



# Effect of Nitrogen and Weed management practices on growth, yield and soil loss in Sesame (*Sesamum indicum* L.) crop under rainfed condition

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## Abstract:

The research experiment of Sesame crop was conducted at the Agricultural Research Farm of Department of Agricultural Chemistry and Soil Science R. B. S. College Bichpuri, Agra during *Kharif* season 2021. The treatment were tested two factor first nitrogen levels i.e. N0 (Control), N1 (20 kg N/ha), N2 (40 kg N/ha) and N3 (60 kg N/ha) and second weed management practices i.e. M0 control (One weeding and hoeing), M1 interculture (Two weeding and hoeing at 20 and 35 DAS) and M2 Chemical weed control (Pendimethalin @ 3.3 l/ha) was replicated thrice in Randomized Block Design. The application of nitrogen significantly increased the growth parameter, yield attributes and yield and reduced splash loss. The treatment N3 gave maximum value followed by other treatment and minimum value under N0 control. The impact of weed management practices improve all above parameter significantly as compared to control reduces splash loss. The M1 two interculture treatments gave highest results followed by M2 treatment and lowest under M0 control.

**Key Words:** Sesame, Nitrogen, Weed Management, Growth, yield and Splash loss

## Introduction:

Sesame (*Sesamum indicum* L.) belongs to the family Pedaliaceae and also known as queen of oilseeds is the most important and oldest oil seed crop used by human. It used not only oil but used in various aspects such as food, feed and preparation of different beverages. The nutritional value is very high, richer in protein, lipids, vitamins they have antioxidant and anti inflammatory and provide more benefits for human healths. Sesame crop is commonly grown as Kharif, rainfed crop and their productivity is low but some part of our country as a irrigated condition perform better productivity. The major sesame producing state of India is Rajasthan, Odisha, Madhya Pradesh, Gujarat, Maharashtra, Uttar Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu and West Bengal, In Uttar Pradesh grown only Kharif season. In Kharif season the major problem of weeds during crop period, the crop not better perform due to weed competition reduced available nutrient to crop. The weed management practices are essential for better crop yield. The present investigation mechanical and chemical weed control enhance the availability of nutrients and soil moisture and enhanced the growth and yield of sesame crop.

## Materials and Methods:

The research project was conducted during Kharif season July to October, 2021 at the Research Farm of Department of Agricultural Chemistry and Soil Science R. B. S. College Bichpuri, Agra. The experiment was tested four levels of Nitrogen viz. N0 (Control), N1 (20 kg N/ha), N2 (40 kg N/ha) and N3 (60 kg N/ha) and three weed management treatments viz M0 control (One weeding and hoeing), M1 Interculture (Two weeding and hoeing at 20 and 35 DAS) and M2 Chemical weed control (Pendimethalin @ 3.3 l/ha) was replicated thrice in Randomized Block Design. The soils of the experimental field is sandy loam in texture, the physic chemical property of soil is pH 8.5, E.C. 0.36 dS/m, organic carbon 0.35, available N

145.5 kg/ha, available phosphorus 16.5 kg/ha and available potassium 185.4 kg/ha, bulk Density 1.49 g/cc, field capacity 17.38. The sesame variety T-78 @ 5kg seed/ha was sown on 5 July 2021 in furrow 15x45 cm row spacing below 3-5 cm depth. Nitrogen was applied through urea, and all cultural operation done as per treatment and chemical weed control through Pendimethalin 3.3 l/ha, crop was harvested on 24 October, 2021. The splash cups (10x20 cm) were fixed in each plot four cm above the soil surface for soil loss study.

## Result and Discussion:

### Plant stand

The analysis of data of initial and final plant stands of sesame crop given in (Table 1). The application of nitrogen levels improve the plant stand as compared to control. The different nitrogen treatments and their effects on sesame crop, statistically non significant. The highest plant stand recorded under N3 treatment followed by N2, N1 and lowest under N0 control. Similar findings were also reported by Singh *et. al.* (2001) and Dhaka *et. al.* (2015)

The different weed management treatment improves the plant stand of sesame crop as compared to control but statistically at par. The highest plant stands counted under M1 treatment then M2 and lowest under N0 treatment. Similar results reported by Singh *et. al.* (2001) and Dhaka *et. al.* (2015)

### Plant height:

The data pertaining to plant height at different stage of crop growth presented in (Table 1). The sesame crop perform better and significant effect of plant height due to application of nitrogen in all stages of crop growth. The treatment N3 have more vigorous plant in comparison to N2, N1 and lowest under n0 control. Nitrogen stimulates cell elongation and improves the plant vigor of sesame crop. Related findings were reported by Singh *et. al.* (2001) and Dhaka *et. al.* (2015)

The weed management treatment gave significant effect on plant height in all stage of crop growth. The tallest plant were observed under M1 (interculture at 20 and 35 DAS) in comparison to M2 chemical weed control (Pendimethalin 3.3 l/ha) and smallest value recorded under M0 control (one weeding and hoeing) treatment. The weed management practices improve crop vigor due to weed free soil provide higher amount of nutrient to crop. Singh *et. al.* (2001), Dhaka *et. al.* (2015) and Neekhers *et. al.* (2019)

**Table1. Effects of nitrogen levels and weed management treatments on growth parameter of sesame**

Treatments	Plant stand		Plant height (cm)			Number of functional leaves/plant			Number of branches/plant		
	Initial plant stand	Final plant stand	Days after sowing			Days after sowing			Days after sowing		
			30	60	85 At harvest	30	60	85 At harvest	30	60	85 At harvest
<b>Nitrogen levels</b>											
<b>N0</b>	14.73	14.37	26.66	97.07	102.72	8.55	55.05	15.95	0.50	5.23	4.20
<b>N20</b>	14.79	14.38	29.73	104.41	111.87	9.49	57.93	18.16	0.60	5.47	4.68
<b>N40</b>	14.78	14.37	31.53	108.43	115.30	10.22	70.14	31.18	0.99	5.83	5.05
<b>N60</b>	14.81	14.40	33.00	110.62	120.05	10.60	72.71	34.90	1.45	6.57	5.39
<b>S.E. (Diff)+_</b>	0.20	0.14	0.74	1.44	2.09	0.31	1.73	0.99	0.052	0.33	0.328
<b>C. D. at 5%</b>	N.S.	N.S.	1.54	2.99	4.35	0.64	3.60	2.05	0.109	0.69	0.682
<b>Weed management</b>											
<b>M0</b>	14.78	14.37	27.85	103.46	109.78	9.36	59.79	20.29	0.79	5.35	4.35
<b>M1</b>	14.80	14.39	32.95	106.85	116.05	10.04	68.06	30.30	1.02	6.43	5.40

<b>M2</b>	14.79	14.38	29.90	105.09	111.63	9.74	64.02	24.55	0.84	5.55	4.74
<b>S.E. (Diff)+</b>	0.17	0.12	064	1.24	1.81	0.26	1.50	0.85	0.045	0.29	0.284
<b>C. D. at 5%</b>	N.S.	N.S.	1.33	2.59	3.76	N.S.	3.12	1.78	0.094	0.60	0.590

### Number of functional leaves:

The results of functional leaves per plant at different stage of crop growth are summarized in (Table 1).The functional leaves per plant at 30, 60 and 85 days of sowing significantly improve and highest number of leaves with application of nitrogen 60 kg N/ha followed by 40 kg N/ha, 20kg N/ha and lowest value recorded under unfertilized control. Similar result also reported by Neekhers et. al. (2019) and Salam et. al.(2020)

The weed management practices also improve and significant effect of number of leaves per plant in all stages of crop growth. The highest number of leaves per plant was observed under M1 treatment than M2 and lowest value recorded under M0 control. The weed management practices reduced the weeds in crop and improve the availability of nutrient to crop and their vigor and also improve the number leaves per plant. The results are in close conformity with the findings of Singh et. al. (2001), Dhaka et. al. (2015) and Neekhers et. al.(2019).

### Number of branches per plant:

The numbers of branches per plant are summarized in (Table 1). The result clearly indicated that the branches per plant were significantly improve under different nitrogen levels at different growth stages viz 30, 60 and 85 DAS ,however the highest number of branches were obtained under N60 kg/ha followed by N40 kg/ha, N20 kg/ha and lowest under N0 control. The nitrogen improves the growth and development of crop at different stages and also improves the number of branches in sesame crop. Neekhers et. al. (2019) and Salam et. al. (2020) also reported similar results.

The weed management treatment significantly affected number of branches per plant. The M1 treatment has maximum result than M2 and lowest branches recorded M0 treatment. Similar results reported by Singh et. al. (2001), Durgwal et. al. (2003) and Dhaka et. al. (2015)

### Yield attributes:

The results of yield attributing characters i.e. numbers of capsules per plant, number of seeds per capsules and 1000 seed weight of sesame crop are depicted in (Table 2). The above yield attributing character was significantly affected by nitrogen levels as compared to unfertilized control. The highest value was observed under N60 kg/ha, than N40 kg/ha, N20 kg/ha and lowest value noticed under control. Neekhers et. al. (2019), Salam et. al. (2020) and Harsh et. al. (2022) reported similar results.

The weed management treatment also improves the number of capsules per plant/number of seeds per capsules and 1000 seed weight significantly. The treatment M1 gave highest results followed by M2 and lowest under M0 control treatment. Similar results reported by researchers. Neekhers et. al. (2019), Salam et. al. (2020) and Harsh et. al. (2022)

**Table2. Effects of nitrogen levels and weed management treatments on yield attributes and yield of sesame**

Treatments	Number of capsules/plant	Number seeds/capsules	1000-seed weight (gm)	Seed yield(q/ha)	Stover yield (q/ha)	Splash soil loss(t/ha)
<b>Nitrogen levels</b>						
<b>N0</b>	25.56	45.66	2.81	3.42	15.07	4.35
<b>N20</b>	28.63	49.00	3.06	4.32	19.52	3.62
<b>N40</b>	30.42	53.77	3.11	5.15	23.43	3.25

<b>N60</b>	31.90	59.33	3.41	5.98	26.72	3.12
<b>S.E. (Diff)+<sub>-</sub></b>	1.51	1.31	0.071	0.132	1.57	0.028
<b>C. D. at 5%</b>	3.13	2.72	0.148	0.273	3.25	0.057
<b>Weed management</b>						
<b>M0</b>	26.75	49.66	2.93	4.06	17.21	4.20
<b>M1</b>	31.85	53.91	3.12	5.44	23.98	3.01
<b>M2</b>	28.80	52.25	3.04	4.65	20.93	3.50
<b>S.E. (Diff)+<sub>-</sub></b>	1.30	1.41	0.062	0.114	1.36	0.025
<b>C. D. at 5%</b>	2.71	2.35	0.128	0.237	2.82	0.052

### Seed and Stover yield:

The yield has been expressed in terms of seed and stover yield of sesame crop given in (Table 2). The result revealed that the seed and stover yield of sesame crop was highly significant effect due to nitrogen application. The minimum value noted under N0 control and progressively improve N20 kg/ha, N40 kg/ha N60 kg/ha treatment gave highest results. The N60 kg/ha treatment have highest seed and stover yield (5.98 and 26.72 q/ha), followed by N40 kg/ha (5.15 and 23.42 q/ha), N20 kg/ha (4.32 and 19.52 q/ha) and lowest result recorded under N0 treatment (3.42 and 15.07 q/ha). The highest results due to application of nitrogen increase the growth and yield attributing character and improve the vigor of crop and also improve the yield of sesame crop. The findings with accordance with Singh *et. al.* (2001) Dhaka *et. al.* (2015), Salam *et. al.* (2020) and Harsh *et. al.* (2022)

The weed management practices gave significant effect on seed and stover yield of sesame crop. The highest seed and stover yield recorded under M1 treatment (5.44 and 23.98 q/ha) followed by M2 treatment (4.65 and 20.93 q/ha) and lowest yield recorded under M0 one weeding and hoeing (4.66 and 17.21 q/ha). The above result was proven by Singh *et. al.* (2001), Bhadauria *et. al.* (2012), Dhaka *et. al.* (2015) and Neekhers *et. al.*(2019).

### Splash soil loss:

The soil loss (Table2) by the direct impact of rain fall reduced due to application of nitrogen significantly. The highest soil loss recorded under control treatment followed by N20 kg/ha, N40 kg/ha, and lowest soil loss recorded under N60 kg/ha. The application of nitrogen improved the crop canopy and reduced the direct impact of rain and reduced the soil loss in sesame crop. The related results accordance with Singh *et. al.* (2020) and Kumar *et. al.* (2021)

In other hand the weed management practices significantly affected the soil loss. The highest soil loss recorded under M0 treatment followed by M2 and lowest value recorded under M1 treatment. This may due to the weed management improve the canopy coverage by crop and reduced the soil loss by the direct impact of rain. Lakhoria *et. al.* (2010), Xiong *et. al.* (2018) and Kumar *et. al.* (2021) also reported similar results.

### Conclusion:

On the basis of stastical analysis and evaluation of results of sesame crop and their different parameter gave better result with the application nitrogen and weed management practices. The treatment N60 kh/ha and M1 weeding and hoeing at 15 and 35 days gave better result on growth, yield attributes, yield and reduces splash soil loss in sesame crop under rain-fed condition.

**References:**

- Bhadauria, N., Yadav, K. S., Rajput, R.L. and Singh, V.B. (2012). Integrated weed management in sesame. *Indian Journal of Weed Science* 44(4): 235–237.
- Dhaka, M. S., Yadav, S. S., Choudhary, G. L., Jat, M. L. and Jeetarwa R. L.(2015) Effect of Weed Management and Nitrogen Levels on Weed Dynamics, Nutrient Uptake and Quality of Sesame (*Sesamum indicum*). *Environment & Ecology* 33 (1): 14—18,
- Dungarwal H.S., Chaplot P.C., Nagda B.L. (2003) Integrated Weed Management in Sesame (*Sesamum indicum* L.) *Indian Journal of Weed Science*. 35(3&4):236- 238.
- Harsh, A., Kamani V.G., Bavalgave and Lad Y.P. (2022) Influence of nitrogen levels and weed management practices on yield attributes, yield and economics of sesame (*Sesamum indicum* L.) under south Gujarat condition. *The Pharma Innovation Journal* 11(6): 870-873.
- Kumar,S. Islam,A. Kumar,S., Ram,S., Vaishnav,M.J. and Dayal ,D.(2021)Evaluating effect of cover crops on runoff, soil loss and soil nutrients in an Indian arid region. *Communications in Soil Science and Plant Analysis Volume* 52(14):1669-1688.
- Lakaria B.L., Narayan D., Katiyar V., Biswas H. (2010) Evaluation of different kharif crops for minimizing runoff and soil loss in Bundelkhand region. *J. Indian Soc. Soil Sci.* 58:252–255
- Neekher S., Jyotishi A., Mehra J. , Singh S. K. and Malviya D. K. (2019) Effect of weed management practices on growth and yield of sesame (*Sesamum indicum* L) *Journal of Plant Development Sciences*. 11(8): 445-451.
- Salam, M.A.,Khatun, A., Kader, M.A.(2020) Effect of Levels of Nitrogen on the Growth and Yield of Sesame (*Sesamum indicum* L.) *Cultivars. Journal of Bangladesh Agricultural University*. 18(4): 949–955,
- Singh P.K., Prakash O., Singh B.P. (2001) studies on the effect of N- fertilization and weed control techniques on weed suppression, yield and nutrients uptake in sesamum, *Indian Journal of weed Science*. 33(3-4):139-142.
- Singh R. K., Chudhary R .S., Somasundram,J., Sinha N.K., Mohanty M., Hti K.M., Patra A.K., Chaudhary S.K. and Lal R. (2020) Soil and nutrient losses under different crop cover in vertisol of central India. *Journal of Soil and Sediment*. 20: 609-620
- Xiong, M.Q.; Sun, R.H.; Chen, L.D. (2018) Effects of soil conservation techniques on water erosion control: A global analysis. *Sci. Total Environ.*645:753–760.