Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 2110-2116

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7692 **Special Issue-6 pp. 2110-2116**
Journal homepage: http://www.ijcmas.com

Original Research Article

Effect of Weed Management Practices on Nutrient Uptake by Weed and Sunflower in Summer Season

P.N. Chirde, S.S. Thakare, J.P. Deshmukh and P.V. Shingrup

Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra 444104, India
**Corresponding author*

A B S T R A C T

A field investigation was carried out at Department of Agronomy farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the summer season of 2014. Among the different herbicides Fluazifop-p-butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 Kg a.i./ha (Tank mix) recorded lowest weed density (36.05/m^2), weed dry matter (30.59 g/m^2), weed index (10.78%) and maximum weed control efficiency (64.36%) and significantly improved the seed yield (1101 kg/ha) and straw yield (4082 kg/ha). The significantly higher weed growth at all stages of crop growth recorded in weedy check plot which was indicated lower weed control efficiency and higher weed index. Among the different weed control measures weedy check recorded significantly higher N (13.91 kg/ha), P (2.15 kg/ha) and K (11.24 kg/ha) uptake by weed. The herbicidal treatment Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha (Tank mix) recorded lower value of nutrient uptake N (4.83 kg/ha), P (0.67 kg/ha), K (3.88 kg/ha) by weeds than rest of herbicidal treatments. Whereas significantly higher nutrients uptake by crop plants N (43.55 kg/ha), P_2O_5 (18.63 kg/ha) and K_2O (58.39 Kg/ha) recorded in treatment Fluazifop-p-butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 Kg a.i./ha (Tank mix) .

Keywords

Herbicides, Sunflower, Weed control

Introduction

Sunflower (*Helianthus annuus*) is a native of North America. Sunflower is an important oilseed crop of the temperate countries like Russia, Canada and Rumania etc. In ancient times sunflower was grown as an ornamental plant. Now it is mainly grown as oilseed crop because of its high oil content.

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. It contributes 8 per cent towards the total edible oil production in the country behind Soybean 21%, Groundnut 14% and Rapeseed mustard 13% (Hegde, 2005). Weeds compete with the crop plants for essentials of growth i.e. water, plant nutrients, space and light, thus, adversely affect crop production if they are not controlled at the right time. The degree of yield losses depends on a number of factors such as weed flora, weed intensity, cultural practices, input used and weather factors. Unchecked weeds cause 33 to 63 % losses in seed yield of sunflower (Saraswat *et al*., 2003).

Hand weeding is traditional and effective method of weed control, but untimely and continuous rains as well as unavailability of labour during peak period of demand are the main limitations of manual weeding. Therefore, need was felt to explore the possibility of pre and post emergences herbicides for effective control of weed. Pre and post emergence weed control method is becoming popular and regarded potentially as one of the most labour saving innovation in modern agriculture. Spraying of pre-emergence herbicides helps to minimize the crop weed competition during such critical growth stages resulting in higher crop yields. In sunflower there are few pre-emergence herbicides like pendimethalin which is well adopted by farmers.

Recently some new selective post-emergence herbicides like Fluazifop-p-butyl and Quizalofop ethyl have been developed for control weeds with no damage to sunflower crop.

Materials and Methods

The present investigation was carried out at Farm of Agronomy Department, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. During *summer* season of 2014. The soil of experiment field was characterized as clay loam in texture, having slightly alkaline pH (7.8), moderate organic carbon status (0.40%), low nitrogen content (224.27 kg/ha), medium available phosphorus content (17.86 kg/ha) and high potassium status (384.25 kg/ha). The experiment was laid out in randomized block design with seven treatment replicated thrice. The treatment comprised of Weed free (T_1), Weedy check (T_2), Mahna-04 @ 2.5 kg/ha PE (T_3), Pendimethalin 1.0 Kg a.i./ha PE (T_4), Fluazifop-p- butyl @ 0.125 kg a.i/ha PoE 15 DAS (T_5), Quizalofop ethyl @ 0.075 kg a.i./ha PoE 15 DAS (T_6) and Fluazifop-p-butyl @ 0.125 kg a.i/ha + Quizalofop ethyl @0.075 kg a.i/ha PoE 15 DAS (Tank Mix) (T_7). The gross and net plot size were 3.6 m x 4.2 m and 2.4 m x3.6 m. Sunflower (TAS-82) was sown on 24th February 2014 at 60 x 30 cm^2 spacing and a fertilizer dose of 60:60:00 NPK kg/ha. The observation were recorded on weed count, weed control efficiency and weed index. Weed control efficiency (%) and Weed index were calculated as per standard formula. The weed count recorded from 1 m^2 area from each plot at 20, 40, 60, 80 DAS and at harvest. Uptake of N, P and K by weeds, seed and straw was obtained by multiplying their nutrient content with corresponding dry matter. Total uptake by crop was obtained by adding the uptake by seed and straw.

Results and Discussion

Weed flora

In the experiment field, predominant weed flora were *Chenopodium album*, *Portulaca oleracea*, *Tridax procumbens*, *Lagasca mollis*, *Euphorbia hirta*, *Euphorbia geniculata*, *Alternanathera triandra*, *Parthenium hysterophorus*, *Digera arvensis*, *Argemone Mexicana*, *Phyllanthus niruri*, among the dicot weed, and *Cynodon dactylon*, *Cyperus rotundus*, *Eleusine indica* among the monocot.

Weed population

The weed density/m^2 at harvest stage was significantly lowest in Weed free. Among the herbicidal treatment application of Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 Kg a.i./ha (Tank mix) showed its superiority in lowering down the weed population over Quizalofop ethyl @ 0.075 kg a.i./ha , Fluazifop-p-butyl @ 0.125 kg a.i./ha , Pendimethalin @ 1 kg a.i./ha and Mahna-04 @ 2.5 kg/ha , among

these treatments, Quizalofop ethyl @ 0.075 kg a.i./ha , Fluazifop-p-butyl @ 0.125 kg a.i./ha and Pendimethalin @ 1 kg a.i./ha were found statistically comparable with each other. The treatment weedy check recorded maximum number of total weeds at the harvest stages of crop. These results are in agreement with the results reported by Damalas (2004) and Parmar *et al.,* (2014).

Weed dry matter accumulation

The different herbicidal treatment applied, in which tank mix application of Fluazifop-p-butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 Kg a.i./ha recorded significantly minimum weed dry weight and it was followed by pendimethalin @ 1kg a.i./ha, Quizalofop ethyl @ 0.075 kg a.i./ha, Fluazifop-p-butyl @ 0.125 kg a.i./ha but these were statistically at par with each other. This might be due to combination of both herbicides that have longer effect on controlling weed population and brought significant reduction in weed dry matter as compared to weedy check. These results are in agreement with the results reported by Nayak *et al.,* (2000), Smita Prachand (2013).

Weed control efficiency (%)

Among the various herbicidal treatments Fluazifop-p-butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 Kg a.i./ha (Tank mix) recorded maximum weed control efficiency at harvest (64.36%) followed by treatments Fluazifop-p-butyl @ 0.125 kg a.i./ha (57.88%), Quizalofop ethyl @ 0.075 kg a.i./ha (57.09%), Pendimethalin 1.0 kg a.i./ha (56.83%). This might be due to combination of both herbicides that have longer effect on controlling the weed population and thereby increasing weed control efficiency. These results are in agreement to the finding of Nayak *et al.,* (2000), Kurchania *et al.,* (2001) and Channappagoudar *et al.,* (2008).

Weed index (%)

The herbicidal treatment tank mix application of herbicide Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha recorded minimum weed index (10.78 %). It was followed by Pendimethalin @ 1 kg a.i./ha (17.50 %), Quizalofop ethyl @ 0.075 kg a.i./ha (24.80 %), Fluazifop-p-butyl @ 0.125 kg a.i./ha (25.93 %), Mahna-04 @ 2.5 kg/ha (35.81%).

The weed free treatment recorded the lowest weed index (0%), indicating that there was no reduction in seed yield in this treatment due to less weed infestation. The highest weed index (60.37%) was recorded in weedy check as result of uncontrolled weed growth which leads to higher competition with the crop. The similar results were reported by Legha *et al.,* (1992).

Yield

The treatment Weed free produced significantly higher sunflower seed and straw yield (1234 kg/ha and 4234 kg/ha) as compared to other treatments but remain at par with treatments Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha (Tank mix) (1101 kg/ha and 4082 kg/ha).

The treatment Weedy check recorded minimum sunflower seed and straw yield (489 kg/ha and 2087 kg/ha). Different weed management practices significantly improved the seed yield over weedy check. This might be due to the better weed control associated with decrease in weed population, which resulted in better utilisation of soil nutrients and improvement in yield contributing characters in these treatments. Similar results were reported by Kumara *et al.,* (2003), Yatang (2007) and Channappagoudar *et al.,* (2008) (Table 1 and 2).

Table.1 Effect of different weed control treatments on weed count, weed dry biomass, weed control efficiency, seed and straw yield of sunflower

Treatments	Weed count/m^2at harvest			Weed dry matter at harvest (g/m^2)	Weed control efficiency (%)	Weed index (%)	Seed yield kg/ha	Straw yield (kg/ha)
	Monocot	Dicot	Total					
T_1 – Weed free	1.87 (3.00)	1.58 (2.00)	2.34 (4.99)	1.43	98.33	-	1234	4234
T_2 – Weedy check	7.27 (52.35)	5.46 (29.31)	9.06 (81.66)	85.83	-	60.37	489	2087
T_3 - Mahna-04 @ 2.5 kg/ha	5.84 (33.61)	4.70 (21.59)	7.46 (55.20)	44.55	48.09	35.81	792	3115
T_4 - Pendimethalin @ 1 kg a.i./ha PE	5.11 (25.61)	4.60 (20.66)	6.84 (46.27)	37.05	56.83	17.50	960	3679
T_5 - Fluazifop-p- butyl @ 0.125 kg a.i./ha PoE 15 DAS	4.88 (23.31)	4.71 (21.68)	6.72 (45.00)	36.15	57.88	25.93	914	3557
T_6 - Quizalofop ethyl @ 0.075 kg a.i./ha PoE 15 DAS	4.72 (21.78)	4.75 (22.06)	6.66 (43.84)	36.83	57.09	24.80	928	3572
T_7 -Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha PoE 15 DAS (Tank mix)	4.11 (16.39)	4.49 (19.66)	6.05 (36.05)	30.59	64.36	10.78	1101	4082
S.E(m)±	0.06	0.09	0.08	1.21	-	-	45.60	96.00
C.D. at 5%	0.18	0.27	0.24	3.72	-	-	137	297
GM	1.87 (3.00)	1.58 (2.00)	2.34 (4.99)	1.43	-	-	917	3475

DAS-Days after sowing, PE-Pre-emergence, PoE- Post-emergence

Table.2 Effect of weed management practices on NPK Uptake by weeds (kg/ha) and crop

Treatment	NPK uptake by weed kg/ha			Total NPK uptake by sunflower kg/ha		
	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)
T_1 – Weed free	0.22	0.03	0.18	48.13	20.41	62.49
T_2 – Weedy check	13.91	2.15	11.24	19.88	8.33	27.44
T_3 - Mahna-04 @ 2.5 kg/ha	7.04	1.07	5.75	31.35	13.16	42.34
T_4 - Pendimethalin @ 1 kg a.i./ha PE	5.74	0.82	4.66	38.49	16.14	51.93
T_5 - Fluazifop-p- butyl @ 0.125 kg a.i./ha PoE 15 DAS	5.82	0.83	4.74	36.55	15.17	49.62
T_6 - Quizalofop ethyl @ 0.075 kg a.i./ha PoE 15 DAS	5.86	0.85	4.71	36.81	15.65	50.02
T_7 -Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha PoE 15 DAS (Tank mix)	4.83	0.67	3.88	43.55	18.63	58.39
S.E(m)±	0.19	0.03	0.16	1.01	0.40	1.29
C.D. at 5%	0.59	0.09	0.48	3.10	1.24	3.97

NPK uptake by weed

Among the different weed control measures Weedy check recorded significantly higher N (13.91 kg/ha), P (2.15 kg/ha) and K (11.24 kg/ha) uptake by weed. The minimum depletion of N (4.83 kg/ha), P (0.67 kg/ha), K (3.88 kg/ha) was recorded with the herbicidal treatment Fluazifop-p-butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha than rest of herbicidal treatments followed by treatment Pendimethalin @ 1.0 kg a.i./ha, Quizalofop ethyl @ 0.075 kg a.i./ha and Fluazifop-p-butyl @ 0.125 kg a.i./ha . This was mainly due to heavy infestation of weeds which took up enormous amount of NPK from soil in weedy check as nutrient uptake and which was directly governed by dry matter production of weeds, similar result noticed by Wanjari *et al.,* (2001[a]).

NPK uptake by crop

Maximum uptake of N (43.55 kg/ha), P (18.63 kg/ha), K (58.39 kg/ha) by seed and straw of sunflower was recorded in treatment Fluazifop-p- butyl @ 0.125 kg a.i./ha + Quizalofop ethyl @ 0.075 kg a.i./ha (Tank mix) over other treatment except weed free. All the herbicidal treatments recorded significantly higher total nutrient uptakes than the weedy check. The lowest value of N (19.88 kg/ha), P (8.33 kg/ha), K (27.44 kg/ha) uptake by sunflower seed and straw in weedy check. Similar were reported by Wanjari *et al.,* (2001) and Sumathi *et al.,* (2009).

References

Channappagoudar, B. B., N. R. Biradar, T. D. Bharamagoudar and C. J. Rokhade, 2008. Physiological Studies on Weed Control Efficiency of Different Herbicides in Sunflower, *Karnataka J. Agric. Sci.*, 21(2): 165-167.

Christos A. Damalas, 2004. Herbicide Tank Mixtures: Common Interactions *International Journal of Agriculture & Biology*, 06 (1)–209–212.

Hegde. D. M., 2005. Striving for self-sufficient the Hindu survey of Indian Agricultural. 2005.:58-63.

Kumara, O., N. Venugopal; S. S. Reddy and Y. K. D. Kumar, 2003. Effect of nitrogen level and weed management on yield of sunflower. *Karnataka J. Agril. Sci.,* 16(3): 454-456.

Kurchania, S.P., Rathi, G.S., Bhalla, C.S. and R.Mathew, 2001. Bioeffficacy of post-emergence Herbicides for weed control in soybean (*Glycine ma*x L.). *Indian J.Weed.Sci*.33 (1&2): 34-37.

Legha P. K, Malik R. K and Faroda A. S. 1992. Weed management in *Kharif* sunflower (*Helianthus annuus* L.). *Crop Research* **5**(2): 376-379.

Nayak, M. P., M. D. Vyas and R. S. Mandioi, 2000. Efficacy of pedimethalin in soybean (*Glycine max*). *Indian J. Agronomy*, 45(1):167-165.

Parmar V. T., Patel J. G., Vasave J. B., 2014. Efficacy of Different Herbicides in Sunflower under South Gujarat Condition. *Trends in Biosciences*, 7(14): 1624-1629.

Saraswat, V. N., V. M. Bhan; N. T. Yaduraju, 2003. Weed control in oilseed and pulses. In weed management, Directed of information and publication of agriculture, ICAR, New Delhi. 226-228.

Smita Prachand. 2013. Integrated weed management in soybean (*Glycine max* L.*)*. M.Sc (Agri) Thesis (unpub.) submitted to Dr. P.D.K.V., Akola.

Sumathi, V., D. S. K. Rao., D. Subramanyam and D. S. Reddy. 2009. Effect of planting pattern and weed management on nutrient uptake and

economics of rabi sunflower and its associated weeds. *Ind. J. Weed Sci*. 41: 65-70.

Wanjari, R. H., N. T. Yaduraju and K. N. Ahuja, 2001. Nutrient uptake by sunflower (*Helianthus annuus* L.) and associated weeds during rainy season. *Indian J. Agronomy*. 46(3): 541-546.

Wanjari, R. H., N. T. Yaduraju and K. N. Ahuja, 2001[a]. Critical period of crop weed competition in rainy sunflower (*Helianthus annuus* L.). *Indian J. Agronomy*, 46(2): 309-313.

Yantang, D., 2007. Experiment in the control of the weeds in sunflower field with 17.5% benazolinquizalofop-p and its safety. *J. Anhui Agric. Sci*.,Vol: 33.