

Efficacy of Different Organic Sources in Combination with Chemical Fertilizer on Growth and Yield Attributes of Sunflower

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ABSTRACT

Field experiment was conducted at Experimental Farm, Annamalai University during the season of January – April 2013 to determine the efficacy of different organic sources in combination with chemical fertilizer on growth and yield attributes of sunflower. The field experiment was raised in a randomized block design with replicated thrice and consists of ten treatments with 5 × 4 m of plot size. Application of recommended dose of fertilizer (60:90:60 kg of NPK ha⁻¹) along with vermicompost @ 5 t ha⁻¹ and combination with foliar application of MnSO₄ @ 0.5% on 40 and 60 DAS recorded the highest plant height, leaf area index and dry matter production under growth attributes. The yield attributes of total number of seeds capitulum⁻¹, number of filled seeds capitulum⁻¹ and seed yield (kg ha⁻¹) has recorded with highest values in above said treatment combination.

Key words: Poultry manure, Foliar fertilization, Chemical fertilizer, Growth and Yield attributes.

INTRODUCTION

Sunflower (*Helianthus annuus* L.) holds great promise as an oilseed crop because of its short duration, photo in sensitivity and wide adaptability to different agro climatic regions and soil types. Sunflower oil is a rich source of linoleic acid (64 per cent) which is good for heart patients. The oil is also used for manufacturing hydrogenated oil. Sunflower can play an important role in meeting out the shortage of edible oil in the country. In India, the area under oilseed crop is 0.55 million ha with

production of 0.42 metric tonnes and productivity is 753 kg ha⁻¹. The area under sunflower crop is world is 18.12 million hectares and production is 22.03 metric tonnes with the productivity of 1216 kg ha⁻¹. The lower productivity of sunflower is mainly due to lack of high yielding varieties and cultivation on marginal lands with inadequate nutrients leads to poor seed setting and also continuous use of inorganic fertilizer deteriorates soil health and also which makes unproductive for next season.

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Imbalanced fertilizer application, accelerated soil loss and exclusion of organic sources combined with over use of nitrogen aggregate the problems of secondary and micronutrients deficiencies besides adversely affecting the soil biota. The cheaply available and renewable inputs such as FYM, vermicompost, poultry manure and biofertilizer will encourage locally available resources in place of costly and high energy requiring industrial inputs thereby solving waste management problems.

Considering many deterrents organic matter may have desirable characteristics, which influence the physical, chemical and biological properties of the soil⁴. Farmyard manure is the most commonly used organic manures. It supplies macro and micro nutrients apart from improving physical conditions of the soil².

MATERIAL AND METHODS

The field investigation was laid out in a randomized block design with three replications during the crop season of January – April 2013 at Annamalai University Experimental Farm with organic and inorganic sources and its combinations with three replications. The organic sources consists of control (T₁). The experiment consisted of the different treatments with three replications. The treatment schedule were T₁ – Control, T₂ – Recommended dose of fertilizer (60:90:60 kg NPK ha⁻¹), T₃ – RDF + FYM @ 750 kg ha⁻¹, T₄ – RDF + Vermicompost @ 5 t ha⁻¹, T₅ – RDF + Poultry manure @ 5 t ha⁻¹, T₆ – RDF + Azospirillum seed inoculation @ 600 g ha⁻¹, T₇

– RDF + FYM @ 750 kg ha⁻¹ + Foliar application of MnSO₄ @ 0.5% on 40 and 60 DAS, T₈ – RDF + Vermicompost @ 5 t ha⁻¹ + Foliar application of MnSO₄ @ 0.5% on 40 and 60 DAS, T₉ – RDF + PM @ 5 t ha⁻¹ + Foliar application of MnSO₄ @ 0.5% on 40 and 60 DAS, T₁₀ – RDF + Azospirillum seed inoculation @ 600 g ha⁻¹ + Foliar application of MnSO₄ @ 0.5% on 40 and 60 DAS.

The organic and inorganic sources were applied as recommended dose as mentioned in treatment schedule. The soil was clay loam, having pH 6.9 and EC 0.42 sunflower hybrid sunbred was sown at a spacing of 60 × 30 cm with a 5 × 4 m plot size. Biometric observations were taken up according to different growth stages. The crop was raised as per package of practices recommendation.

RESULTS AND DISCUSSION

The growth and yield attributes of sunflower was observed with combined inoculation of *Azospirillum* with recommended dose of fertilizer along with vermicompost and foliar application of MnSO₄ (Table 1). This might be due to the fact that vermicompost offer a balanced nutritional release pattern to plants, providing nutrients such as available N, soluble K, exchangeable Ca, Mg and P that can be taken readily by plants and greater microbial diversity. Also the availability of the essential micronutrients viz., manganese and sulphur in the treatment. The findings of the present study are in line with the earlier reports of Blaise and Prasad¹, Radakrishnan³ and Tejaswara rao *et al*⁵.

Table 1: Effect of organic sources with inorganic fertilizers on the growth components of sunflower

Treatment details	Plant height (cm)	Leaf area index	Dry matter production
T ₁	101.4	2.9	2096
T ₂	113.9	3.6	2416
T ₃	156.0	4.8	3874
T ₄	156.3	4.8	4069
T ₅	142.0	4.4	3304
T ₆	127.7	4.0	2736
T ₇	156.2	4.8	3918
T ₈	169.0	5.2	4663
T ₉	143.1	4.4	3402
T ₁₀	129.2	4.0	2747
S.Ed.	5.95	0.18	157.08
CD (P=0.05)	11.90	0.36	314.16

Table 2: Effect of organic sources with inorganic fertilizers on yield attributes of sunflower

Treatment details	Total number of seeds capitulum ⁻¹	No. of filled seeds capitulum ⁻¹	Seed yield (kg ha ⁻¹)
T ₁	475.0	230.5	873
T ₂	548.2	325.3	1011
T ₃	953.3	828.7	1814
T ₄	964.3	852.6	1847
T ₅	867.3	745.1	1558
T ₆	775.4	584.3	1372
T ₇	959.0	838.8	1828
T ₈	1045.9	930.6	2195
T ₉	881.0	769.8	1655
T ₁₀	776.7	614.7	1404
S.Ed.	35.45	29.02	68.13
CD (P=0.05)	70.90	58.04	136.26

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