



Study on growth and yield of drip irrigated sunflower

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Abstract

Field experiment was conducted in a farmer's field at Kovakkulam village in Karur (Dt) to evolve the study on weed management in drip irrigated sunflower during February-May (2019). The experiment was laid out RBD with replicated thrice with eight treatments like Unweeded control, combination of hand weeding mulching with organic residues like paddy straw, sugarcane trash and pre-emergence herbicides like pendimethalin 30% EC and alachlor 50% EC. Among these combination of weed control treatments, pre-emergence application of pendimethalin 30% EC @ 2.5 l ha⁻¹ on 3 DAS + Mulching with sugarcane trash 10 DAS was recording higher values of growth and yield components such as plant height, LAI, DMP, head diameter, number of seed capitulum⁻¹, oil content, seed yield (1932 kg ha⁻¹) etc. Unweeded control recorded the highest weed counts and weed biomass resulting in very low seed yield (610 kg ha⁻¹).

Keywords: paddy straw, sugarcane trash and pre-emergence herbicides

Introduction

Sunflower (*Helianthus annuus* L.), is one of the important oilseed crops in India and contributed to rapid growth in oil production in India. Sunflower is the latest addition to the list of major edible oilseed crops in importance after Soybean, Groundnut, Rapeseed and Mustard at the national and international level. Sunflower is the oil of preference among the consumers worldwide to its health appeal and in India too, sunflower oil is the largest selling oil in the branded oil segment. It is also a crop of choice for farmers due to its wider adaptability, high yield potential, shorter duration, and profitability (Narender *et al* 2017) [1]. USDA estimates that the world sunflower production in 2020-2021 will be 54.97 million metric tonnes. Sunflower production around last year was 54.97 million metric tonnes. This year's estimated 56.69 million tonnes could represent an increase of 1.72 million metric tonnes or 3.13 per cent in sunflower production around the globe. The major sunflower growing countries are Ukraine, Russia, the European Union, Argentina, and China. In India, the sunflower is cultivated around 430 thousand ha, with a production of 350 thousand metric tonnes in 2018- 2019. The area under sunflower in Tamilnadu is about 6749 ha with a total production of 5993 tonnes and total productivity is about 888 kg ha⁻¹ Karur, Thoothukudi, Trichy, Dindugal, Virudhunagar districts account for 81 per cent area and 79 per cent production of Tamilnadu. Sunflower seedlings are poor competitors to weeds, and young plants are easily damaged by mechanical cultivation. Timely weeding is not feasible due to paucity and high cost of labour or unfavorable soil conditions, chemical weed control through pre or post emergence herbicides may be preferred for better weed management across the crop growth period.. Although herbicides are fast replacing the traditional methods, hand weeding in India is still adopted by farmers as an effective

method of weed control. Mulches prevent soil erosion, reduces evaporation, increase infiltration, keeps down weeds, improves soil structure, and eventually increasing crop yields.

Materials and Method

The field experiment was conducted in a farmer's field at Kovakkulam village in Karur district from February – May, 2019 to study on weed management practices in drip-irrigated sunflower hybrid [TNAU Sunflower hybrid (CO2)] with spacing of 60x30cm. The experimental farm is situated at 10.96° North Latitude, 78.08° East Longitude with an altitude of 126 m above mean sea level. The soil of the experimental field is sandy clayey loam in texture. The nutrient status of the experimental soil was low in available nitrogen, Medium in available Phosphorus, Medium in available potassium. Sugarcane trash and paddy straw obtained from the experimental farm were used as mulching materials. The experiment was laid out in a randomized block design with three replication. Drip irrigation system were adopted in experimental farm.

Result and Discussion

Among the weed control treatments, pre-emergence application of pendimethalin 30% EC @ 2.5 l ha⁻¹ on 3 DAS + Mulching with sugarcane trash on 10 DAS was effective and better control of weeds during the crop growth period, it favored better nutrient uptake and growth by the crops due to application of herbicide and cultural practices resulting in reduced crop and weed competition and creating a good environment for better growth of the plant which gave maximum growth and yield (Sootrakar *et al.*, 1995) [5]. Pre-emergence application of pendimethalin 30 % EC @ 2.5 l ha⁻¹ on 3 DAS + Mulching with sugarcane trash on 10 DAS recorded bigger capitulum with more seeds capitulum⁻¹ and

test weight of sunflower. This might be due to reduced weed density and biomass of all categories of weeds during the critical period of crop weed competition thus resulting in better translocation of assimilates from source to sink during the post-anthesis period (Sumathi *et al.*, 2010) [6].

Pre-emergence application of pendimethalin 30 % EC @ 2.5 l ha⁻¹ on 3 DAS + Mulching with sugarcane trash on 10 DAS recorded higher seed yield (1932 kg ha⁻¹) and stalk yield. This might be due to the early application of broad-spectrum selective herbicide which controlled the weeds and increased the seed yield of sunflower. These findings are under those of Jat and Giri (2000) [2]. This treatment was

followed by pre-emergence application of alachlor 50% EC @ 2.5 l ha⁻¹ on 3 DAS + Mulching with sugarcane trash on 10 DAS recorded the higher growth, yield parameters, and seed yield. This treatment was on pair with twice hand weeding on 15 and 30 DAS recorded the higher growth, yield parameter, and seed yield. Unweeded control resulted in lower seed yield (610 kg ha⁻¹) and yield attributes due to stiff and continuous weed competition from the germination of crops throughout its growing period. Bedmar *et al.* (1989) [1] and Nayak *et al.* (2000) [4] obtained a reduction in seed number capitulum⁻¹ with unweeded control.

Table 1: Effect of different weed management practices on growth and yield parameters in drip irrigated sunflower.

Treatments	Plant height(cm)	LAI	Total no of seeds head ⁻¹	DMP (kg ha ⁻¹)
T ₁ -Unweeded control.	66.54	1.71	495	1650
T ₂ -Hand weeding twice on 15 and 30 DAS	141.07	3.48	842	4449
T ₃ -Mulching with paddy straw (10DAS) + One hand weeding on 30 DAS.	91.25	2.53	574	3135
T ₄ -Mulching with sugarcane trash (10 DAS) + One hand weeding on 30 DAS.	105.23	2.79	633	3470
T ₅ -Pre-emergence application of alachlor 50% EC @ 2.5 l ha ⁻¹ on 3 DAS+ Mulching with paddy straw (10 DAS).	120.62	3.03	706	3791
T ₆ -Pre-emergence application of alachlor 50% EC @ 2.5 l ha ⁻¹ on 3 DAS + Mulching with sugarcane trash (10 DAS).	143.91	3.58	855	4452
T ₇ -Pre-emergence application of pendimethalin 30% EC @ 2.5 litre ha ⁻¹ on 3DAS + Mulching with paddy straw (10 DAS).	131.64	3.23	782	4118
T ₈ -Pre-emergence application of pendimethalin 30% EC @ 2.5 litre ha ⁻¹ on 3 DAS + Mulching with sugarcane trash (10 DAS).	155.62	3.79	910	4776
S.Ed CD(p=0.5)	2.34 5.026	0.05 0.125	13.67 29.33	75.56 162.09

Table 2: Effect of different weed management practices on Seed yield and stalk yield (kg ha⁻¹) in drip irrigated sunflower

Treatments	Seed yield (kg ha ⁻¹)	Stalk yield (kg ha ⁻¹)
T ₁ -Unweeded control.	610	1498
T ₂ -Hand weeding twice on 15 and 30 DAS	1760	3650
T ₃ -Mulching with paddy straw (10DAS) + One hand weeding on 30 DAS.	1130	1927
T ₄ -Mulching with sugarcane trash (10 DAS) + One hand weeding on 30 DAS.	1278	2496
T ₅ -Pre-emergence application of alachlor 50% EC @ 2.5 l ha ⁻¹ on 3 DAS+ Mulching with paddy straw (10 DAS).	1417	2846
T ₆ -Pre-emergence application of alachlor 50% EC @ 2.5 l ha ⁻¹ on 3 DAS + Mulching with sugarcane trash (10 DAS).	1765	3700
T ₇ -Pre-emergence application of pendimethalin 30% EC @ 2.5 litre ha ⁻¹ on 3DAS + Mulching with paddy straw (10 DAS).	1533	3305
T ₈ -Pre-emergence application of pendimethalin 30% EC @ 2.5 litre ha ⁻¹ on 3 DAS + Mulching with sugarcane trash (10 DAS).	1932	4150
S.Ed CD(p=0.05)	28.54 61.232	58.31 125.08

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