

EFFECT OF ORGANIC NUTRIENT SOURCES ON VARIOUS INDICES AND PARAMETERS OF FODDER CROPS - A MINI REVIEW

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SUMMARY

Organic farming is becoming increasingly popular in modern agriculture. It is implemented using a mix of environmentally friendly, modern technologies that are acceptable to farmers. Organic manures, such as farm yard manure (FYM), poultry manure (PM), and others, play a significant role in nutrient recycling in the soil. Organic nutrients boost soil production through improving the physical, chemical, and biological aspects of the soil. These sources also boost crop yields and quality of produce by acting as a source of both macro and micro nutrients required to plants. These sources of nutrition help us to provide a better sustainable environment for agriculture to our future generations.

Key words: FYM, *Jeevamrit*, *Beejamrit* poultry manure

The indiscriminate use of chemical fertilizers to soil promotes toxicity of numerous elements in the soil, as well as a decline in soil health and quality. As a result, the usage of organic sources on the farm is increasing day by day in order to ensure long-term soil health sustainability. The basic goal of sustainable farming is to achieve long-term agricultural production without compromising soil biological health.

To address the aforementioned issues, farmers are being introduced to a new idea of zero budget natural farming, in which only on-farm inputs are required to meet crop nutrient demands. The use of off-farm inputs is strictly prohibited. It has four main components: *Beejamrit* (seed treatment using local cow dung and cow urine), *Jeevamrit* (applying inoculation made of local cow dung and cow urine without any fertilizers and pesticides), *mulching* (activities to ensure favorable microclimate in the soil), and *waaphasa* (soil aeration). This system works towards chemical-free agriculture at the lowest cost to farmers and thereby enhancing their incomes. Here, an attempt has been made to review the pertinent research work done by various workers under different agro climatic conditions on various forage crops in respect of organic sources under the following headings:

- A. Growth and yield
- B. Crop quality
- C. Nutrient uptake
- D. Soil properties

Growth and yield

It has been well established that organic sources not only improve the soil health but also help in increasing the yield contributing characters of crop. With the use of FYM alone or in conjunction with bio-fertilizers in sandy loam textured soil, a significant increase in total green fodder productivity reported by Kumar and Gautam (2004) at IARI (New Delhi). Khanday *et al.* (2009) at Srinagar (Jammu and Kashmir) also reported about the significance of increasing FYM use for crop production. He reported highest seed and straw yields in a dual-purpose oats crop when 20 t FYM ha⁻¹ was applied, which was statistically equivalent to 15 t FYM ha⁻¹. Long term study on nutrient management in maize + soybean-wheat + gram cropping system under rainfed conditions of Palampur (Himachal Pradesh), Saini and Kumar (2014) reported better yield and improvement in soil fertility with the application of farmyard manure, Vermicompost, himcompost alone in different possible combinations compared to no application of nutrient sources.

Seed inoculation with *Azospirillum* + phosphorus solubilizing organisms produced better biomass production than no seed inoculation circumstances, demonstrating the favourable benefits of bioinoculants. The use of *Jeevamrit*, *Panchgavya*, and other on-farm preparations aids in the improvement of soil qualities, resulting in improved yield and other growth metrics. In Dharwad (Karnataka), Gore and

Sreenivasa (2010) found that using *Beejamrit*+*Jeevamrit*+*Panchgavya* results in significantly higher tomato yields than using the recommended fertilizer dose alone, owing to better nutrient availability to plants throughout the crop growth period. Patel *et al.* (2018) found that foliar application of *Panchgavya* @2% + soil application of *Jeevamrit* @ 500 l/ha resulted in a consistent increase in different yield attributes of Kharif groundnut as compared to other treatments at Sardarkrushinagar. This could be due to the release of smaller quantities of growth regulators, which results in higher pod yield in groundnut.

Crop quality

Abusuwar and Zilal (2010) found a favourable effect of poultry manure on the nutritional value of forage sorghum grown in sandy loam soil conditions in Khartoum (Sudan). Up to a maximum tested amount of 7.5 t/ha poultry manure, fodder quality improved dramatically, with the highest protein and lowest fibre percentage. Jadhav *et al.* (2011) also found considerably enhanced protein content in pearl millet with the use of vermicompost @ 1.5 t/ha cultivated on clay textured soil in the arid climatic conditions of Junagadh (Gujarat). A significant increase in crude protein content of pearl millet was found with the application of FYM @ 10 t/ha in Banaskantha (North Gujarat) (Goloda *et al.* 2012). In soils deficient in nitrogen content Bama (2017) at Coimbatore (Tamil Nadu) observed that the quality parameters of Cumbu hybrid fodder grass improved with application of organic manure. Significantly higher crude protein content (8.8%) was recorded with application of FYM. The nutrient management study in pearl millet conducted by Singh *et al.* (2018) in sandy loam soil at Allahabad (Uttar Pradesh) reported significant improvement in protein content of pearl millet with the inclusion of bioinoculant in nutrient management practices. The overall quality of forage crops in respect of palatability, succulence etc. also improve by organic sources. Sharma (2009) in sandy soils at Bikaner (Rajasthan) found out that the application of sheep manure @ 10 t ha⁻¹ significantly improved the quality of fodder oats over control. Moreno-Resendez *et al.* (2017) at Mexico also observed beneficial effect of organic fertilization on the improvement of nutritional parameters such as acid detergent fibre, neutral detergent fibre, non-fibre carbohydrate and total digestible nutrients in forage maize.

Nutritional uptake

Various studies have looked into the impact of nutrient management practices on crop nutrient uptake. Bayu *et al.* (2006) found that raising the level of FYM improved total nitrogen uptake by up to 36% in North Eastern Ethiopia (East Africa). FYM aided in the continual supply of nitrogen to agricultural plants, resulting in continued nitrogen absorption by plants. Jat *et al.* (2013) also observed greater nitrogen, phosphorus, and potassium uptake by the sorghum crop with the use of 10 t FYM ha⁻¹ over no FYM application in a nutrient management research in Udaipur (Rajasthan). The study of Verma *et al.* (2016) at Navsari (Gujarat), Singh *et al.* (2018) at Allahabad indicated significant improvement in nitrogen, phosphorus and potassium uptake by oats and pearl millet with the application of bioinoculants to those crops. Patel *et al.* (2018) at Banaskantha (North Gujarat) studied the effect of variable doses of *Panchgavya* and *Jeevamrit* application on nutrient uptake by *kharif* groundnut and found higher uptake of nitrogen, phosphorus and potassium with the foliar application of 6 per cent *Panchgavya* coupled with soil application of *Jeevamrit* @ 500 l/ha. In soils with medium nitrogen content at Solan (Himachal Pradesh) Nitika *et al.* (2018) observed that the application of vermicompost @ 5t ha⁻¹ + *Jeevamrit* + *Panchgavya* @ 5% + spray @ 3% gave significantly higher NPK uptake in European carrot.

Soil properties

Several studies have found that using organic manures regularly, either alone or in combination with inorganic fertilisers, improved the soil's available nutritional status (Toor and Bishnoi, 1996).

Golada *et al.* (2012) noticed a considerable improvement in organic carbon content, accessible nitrogen, and phosphorus status with the application of FYM in pearl millet crop under rainfed circumstances in loamy sand soils of Banaskantha (North Gujarat). Masood *et al.* (2013) also reported that applying FYM to a maize crop in Faisalabad (Pakistan) resulted in a decrease in soil pH and bulk density, as well as an increase in soil porosity and organic matter. With the use of FYM in a broccoli-mung bean cropping system, Ojha *et al.* (2014) reported a decrease in bulk density and an increase in soil porosity in Chitwan (Nepal). Bama (2017) found

that using organic nutrient sources improved soil characteristics in Coimbatore (Tamil Nadu). Organic manure application resulted in significantly enhanced soil organic carbon content and accessible soil NPK in Cumbu hybrid napier fodder grass. The rise in nitrogen could be linked to increased microbial proliferation as a result of the manure's assimilation and conversion of organic to inorganic forms.

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