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Influence of sowing time and weed management practices on weed dynamics and weed control parameters in summer sesame

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Abstract

A field investigation entitled "Effect of dates of sowing and weed management practices on summer sesame in the New Alluvial Zone of West Bengal" was carried out during the summer seasons of 2022 and 2023 at the Instructional Farm, Jaguli, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal. The experimental field had a clay loam soil texture, was nearly neutral in soil reaction (pH 6.5), and non-saline in nature with an electrical conductivity of 0.3 dS m^{-1} . The soil contained medium organic carbon (0.68%), low available nitrogen ($196.76 \text{ kg ha}^{-1}$), and high levels of available phosphorus ($24 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$) and potassium ($294.5 \text{ kg K}_2\text{O ha}^{-1}$).

The experiment was conducted using a split-plot design with three replications, where three sowing dates were assigned to the main plots and eight weed management treatments to the sub-plots. The sowing dates consisted of D₁: 21 February, D₂: 7 March, and D₃: 22 March. The weed management treatments included: W₁ – pendimethalin @ $1 \text{ kg a.i. ha}^{-1}$ applied at 2 DAS followed by hand weeding at 30 DAS; W₂ – butachlor @ $1 \text{ kg a.i. ha}^{-1}$ at 2 DAS with hand weeding at 30 DAS; W₃ – hand weeding at 15 DAS followed by quizalofop-ethyl @ $50 \text{ g a.i. ha}^{-1}$ at 30 DAS; W₄ – pendimethalin @ $1 \text{ kg a.i. ha}^{-1}$ at 2 DAS combined with quizalofop-ethyl @ $50 \text{ g a.i. ha}^{-1}$ at 30 DAS; W₅ – butachlor @ $1 \text{ kg a.i. ha}^{-1}$ at 2 DAS along with quizalofop-ethyl @ $50 \text{ g a.i. ha}^{-1}$ at 30 DAS; W₆ – hand weeding twice at 15 and 30 DAS; W₇ – weedy check; and W₈ – weed-free check. The sesame variety 'Savitri' was selected for the study.

Weed parameters in sesame (weed density, weed dry weight, weed control efficiency and weed index) were significantly influenced by subplot treatments only. Main plots and interaction effects were found to be non-significant. Among the subplot treatments, application of Pendimethalin @ $1 \text{ kg a.i. ha}^{-1}$ (2 DAS) + Hand weeding (30 DAS) i.e. W₁ recorded significantly lower total weed density (7.94 m^{-2}), total weed dry weight (6.03 g m^{-2}) and higher weed control efficiency (92.27%) as well as weed index (2.16%).

Keywords: Weed, herbicide, weed control efficiency, weed index

Introduction

Sesame (*Sesamum indicum* L.) is one of the most significant oilseed crop next to groundnut, rapeseed and mustard in India. The crop's superior polyunsaturated stable fatty acid has given it the evocative moniker "Queen of oilseeds.". Small farmers in underdeveloped nations usually grow sesame because it is thought to be a drought-tolerant crop (Jefferson, 2003) [8]. Boureima *et al.* (2011) [3] pointed out that sesame is a stress-tolerant crop that produces unique chemical compounds, which are not found in other edible oil crops. These compounds help protect sesame oil from oxidative rancidity, enhancing its stability and shelf life. Sesame is a short-day plant that typically flowers in 42-45 days when exposed to a 10-hour day length. Its significance lies in its dual role as a food crop and a raw material for various industries, making it a major export crop. Sesame seeds are rich in nutrients, containing approximately 50% oil, 25% protein, and 20% carbohydrates, along with vitamins, minerals, antioxidants, and all essential amino and fatty acids. Also, seed meal is an excellent high protein (34-50%).

Sesame oil cake is an excellent cattle feed due to its high-quality protein and significant amounts of phosphorus and potash. It is commonly cultivated in tropical and subtropical regions. India is the largest producer, consumer, and exporter of sesame globally. However, sesame yields can vary significantly based on factors such as the growing environment, cultural practices, and the

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specific cultivars used. The yield potential of sesame is determined by several yield components, each of which is significantly influenced by environmental factors and agronomic practices. Among them sowing time and weed competition with crop is very important.

The appropriate sowing date is a crucial factor in aligning plant growth stages with environmental conditions to achieve optimal yield. Sesame, known for its drought tolerance, is primarily grown as a dryland crop, particularly in the Indian subcontinent, where the timing of sowing depends on the availability of moisture. As a result, sowing is often delayed to ensure the crop receives sufficient water for proper growth.

By choosing the right sowing date, different stages of plant growth can be better synchronized with environmental conditions, which enhances the efficiency of photosynthesis. This, in turn, promotes the assimilation and storage of nutrients in seeds, leading to improved crop productivity (Erhart *et al.*, 2005) [5]. Determining the optimal sowing time, which enhances the efficient use of land area, along with selecting a cultivar that offers a high average yield, is a key factor in ensuring a profitable return from sesame cultivation (Hamza and Abd El Salam, 2015) [6]. Delayed sowing discourages growers, leading to a reduction in the area dedicated to sesame cultivation. It also increases the susceptibility to pests and diseases, further impacting crop health and yield. Delayed sowing consequently shortens the maturity period of sesame, which can affect its overall growth and yield potential.

Weed infestation is one of the major constraints limiting sesame yield. Additionally, sowing sesame seeds is challenging due to their small size, requiring precise placement at the optimal depth for successful germination and establishment. Moreover, sesame seedlings are small, tender, and exhibit slow initial growth compared to other oilseed crops, which leads to increased weed infestation. The extent of yield loss depends on the type of weed flora and the timing of weed infestation under specific agro-climatic conditions. Uncontrolled weed growth in sesame has been reported to cause yield losses of up to 50% (Dungarwal *et al.*, 2003) [4].

Weeds limit sesame yield because its seedlings grow slowly during the first four weeks, making sesame a weak competitor against weeds in the early stages of growth (Bennett *et al.*, 2003) [2]. Weeds impose significant stress during the early growth stages, which negatively impacts the economic yield of sesame. The presence of weeds can reduce sesame yield by up to 60%. Amare *et al.* (2009) [1] found a critical period of weed competition in sesame crop between 15 and 30 days after seedlings emergence. So, during that period, the crop ought to be maintained in weed free condition in order to realize maximum yield. Though manual weeding is effective and eco-friendly yet they are tedious and time consuming

Hand weeding is the most common method of weed control used by farmers, but it is labor-intensive, costly, and physically demanding. Additionally, the non-availability of labor during peak agricultural periods and high labor wages push farmers to explore alternative options. Chemical weed management, particularly the use of herbicides, has become a viable solution, offering an effective and economically feasible way to control weeds from sowing onward.

A suitable, economically viable, and ecologically safe combination of chemical and manual weeding could effectively control weeds and reduce yield loss. In light of this, a research program titled "Effect of Dates of Sowing and Weed Management Practices on Summer Sesame in the New Alluvial Zone of West Bengal" has been initiated to explore the optimal

strategies for weed control and improve sesame yield in the region.

Materials and Methods

A field experiment entitled "Effect of dates of sowing and weed management practices on summer sesame in new alluvial zone of West Bengal" had been conducted during summer season of 2022 and 2023 at Instructional farm, Jaguli. Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal. The soil of experimental site was clay loam in texture, near neutral in reaction (pH: 6.5) and non-saline (EC 0.3); medium in organic carbon (0.68), low available nitrogen (196.76 kg ha⁻¹) and high in available phosphorus (24 P₂O₅ kg ha⁻¹) and available potassium (294.5 K₂O kg ha⁻¹). The experiment was laid out in split plot design with three main plot treatments (dates of sowing) and eight sub plot treatments (weed management practices) replicated thrice. Main plot treatments comprised of three dates of sowing i.e. D₁: Sowing on February 21st, D₂: Sowing on March 7th, and D₃: Sowing on March 22nd. Sub plot treatments comprised of eight weed management practices i.e. W₁: Pendimethalin @ 1 kg a.i. ha⁻¹ [2 DAS (days after sowing)] + Hand weeding (30 DAS), W₂: Butachlor @ 1 kg a.i. ha⁻¹ (2 DAS) + Hand weeding (30 DAS), W₃: Hand weeding (15 DAS) + Quizalofop ethyl @ 50 g a.i. ha⁻¹ (30 DAS), W₄: Pendimethalin @ 1 kg a.i. ha⁻¹ (2 DAS) + Quizalofop ethyl @ 50 g a.i. ha⁻¹ (30 DAS), W₅: Butachlor @ 1 kg a.i. ha⁻¹ (2 DAS) + Quizalofop ethyl @ 50 g a.i. ha⁻¹ (30 DAS), W₆: Hand weeding (15 DAS) + Hand weeding (30 DAS), W₇: Weedy check and W₈: Weed free check. 'Savitri' was chosen for the experiment.

Throughout the crop growing season, all advised cultural practices and plant protection techniques were followed. "Observation like plant height, dry matter accumulation, leaf area index, number of branches per plant, number of capsules per plants, number of seeds per capsule, seed yield and stalk yield were taken using standard procedures from five randomly selected tagged plants from each plot. Harvesting was done as per the treatments and maturity of crop, respectively. Threshing was one plot wise and the seed yield from the net plot was converted into kg ha⁻¹ to which the yield from five tagged plants was also added. For calculating gross return, net return and B:C ratio.

Results and Discussion

1. Total weed density

From the pooled data it was noticed that total weed density was influenced by weed management practices only. Interaction between dates of sowing and weed management practices was found to be non-significant. From the data, revealed that both the chemical and hand weeding treatment showed remarkable reduction in total weed population over weedy check treatment at all the growth stages.

At all the five investigations (30, 45, 60, 75 DAS and at harvest), among all the treatments, the treatment with weed free plot (W₈) recorded the lowest weed density and highest weed density was observed in weedy check (W₇) in both the year of experimentation. Among the herbicidal treatments, Pendimethalin @ 1 kg a.i. ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS i.e. W₁ controls weeds very effectively and showed the minimum weed density (7.14, 6.11, 7.72, 8.93 and 7.94 m⁻² at 30, 45, 60, 75 DAS and at harvest respectively) followed by the treatment treated by Butachlor @ 1 kg a.i. ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS i.e. W₂. From 30 DAS to at harvest, treatment W₈ was noticed minimum weed density. Total density of weeds was increased from their

previous observation. (Table.1)

The above findings thus indicated that weed free plot (W_8) and Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS i.e. W_1 always showed the excellent performance by registering the lowest weed density. It might be due to early spraying of herbicides as an effective means of controlling weeds from the very start of germination was opined earlier by Rajesh *et al.* (2024) ^[11]. (Table.1)

2. Total dry weight of weeds

From the experiment it was confirmed that total weed dry weight was significantly influenced by weed management treatments only. There was no significant influence of dates of sowing on total dry weight. Interaction between these two factors was found to be non-significant.

From the data, it was indicated the increasing trend of total dry matter (g m⁻²) of weeds with the advance of growth stages. At 30 DAS, highest total weed dry weight (13.98 g m⁻²) was obtained from the W_7 (weedy check) which was significantly differed with all other treatments and the lowest weed dry matter (0.71 g m⁻²) had been registered from W_8 (weed free plot). Among the single herbicidal treatments with one hand weeding, the lowest value (5.60 g m⁻²). was observed in (W_1) Pendimethalin @ 1 kg a.i. ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS. Among combined herbicidal treatments (PE + POE), (W_5) Butachlor @ 1 kg a.i. ha⁻¹ (2 DAS) + Quizalofop ethyl @ 50 g a.i. ha⁻¹ (30 DAS) recorded satisfactory result.

At 45 DAS, minimum (0.71 g m⁻²) weed dry weight was recorded from W_8 (weed free plot) and the maximum (14.49 g m⁻²) dry weight of weed was registered from W_7 (weedy check) In case of herbicidal treatments, (W_1) Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS registered the lowest (4.24 g m⁻²) weed dry weight and (W_4) Pendimethalin @ 1 kg a.i. ha⁻¹ (2 DAS) + Quizalofop ethyl @ 50 g a.i. ha⁻¹ (30 DAS) recorded the highest (7.44 g m⁻²). (Table.2)

At 60 DAS, the maximum and minimum weed dry weights were recorded from W_7 and W_8 respectively, however, both significantly differed with other treatments. From 75 DAS to at harvest, total weed dry weight (g m⁻²) increased gradually in all the treatments with the age of the plant. At 75 DAS and at harvest the lowest weed dry weight were observed in weed free plot treatment (0.71 g m⁻²) followed by Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS (7.27 g m⁻² and 6.03 g m⁻² respectively) and the highest total weed dry weight were observed in weedy check (18.29 and 17.51 g m⁻² respectively).

The maximum dry weight of weed was registered from weedy check (W_7) at all the five investigations (30, 45, 60, 75 DAS and at harvest) and that was significantly higher than all other treatments. Among the herbicidal treatments, Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS i.e. W_1 recorded the lowest weed dry weight which reflects its superiority for controlling weeds and low crop phytotoxicity. Among all the weed management practices, weed free treatment was found to be superior, which was followed by herbicide application combined with hand weeding in suppressing the weed density and dry matter which was in accordance of the findings of Mruthul *et al.* (2015) ^[10].

3. Weed control efficiency (WCE)

From pooled data it was revealed that there was influence of various weed management practices on weed control efficiency. There was no significant influence of dates of sowing on weed

control efficiency. Interaction between these two factors were found to be non-significant. (Table.3). Among various weed management practices, treatment W_8 (weed free plot) registered highest weed control efficiency at all the observations at 30, 45, 60, 75 DAS and at harvest respectively).

At 30 DAS, among all the herbicidal treatments W_1 (Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS recorded the highest weed control efficiency (84.84%) and lowest (0%) weed control efficiency was observed in W_7 (Weedy check)

At 45 DAS, among various weed management practices W_8 (weed free plot) registered highest weed control efficiency (100%) and the lowest WCE was observed in W_7 (weedy check) (0%). Whereas among the herbicidal treatments, W_1 (Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS noticed highest WCE (92.27%) followed by Butachlor @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS i.e. W_2 (84.61%).

From 60 DAS to at harvest, in all the observations, W_8 (weed free plot) recorded the highest weed control efficiency (100%) and lowest weed control efficiency was observed at (W_7) weedy check (0%). Among all the herbicidal plots W_1 (Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS noticed maximum weed control efficiency (88.30%, 84.69% and 78.36% respectively) which was followed by W_2 (Butachlor @ 1 kg a.i. ha⁻¹ (2 DAS) + Hand weeding (30 DAS) and the lowest weed control efficiency (69.95%, 65.43% and 55.26% respectively) was registered in W_4 Pendimethalin @ 1 kg a.i. ha⁻¹ (2 DAS) + Quizalofop ethyl @ 50 g a.i. ha⁻¹ (30 DAS. (Fig.1)

The data clearly indicated that among weed management treatments, the highest weed control efficiency was recorded under the W_8 (weed free plot) followed by the treatment W_1 (Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS and W_6 (Hand weeding (HW) at 15 and 30 DAS, however, the lowest weed control efficiency was observed under the treatment W_7 (weedy check). This might be due to effective weed control achieved under efficient method of weed management in terms of lower weed population per unit area and reduced biomass production of weeds which ultimately brought higher weed control efficiency. These results corroborated with the findings of Mathukia *et al.* (2015) ^[9] and Mruthul *et al.* (2015) ^[10].

4. Weed index (WI)

The data showed prominent influence of various weed management treatments on weed index. There was no significant influence of dates of sowing on weed index. Interaction between these two factors were found to be non-significant. Among the weed management practices, W_8 (weed free plot) there was no reduction in yield due to weeds. Among the herbicide treatments, it was revealed that W_1 (Pendimethalin @ 1 kg a.i ha⁻¹ (2 DAS) + one hand weeding (HW) at 30 DAS recorded lower weed index (2.16%). The highest weed index (51.75%) was observed under the treatment W_7 (weedy check). This might be due to effective weed control achieved under this weed management treatment in terms of lower weed population per unit area which reduced biomass production of weeds and higher weed control efficiency was obtained. Due to less weed density there is no competition with crop, this results increased the crop yield ultimately treatment W_8 and W_1 gave more yield of crop and recorded lower weed index. Similar reports were observed also by Hossain *et al.* (2020) ^[7].

Table 1: Effect of dates of sowing and weed management practices on total weed density of summer sesame

Total weed density (m ⁻²)															
	30 DAS			45 DAS			60 DAS			75 DAS			AT HARVEST		
	2022	2023	pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled
Date of sowing															
D1	9.48 (89.37)	8.30 (68.42)	8.91 (78.89)	8.35 (69.20)	7.99 (63.41)	8.17 (66.30)	9.78 (95.11)	9.60 (91.75)	9.78 (95.11)	10.97 (119.77)	10.73 (114.71)	10.85 (117.24)	10.48 (109.43)	9.80 (95.54)	10.15 (102.48)
D2	6.63 (43.45)	7.69 (58.57)	7.18 (51.01)	5.45 (29.18)	7.44 (54.79)	6.52 (41.98)	8.10 (65.09)	8.98 (80.07)	8.10 (65.09)	8.51 (71.87)	10.15 (102.58)	9.37 (87.22)	7.84 (60.94)	9.18 (83.70)	8.53 (72.32)
D3	8.29 (68.30)	6.95 (47.81)	7.65 (58.05)	6.93 (47.55)	6.95 (47.81)	6.94 (47.68)	8.64 (74.15)	8.42 (70.47)	8.64 (74.15)	9.99 (99.35)	9.60 (91.69)	9.80 (95.52)	9.46 (88.91)	8.59 (73.28)	9.03 (81.10)
SE (m±)	0.26	0.21	0.24	0.27	0.34	0.30	0.31	0.34	0.32	0.34	0.29	0.31	0.31	0.22	0.24
C.D.at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Weed management practices															
W1	7.65 (58.09)	6.58 (42.84)	7.14 (50.47)	5.59 (30.77)	6.58 (42.84)	6.11 (36.80)	7.26 (52.15)	8.16 (66.12)	7.72 (59.13)	8.35 (69.15)	9.48 (89.34)	8.93 (79.24)	7.66 (58.15)	8.22 (67.08)	7.94 (62.62)
W2	8.31 (68.50)	7.25 (52.09)	7.80 (60.29)	6.35 (39.80)	7.25 (52.09)	6.81 (45.94)	8.40 (69.99)	9.08 (81.94)	8.74 (75.96)	9.59 (91.49)	10.30 (105.67)	9.95 (98.58)	9.03 (80.99)	9.20 (84.21)	9.12 (82.60)
W3	8.64 (74.13)	7.61 (57.43)	8.14 (65.78)	6.63 (43.47)	7.61 (57.43)	7.14 (50.45)	8.88 (78.27)	9.49 (89.48)	9.19 (83.88)	10.14 (102.27)	10.66 (113.20)	10.40 (107.74)	9.55 (90.77)	9.62 (92.14)	9.59 (91.46)
W4	9.43 (88.49)	8.35 (69.28)	8.91 (78.89)	7.52 (56.00)	8.35 (69.28)	7.95 (62.64)	9.72 (93.90)	10.27 (105.03)	10.00 (99.47)	11.11 (122.90)	11.43 (130.12)	11.27 (126.51)	10.58 (111.40)	10.39 (107.47)	10.49 (109.44)
W5	8.99 (80.31)	8.01 (63.65)	8.51 (71.98)	7.07 (49.48)	8.01 (63.65)	7.55 (56.56)	9.40 (87.93)	9.84 (96.36)	9.62 (92.14)	10.79 (115.93)	11.04 (121.42)	10.92 (118.68)	10.24 (104.43)	9.94 (98.33)	10.09 (101.38)
W6	8.00 (63.52)	6.95 (47.82)	7.49 (55.67)	6.05 (36.08)	6.95 (47.82)	6.52 (41.95)	7.82 (60.66)	8.57 (73.02)	8.21 (66.84)	9.04 (81.27)	9.88 (97.21)	9.47 (89.24)	8.35 (69.16)	8.78 (76.66)	8.57 (72.91)
W7	10.19 (103.29)	10.49 (109.58)	10.34 (106.43)	11.58 (133.55)	10.49 (109.58)	11.05 (121.56)	12.70 (160.84)	11.60 (134.17)	12.17 (147.50)	13.91 (192.97)	12.94 (166.99)	13.43 (179.98)	13.30 (176.51)	12.17 (147.50)	12.75 (162.01)
W8	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)
SEm±	0.25	0.29	0.23	0.29	0.32	0.28	0.26	0.31	0.28	0.31	0.38	0.34	0.32	0.29	0.26
C.D.at 5%	0.72	0.93	0.65	0.84	0.91	0.76	0.75	0.911	0.924	0.88	1.11	2.81	0.91	0.80	0.70

* Figures in parentheses indicate original values

** The square root transformed value of (X+0.5) was used for statistical analysis

Interaction (DxW)															
D1W1	9.22 (84.56)	7.25 (52.06)	8.30 (68.31)	7.31 (52.88)	7.25 (52.06)	7.28 (52.47)	8.88 (78.4)	8.89 (78.5)	8.89 (78.45)	9.79 (95.4)	10.16 (102.73)	9.98 (99.06)	9.21 (84.4)	8.98 (80.07)	9.10 (82.23)
D1W2	9.77 (94.97)	7.86 (61.31)	8.87 (78.14)	7.90 (61.92)	7.86 (61.31)	7.88 (61.61)	9.84 (96.24)	9.80 (95.54)	9.82 (95.89)	10.87 (117.74)	10.93 (119.06)	10.90 (118.4)	10.38 (107.2)	9.88 (97.19)	10.14 (102.22)
D1W3	10.05 (100.59)	8.19 (66.65)	9.17 (83.62)	8.13 (65.59)	8.19 (66.65)	8.16 (66.12)	10.25 (104.52)	10.12 (101.86)	10.18 (103.19)	11.36 (128.52)	11.27 (126.59)	11.32 (127.56)	10.84 (117.02)	10.28 (105.13)	10.56 (111.08)
D1W4	10.75 (114.96)	8.89 (78.51)	9.86 (96.73)	8.87 (78.12)	8.89 (78.51)	8.88 (78.31)	10.98 (120.15)	10.86 (117.41)	10.92 (118.78)	12.23 (149.15)	12.00 (143.51)	12.12 (146.33)	11.75 (137.6)	11.00 (120.46)	11.38 (129.06)
D1W5	10.36 (106.78)	8.57 (72.87)	9.50 (89.83)	8.49 (71.6)	8.57 (72.87)	8.53 (72.24)	10.71 (114.18)	10.45 (108.74)	10.58 (111.46)	11.94 (142.18)	11.63 (134.82)	11.79 (138.5)	11.45 (130.6)	10.57 (111.32)	11.02 (121)
D1W6	9.51 (89.99)	7.59 (57.05)	8.60 (73.52)	7.66 (58.2)	7.59 (57.05)	7.62 (57.63)	9.35 (86.92)	9.27 (85.4)	9.31 (86.16)	10.34 (106.42)	10.54 (110.6)	10.44 (108.51)	9.79 (95.42)	9.49 (89.64)	9.65 (92.53)
D1W7	11.12 (123.14)	10.92 (118.8)	11.02 (120.97)	12.88 (165.27)	10.92 (118.8)	11.94 (142.04)	13.70 (187.31)	12.13 (146.55)	12.94 (166.93)	14.81 (218.75)	13.45 (180.38)	14.14 (199.56)	14.26 (202.9)	12.69 (160.49)	13.50 (181.74)
D1W8	0.71 (0)	0.71 (0)	4.53 (20.04)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)
D2W1	5.56 (30.38)	6.54 (42.22)	6.07 (36.3)	2.96 (8.25)	6.54 (42.22)	5.07 (25.23)	4.86 (23.11)	8.12 (65.41)	6.69 (44.26)	6.37 (40.11)	9.45 (88.87)	8.06 (64.49)	5.44 (29.11)	8.19 (66.55)	6.95 (47.83)
D2W2	6.43 (40.79)	7.21 (51.46)	6.83 (46.12)	4.22 (17.28)	7.21 (51.46)	5.91 (34.37)	6.44 (40.95)	9.01 (80.62)	7.83 (60.78)	7.93 (62.45)	10.28 (105.19)	9.18 (83.82)	7.24 (51.95)	9.17 (83.67)	8.26 (67.81)
D2W3	6.85 (46.41)	7.57 (56.81)	7.22 (51.61)	4.63 (20.95)	7.57 (56.81)	6.28 (38.88)	7.05 (49.23)	9.45 (88.78)	8.34 (69.01)	8.59 (73.23)	10.64 (112.73)	9.67 (92.98)	7.89 (61.73)	9.60 (91.6)	8.78 (76.67)
D2W4	7.83 (60.78)	8.32 (68.66)	8.08 (64.72)	5.83 (33.49)	8.32 (68.66)	7.18 (51.07)	8.08 (64.86)	10.24 (104.33)	9.22 (84.59)	9.71 (93.86)	11.41 (129.65)	10.60 (111.76)	9.10 (82.36)	10.37 (106.94)	9.75 (94.65)
D2W5	7.29 (52.6)	7.97 (63.03)	7.64 (57.81)	5.24 (26.96)	7.97 (63.03)	6.74 (44.99)	7.71 (58.89)	9.81 (95.65)	8.82 (77.27)	9.35 (86.89)	11.02 (120.95)	10.22 (103.92)	8.71 (75.39)	9.91 (97.79)	9.33 (86.59)
D2W6	6.03 (35.81)	6.91 (47.2)	6.48 (41.5)	3.75 (13.57)	6.91 (47.2)	5.56 (30.39)	5.67 (31.63)	8.53 (72.32)	7.24 (51.97)	7.41 (54.46)	9.86 (96.74)	8.72 (75.6)	6.37 (40.13)	8.75 (76.12)	7.66 (58.12)
D2W7	9.02 (80.86)	10.46 (108.95)	9.77 (94.91)	10.65 (112.93)	10.46 (108.95)	10.56 (110.94)	11.52 (132.16)	11.57 (133.46)	11.55 (132.81)	12.82 (163.94)	12.92 (166.52)	12.87 (165.23)	12.14 (146.88)	12.14 (146.96)	12.14 (146.92)
D2W8	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)

D3W1	7.74 (59.34)	5.89 (34.24)	6.88 (46.79)	5.63 (31.16)	5.89 (34.24)	5.76 (32.7)	7.45 (54.93)	7.41 (54.45)	7.43 (54.69)	8.51 (71.93)	8.77 (76.42)	8.64 (74.18)	7.84 (60.93)	7.42 (54.63)	7.63 (57.78)
D3W2	8.38 (69.75)	6.63 (43.49)	7.56 (56.62)	6.38 (40.19)	6.63 (43.49)	6.51 (41.84)	8.56 (72.77)	8.38 (69.65)	8.47 (71.21)	9.73 (94.27)	9.66 (92.74)	9.70 (93.51)	9.18 (83.77)	8.50 (71.76)	8.85 (77.77)
D3W3	8.71 (75.37)	7.02 (48.83)	7.91 (62.1)	6.66 (43.86)	7.02 (48.83)	6.84 (46.35)	9.03 (81.06)	8.85 (77.81)	8.94 (79.43)	10.27 (105.06)	10.04 (100.28)	10.16 (102.67)	9.70 (93.56)	8.95 (79.69)	9.33 (86.62)
D3W4	9.50 (89.74)	7.82 (60.68)	8.70 (75.21)	7.54 (56.4)	7.82 (60.68)	7.68 (58.54)	9.86 (96.68)	9.69 (93.36)	9.77 (95.02)	11.23 (125.68)	10.85 (117.2)	11.04 (121.44)	10.71 (114.18)	9.77 (95.03)	10.25 (104.6)
D3W5	9.06 (81.56)	7.45 (55.05)	8.29 (68.3)	7.10 (49.87)	7.45 (55.05)	7.28 (52.46)	9.55 (90.71)	9.23 (84.69)	9.39 (87.7)	10.92 (118.71)	10.44 (108.5)	10.68 (113.61)	10.38 (107.21)	9.29 (85.88)	9.85 (96.55)
D3W6	8.08 (64.77)	6.30 (39.22)	7.24 (51.99)	6.08 (36.48)	6.30 (39.22)	6.19 (37.85)	8.00 (63.45)	7.86 (61.35)	7.93 (62.4)	9.14 (82.95)	9.21 (84.29)	9.17 (83.62)	8.51 (71.95)	8.04 (64.21)	8.28 (68.08)
D3W7	10.31 (105.86)	10.07 (100.98)	10.19 (103.42)	11.09 (122.45)	10.07 (100.98)	10.59 (111.71)	12.79 (163.04)	11.09 (122.49)	11.97 (142.76)	14.03 (196.22)	12.43 (154.07)	13.25 (175.15)	13.42 (179.67)	11.64 (135.05)	12.56 (157.36)
D3W8	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)
SE (m±)															
D*W	0.22	0.18	0.20	0.23	0.31	0.27	0.28	0.31	0.30	0.31	0.25	0.28	0.28	0.20	0.24
W*D	0.22	0.26	0.24	0.24	0.30	0.27	0.22	0.28	0.25	0.27	0.34	0.31	0.29	0.26	0.28
C.D.at 5%															
D*W	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
W*D	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

* Figures in parentheses indicate original values

** The square root transformed value of (X+0.5) was used for statistical analysis

Table 2: Effect of dates of sowing and weed management practices on total weed dry weight of summer sesame

Total weed dry weight (gm⁻²)															
	30 DAS			45 DAS			60 DAS			75 DAS			AT HARVEST		
	2022	2023	pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled
Date of sowing															
D1	9.52 (90.12)	8.91 (78.93)	8.54 (72.50)	8.77 (76.43)	8.31 (68.58)	8.54 (72.50)	10.55 (110.83)	7.38 (53.99)	9.11 (82.41)	11.53 (132.42)	11.32 (127.70)	11.43 (130.06)	10.93 (118.96)	10.50 (109.79)	10.72 (114.37)
D2	7.03 (48.97)	6.44 (40.99)	6.11 (37.50)	6.33 (39.54)	6.00 (35.46)	6.16 (37.50)	8.71 (75.33)	6.76 (45.18)	7.79 (60.26)	9.28 (85.66)	8.67 (74.68)	8.98 (80.17)	8.55 (72.58)	7.74 (59.42)	8.15 (66.00)
D3	8.50 (71.81)	7.92 (62.18)	7.47 (55.27)	7.70 (58.78)	7.23 (51.76)	7.47 (55.27)	9.68 (93.24)	6.21 (38.02)	8.13 (65.63)	10.65 (112.86)	10.13 (102.17)	10.39 (107.52)	10.15 (102.61)	9.08 (81.96)	9.63 (92.28)
SE (m±)	0.21	0.29	0.26	0.29	0.27	0.24	0.29	0.28	0.26	0.50	0.48	0.49	0.64	0.56	0.58
C.D.at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Weed management practices															
W1	6.25 (38.54)	4.87 (23.21)	5.60 (30.88)	4.77 (22.28)	3.64 (12.72)	4.24 (17.50)	6.50 (41.76)	5.90 (34.36)	6.21 (38.06)	7.55 (56.57)	6.98 (48.18)	7.27 (52.37)	6.57 (42.73)	5.42 (28.88)	6.03 (35.81)
W2	7.65 (58.05)	6.79 (45.57)	7.23 (51.81)	6.20 (37.90)	5.50 (29.74)	5.86 (33.82)	8.20 (66.70)	6.49 (41.58)	7.39 (54.14)	9.47 (89.16)	8.71 (75.42)	9.10 (82.29)	8.83 (77.44)	7.67 (58.31)	8.27 (67.87)
W3	8.18 (66.38)	7.30 (52.79)	7.75 (59.59)	6.71 (44.52)	6.38 (40.26)	6.55 (42.39)	8.68 (74.76)	6.81 (45.86)	7.80 (60.31)	10.03 (100.17)	9.24 (84.96)	9.65 (92.57)	9.30 (85.99)	8.27 (67.93)	8.80 (76.96)
W4	8.90 (78.73)	8.82 (77.33)	8.86 (78.03)	7.85 (61.09)	7.44 (54.78)	7.64 (57.94)	9.51 (90.00)	7.46 (55.14)	8.55 (72.57)	10.85 (117.24)	10.76 (115.32)	10.81 (116.28)	10.18 (103.16)	10.10 (101.49)	14.14 (102.33)
W5	8.42 (70.38)	7.88 (61.59)	18.15 (65.98)	7.15 (50.68)	6.91 (47.20)	7.03 (48.94)	8.98 (80.06)	7.11 (50.06)	8.10 (65.06)	10.29 (105.35)	9.98 (99.13)	10.14 (102.24)	9.70 (93.65)	9.19 (83.94)	9.45 (88.80)
W6	7.27 (52.35)	5.83 (33.44)	6.59 (42.90)	5.57 (30.52)	4.66 (21.18)	5.13 (25.85)	7.55 (56.55)	6.18 (37.68)	6.90 (47.12)	8.69 (75.02)	7.78 (60.02)	8.25 (67.52)	7.45 (55.01)	6.65 (43.71)	7.06 (49.36)
W7	14.09 (197.96)	13.86 (191.67)	13.98 (194.82)	14.82 (218.99)	14.49 (209.57)	14.66 (214.28)	18.32 (335.23)	8.79 (76.74)	14.37 (205.98)	18.42 (338.97)	18.15 (329.10)	18.29 (334.04)	18.08 (326.39)	16.91 (285.53)	17.51 (305.96)
W8	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)
SEm±	0.26	0.31	0.29	0.27	0.29	0.24	0.36	0.31	0.32	0.53	0.49	0.51	0.61	0.55	0.53
C.D.at 5%	0.74	0.99	0.83	0.78	0.89	0.66	1.04	0.91	0.94	1.52	1.47	1.48	1.76	1.55	1.56

* Figures in parentheses indicate original values

** The square root transformed value of (X+0.5) was used for statistical analysis

Interaction (DxW)															
D1W1	7.92 (62.19)	6.66 (43.9)	7.32 (53.05)	6.39 (40.28)	5.55 (30.25)	5.98 (35.26)	8.19 (66.54)	6.57 (42.62)	7.42 (54.58)	9.28 (85.54)	8.97 (79.89)	9.12 (82.71)	8.69 (75.09)	7.72 (59.14)	8.22 (67.11)
D1W2	9.02 (80.81)	8.22 (66.99)	8.63 (73.9)	7.64 (57.84)	7.01 (48.63)	7.33 (53.24)	9.30 (86.08)	7.10 (49.84)	8.27 (67.96)	10.74 (114.82)	10.30 (105.58)	10.52 (110.2)	10.15 (102.5)	9.34 (86.81)	9.76 (94.69)
D1W3	9.48 (89.39)	8.65 (74.4)	9.08 (81.89)	8.12 (65.44)	7.76 (59.71)	7.94 (62.58)	9.76 (94.69)	7.39 (54.12)	8.66 (74.41)	11.19 (124.66)	10.81 (116.41)	11.00 (120.53)	10.14 (102.3)	9.94 (98.32)	10.04 (100.3)
D1W4	10.14	9.98	10.06	9.43	8.70	9.07	10.47	7.99	9.32	12.04	12.12	12.08	11.39	11.53	11.45

	(102.35)	(99.16)	(100.75)	(88.4)	(75.18)	(81.79)	(109.15)	(63.41)	(86.28)	(144.45)	(146.28)	(145.36)	(129.2)	(132.37)	(130.7)
D1W5	9.74 (94.29)	9.16 (83.42)	9.45 (88.86)	8.56 (72.73)	8.24 (67.46)	8.40 (70.1)	9.98 (99.04)	7.67 (58.32)	8.90 (78.68)	11.42 (129.84)	11.43 (130.17)	11.42 (130.01)	11.09 (122.4)	10.71 (114.15)	10.89 (118.2)
D1W6	8.58 (73.04)	7.35 (53.49)	7.98 (63.26)	7.02 (48.79)	6.31 (39.32)	6.67 (44.05)	8.81 (77.15)	6.81 (45.94)	7.88 (61.54)	9.95 (98.57)	9.61 (91.89)	9.78 (95.23)	8.73 (75.77)	8.67 (74.59)	8.70 (75.18)
D1W7	14.81 (218.89)	14.51 (210.12)	14.66 (214.5)	15.44 (237.97)	15.12 (228.08)	15.28 (233.03)	18.83 (354.02)	9.25 (85)	14.83 (219.51)	19.03 (361.47)	18.76 (351.36)	18.89 (356.42)	18.57 (344.2)	17.71 (312.98)	18.14 (328.6)
D1W8	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)
D2W1	3.83 (14.17)	1.32 (1.25)	2.87 (7.71)	2.04 (3.65)	2.48 (5.63)	2.27 (4.64)	3.88 (14.52)	5.86 (33.81)	4.97 (24.16)	4.32 (18.12)	4.11 (16.37)	4.21 (17.24)	3.91 (14.77)	3.81 (13.99)	3.86 (14.38)
D2W2	5.93 (34.63)	4.83 (22.84)	5.41 (28.74)	4.45 (19.29)	3.59 (12.39)	4.04 (15.84)	6.96 (47.95)	6.44 (41.03)	6.71 (44.49)	7.85 (61.07)	6.55 (42.42)	7.23 (51.75)	7.20 (51.32)	5.28 (27.34)	6.31 (39.33)
D2W3	6.47 (41.37)	5.43 (29.03)	5.97 (35.2)	4.61 (20.73)	4.99 (24.36)	4.80 (22.54)	7.45 (54.97)	6.77 (45.32)	7.12 (50.14)	8.65 (74.29)	7.29 (52.64)	8.00 (63.46)	8.02 (63.79)	6.18 (37.67)	7.16 (50.73)
D2W4	7.40 (54.33)	7.37 (53.79)	7.39 (54.06)	6.12 (36.98)	5.41 (28.72)	5.77 (32.85)	8.57 (72.93)	7.42 (54.6)	8.02 (63.76)	9.49 (89.58)	9.21 (84.26)	9.35 (86.92)	8.72 (75.58)	8.44 (70.72)	8.58 (73.15)
D2W5	6.75 (45.02)	6.21 (38.05)	6.48 (41.54)	5.27 (27.3)	5.16 (26.11)	5.22 (26.71)	7.90 (61.97)	7.07 (49.52)	7.50 (55.74)	9.01 (80.62)	8.18 (66.4)	8.60 (73.51)	7.91 (62.1)	7.35 (53.5)	7.64 (57.8)
D2W6	5.05 (25.01)	3.02 (8.62)	4.16 (16.82)	2.89 (7.88)	1.49 (1.71)	2.30 (4.8)	5.72 (32.17)	6.13 (37.13)	5.93 (34.65)	6.53 (42.13)	5.28 (27.37)	5.94 (34.75)	4.23 (17.38)	3.80 (13.94)	4.02 (15.66)
D2W7	13.33 (177.2)	13.22 (174.33)	13.28 (175.76)	14.18 (200.45)	13.98 (194.98)	14.08 (197.71)	17.85 (318.11)	8.76 (76.19)	14.06 (197.15)	17.89 (319.45)	17.56 (307.99)	17.73 (313.72)	17.58 (308.7)	16.48 (271.18)	17.04 (289.94)
D2W8	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)
D3W1	6.31 (39.26)	5.00 (24.49)	5.69 (31.88)	4.84 (22.93)	3.61 (12.54)	4.27 (17.73)	6.69 (44.21)	5.21 (26.64)	5.99 (35.43)	8.16 (66.04)	6.98 (48.28)	7.59 (57.16)	7.20 (51.34)	5.20 (26.51)	6.28 (38.92)
D3W2	7.69 (58.7)	6.88 (46.86)	7.30 (52.78)	6.09 (36.57)	5.36 (28.2)	5.73 (32.38)	8.16 (66.07)	5.86 (33.86)	7.10 (49.97)	9.60 (91.6)	8.87 (78.25)	9.24 (84.92)	8.88 (78.44)	7.83 (60.77)	8.37 (69.6)
D3W3	8.30 (68.4)	7.45 (54.94)	7.88 (61.67)	6.92 (47.4)	6.10 (36.7)	6.52 (42.05)	8.67 (74.63)	6.22 (38.15)	7.54 (56.39)	10.10 (101.58)	9.29 (85.83)	9.71 (93.7)	9.61 (91.83)	8.27 (67.82)	8.96 (79.82)
D3W4	8.95 (79.52)	8.92 (79.03)	8.93 (79.28)	7.64 (57.9)	7.81 (60.43)	7.72 (59.17)	9.40 (87.92)	6.92 (47.43)	8.26 (67.67)	10.87 (117.7)	10.77 (115.44)	10.82 (116.57)	10.26 (104.7)	10.09 (101.38)	10.18 (103.04)
D3W5	8.50 (71.81)	7.99 (63.29)	8.25 (67.55)	7.25 (52)	6.97 (48.03)	7.11 (50.02)	8.93 (79.16)	6.55 (42.35)	7.83 (60.76)	10.30 (105.59)	10.07 (100.83)	10.18 (103.21)	9.85 (96.43)	9.20 (84.16)	9.53 (90.29)
D3W6	7.71 (59)	6.22 (38.23)	7.01 (48.61)	5.95 (34.89)	4.80 (22.51)	5.40 (28.7)	7.80 (60.34)	5.52 (29.96)	6.76 (45.15)	9.21 (84.37)	7.83 (60.8)	8.55 (72.59)	8.51 (71.87)	6.56 (42.59)	7.60 (57.23)
D3W7	14.08 (197.81)	13.82 (190.57)	13.95 (194.19)	14.80 (218.56)	14.36 (205.65)	14.58 (212.1)	18.28 (333.56)	8.34 (69.02)	14.21 (201.29)	18.34 (336)	18.12 (327.95)	18.23 (331.97)	18.08 (326.25)	16.52 (272.44)	17.32 (299.34)
D3W8	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)
SE (m±)															
D*W	0.20	0.26	0.23	0.25	0.23	0.24	0.27	0.26	0.27	0.48	0.44	0.46	0.61	0.52	0.57
W*D	0.24	0.30	0.27	0.22	0.27	0.25	0.34	0.30	0.32	0.48	0.46	0.47	0.58	0.51	0.55
C.D.at 5%															
D*W	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
W*D	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

* Figures in parentheses indicate original values

** The square root transformed value of (X+0.5) was used for statistical analysis

Table 3: Effect of dates of sowing and weed management practices on weed control efficiency and weed index of summer sesame

Weed control efficiency (%)																Weed Index (%)		
	30 DAS			45 DAS			60 DAS			75 DAS			AT HARVEST					
	2022	2023	pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled
Date of sowing																		
D1	58.81	69.85	60.60	67.88	69.85	68.87	68.70	65.29	66.99	63.36	63.63	63.49	63.19	57.87	60.53	12.57	10.866	11.718
D2	72.35	81.74	74.39	80.30	81.74	81.02	76.32	77.10	76.71	73.18	75.75	74.46	74.24	73.97	74.105	10.95	8.911	9.985
D3	63.66	74.75	65.49	73.09	74.75	73.92	72.04	69.80	70.92	66.40	68.82	67.61	66.29	64.05	65.17	12.22	9.024	10.567
SE (m±)	2.41	2.32	2.36	1.99	1.92	1.95	1.89	1.91	1.90	1.76	1.71	1.73	1.61	1.41	1.51	0.526	0.838	0.372
C.D.at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Weed management practices																		
W1	81.23	88.45	84.84	90.27	94.28	92.27	87.80	88.80	88.30	83.67	85.71	84.69	78.55	78.18	78.365	1.34	2.16	2.99
W2	71.26	76.72	73.99	83.11	86.10	84.61	80.27	79.35	79.81	73.94	77.42	75.68	67.76	67.2	67.48	4.51	5.67	6.83
W3	67.04	72.95	69.99	80.15	81.03	80.59	77.86	75.64	76.75	70.66	74.51	72.59	65.06	62.51	63.785	6.02	6.62	7.22
W4	60.72	60.11	60.42	72.58	74.17	73.37	73.28	66.62	69.95	65.63	65.22	65.43	59.85	50.68	55.265	7.55	8.61	9.67
W5	65.04	68.34	66.69	77.34	77.79	77.56	76.27	71.69	73.98	69.13	70.19	69.66	62.83	56.25	59.54	7.05	7.66	8.27
W6	74.22	83.12	78.67	86.61	90.23	88.42	83.34	83.76	83.55	78.14	82.13	80.14	74.7	73.07	73.885	2.28	3.09	3.90
W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.04	51.755	55.47

W8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SEm±	2.30	2.41	2.35	2.06	1.96	2.02	2.03	1.98	2.00	1.70	1.82	1.76	1.58	1.49	1.53	0.221	0.226	0.234
C.D.at 5%	6.56	6.72	6.83	6.18	5.82	5.71	5.90	5.94	5.89	5.24	5.00	5.35	4.98	5.13	5.29	0.678	0.706	0.742
Interaction (DxW)																		
D1W1	71.58	79.05	75.32	83.10	86.68	84.89	81.22	78.50	79.86	76.34	77.23	76.79	78.19	75.33	76.76	6.37	3.38	4.87
D1W2	63.07	68.05	65.56	75.72	78.58	77.15	75.69	72.93	74.31	68.23	69.91	69.07	70.20	66.66	68.43	4.10	2.38	3.24
D1W3	59.13	64.51	61.82	72.49	73.70	73.09	73.25	68.63	70.94	65.50	66.83	66.16	70.25	60.21	65.23	7.32	4.70	6.01
D1W4	53.19	52.77	52.98	62.79	66.85	64.82	69.15	60.53	64.84	60.01	58.31	59.16	62.44	51.11	56.78	10.85	7.88	9.37
D1W5	56.91	60.23	58.57	69.43	70.32	69.88	72.03	65.76	68.89	64.07	62.91	63.49	64.42	56.39	60.40	7.54	6.28	6.91
D1W6	66.64	74.50	70.57	79.54	82.69	81.11	78.22	75.98	77.10	72.74	73.82	73.28	77.99	71.26	74.62	4.02	1.40	2.71
D1W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	45.26	51.43
D1W8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00
D2W1	85.89	80.00	83.45	92.25	89.04	91.65	79.89	86.30	83.09	74.82	72.12	73.97	72.39	70.84	71.11	13.72	14.66	14.19
D2W2	75.89	80.00	75.45	86.25	82.04	84.65	72.89	78.30	76.09	68.82	70.12	68.97	65.39	64.84	64.11	4.35	2.28	3.31
D2W3	47.62	57.37	52.5	61.53	66.46	64	59.41	58.5	58.95	52.38	58.95	55.66	55.47	57.85	56.66	6.14	4.50	5.32
D2W4	55.19	57.77	56.98	60.79	59.85	59.82	54.15	52.53	52.84	50.01	48.31	48.16	49.44	46.11	48.78	9.52	7.54	8.53
D2W5	74.57	78.09	76.33	86.39	86.50	86.44	80.52	78.88	79.70	74.75	78.43	76.59	79.87	76.17	78.02	8.51	6.01	7.26
D2W6	79.89	82.00	80.45	90.25	88.04	88.65	76.89	84.30	80.09	72.82	70.12	70.97	71.39	68.84	69.11	2.55	1.34	1.94
D2W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.79	50.60	53.20
D2W8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00
D3W1	76.12	74.87	74	88.03	83.96	86.5	78.91	79	78.45	72.88	76.45	75.16	72.97	75.35	74.16	4.94	3.11	3.84
D3W2	67.12	69.87	68.67	72.03	84.96	83.5	73.91	77.78	75.45	71.88	70.45	70.16	70.44	768.43	68.43	3.53	2.19	2.73
D3W3	62.65	62.71	62.18	78.20	78.53	78.36	78.26	72.43	75.35	70.12	69.97	69.95	68.44	67.43	67.43	7.61	4.33	5.69
D3W4	59.72	58.47	59.10	73.43	70.49	71.96	73.63	66.42	70.02	64.94	64.75	64.85	59.94	50.75	50.85	9.31	7.24	7.94
D3W5	63.65	66.71	65.18	76.20	76.53	76.36	76.26	70.43	73.26	68.56	69.22	68.89	70.44	62.43	66.43	9.29	5.78	7.19
D3W6	65.12	74.87	70	79.03	83.96	81.5	76.91	76	76.45	71.88	73.45	72.16	70.44	71.43	70.43	2.61	1.29	1.85
D3W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.18	48.26	50.64
D3W8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00
SE (m±)																		
D*W	2.41	2.32	2.36	1.99	1.92	1.95	1.89	1.91	1.90	1.71	1.68	1.69	1.55	1.47	1.51	1.867	2.968	1.529
W*D	2.30	2.41	2.35	2.06	1.96	2.02	2.03	1.98	2.00	1.59	1.73	1.66	1.49	1.41	1.46	2.136	3.465	1.893
C.D.at 5%																		
D*W	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
W*D	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

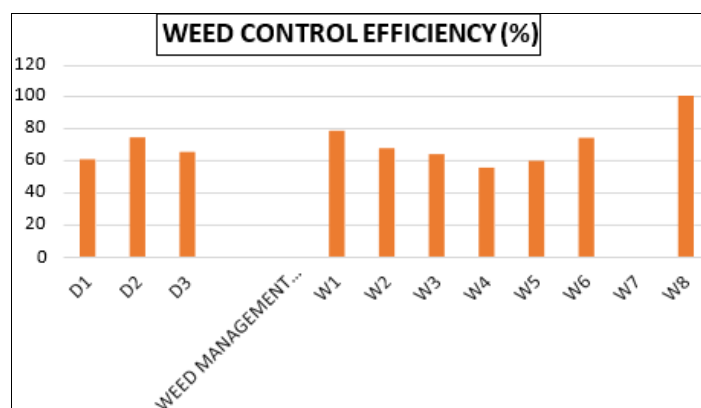


Fig 1: Graphical representation of weed control efficiency at harvest

Conclusion

Weed parameters in sesame (weed density, weed dry weight, weed control efficiency and weed index) were significantly influenced by subplot treatments only and main plots and interaction effects were found to be non significant.

Among the subplot treatments, application of Pendimethalin @ 1 kg a.i. ha⁻¹ (2 DAS) + Hand weeding (30 DAS) i.e. W₁ recorded significantly lower total weed density (7.94 m⁻²), total weed dry weight (6.03 g m⁻²) and higher weed control efficiency (92.27%) as well as weed index (2.16%). Maximum total weed density (12.75 m⁻²), total weed dry weight (17.51 g m⁻²) and weed index (51.75%) were observed in weedy check (W₇).

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