Impact of Organic Inputs (Jeevamruth and Beejamruth) on Quality Parameters of Fenugreek

Abstract:

The present study on 'Biochemical evaluation of organic inputs (Jeevamruth and Beejamruth) and their efficacy on Greens' was carried out at the Department of sustainable organic agriculture, Tamil Nadu Agricultural University, Coimbatore and the laboratory experiments were carried out at the Department of Environmental Sciences. A field experiment was conducted in a randomized block design with three replications. Biometric observations were taken during 10^{th}, 20^{th} and 30^{th} days after sowing. Soil samples were collected during initial and at the stage of harvest and analysed for chemical and biological properties. Plant samples were analysed for protein and chlorophyll contents. Quality parameters like protein content was found to be high in both treatments Jeevamruth @ 5 % Spray (using Green gram flour) and Jeevamruth @ 5 % Spray (using Green gram +Black gram flour); and the chlorophyll content was high in Jeevamruth @ 5 % Spray (Green gram flour). From the results, the application of Jeevamruth as a 5 % spray was observed as a viable organic approach to improve soil and eco-friendly fenugreek production.

Key words: Jeevamruth, Beejamruth, Biochemical evaluation, Organic inputs, Protein content, Chlorophyll content.

Introduction:

With the growing awareness for safe and healthy food, the demand for organic food is increasing. Concern for deteriorating soil health and increasing contamination in ground water and surface water bodies have also added to the need for alternative technologies which not only can ensure safe and healthy food but are also environment friendly, contribute to the long term fertility and sustainability of the soils. During the last 10 years, many farmers due to various reasons, have switched over to the organic methods of cultivation and are now successfully growing comparable productivities with much less costs. In the absence of any scientific support, majority of the farmers relied on the traditional wisdom. On-farm experimentation has developed innovative inputs which has to be prepared on-farm with local resources. Among these innovative inputs most common and successful inputs are Panchagavya, Jeevamruth and Vermiwash. Among the

liquid formulations, panchagavya is one of the most important liquid formulations to be considered for the study of shelf life as it not only proves to be most effective for crop growth but also widely used by the farmers (Sugumaran *et al*., 2018).

Nowadays organic farming practices are gaining importance as farmers have realized the benefits of organic farming in terms of soil fertility, soil health and sustainable productivity. Farmers are well aware with the use of organic liquid manure such as Panchagavya, Beejamruth and Jeevamruth as well as bio digester in organic farming. These organic liquid manures play a key role in promoting growth and providing immunity to plant system. The spray of Panchgavya on crop imparts dark green colour leaves within 10 days. Its role as plant growth promoter has already been reported by Subhashini *et al*., (2001) and Sreenivasa *et al*., (2010).

Materials and methods:

Field experimental details

The experiment was conducted in a randomised block design with three replications. The experimental layout was kept undisturbed throughout the period of investigation and fenugreek seeds were soaked for 1 hr in the Beejamruth solution before sowing and were sown in the field.

Design	: RBD
Number of treatments	: 7
Number of replications	: 3

The treatment details are given below:

Treatments

T_1–Control
T_2-Jeevamruth @ 3% Spray (Green gram flour)
T_3-Jeevamruth @ 5 % Spray (Green gram flour)
T_4-Jeevamruth @ 3 % Spray (Black gram flour)
T_5-Jeevamruth @ 5 % Spray (Black gram flour)
T_6-Jeevamruth @ 3 % Spray (Green gram + Black gram flour)
T_7-Jeevamruth @ 5 % Spray (Green gram +Black gram flour)

Field preparation and sowing

The field was thoroughly prepared to a fine tilth. The soil type of experimental plot was clay loam with a pH of 7.42. Seeds of fenugreek variety Co1 selection were sown in lines adopting a spacing of 30 × 15 cm at the rate of 40 grams per bed (size 2.0×2.0). Plants were thinned at 3 days after sowing.

Leaf protein

The leaf protein was estimated as per the method described by Lowrey *et al*., (1951).

Leaf chlorophyll content

The amount of chlorophyll was estimated according to Yoshida *et al*. (1971).

Results and Discussion:

Protein content

The treatments Jeevamruth @ 5 % Spray (using Green gram flour) and Jeevamruth @ 5 % Spray (using Green gram flour+Black gram flour) are on par with each other and the protein contents were 1.493 mg/100 g and 1.492 mg/100g of greens respectively. Lowest protein content was recorded in control (0.795 mg/100 g) (Fig.1). The nutritional quality of fenugreek plant is decided by parameters like protein content and chlorophyll content. Prabhakaran and Pitchai (2002) reported that the application of recommended dose of nitrogen through poultry manure recorded higher protein in tomato fruit compared with inorganic fertilizer. The present investigation results go in support of Beaulah (2001). Montagu and Goh (1990) also found that the rate of nitrogen through fertilizer significantly decreased vitamin C concentration and fruit visual quality in tomato. Boomiraj (2003) had also reported the increased protein content of Bhendi fruit due to panchagavya application and Jeevamruth application. The microorganisms present in the Jeevamruth would have helped in the fixation of atmospheric nitrogen and its adsorption and utilization for protein synthesis. Increased nitrogen content would increase protein content. These results are in line with earlier findings of Roy and Seth (1971) in radish, Venter (1979) in carrot, Bome *et al*. (1987) in cabbage, Kohil *et al*. (1992) in pea, Beaulah (2001) in moringa and Somasundaram (2003) in maize, sunflower and green gram. The plant height, root length and single plant weight in fenugreek are high in the treatment as Jeevamruth 5% spray was observed as a viable organic approach to improve soil and eco-friendly fenugreek production (Goveanthan *et al.*, 2020). In another study, seeds treated with Panchagavya and Jeevamruth separately, the maximum shoot length and root length were recorded in Panchagavya treatment and minimum shoot length and root length of was recorded in Jeevamruth treated seeds and also the panchagavya treated seeds registered the maximum vigour index (Akila *et al.,* 2020). Compounds Erioflorin and nagilactone A present in Beejamruth are plant growth regulators and hence Beejamruth is a valid and effective alternative fertilizer for the production of safe and good quality food produces which could cater the needs of the modern Indian requirements (Goveanthan *et al.,* 2019).

In another study, the soluble protein content (0.87 mg/g) and total sugar content (11.20 µg/g) were found to be improved in Panchagavya (Groundnut cake instead of ghee) @ 3% spray treatment and Recommended dose of NPK fertilizer applied plants (Sugumaran *et al.,* 2019).

Chlorophyll content

The chlorophyll A content was high (2.377) in the treatment Jeevamruth @ 5 % Spray (Black gram flour)(1.776) followed by Jeevamruth @ 5 % Spray (using Green gram flour+Black gram flour) (1.578). The lowest chlorophyll A content was found in control (0.544). The chlorophyll B content was high (0.678) in the Jeevamruth @ 5 % Spray (using Green gram flour). The lowest chlorophyll B content was found in control (0.362). The total chlorophyll content was high (2.854) in the treatment Jeevamruth @ 5 % Spray (using Green gram flour). The total chlorophyll content was found to be on par with Jeevamruth @ 5 % Spray (using Green gram flour+Black gram flour) (2.453) and Jeevamruth @ 5 % Spray (Black gram flour) (2.352). The lowest total chlorophyll content was found in control (1.342) (Table 1). Magnesium is essential for normal plant growth and development (Bose *et al.,* 2011). Mg is an integral part of chlorophyll, essential for photosynthesis. Thus the presence of magnesium in the Jeevamruth will supplement the magnesium requirement of the crop. The maize plants in treatment TNAU Panchagavya @ 3% spray and Panchagavya (Groundnut cake instead of ghee) @ 3% spray increased the quantity of photosynthetic pigments and root oxidation activity than in the control plants (Sugumaran *et al.,* 2019). Compounds Isoenanthic acid, Columbianetin and Lomatin,1, 6-Hexanediol, Mevastatin and Gitoxigenin, Dibutoxy anthracine, Erioflorin and nagilactone, Trimegestonea, Rofe Coxib, Clupanodonic acid are present in Jeevamruth which helps in the plant metabolism and also improves its growth (Goveanthan *et al*., 2021).

Conclusion

From the field experiment conducted at Research Farm, Department of Sustainable Organic Agriculture, Tamil Nadu Agricultural University, Coimbatore to test the effect of Jeevamruth and Beejamruth on Fenugreek, it is inferred that, the quality parameters like protein content was found to be high in both Jeevamruth @ 5 % Spray (using Green gram flour) and Jeevamruth @ 5 % Spray (using Green gram flour+Black gram flour); and the chlorophyll content was high in the treatment Jeevamruth @ 5 % Spray (using Green gram flour).

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

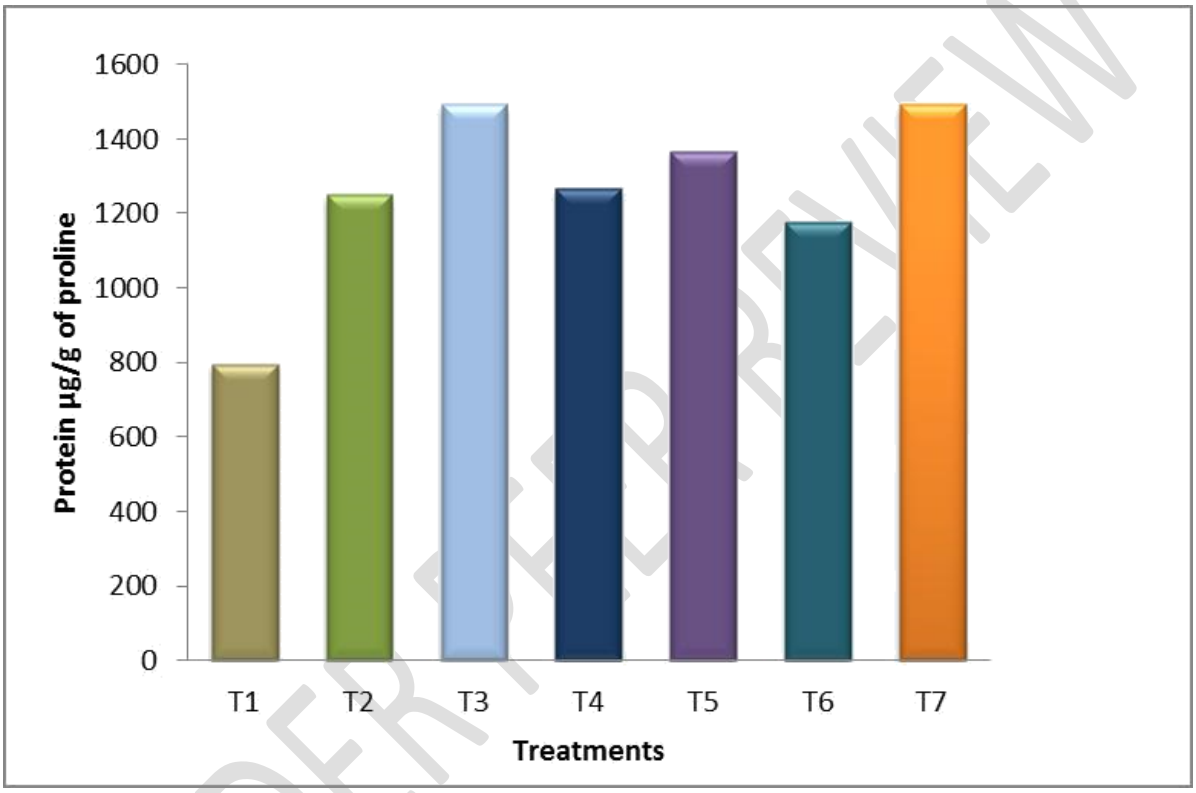

Fig. 1 Effect of organic nutrient source (jeevamrutham) on (µg/100 g) of Fenugreek plant leaf protein content

Table 1. Effect of organic nutrient source (Jeevamruth) on Fenugreek plant leaf Chlorophyll content

Treatment	Chlorophyll A	Chlorophyll B	Total
T_1 - Control	0.5441	0.3619	1.3423
T_2 - Jeevamruth @ 3% Spray(Green gram)	1.5854	0.3228	1.474
T_3 - Jeevamruth @ 5 % Spray(Green gram)	2.3765	0.1045	2.854
T_4 - Jeevamruth @ 3 % Spray(Black gram)	1.4663	0.6776	1.795
T_5 - Jeevamruth @ 5 % Spray(Black gram)	1.7760	0.3338	2.352
T_6 - Jeevamruth @ 3 % Spray(Green gram + Black gram)	1.3977	0.3179	1.911
T_7 - Jeevamruth @ 5 % Spray(Green gram + Black gram)	1.5778	0.4441	2.453
SEd	**0.0913**	**0.021**	**0.1182**
CD (P = 0.05)	**0.199**	**0.0458**	**0.2575**

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Fig 2. Experimental field view