

Liquid Organic Manures in Organic Farming: Types, Preparation, Functions and Agricultural Significance

Pritha Kundu^{1*}

¹*Division of Agriculture, Faculty Centre of Agriculture, Rural and Tribal Development, Ramakrishna Mission Vivekananda Educational and Research Institute, Ranchi-834008, India*

Corresponding Author

Pritha Kunda

Email: pritha.agronomy@gmail.com



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ABSTRACT

Liquid organic manures are biological inputs used in organic and low-input farming to recycle locally available resources and support soil fertility. This article describes their characteristics, preparation, functions, application methods, benefits and limitations. It covers traditional Indian formulations, including Jeevamrit, Beejamrit, Panchagavya, Amritpani and Kunapajala, as well as fish amino acid, fermented plant extracts and compost tea. These preparations differ in their ingredients and intended uses: some are applied to treat seeds, while others supply soluble nutrients, provide organic compounds or stimulate microbial activity. Their potential contributions include nutrient mineralization, rhizosphere activity, plant growth and the recycling of agricultural, animal and food-processing residues. Soil application, foliar spraying, seed treatment and irrigation delivery allow their use at different crop stages. However, their nutrient and microbial composition varies with raw materials, preparation, fermentation, storage and application. Many formulations lack standardized nutrient analyses, and poorly handled animal-based preparations may pose hygiene risks. Liquid organic manures should therefore be treated as supplementary components of integrated nutrient management, alongside compost, farmyard manure, crop residues, legumes and green manures, rather than assumed to meet all crop nutrient

requirements. Further research is needed to standardize preparation, characterize composition, establish crop-specific application rates, assess long-term soil effects and validate mechanisms of action.

INTRODUCTION:

Organic farming is an agricultural production system that emphasizes the efficient use of locally available biological resources while minimizing dependence on synthetic fertilizers, pesticides and other chemically intensive inputs. Maintaining soil fertility in such systems depends largely on regularly adding and recycling organic materials. Farmyard manure, compost, crop residues, green manures, animal manures and various fermented organic preparations are commonly used to maintain soil productivity. Among these inputs, liquid organic manures have received considerable attention because they can be prepared from readily available farm resources and applied directly to soil, seeds or foliage.

Liquid organic manures are organic formulations prepared through fermentation, decomposition, extraction or dilution of plant- and animal-derived materials. Depending on their ingredients and preparation methods, they may supply soluble nutrients, organic compounds, and beneficial microorganisms, or stimulate biological processes in the rhizosphere. Some preparations are primarily intended to provide nutrients, whereas others are used mainly as microbial inoculants, seed treatments or plant growth-promoting formulations.

In India, preparations such as *Jeevamrit*, *Beejamrit*, *Panchagavya*, *Amritpani* and *Kunapajala* are associated with traditional, organic or natural farming practices. Other formulations, including fermented plant extracts, compost teas and fish-based preparations, are also used in different organic farming systems. Their composition and

agricultural value, however, depend strongly on the source materials, fermentation conditions, dilution, storage and method of application. Consequently, liquid organic manures should be considered complementary components of an integrated nutrient-management strategy rather than universally standardized substitutes for fertilizers.

1. Concept and Characteristics of Liquid Organic Manures

Liquid organic manures differ from conventional solid organic manures primarily in their physical form and mode of application. They are generally produced by mixing organic materials with water and allowing them to undergo controlled fermentation or extraction. During this process, microorganisms break down complex organic substances and release soluble compounds. Depending on the formulation, the final product may contain mineral nutrients, amino acids, organic acids, enzymes, microbial cells and other biologically active substances.

One important advantage of liquid formulations is their ease of application. They can be delivered to the soil through irrigation water or applied directly around the root zone. Some formulations can also be diluted and sprayed onto foliage or used for treating seeds and planting materials. Because of this versatility, liquid organic manures can be incorporated into different stages of crop production.

However, the nutrient concentration of homemade liquid organic manures is generally variable. Unlike commercial fertilizers, they usually do not have a fixed nutrient analysis.

Therefore, their contribution to crop nutrient requirements depends on the raw materials used and the preparation method. Their major importance in organic farming may consequently extend beyond direct nutrient supply to include organic matter recycling, microbial stimulation, nutrient mineralization and plant growth promotion.

2. Major Liquid Organic Manures Used in Organic Farming

2.1. Jeevamrit

Jeevamrit, also known as Jivamrutha, is a fermented liquid preparation widely associated with Indian natural farming systems. A conventional formulation generally includes *cow dung, cow urine, jaggery, pulse flour, soil* and *water*. The mixture is fermented for a specified period with regular stirring to facilitate microbial activity.

The ingredients provide different resources for microbial growth. Cow dung introduces a diverse microbial population, while jaggery and pulse flour provide readily available carbon and nitrogenous substrates. Soil is traditionally added as a source of indigenous microorganisms. During fermentation, microbial multiplication and decomposition of organic constituents result in a biologically active preparation.

Jeevamrit is commonly applied to the soil or mixed with irrigation water. Its principal purpose is generally considered to be stimulation of soil biological activity and nutrient cycling rather than supplying large quantities of nutrients (Biswas, 2020). Microbial decomposition can contribute to the transformation of organically bound nutrients into forms that are more readily available to plants.

The effectiveness of Jeevamrit can vary depending on its preparation, raw materials, environmental conditions, crop and application

frequency. Thus, it is more appropriate to view it as a microbial and biological input within an organic farming system than as a standardized fertilizer.

2.2. Beejamrit

Beejamrit is another traditional formulation associated with natural farming and is primarily used for seed and planting-material treatment. It is generally prepared from *cow dung, cow urine, lime, soil* and *water*.

Seeds are coated or treated with the diluted preparation before sowing. The practice is intended to establish a biologically active microbial environment around the seed and support early seedling establishment (Biswas, 2020). The lime component also contributes to the formulation's alkaline character.

Unlike nutrient-rich liquid manures that are applied repeatedly to the crop, Beejamrit is mainly used at the beginning of crop establishment. Its role therefore lies more in seed treatment and biological protection than in supplying the complete nutritional requirements of a growing crop.

2.3. Panchagavya

Panchagavya is a traditional preparation based on five products obtained from cattle: *cow dung, cow urine, milk, curd* and *ghee*. These materials are mixed and fermented, often with additional ingredients depending on the particular preparation method.

The resulting formulation is generally diluted before application. Panchagavya may be applied as a foliar spray, soil application or, in some systems, as a seed or planting-material treatment.

The agricultural interest in Panchagavya arises from its potential to provide organic compounds and biologically active substances that may influence plant growth and

rhizosphere processes. Experimental studies have reported changes in plant growth, nutrient uptake and yield under particular crop and management conditions.

2.4. Amritpani

Amritpani is a traditional liquid organic preparation generally made from *cow dung*, *ghee* and a carbohydrate source such as *honey* or *jaggery*, followed by dilution with water. It is primarily intended to stimulate biological activity in the soil.

The organic materials in the preparation can serve as substrates for microorganisms. When applied to soil, the formulation may support microbial processes involved in decomposition and nutrient cycling (Biswas and Das, 2022). Amritpani is therefore generally regarded as a biological soil amendment rather than a concentrated nutrient fertilizer.

2.5. Kunapajala

Kunapajala represents an older form of fermented liquid organic manure described in traditional Indian agricultural literature. It is generally prepared using protein-rich animal materials, such as *fish* or *meat*, together with plant-derived ingredients and other materials that support fermentation (Biswas and Das, 2025).

The decomposition of protein-rich substances releases nitrogen-containing compounds and other soluble nutrients. Consequently, Kunapajala can function more directly as a nutrient-containing liquid manure than microbial preparations such as Jeevamrit.

Its use illustrates an important principle of organic nutrient management: materials that would otherwise be considered agricultural or household wastes can be transformed through biological decomposition into useful nutrient resources. However, because animal-derived ingredients are involved, hygienic preparation,

appropriate fermentation and safe application are essential.

2.6. Fish Amino Acid

Fish amino acid is a fermented preparation produced from fish or fish-processing residues and a carbohydrate source, commonly sugar or molasses. During fermentation, proteins are hydrolyzed and transformed into smaller nitrogen-containing compounds, including amino acids and peptides.

Fish amino acid is generally used as a diluted foliar spray or soil application. It can provide nitrogen and organic compounds that may contribute to plant nutrition. Its use also represents a method of recycling fish-processing residues into agricultural inputs.

The nutrient content of fish amino acid can vary considerably according to the type of fish material, ratio of ingredients, fermentation conditions and duration. Therefore, application rates should be based on the formulation used rather than assuming a uniform nutrient concentration.

2.7. Fermented Plant Extracts

Fermented plant extracts are prepared by fermenting fresh green leaves, weeds or other plant biomass with water and a carbohydrate source. The fermentation process releases soluble organic compounds and nutrients from plant tissues.

These preparations can be produced using locally available vegetation and therefore have particular relevance to smallholder and low-input farming systems. Depending on the plant material used, the resulting extract may contain varying quantities of mineral nutrients and secondary metabolites.

Fermented plant extracts are generally used as foliar sprays or soil applications. Their nutrient contribution is usually supplementary, and

their value may depend strongly on the plant species used as the raw material.

2.8. Compost Tea

Compost tea is a liquid preparation obtained by extracting soluble compounds and microorganisms from mature compost into water. In some systems, the mixture is aerated to encourage microbial activity, whereas non-aerated methods are also practiced.

Compost tea is commonly used as a soil drench or foliar application. Its potential role is primarily associated with microbial activity and the transfer of soluble organic compounds from compost to the liquid phase. The quality of compost used, extraction method, aeration, duration and hygiene conditions can substantially influence the resulting preparation.

3. Mechanisms of Action of Liquid Organic Manures

- a. **Enhancement of microbial activity** - Many liquid organic formulations contain microorganisms or provide readily decomposable carbon compounds that can stimulate microbial populations. Soil microorganisms play essential roles in decomposition, nutrient mineralization, carbon transformation and formation of soil aggregates.
- b. **Nutrient mineralization** - Organic nitrogen, phosphorus and other nutrients present in raw materials are often present in complex forms. Microbial decomposition converts some of these compounds into simpler mineral forms that can subsequently become available to plants. Thus, liquid organic manures may contribute to nutrient cycling even when their direct nutrient concentration is relatively low.

- c. **Improvement of rhizosphere processes** - The rhizosphere is a biologically active zone surrounding plant roots. Organic compounds supplied through liquid formulations can influence microbial activity in this region. Increased microbial activity may affect decomposition, nutrient transformations and interactions between plants and soil microorganisms.
- d. **Plant growth promotion** - Some fermented organic preparations contain compounds that may influence plant growth directly or indirectly. Their effects can include changes in root development, nutrient uptake and plant vigour. However, such effects are formulation- and crop-dependent and should not be generalized to all liquid organic manures.

4. Methods of Application

Liquid organic manures can be applied through several methods depending on their intended purpose.

- a. **Soil application** - The diluted formulation is applied around the root zone or incorporated with irrigation water. This method is commonly used for Jeevamrit and other microbial formulations.
- b. **Foliar application** - A suitably diluted preparation is sprayed onto plant leaves. Panchagavya, fermented plant extracts and fish-based preparations may be used in this manner.
- c. **Seed treatment** - Preparations such as Beejamrit are used to coat or treat seeds before sowing.
- d. **Irrigation application** - Certain liquid formulations can be delivered through irrigation water, allowing relatively uniform distribution across the cultivated area.

The concentration and frequency of application should be determined according to the particular formulation. Excessively concentrated organic preparations may cause undesirable effects, while poorly prepared products may introduce pathogens or phytotoxic compounds.

5. Role in Sustainable Soil Fertility Management

Liquid organic manures can contribute to sustainable soil management by supporting the recycling of locally available biological resources. Their preparation often utilizes agricultural residues, animal-derived materials, plant biomass and food-processing by-products that might otherwise be discarded.

Their greatest significance is therefore not necessarily their ability to replace all nutrient inputs, but their potential to become part of a closed-loop nutrient management system. Crop residues, livestock resources and other organic wastes can be processed and returned to the soil, reducing nutrient losses and improving resource-use efficiency.

Liquid organic manures are particularly useful when integrated with compost, farmyard manure, green manures, crop residues, legume-based rotations and other soil-building practices. Such integration can provide both immediate and longer-term benefits because liquid formulations mainly act as supplementary biological or nutrient inputs, whereas solid organic amendments contribute more substantially to soil organic matter.

6. Limitations and Precautions

Despite their potential benefits, liquid organic manures have several limitations.

- a. Their chemical and biological composition can vary widely between preparations. Differences in raw materials, fermentation period, temperature, moisture, pH and

storage conditions can alter the final product.

- b. Many traditional formulations lack standardized nutrient concentrations. Consequently, it is difficult to calculate their exact contribution to crop nutrient requirements without laboratory analysis.
- c. Improperly prepared animal-based formulations may present microbiological risks. Appropriate hygiene, fermentation and handling practices are therefore essential. Application of contaminated preparations to edible plant parts should be avoided unless their safety has been adequately established.
- d. Liquid organic manures should not automatically be considered complete substitutes for nutrient management. Crops require nitrogen, phosphorus, potassium, sulfur and micronutrients in quantities that vary with crop type, soil fertility and yield target. Sustainable organic farming therefore requires a balanced nutrient-management strategy based on soil testing, organic matter recycling and appropriate nutrient budgeting.

CONCLUSION

Liquid organic manures represent an important group of biological inputs used in organic and low-input farming systems. Preparations such as Jeevamrit, Beejamrit, Panchagavya, Amritpani, Kunapajala, fish amino acid, fermented plant extracts and compost tea differ substantially in their ingredients, preparation methods and intended functions. Some primarily stimulate microbial activity, some provide soluble nutrients, and others are used mainly for seed treatment or plant growth promotion.

Their significance in organic farming lies particularly in the recycling of locally available biological resources and the

promotion of soil biological processes. However, their effectiveness cannot be generalized across all crops and farming situations because their composition is highly dependent on preparation and management conditions. They are therefore most appropriately used as components of an integrated organic

nutrient-management system that combines organic manures, compost, crop residues, legumes, green manures and appropriate crop rotations.

Future research should focus on standardizing preparation methods, characterizing nutrient and microbial composition, determining crop-specific application rates, evaluating long-term soil effects and establishing scientifically validated mechanisms of action. Such research can help bridge the gap between traditional knowledge and scientifically optimized

organic nutrient management, thereby improving the reliability and practical value of liquid organic manures in sustainable agriculture.

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