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# Liquid-Manure: A Low-Cost Sustainable Organic Input

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**SUMMARY**

Maintaining sustainability in agricultural production is the main problem in the recent scenario. Population explosion forces the farmer to feed the soil with more commercial fertilizer which is a principle cause of soil quality degradation in long run. To compensate this problem without reducing food yield, farmers should use an integrated method of nutrient management. Liquid organic manure are low cost, eco-friendly, liquid products which supplies essential plant nutrients and at the same time is eco-friendly. The popular liquid organic manures include Vermiwash, *Panchagavya*, *Sasyagavya*, *Amritpani*, *Kunapajala*, *Jeevamrita*, Seaweed sap etc. These manures apart from providing food to the plants provide well-being of the soil.

## INTRODUCTION

With the ever increasing population and reduction of land for agriculture purpose, farmers are facing a tough challenge to secure food for the population. Farmers are adopting strategies to increase yields by using more commercial inorganic fertilizers which apart from producing good yield is reducing the sustainability, soil health and apparently the environmental health. To combat this problem scientists always recommend supplementation of modern agriculture with organic inputs like organic manures in an integrated manner which can reduce the rate of application of commercial inorganic fertilizers and thus can make the system sustainable. Liquid manure are low cost, eco-friendly, liquid products which are produced as a result of fermentation and/or decomposition of organic matter like cattle dung and urine, vegetable wastes, crop residue and other plant materials. Apart from providing the essential plant nutrients, they also provide some plant growth regulators (PGR), aids in plant protection and also maintain the beneficial soil micro flora thus play a key role in organic matter and nutrient recycling. During the early twentieth century, cattle urine was used to fertilize the crops. But the method of collection and application of cattle urine was found dirty and troublesome. Hence, new forms of liquid manure evolved.

### Advantages of liquid organic manure:

- Liquid organic manures,
- Supplies both macro and micro nutrients as per the crop dietary requirements,
- Provides plant growth hormones and used as a tonic for plants,
- Improves the beneficial microbes population in soil,
- Induces drought, pest and disease resistance in crops,
- Improves the soil physical properties
- Low cost input and can be prepared well in farmer's level,
- Sustainable in nature.

### Demerits of liquid organic manure:

Though they supply essential plant nutrients but are bulky in nature and nutrient content is low. The process of preparation of these manures is time consuming and may be laborious to city dwellers. Moreover the preservation of this liquid manure is difficult.

### Types of liquid organic manure:


Fig 1: Types of liquid organic manures

**Vermiwash**

Vermiwash is a clear, transparent, pale yellow liquid collected after the passage of water through a column of earthworms. It is basically a collection of excretory products and mucus secretions and coelomic fluids oozed out by the earthworms. It contains optimum amount of enzymes, vitamins and hormones like auxin, gibberellins etc. for proper growth and development of plants. along with macro and micronutrients. Apart from nutritional point of view, it helps in development of resistance to pests and diseases. (Biocide).

**A Model of Vermiwash production:**

1. Take an earthen pot of height 30 cm with a hole at the bottom of the pot and a tap or rubber pipe fixed to it.
2. Fill 10 cm height from bottom with stones pieces.
3. Place a muslin cloth or filter paper.
4. Place a thin layer of humus as a growing medium for worms.
5. Release about 200 earthworms.
6. Add 2-4 table spoon of fresh dung slurry on humus everyday as feed for the worms.
7. Add 100 ml of water every day from the top.
8. 100 ml of Vermiwash can be obtained daily.

Fig 2: Foliar spray of vermiwash

**Application**: This vermiwash can be applied in the rhizosphere @100ml/plant or may be applied as foliar spray after dilution (4 times, 100 ml vermiwash: 400 ml water).

**Panchagavya**

Panchagavya is an organic product that promotes growth and provides immunity to plant system. *Panchagavya* consists of mainly five products from cow which includes cow dung, cow urine, cow milk, curd and ghee in a ratio 5:3:2:2:1. *Panchyagavya* shows huge potential as an organic fertilizer and pesticide (Dhama *et al*., 2005 and Kumar *et al*., 2005).

*Ingredient*: Cow dung 7kg, cow ghee 1kg, cow urine 10 lit, water 10 lit, cow milk 3 lit, cow curd 2 kg, jaggery 3 kg and 12 bananas.

**A Model of Panchagavya production:**

1. Mix cow dung and ghee.
2. Keep it for 3 days.
3. Add cow urine and water.
4. Keep it for 15 days and stir quickly and regularly.
5. Add cow milk, cow curd and jaggery and well ripened banana.
6. Stir quickly the mixture, twice a day.
7. Ready for use after 30 days.

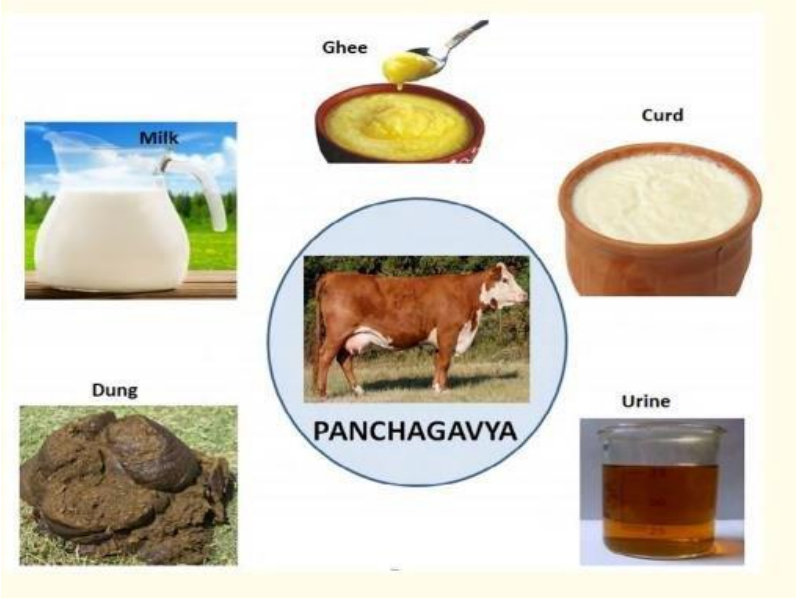


Fig 3: Ingredients of *Panchagavya* from cow

**Application:** Three per cent (3%) solution of *panchagavya* is used as foliar spray. It can also be used for seed soaking @ 3% *panchagavya* for 20 minutes.

**Jeevamrutha**

*Jeevamrutha* is a microbial culture mainly prepared from cow dung and urine which is use to enhance the microbial activity in soil and meet nutrient requirement of crop. The nitrogen fixing microbes includes *Azotobacter* and *Azospirillum*. Phosphorus solubilizing bacteria (PSB) as *Pseudomonas fluorescence* and Potash solubilizing bacteria like *Bacillus* are present in the cow dung that is used to prepare Jeevamrutha (Ramprasad *et al*., 2009). *Jeevamrut* is one of the important components of Zero Budget Natural Farming (ZBNF) (Chakraborty *et al*., 2019).

**Ingredients:** Cow dung 10 kg, cow urine 10 lit, jaggery 2 kg, pulse grain flour 2 kg, organic soil 1 kg and water 200 lit.

**A Model of Jeevamrutha production**:
1. Mix all ingredients.
2. Keep it for fermentation for 6-8 days.
3. Stir vigorously for 10-15 minutes thrice a day.
4. The final volume of mixture was made to 2 lit with water.

Fig 4: Stirring of *Jeevamrutha*

**Application:** 500 lit per hectare

**Amritpani**

Amritpani is liquid manure prepared by Rishi-Krishi technique and it invigorates the living soil and converts a dead soil into a living one. It is used as Seed treatment (*Beej sanskar*), enrichment of soil (*Mrittika sanskar*) and Foliar spray (*Padak sanskar*).

**Ingredients:** It consists of cow dung 10 kg, 500 g honey, ghee 250 g, water 200 lit.

**A Model of Amritpani production:**
1. Mix 10 kg cow dung with 500 g honey.
2. Mix up thoroughly to form a creamy paste.
3. Add 200 g desi ghee and mix at high speed.
4. Dilute with 200 lit of water.

Fig 5: *Amritpani* preparation

**Application:** Seed treatment, enrichment of soil, foliar spray.

**Sasyagavya**

*Sasyagavya* is a low cost organic nutrient supplier which contains cow dung, cow urine, vegetable peels or crop residue and water at a ratio of 1:1:1:2.

**A Model of Sasyagavya production:**
1. The vegetable peels and crop residue are cut into minute pieces.
2. Add fresh cow dung and cow urine.
3. Keep it for 10-12 days for fermentation.
4. Stir quickly twice a day with a stick.

5. Sieve the fermented mixture with a muslin cloth.

Fig 6: Vegetable peels for S*asyagavya*

**Application:** Foliar Spray *Sasyagavya* 5% twice till 30 DAS and *Sasyagavya* 10% twice from 30 DAS till crop ripening of the crop. It can also be applied with irrigation water.

**Kunapajala**

*Kunapajala* is ancient fermented liquid organic manure consisting of cow dung, cow urine, animal matter (flesh) and water in ratio of 1:1:1:100 which supplies plant nutrients in adequate amount. The concept of biofertilizer is mentioned in Vrikshyaurveda under the generic name "*kunapajala*" by *Surpala* (1000 AD) (Maity *et al*, 2020)

**Ingredients:** Water 5 lit, animal flesh or fish waste 1 kg, milk 1 lit, ghee 1 kg, honey 500 g, cow urine 1 lit.

**A Model of Kunapajala production:**

1. Boil the flesh in water.
2. Transper the boiled flesh in earthen pot and add all other ingredients.
3. Add 5 lit hot water.
4. Close the mouth of the pot with cotton cloth.
5. Mix the content every day.
6. After 14 days filter the content.
7. Use *Kunapajala* in ratio 1:10 with water.

Fig 7: Final texture of *Kunapjala*

**Seaweed Sap:**

Seaweed sap is prepared from the marine algae which grow in the coastal areas. It contains many plant nutrients, growth promoting chemicals and amino acids. Generally brown and red algae are used in making seaweed sap which has an application on crops. It helps the plant to combat biotic and abiotic stresses.

**Application:** Generally seaweed saps are used as foliar spray at vegetative stages with dilution with water.

Fig 8: Seaweed cultivation in coastal regions

[*The above mentioned models are given as per normal or standard procedure, however, the steps, mentioned amounts and time frame may vary as per local weather parameters / season, materials used and requirement of the farmer / user].

**Points to be kept in mind while preparation, storage and application of liquid manures:**

1) For soil drenching, dilution may not necessary but for canopy (foliar) spray, dilution is must.
2) The manure should be applied fresh (as quickly as possible, because shelf-life is generally low.
3) Should be kept (preserved) in dry, cool and shaded conditions.
4) Quality of the liquid manure depends on several factors, mainly on the ingredients used for the preparation.

## CONCLUSION

Farmers should include the low cost liquid manure in their nutrient management as it will help to reduce the amount of commercial inorganic fertilizer application, it is eco-friendly, and thus will be more effective from sustainable point of view. Necessary steps should be taken to make the farmers aware about the correct preparation methods of liquid manures, their application and storage. Application of liquid organic manure may reduce the cost of cultivation and will definitely enhance the yield and quality of the produce. Moreover, it increases the soil microbial flora which in return will help in mineralization of plant nutrients and decomposition of organic matter and thus gift a healthy and live soil.

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