

EFFECT OF WEED MANAGEMENT ON GROWTH AND YIELD OF SUMMER SESAME (*Sesamum indicum* L.)

¹PATEL, C. P.; ²PATEL, D. D.; ³PATEL, T. U.; ⁴JOSHI, M. P. AND ⁵PATEL, H. N.

DEPARTMENT OF AGRONOMY
N.M. COLLEGE OF AGRICULTURE
NAVSARI AGRICULTURAL UNIVERSITY
NAVSARI-396 450, GUJARAT, INDIA

*EMAIL: ddpatel@nau.in

¹M. Sc. (Agri.) Student, N. M. College of Agriculture, Navsari Agricultural University, Navsari - 396 450

²Associate Professor, Agronomy, College of Agriculture, Navsari Agricultural University, Bharuch - 392 012

³Assistant Professor, Agronomy, College of Agriculture, Navsari Agricultural University, Bharuch - 392 012

⁴M. Sc. (Agri.) Student, N. M. College of Agriculture, Navsari Agricultural University, Navsari - 396 450

⁵Assistant Professor, Cotton Wilt Research Sub Station, Navsari Agricultural University, Hansot - 393 030

ABSTRACT

A field experiment was conducted on heavy black soil at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during the summer season of 2016. The results revealed that maximum growth and yield parameters along with profitable yield of summer sesame can be obtained by two hand weeding and interculturing at 20 and 40 DAS or pre emergence application of pendimethalin @ 0.75 kg/ha coupled with one hand weeding and interculturing at 30 DAS under south Gujarat conditions.

KEY WORDS: Economics, Growth parameter, Sesamum, Weed management,

INTRODUCTION

Sesame is an important and ancient oil-yielding crop. Oilseeds crops occupy a large area in India. It is mainly grown in tropics and subtropics. The major sesame growing districts in Gujarat are Mehsana, Banaskantha, Sabarkantha, Kheda, Amreli, Bhavnagar, Junagadh and Surendranagar. In Gujarat, sesame is cultivated in an area of about 1.41 lakh ha and producing about 63,000 MT of seeds and the average productivity of the state is 449 kg/ha (Anonymous, 2014). It is grown throughout the year i.e. during *kharif*, semi *rabi* and summer as a sole as well as mixed or inter crop. Like any other oilseeds crop, the significant scope for harnessing the total production of sesame can be achieved by increasing the area or by improving its productivity. Efficient crop management

practices which involve selection of high yielding disease and pest resistant varieties along with adoption of proper crop rotation, timely planting, adequate plant stand, balanced plant nutrition, need based plant protection, irrigation and timely weed control; all have great influence on productivity of sesame. Weed is one of the serious bottlenecks in increasing the yield because the slow initial growth of sesame and irrigations provide suitable environment for weed growth. The critical crop weed competition period in sesame is up to 40 DAS (Days after sowing). The crop is very sensitive to weed competition during the first 20-25 days. Therefore, the crop requires effective control of weeds during this period. In modern agriculture, the costly inputs applied for raising the crop are robbed away by the weeds. Integrated

approach consisting judicious combination of two or more than two suitable methods of weed control become essential to sustain the production of sesame. Keeping all these points in view, the present research work entitled “Effect of weed management on growth and yield of summer sesame (*Sesamum indicum* L.)” was conducted.

MATERIALS AND METHODS

The experiment was conducted at the College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during summer season of 2016. Navsari falls under Agro-ecological situation-III of south Gujarat heavy rainfall zone which is characterized by fairly warm summer. The investigation was carried out with sesame variety GT 3. It takes about 90-95 days to mature. The experimental soil was clay in texture, low in available nitrogen (276 kg/ha), medium in available phosphorus (40.30 kg/ha), fairly rich in available potassium (369.80 kg/ha) and slightly alkaline in reaction (pH 7.8). The crop was fertilized with 50-25-0 N-P₂O₅-K₂O kg/ha. Nitrogen was applied in two splits (as basal (50% N) and at 40 DAS (50% N)) and whole phosphorus was applied as basal only. The experiment comprising eleven treatment combinations were laid out in randomized block design and replicated three times. The treatment consisted combinations like W₁ (Pendimethalin @ 0.75 kg/ha as pre emergence), W₂ (Pendimethalin @ 0.75 kg/ha as pre emergence + hand weeding and interculturing at 30 DAS), W₃ (Imazethapyr @ 75 g/ha as post emergence at 20-25 DAS), W₄ (Imazethapyr @ 100 g/ha as post emergence at 20-25 DAS), W₅ (Pendimethalin @ 0.75 kg/ha as pre emergence + Imazethapyr @ 100 g/ha as post emergence at 20-25 DAS), W₆ (Imazethapyr @ 100 g/ha as post emergence at 20 DAS + hand weeding and interculturing at 40 DAS), W₇ (Pendimethalin @ 0.75 kg/ha as pre

emergence + Imazethapyr @ 75 g/ha as post emergence at 20-25 DAS), W₈ (Imazethapyr @ 75 g/ha as post emergence at 20 DAS + hand weeding and interculturing at 40 DAS), W₉ (Hand weeding and interculturing twice at 20-40 DAS), W₁₀ (Weed free check) and W₁₁ (Weedy check). Adequate irrigations were given to the crop as per recommendation by Navsari Agricultural University. The crop was managed as per the standard package of practices. The observations on growth parameters, yield attributes and yield were taken from the net plot. The data related to each parameter of the experiment were statistically analyzed using MSTATC software. The purpose of analysis of variance was to determine the significant effect of treatments on weed and castor. LSD test at 5 per cent probability level was applied when analysis of variance showed significant effect for treatments (Steel and Torrie, 1980). The net realization was calculated by deducting the total cost of cultivation from the gross realization for each treatment. The benefit cost ratio (BCR) was calculated on the basis of the formula given below:

BCR = Net realization (₹ /ha) / Cost of cultivation (₹ /ha)

RESULTS AND DISCUSSION

Influence on growth and yield attributes of sesamum crop

Significant differences in plant height, number of branches per plant and dry matter accumulation per plant were observed due to various weed management practices (Table 1). The plant height of sesamum crop was significantly the maximum under weed free check (W₁₀), but it was found statistically at par with treatment W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS), W₅ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 100 g / ha as post emergence at 20-25 DAS), W₇ (Pendimethalin @ 0.75 kg / ha as pre

emergence + Imazethapyr @ 75 g / ha as post emergence at 20-25 DAS) and W₉ (Hand weeding and interculturing twice at 20-40 DAS) at harvest. This might be due to lower crop weed competition in these treatments. Almost similar results were also reported by Krishnaprabhu and Kalyansundaram (2007) and Mathukia *et al.* (2015).

The treatment W₁₀ (weed free check) recorded significantly the highest number of branches per plant at harvest followed by treatments W₉ (Hand weeding and interculturing twice at 20-40 DAS) and W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS) (Table 1). The lowest number of branches per plant were noted under W₁₁ (weedy check) treatment. The treatment weed free check (W₁₀) recorded the higher dry matter accumulation per plant (Table 1), but it was statistically found at par with treatments W₉ (Hand weeding and interculturing twice at 20-40 DAS) and W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS) at harvest. The lowest dry matter accumulation per plant was found in treatment W₁₁ (weedy check). Such increases in dry matter accumulation per plant might be due to effective control of weeds under these treatments which reduced the crop weed competition facilitating sufficient space, nutrient, moisture and light for better growth of crop. Baskaran and Solaimalai (2002) reported similar results for sesamum crop.

Various yield attributes viz., number of capsules per plant, number of seeds per capsule, length of capsule, seed weight per plant and test weight play a vital role in increasing the productivity of sesamum crop. The treatment weed free check (W₁₀) recorded significantly the higher number of capsules per plant (34.30) and number of seeds per capsule (58.87) and treatments W₂ (Pendimethalin @ 0.75 kg/ha + hand

weeding and interculturing at 30 DAS), W₅ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 100 g / ha as post emergence at 20-25 DAS), W₆ (Imazethapyr @ 100 g / ha as a post emergence at 20 DAS + hand weeding and interculturing at 40 DAS), W₇ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 75 g / ha as post emergence at 20-25 DAS) and W₉ (Hand weeding and interculturing twice at 20-40 DAS) were remained at par in case of number of capsules per plant, while treatments W₁, W₂, W₅, W₆, W₇, W₈ and W₉ were remained at par for number of seeds per capsule. Treatment W₁₁ (weedy check) recorded the minimum number of capsules per plant (16.62) and number of seeds per capsule (48.95). W₉ (Hand weeding and interculturing twice at 20-40 DAS), W₂ (Pendimethalin @ 0.75 kg/ha+ hand weeding and interculturing at 30 DAS) and W₅ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 100 g / ha as post emergence at 20-25 DAS) had controlled weed effectively, and thus reduced the competition by weeds to a greater extent and thus helped in better growth and development of sesamum crop, resulting in higher value of above yield attributing characters. Similar results were reported by Sootrakar *et al.* (1995), Narkhede *et al.* (2000) and Bhadauria *et al.* (2012).

The maximum length of capsules (3.64) (Table 1) was found under treatment W₁₀ (weed free check) which was statistically at par with treatment W₂ (Pendimethalin @ 0.75 kg/ha+ hand weeding and interculturing at 30 DAS), W₅ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 100 g / ha as post emergence at 20-25 DAS), W₆ (Imazethapyr @100 g / ha as a post emergence at 20 DAS + hand weeding and interculturing at 40 DAS), W₇

(Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 75 g / ha as post emergence at 20-25 DAS) and W₉ (Hand weeding and interculturing twice at 20-40 DAS). Significantly the higher seed weight per plant (8.50 g) (Table 1) was observed under treatment W₁₀ (weed free check), being statistically at par with treatments W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS) and W₉ (Hand weeding and interculturing twice at 20-40 DAS). The lowest seed weight (4.67) was observed in treatment W₁₁ (weedy check) due to effective weed control under treatment of weed free check. There were no significant differences were observed in test weight (Table 1) by various weeds management treatments.

Influence on yield and economics of sesamum crop

Effective weed control achieved under different weed control methods improved the growth as well as yield attributing characters in sesamum. This improvement ultimately resulted in high seed yield and stover yield in sesamum. However, the degree of improvement was dependent to the effectiveness of different weed management treatments.

The maximum seed yield (1020.8 kg/ha) was obtained under treatment W₁₀ (weed free check) which was statistically at par with treatments W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS) and W₉ (Hand weeding and interculturing twice at 20-40 DAS). Significantly the highest stover yield (1706.9 kg/ha) was obtained in treatment W₁₀ (weed free check) which was found statistically at par with W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS), W₅ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 100 g / ha as post emergence at 20-25 DAS) and W₉

(Hand weeding and interculturing twice at 20-40) treatments. This might be due to enhancement in growth and better development under comparatively better weed free environment as compared to weedy check, where dense indiscriminate growth of weeds exerted crop weed competition with respect to moisture, nutrient, light and space. Such effects cumulatively resulted in poor growth and development of crop and finally resulted in poor seed and stover yield of sesamum crop. The results were in accordance with those reported by Duary and Hazra (2013), Sasikala *et al.* (2013), Dhaka *et al.* (2015) and Mruthul *et al.* (2015).

The weed control treatment also improved the harvest index. The data (Table 2) showed that higher harvest index (%) was found in W₁₀ (weed free check) which was statistically at par with W₂ (Pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS), W₅ (Pendimethalin @ 0.75 kg / ha as pre emergence + Imazethapyr @ 100 g / ha as post emergence at 20-25 DAS), W₆ (Imazethapyr @ 100 g / ha as a post emergence at 20 DAS + hand weeding and interculturing at 40 DAS), W₇ (Pendimethalin @ 0.75 kg/ha as pre emergence + Imazethapyr @ 75 g / ha as post emergence at 20-25 DAS) and W₉ (Hand weeding and interculturing twice at 20-40 DAS) treatments.

Economics

The highest net realization of ₹ 54758 per hectare was obtained with treatment of hand weeding and interculturing twice at 20-40 DAS (W₉) with BCR of 2.93, followed by treatment of pendimethalin @ 0.75 kg/ha + hand weeding and interculturing at 30 DAS (W₂) with BCR value of 2.87 probably due to comparatively higher yield obtained under these treatments. The findings were in

accordance with Mathukia *et al.* (2015) and Mruthul *et al.* (2015).

CONCLUSION

Based on the results of the field experimentation, it seems quite logical to conclude that maximum growth and yield parameters along with profitable yield of summer sesamum can be obtained by two hand weeding and interculturing at 20 and 40 DAS or pre emergence application of pendimethalin @ 0.75 kg/ha coupled with one hand weeding and interculturing at 30 DAS under south Gujarat conditions.

REFERENCES

- Anonymous. (2014). 14th National Food Security Mission Executive Committee (NFSMEC) Meeting, Director of Agriculture, Gujarat state, Gandhinagar, Gujarat. November 18, 2014.
- Baskaran, R. and Solaimalai, A. (2002). Growth and yield of rice fallow sesame as influenced by weed management practices. *Sesame Safflower Newsl.*, **17**: 42-45.
- Bhadauria, N.; Arora, A. and Yadav, K. S. (2012). Effect of weed management practices on seed yield and nutrient uptake in sesame. *Indian J. Weed Sci.*, **44**(2): 129-131.
- Dhaka, M. S.; Yadav, S. S.; Choudhary, G. L.; Jat, M. L. and Jeetarwal, R. L. (2015). Effect of weed management and nitrogen levels on weed dynamics, nutrient uptakes and quality of sesame (*Sesamum indicum* L.). *Environ. Ecol.*, **33**(1):14-18.
- Duary, B. and Hazra, D. (2013). Determination of critical period of

- crop-weed competition in sesame. *Indian J. Weed Sci.*, **45**(4): 253-256.
- Krishnaprabhu, S. and Kalyansundaram, D. (2008). Influence of weed control treatments on weed control and productivity of rice fallow sesame. *Plant Arch.*, **8**(2):723-724.
- Mathukia, R. K.; Sagarka, B. K. and Jadav, C. N. (2015). Integrated weed management in summer sesame. *Indian J. Weed Sci.*, **47**(2): 150-152.
- Mruthul, T.; Halepyati, A. S. and Chittapur, B. M. (2015). Chemical weed management in sesame (*Sesamum indicum* L.). *Karnataka J. Agril. Sci.*, **28**(2): 151-154.
- Narkhede, T. N.; Wadile, S. C.; Attarde, D. R. and Suryawanshi, R. T. (2000). Integrated weed management in sesame under rainfed conditions. *Indian J. Agric. Res.*, **34**(4): 247-250.
- Sasikala, K.; Ashok, P. and Ramachandra, B. S. N. M. (2013). Evaluation of some post-emergence herbicides against weeds in summer irrigated gingelly (*Sesamam indicum* L.). *Int. J. Farm Sci.*, **3**(1): 47-50.
- Sootrakar, B. P.; Namdeo, K. N. and Khare, L. J. (1995). Effect of weed control on productivity of sesame (*Sesamum indicum* L.). *Indian J. Agron.*, **40**(3): 454-458.
- Steel, R. G. D. and Torrie, J. H. (1980). Principles and Procedures of Statistics, 2nd Edition, pp. 172-77. McGraw Hill Book Book Co., Singapore.

Table 1: Growth and yield attributes of sesamum as influenced by various weed management treatments

Treatments	Plant Height at Harvest (cm)	Number of Branches per Plant at Harvest	Dry Matter Production per Plant at Harvest (g/plant)	Number of Capsules per Plant	Number of Seeds per Capsule	Length of Capsules (cm)	Seed Weight per Plant (g)	Test Weight (g)
W ₁	83.90	4.14	13.20	26.20	54.37	2.70	5.60	2.49
W ₂	92.45	4.76	15.26	31.60	57.95	3.32	7.76	3.11
W ₃	77.59	4.07	12.77	22.41	50.85	2.63	4.88	2.42
W ₄	81.85	4.13	12.96	24.32	51.36	2.69	5.12	2.48
W ₅	89.69	4.73	14.98	31.15	57.44	3.29	6.53	3.08
W ₆	86.92	4.42	13.46	29.99	57.03	2.98	5.72	2.77
W ₇	88.34	4.58	13.88	30.27	57.05	3.14	6.34	2.93
W ₈	85.31	4.35	13.26	27.63	55.82	2.91	5.50	2.70
W ₉	93.04	4.80	15.29	31.94	58.23	3.36	7.85	3.15
W ₁₀	94.95	5.08	15.69	34.30	58.87	3.64	8.50	3.43
W ₁₁	73.66	4.02	12.00	16.62	48.95	2.58	4.67	2.41
S.Em. ±	3.44	0.23	0.77	1.94	2.18	0.23	0.57	0.23
C.D. (P=0.05%)	10.14	0.67	2.28	5.73	6.42	0.67	1.69	NS
C.V. %	6.91	8.79	9.69	12.07	6.83	12.98	15.93	14.00

Table 2: Yield and economics of sesamum as influenced by various weed management treatments

Treatments	Seed Yield (kg/ha)	Stover Yield (kg/ha)	Harvest Index (%)	Gross Realization (₹ /ha)	Net Realization (₹ /ha)	B: C Ratio
W ₁	605.4	1407.0	30.15	45602	29983	1.92
W ₂	925.9	1617.9	36.29	69211	51342	2.87
W ₃	439.2	1273.6	25.48	33337	18495	1.25
W ₄	486.7	1321.1	26.87	36850	21851	1.46
W ₅	802.4	1549.8	34.13	60130	43580	2.63
W ₆	752.6	1474.4	33.75	56415	39115	2.26
W ₇	783.4	1503.3	34.02	58697	42306	2.58
W ₈	624.4	1424.2	30.41	47006	29864	1.74
W ₉	982.9	1674.8	36.90	73427	54758	2.93
W ₁₀	1020.8	1706.9	37.36	76232	50663	1.98
W ₁₁	289.6	1201.4	19.16	22346	8277	0.59
S.Em. ±	62.6	67.7	2.09	-	-	-
C.D. (P=0.05%)	184.7	199.8	6.17	-	-	-
C.V. %	15.57	7.99	11.56	-	-	-

[MS received : December 04, 2017]

[MS accepted : December 14, 2017]