

## Original Research Article

# Performance of Sunflower under Ecofriendly Low Cost Input Technology

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## ABSTRACT

The indiscriminate use of agrochemicals since green revaluations resulted in adverse effect on the soil fertility, crop productivity, quality of produce and more specifically on the environmental system. The current scenario under such situations firmly emphasizes the need to adopt eco-friendly agricultural practices for food production by considering the sustainability of soil and environment. Looking into the importance of organic inputs, an experiment was conducted during 2013 and 2014 to know effect of foliar spray of nutrients on growth and yield of sunflower. Pooled data for two years indicated that, foliar spray of cow urine @ 5 % at 30 and 45 DAS recorded significantly higher grain yield (1593 kg ha<sup>-1</sup>) as compared to control (1350 kg ha<sup>-1</sup>) and foliar spray of butter milk at 5 % (1472 kg ha<sup>-1</sup>) but on par with rest of the treatments. As far the economics is concern, higher net returns was realized with foliar spray of cow urine (31618 ha<sup>-1</sup>) followed by foliar spray of Jeevamruth @ 5% (31072 ha<sup>-1</sup>) compared to control (23385 ha<sup>-1</sup>) and other treatments. Significantly lower percentage of powdery mildew (5.8 %) and necrosis (4.2 %) incidence was observed with foliar spray of cow urine compared to the control (12.0 % and 10.0 %, respectively).

## Keywords

Sunflower,  
Cowurine,  
Jeevamruth,  
organics, nutrients,  
foliar spray

## Introduction

Sunflower (*Helianthus annuus* L.) is an important annual vegetable oilseed crop in the world and ranks third next to groundnut and rapeseed. In Karnataka, it is grown over an area of 0.49 m ha with a production of 0.21 m t and the average productivity is 419 kg ha<sup>-1</sup> (Anon., 2001). In Karnataka, major sunflower acreage is concentrated in northern parts like Bijapur, Bellary, Gulbarga, Raichur and Dharwad districts that accounts nearly 85 per cent of total acreage. However the productivity (419 kg ha<sup>-1</sup>) of this crop is very low in these areas. One of the major reasons for low productivity is that major area is under

rained situation with injudicious and poor nutrient management practices led to harbouring diseases like sunflower necrosis which has direct influence on crop productivity. Sunflower being exhaustive oilseed crop giving good response to the applied manures and fertilizers, chemical fertilizers have had a substantial impact on yield increments in the recent past and are today an indispensable part of modern agriculture. To overcome this problem, and nutritional disorders of sunflower, application of an organic input is assuming a paramount importance for maintenance of soil health as well as productivity.

The indiscriminate use of agrochemicals since green revaluations resulted in adverse effect on the soil fertility, crop productivity, quality of produce and more specifically on the environmental system. The current scenario under such situations firmly emphasizes the need to adopt eco-friendly agricultural practices for food production by considering the sustainability of soil and environment. The use of cow urine can be considered as a low cost agricultural practice for farmers and had been extensively used in traditional agriculture in India for medicinal and agricultural purposes since Vedic period. Among different organic sources cow urine is good source of nitrogen besides it contains sulphur, phosphate, potassium, sodium, manganese, carbolic acid, iron, silicon, chlorine, salt, enzyme and hormones. It strengthens the fact that cow's urine is not a toxic effluent as 95% of its content being water, 2.5% urea and the remaining 2.5% a mixture of minerals, salts, hormones and enzymes. It is also considered as a natural disinfectant and pest repellent and forms the main component of Panchagavya, an organic crop booster prepared and sprayed by Indian farmers.

As products of ecological sanitation, urine is therefore in many ways suited for use as fertilizer as they contain essential nutrients needed for plant growth. Favourable effect of cow urine application has been reported in enhancing the productivity of different crops viz. maize, mustard and rice etc (Sunitha Choudhary *et al.*, 2017).

Use of cow urine as a single organic which can act as a growth promoter and immunity booster, has revolutionized and revitalized organic agriculture. Looking into the importance of cow urine, an experiment was conducted during 2013 and 2014 to know effect of foliar spray of nutrients on growth and yield of sunflower.

## **Materials and Methods**

The field experiment was carried out on sunflower var. RSFH 130 at Agricultural Extension Education Centre, Lingsugur during 2013- 2015 for two years. Lingsugur is situated in Northern Dry Zone (Zone-2) of Karnataka at 16° N latitude and 76° E longitude with an altitude of 499 meters above the mean sea level. The soil type was medium back soil. The experiment was laid out in a randomized block design having eight treatments replicated thrice. Treatment were includes Cow urine spray @ 5 %, Jeevamruth spray @ 5 %, Chamak spray @ 0.3 %, Butter milk spray @ 5 %, Multinutrient spray @ 0.3 %, Bio-max spray @ 0.3 % and control. These sources of nutrients were sprayed at 30 and 45 days of after sowing (DAS). The calculated quantity of nitrogen was applied in the form of urea, phosphorus in the form of diammonium phosphate and potassium in the form of muriate of potash and uniform basal dose of nitrogen with 90 kg ha<sup>-1</sup>, phosphorous with 90 kg ha<sup>-1</sup>, potassium. The observations with respect to growth, yield parameters, powdery mildew and Necrosis incidence were recorded.

## **Results and Discussion**

The experiment was conducted for two years and data were subjected to analysis and presented in Table 1-3.

### **Growth parameters**

There was no significant difference between treatments related to plant height, number of leaves per plant during the both the years and in mean. However foliar spray of jeevamrutha and 5% cow urine markedly influence on the plant height compared to control. Similar trend was also noticed with respect to number of leaves per plant. This is

mainly due to growth hormones, enzymes, vitamins present in these inputs.

### **Yield and yield parameters**

The important yield parameters viz., the head diameter and test weight were subjected to analysis indicated that foliar spray of cow urine followed by Jeevamrutha spray recorded significantly higher head diameter which were on par with micronutrient spray and biomax spray in both the years. The increase in head diameter is due to the plant growth regulators present in these treatments which influence on the meristematic tissue development. Test weight is one of the important parameter which was significantly influenced by foliar sprays of different treatments. Foliar spray of cow urine recorded significantly higher test weight as compared to control and foliar spray of butter milk but on par with spray of Jeevamrutha and foliar spray of multinutrient chamak and biomax. This may be attributed to transfer of photosynthates from source to sink due to nutrient content in these ingredients.

The sunflower grain yield was significantly influenced by foliar spray of different sources of nutrients. During 2013, the foliar spray of cow urine recorded significantly higher grain yield as compared to control, however, on par with rest of the treatments. During 2014, similar trend followed but foliar spray of butter milk recorded significantly lower grain yield next to control. The marked increase in yield due to these treatment mainly attributed to significant increase in yield parameters like test weight and head diameter. Similar findings in sunflower with foliar spray of cow urine by Manjunath *et al.*, (2009) and with panchagavya spray which content cow urine were observed in *Arachis hypogaea*

(Subramaniyan, 2005) and *Abelmoschus esculentus* (L.) Moench (Rajesh and Jayakumar, 201). Cow urine plays a pivotal role in boosting the crop productivity by releasing essential nutrients, hormones, enzymes. Cow urine contains many beneficial elements, that is, chemical properties, potentialities, and constituents which help in removing all the ill effects and imbalances of body caused by infectious agents. Cow urine contains 95% water, 2.5% urea, and the remaining 2.5% a mixture of salts, hormones, enzymes, and minerals (Arunkumar *et al.*, 2010).

### **Effect on diseases**

Powdery mildew and necrosis diseases affecting growth and yield of sunflower. Foliar spray of organic play a significant role in suppressing the disease incidence. Among these, foliar sprays of cow urine showed significantly lower incidence of powdery mildew as compared to control. This may be attributed to ability of cow urine against the infection and spread of powdery mildew spores, upon spray development of host resistance play vital role in spread of necrosis disease. The powdery mildew incidence 10.8% noticed in control and cow urine noticed 6.7% with good disease reductions. The necrosis 6.1% noticed in cow urine treatment compared to control 9.6%. Cow urine has antifungal activities and the inhibitory activity can be used in the control of fungi (Savitha *et al.*, 2015, Sathasivam *et al.*, 2010 and Rakesh *et al.*, 2013). Upperi *et al.*, (2009) found similar results that is The cow urine sprayed sunflower plot recorded low incidence of 2.0% of powdery mildew and 2.60% of necrosis, with high seed weight (4.32 g/100 seeds) and highest yield of 1545 kg/ha when compared to control plot had high powdery mildew incidence (6.0%) and necrosis disease (12.34%).

**Table.1** Growth and yield parameters of sunflower as influenced by different nutrients

Tr No	Treatments	Plant height (cm)			No of leaves / plant			Head diameter (cm)			1000 seed wt (g)		
		2013	2014	P	2013	2014	P	2013	2014	P	2013	2014	P
T1	Control	82.7	80.7	81.7	21	22	22	10.7	10.2	10.4	30.7	31.1	30.9
T2	Cow urine spray 5 %	82.6	82.5	82.5	21	23	22	11.1	11.2	11.2	33.5	33.1	33.3
T3	Jeevamrith spray 5 %	82.2	83.3	82.7	21	24	23	11.3	11.4	11.4	33.2	32.5	32.8
T4	Chamak spray 0.3 %	80.0	79.3	79.6	22	23	22	10.7	10.8	10.7	33.6	31.5	32.6
T5	Butter milk spray 5 %	82.8	80.3	81.6	22	23	23	10.5	9.5	10.0	32.1	30.9	31.5
T6	Multinutrient spray 0.3 %	80.5	79.9	66.8	21	22	18	11.5	11.3	11.4	32.5	32.5	32.5
T7	Bio-max spray 0.3 %	83.2	82.1	68.9	21	22	21	11.4	11.3	11.4	32.9	31.9	32.4
SEm+/-		0.8	1.2	6.6	0.7	0.5	1.3	0.2	0.2	0.2	0.5	0.4	0.3
CD at 5%		NS	NS	NS	NS	NS	NS	0.7	0.5	0.5	1.6	1.2	0.9

**Table.2** Disease scoring in sunflower as influenced by different sources of nutrients

Tr No	Treatments	Powdery mildew %			Necrosis %		
		2013	2014	Pooled	2013	2014	Pooled
T1	Control	10.3	11.2	10.8	8.2	11.1	9.6
T2	Cow urine spray 5 %	6.7	6.1	6.4	5.7	6.4	6.1
T3	Jeevamrith spray 5 %	6.7	6.3	6.5	5.6	7.1	6.4
T4	Chamak spray 0.3 %	6.9	6.9	7.0	5.8	7.6	6.7
T5	Butter milk spray 5 %	6.3	5.9	6.1	5.7	8.7	7.2
T6	Multinutrient spray 0.3 %	7.7	7.8	7.7	6.3	8.3	7.3
T7	Bio-max spray 0.3 %	7.7	7.7	7.7	6.7	8.2	7.4
SEm+/-		0.3	0.3	0.2	0.3	0.3	0.2
CD at 5%		0.9	0.8	0.7	0.8	1.0	0.6

This is due to the nutrient composition of cow urine which has toxic inhibitory action against fungal growth and multiplication and at the same time it has supplied the required nutrients during different stages of crop growth.

**Economics**

As far the economics is concern, higher net returns was realized with foliar spray of cow urine (31618 ha<sup>-1</sup>) followed by foliar spray of Jeevamruth @ 5% (31072 ha<sup>-1</sup>) compared to control (23385 ha<sup>-1</sup>) and other treatments.

There was Rs.8648 higher income was obtained due to foliar spray of cowurine compared to control.

Recent day’s organic farming gaining importance with respect to crop production and crop protection. Adoption of low cost production technology need of the hour so among the organics cow urine plays a vital role in boosting the crop production by reducing the incidence of powdery mildew and necrosis disease in sunflower hence higher net returns obtained due to low cost organic input use for sustainable agriculture. Foliar feeding of nutrients generally is more effective, less costly and also improves nutrient use efficiency and lower environmental pollution through reducing the amount of fertilizers added to soil. On the other hand, foliar feeding of a nutrient may actually promote root absorption of the same nutrient or other nutrients through

improving root growth and increasing nutrients uptake.

Therefore the use of cow urine provides better alternative to synthetic chemicals which are expensive and pose potential danger to the farmers, marketers, consumers, and environment.

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