes. Moisture has to be provided periodically. Vermiwash will be ready in about 15-20 day's time. One day before collecting the vermiwash, about 5 - 6 liters of water may be given through the top of the container. Next day, vermiwash can be collected through the pipe fitted at the bottom of the barrel. Like this vermiwash can be collected for 3-4 times. The vermiwash thus collected is 5-10 times diluted with water before spraying on crops. The vermicompost collected from the barrel may also be made in the form of tea bags and dipped in water for 24hours. The vermiwash thus collected may also be diluted and used for crops.

Vermiwash contains 60 per cent organic matter, 80 per cent total humic substances and C:N ratio is 1:20.

Vermiwash can either be used as foliar spray, soil drench, or even as root dip or stem dip. Vermiwash can also be mixed with cow urine and diluted to be used as a liquid manure and biopesticide.

4.2 Dosage for use in agriculture

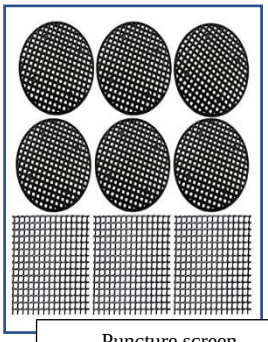
- Seedling root dip: Vermiwash has to be diluted 5 times with water and plants are to be dipped in vermiwash solution for 15-20 minutes.
- Foliar spray: Diluted 5 times with water and could be used as spray
- Soil drench: Diluted 10 times with water and could be used as soil drench

4.3 Composition of vermiwash

Components	
pH	7.5-8
Organic carbon, %	0.008± 0.001
Total nitrogen, %	0.01±0.005
Phosphorous, %	1.69 ±0.05
Potassium, ppm	25± 2

Sodium, ppm	8 ± 1
Calcium, ppm	3 ± 1
Copper, ppm	0.01 ± 0.001
Fe, ppm	0.06 ± 0.001
Magnesium, ppm	158.44 ± 23.42
Zinc, ppm	0.02 ± 0.001
Manganese, ppm	0.58 ± 0.040
Nitrosomonas (CFU/mL)	1.01×10^3
Nitrobacter (CFU/mL)	1.12×10^3
Total fungi (CFU/mL)	1.46×10^3

Barrel with tap



Puncture screen

Vermiwash

4.4 Benefits of Vermiwash

- Ecofriendly
- It stimulates the plant growth
- Develop resistance against pests and diseases
- Enhances the flowering and yield increase in crops especially in vegetables
- Acts as biopesticide when diluted with 10% cow's urine/ neem extract/ garlic extract
- Improve the physico-chemical properties of soil
- Increases the microbial activity in the soil