Liquid Organic Manures and their Role in Agriculture

Sushma, N.*

Ph.D. Scholar, Department of Soil Science, College of Agriculture, Shivamogga

Corresponding Author
Sushma, N
Email: sushmanagaraj.work@gmail.com

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ABSTRACT

Liquid organic manures (LOMs) are gaining prominence as sustainable alternatives to synthetic fertilizers in modern agriculture. Derived from organic wastes, plant residues and animal excreta, these nutrient-rich formulations provide essential macro- and micronutrients, beneficial microorganisms and bioactive compounds that enhance soil fertility and plant growth. Common types such as jeevamrutha, panchagavya, vermiwash and cow urine-based manures improve soil biological activity, nutrient cycling and disease resistance while maintaining ecological balance. The application of LOMs through soil drenching, foliar spray, seed treatment, and fertigation promotes root development, chlorophyll synthesis and yield improvement. Environmentally, they minimize pollution, recycle farm wastes and enhance sustainability at low cost. However, challenges such as low nutrient concentration, lack of standardization, and limited shelf life hinder their large-scale adoption. Integrating LOMs with other organic practices offers a viable pathway toward sustainable and eco-friendly agriculture.

INTRODUCTION

Sustainable agriculture aims to maintain soil fertility, productivity, and ecological balance without relying heavily on synthetic fertilizers. Among the various eco-friendly alternatives, liquid organic manures (LOMs) have gained

increasing attention for their ability to provide nutrients in readily available forms, enhance soil microbial activity, and improve plant growth naturally (Devi & Sharma, 2021). Liquid organic manures are nutrient-rich solutions prepared from organic wastes, plant residues, and animal excreta through processes like fermentation or decomposition. Common examples include *jeevamrutha*, *panchagavya*, *beejamrutha*, *vermiwash*, and cow urine-based formulations (Sreenivasa *et al*., 2010).

Definition and Types

Liquid organic manures are organic nutrient solutions containing essential plant nutrients, enzymes, hormones, and beneficial microorganisms. These are applied either to the soil or directly on plant foliage to promote growth and resistance to pests and diseases (Singh & Reddy, 2019). Depending on their source and preparation method, LOMs can be categorized into several types:

1. **Jeevamrutha** – A traditional Indian formulation made from cow dung, cow urine, jaggery, pulse flour, and soil. It acts as a microbial culture that enhances soil biological activity and nutrient availability (Palekar, 2006; Sreenivasa *et al*., 2010).

2. **Panchagavya** – Prepared from five cow-based products (milk, curd, ghee, urine, and dung), it serves as a growth promoter and bio-stimulant for crops (Natarajan, 2002).

3. **Vermiwash** – A liquid extract collected from vermicompost units, rich in plant growth regulators, enzymes, and nutrients (Singh & Reddy, 2019).

4. **Cow urine-based manures** – Contain nitrogen, potassium, and several micronutrients, along with antibacterial and antifungal properties (Prakash & Nagaraj, 2020).

5. **Plant extract-based formulations** – Prepared from leaves of neem, tulsi, or custard apple, these solutions have pesticidal and growth-promoting effects (Singh *et al*., 2013).

Nutrient Composition and Benefits

Liquid organic manures supply both macro and micronutrients in dissolved form, making them quickly available for plant uptake. Although their nutrient concentration is lower than chemical fertilizers, their benefits are more holistic (Devi & Sharma, 2021). They contain beneficial microorganisms such as *Azotobacter*, *Phosphobacteria*, and *Rhizobacteria*, which help fix atmospheric nitrogen and solubilize phosphorus (Sreenivasa *et al*., 2010). Moreover, the presence of organic acids, amino acids, and enzymes enhances nutrient absorption and root activity (Prakash & Nagaraj, 2020).

Some typical nutrient contents found in liquid organic manures are (Singh & Reddy, 2019):

- Nitrogen (N): 0.1–0.3%
- Phosphorus (P_2O_5): 0.05–0.2%
- Potassium (K_2O): 0.2–0.4%
- Micronutrients: Zn, Fe, Mn, Cu in trace amounts

These nutrients not only meet crop requirements but also stimulate microbial growth, improve soil enzyme activity, and increase organic matter decomposition, leading to better soil structure and fertility (Singh *et al*., 2013).

Application Methods

Liquid organic manures can be applied through different methods depending on the crop and farming system (Devi & Sharma, 2021):

1. **Soil Application:** Diluted LOMs are applied near the root zone to enrich soil microorganisms and supply nutrients.

2. **Foliar Spray:** Spraying diluted formulations directly on leaves allows rapid nutrient absorption and acts as a bio-stimulant (Natarajan, 2002).

3. **Seed Treatment:** Soaking seeds in preparations like *beejamrutha* enhances germination and seedling vigor (Sreenivasa *et al*., 2010).

4. **Drip Irrigation or Fertigation:** LOMs can be integrated with irrigation systems for efficient nutrient delivery in horticultural crops (Singh & Reddy, 2019).

Role in Soil and Plant Health

Liquid organic manures play a crucial role in maintaining soil and plant health. The organic carbon present in these solutions improves soil structure and water retention (Prakash & Nagaraj, 2020). Beneficial microbes introduced through LOMs enhance nutrient cycling, suppress soil-borne pathogens, and promote symbiotic relationships in the rhizosphere (Sreenivasa *et al*., 2010).

Plants treated with liquid manures exhibit better root development, chlorophyll content, and yield. For example, foliar application of *panchagavya* has been found to increase flowering and fruit set in crops like tomato, banana, and paddy (Natarajan, 2002; Singh & Reddy, 2019). *Jeevamrutha* application enhances microbial biomass and enzyme activity in the soil, which supports sustainable nutrient supply throughout the crop cycle (Palekar, 2006; Prakash & Nagaraj, 2020).

Environmental and Economic Advantages

The use of liquid organic manures offers several environmental benefits. Unlike chemical fertilizers, they do not cause nutrient leaching, groundwater pollution, or soil degradation (Singh *et al*., 2013). Their production utilizes locally available materials such as cow dung, crop residues, and kitchen waste, making them cost-effective for small and marginal farmers (Prakash & Nagaraj, 2020). By promoting waste recycling, they contribute to circular agriculture and reduce dependence on external chemical inputs (Devi & Sharma, 2021).

Economically, farmers benefit from reduced fertilizer costs, improved soil fertility, and higher long-term yields (Singh & Reddy, 2019). Furthermore, organic produce obtained from LOM-based cultivation fetches better market value, enhancing farm profitability and sustainability (Singh *et al*., 2013).

Limitations and Challenges

Despite their advantages, liquid organic manures have certain limitations. Their nutrient content is relatively low, requiring frequent application to meet crop demands (Devi & Sharma, 2021). Preparation and storage conditions must be carefully maintained to prevent microbial contamination or nutrient loss (Prakash & Nagaraj, 2020). Lack of standardization in formulation and quality control also limits their large-scale adoption (Singh & Reddy, 2019). Moreover, the short shelf life of homemade preparations makes commercial distribution challenging (Sreenivasa *et al*., 2010).

CONCLUSION

Liquid organic manures serve as an integral component of organic and sustainable farming systems. They not only supply essential nutrients but also rejuvenate soil health, improve crop quality, and promote eco-friendly agriculture (Devi & Sharma, 2021). Integrating these bio-enhancers with other organic practices such as composting, green manuring, and crop rotation can significantly reduce dependence on chemical fertilizers

(Singh *et al*., 2013). To maximize their potential, awareness, training, and scientific validation of their formulations are essential. Ultimately, the widespread use of liquid organic manures represents a sustainable pathway toward restoring soil vitality and ensuring long-term agricultural productivity (Prakash & Nagaraj, 2020).

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