**Effect of dates of sowing and weed management practices on grass weed, sedge weed and broad leaved weed density of summer sesame**

**ABSTRACT**

At Instructional Farm in Jaguli, a field experiment was carried out in the summer of 2022 and 2023 at 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@ 1kga.i. ha-1(2 DAS)+Hand weeding(30 DAS),W3: Hand weeding(15DAS)+ Quizalofop ethyl @ 50 g a.i. ha-1 (30 DAS), W4: Pendimethalin @ 1 kg a.i.ha-1 (2 DAS) + Quizalofop ethyl @ 50 ga.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(30DAS),W7:Weedy check and W8:Weed free check. Sesame variety ‘Savitri’was chosen for the experiment. The weed density (Grass weed density, sedge weed density, broad leaved density and total weed density were significantly influenced by weed management practices only. Interactions between dates of sowing and weed management practices were found to be non-significant.

Among the weed management practices, (W1) Pendimethalin @ 1 kg a.i. ha-1 (2 DAS) + Hand weeding 30 DAS observed significantly lower grass, weed, sedge weed, broad leaved weed and total weed density (7.94 m-2) were noticed. The highest total weed density (12.75 m-2) was observed in weedy check (W7).

**Keywords:** *Weed, Grasses, dates of sowing, sedge, herbicides.*

**INTRODUCTION**

Sesame (*Sesamum indicum* L.) is a 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). Boureima et al. (2011) 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 (Weiss, 1983). 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 specific cultivars used(Brigham, 1985). 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). 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). 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. (El-Bakheit, 1985)**.** Delayed sowing consequently shortens the maturity period of sesame, which can affect its overall growth and yield potential. (Stumpf, 1959).

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).

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). 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% (Ibrahim *et al*., 1988). Amare *et al.* (2009) 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 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 onMarch 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@ 1kga.i. ha-1(2 DAS)+Hand weeding(30 DAS),W3: Handweeding(15DAS) + Quizalofop ethyl @ 50 g a.i. ha-1 (30 DAS), W4: Pendimethalin @ 1 kg a.i.ha-1 (2 DAS) + Quizalofop ethyl @ 50 ga.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 protectiontechniques were followed. “Observation like plant height, drymatter accumulation, leaf area index, number of branches per plant, number of capsules perplants, number of seeds per capsule, seed yieldand 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 wasd one plot wise and the seed yield from the netplot was converted into kg ha-1to which the yieldfrom five tagged plants was also added. For calculating gross return, net return and B:C ratio.

**RESULTS AND DISCUSSION**

**Weed Density:**

Weed density in sesame was significantly influenced by different weed management practices.

Dates of sowing and Interaction between dates of sowing and weed management practices were

found to be non-significant. Hand weeding and post- emergence application of herbicides were

not imposed by the time of sampling at 30 DAS.

1. **Grasses**

From the data, it was found that grassy weed population had been increased with the advancement of growth stages in cases of all the treatments, grassy weeds had been decreased at 45 DAS and after that increased subsequently. The highest weed population was found in the weedy check treatment (W7) which was significantly higher than any other treatments (Table.1).

From the data, it was found that grassy weed population had been increased with the advancement of growth stages in cases of all the treatments, grassy weeds had been decreased at 45 DAS and after that increased subsequently. The highest weed population was found in the weedy check treatment (W7) which was significantly higher than any other treatments (Table.2).

At 30 DAS, the lowest number of grassy weed population (0.71 m-2) was recorded in weed free plot (W8) followed by W1 (Pendimethalin @ 1 kg a.i ha-1 at 2 DAS + one hand weeding at 30 DAS (3.79 m-2 ) whereas weedy check (W7) recorded the maximum number (5.48 m-2) of grassy weed population.

Among the herbicidal treatments, Pendimethalin @1 kg a.i ha-1 (2 DAS) + Quizalofop ethyl @ 50 g a.i ha-1 (30 DAS i.e.W4 noticed highest grassy weed density( 5.38m-2), whereas Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS i.e.W1 observed lowest grassy weed (3.79 m-2) population.

Weed free plot (W8) registered lowest grassy weed population (0.71 m-2) followed by W1 (Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS (2.15 m-2 ), however, weedy check (W7) recorded the highest grassy weed population (6.43 m-2) at 45 DAS.

At 60 DAS, all the weed control treatments gave better results than the weedy check treatment. Among them, weed free plot (W8) recorded minimum number of grassy weeds (0.71 m-2). Among the herbicidal treated plots (single or combined), Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS i.e.W1 controlled weeds very effectively and registered minimum number of grassy weeds (3.10 m-2), however, Pendimethalin @1 kg a.i ha-1 (2 DAS) + Quizalofop ethyl @ 50 g ai, ha-1 (30 DAS treated plot i.e. W4 noticed maximum grassy weed density (5.15 m-2).

From 75 DAS to at harvest, grassy weed population increased with the slower increasing rate in all the treatments except the treatment W7 (6.87 m-2 to 7.14 m-2 respectively).

These results were attributed to the control of weeds at germination phase by the application of pre emergence herbicides and significant reduction of their population at later growth stage as late germinating weeds were controlled by post emergence application of herbicides. Similar findings were also reported by Sheoran *et al*. (2012) and Mruthul *et al.* (2014).

1. **Sedges**

At 30 DAS, weed free plot (W8) gave best performance in reducing sedge weed population (0.71 m-2) which was significantly superior over other treatments. The maximum sedge weed population was found in W7 (weedy check) which was (6.17 m-2.) followed by Pendimethalin @1 kg a.i ha-1 (2 DAS) + Quizalofop ethyl @ 50 g ai, ha-1 (30 DAS treated plot i.e. W4 noticed highest sedge weed density (5.83 m-2), whereas Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS i.e.W1 observed lowest sedge weed (4.31 m-2) population. (Table.2)

At 45 DAS, Pendimethalin @ 1 kg a.i ha-1(2 DAS) + one hand weeding (HW) at 30 DAS recorded decreasing rate in sedge weed population. The density of sedge leaved weeds was decreased than its previous observation. But there was increased rate of sedge leave weeds population was found in weedy check W7 (6.57 m-2).

From 60 DAS to harvest sedge weed population increased with the slower increasing rate in all the treatments than the treatment W7 (7.35 m-2, 8.07 m-2 and 7.79 m- 2 respectively). Pre-emergence herbicides were used to reduce weeds during the germination phase and early post-emergence herbicides applications were used to suppress late-germinating weeds. These results corroborated the findings of Mruthul *et al.* (2014)

**3. Broad leaved weeds**

From the data revealed that at 30 DAS, among all the treatments, number of broad leaved weed population was minimum in weed free plot (W8) plot (0.71 m-2) followed by W1 Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS and maximum (17.87 m-2) was registered in weedy check (W7).

At 45 DAS, broad leaved weed population was low in W1 Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS and W6 (Hand weeding twice at 15 and 30 DAS i.e. 2.96 and 3.32 m-2 respectively ). Maximum weed population was noticed in weedy check W7 (6.35 m-2). (Table.3)

At 60 DAS, the maximum broad leaved weed density (7.51 m-2) was recorded in weedy check (W7) whereas weed free plot (W8) recorded minimum weed number (0.71 m-2). Out of different chemicals, Pendimethalin @1 kg a.i ha-1 (2 DAS) + Quizalofop ethyl @ 50 g a.i, ha-1 (30 DAS (W4) had shown poor performance in keeping the broad leaved weeds under control(7.51 m-2).

From 60 DAS to at harvest, broad leaved weed density followed an increasing trend in all treatments. The maximum weed density was found in treatment W7 and minimum density was noticed in case of W8 treatment. Among the herbicidal treatments, Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS i.e. W1 was found to be superior(less weed density) over other treatments. These results were attributed due to the control of weeds at germination phase by the application of pre emergence herbicide viz., pendimethalin and significant reduction of late germinating weeds were controlled by post emergence application of herbicide viz., quizalofop ethyl. These results were in agreement with Sujithra *et al*. (2018).

**4.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.4)

The above findings thus indicated that weed free plot (W8) and Pendimethalin @ 1 kg a.i ha-1 (2 DAS) + one hand weeding (HW) at 30 DAS i.e.W1 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).

**Table.1 Effect of dates of sowing and weed management practices on grass weed density of summer sesame**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Grass 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** | 4.99  (24.42) | 5.71  (32.07) | 5.36  (28.25) | 4.17  (16.90) | 4.59  (20.55) | 4.38  (18.72) | 5.09  (25.38) | 5.44  (29.06) | 5.26  (27.22) | 5.85  (33.72) | 6.30  (39.20) | 6.08  (36.46) | 5.56  (30.42) | 5.82  (33.34) | 5.69  (31.88) |
| **D2** | 3.22  (9.86) | 3.70  (13.17) | 3.47  (11.51) | 2.45  (5.48) | 2.80  (7.34) | 2.63  (6.41) | 3.23  (9.96) | 3.62  (12.58) | 3.43  (11.27) | 3.87  (14.48) | 4.20  (17.13 | 4.04  (15.81) | 3.25  (10.07) | 3.65  (12.81) | 3.46  (11.44) |
| **D3** | 4.01  (15.60) | 4.61  (20.72) | 4.32  (18.16) | 3.31  (10.43) | 3.79  (13.89) | 3.56  (12.16) | 4.18  (16.97) | 4.55  (20.21) | 4.37  (18.59) | 4.99  (24.43) | 5.41  (28.81) | 5.21  (26.62) | 4.51  (19.86) | 5.14  (25.96) | 4.84  (22.91) |
| **SE (m±)** | 0.33 | 0.35 | 0.32 | 0.36 | 0.31 | 0.233 | 0.34 | 0.31 | 0.32 | 0.31 | 0.36 | 0.32 | 0.29 | 0.34 | 0.30 |
| **C.D.at 5%** | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Weed management practices** | | | | | | | | | | | | | | | |
| **W1** | 3.37  (10.84) | 4.17  (16.91) | 3.79  (13.87) | 1.27  (1.12) | 2.15  (4.12) | 1.77  (2.62) | 2.76  (7.12) | 3.41  (11.12) | 3.10  (9.12) | 4.09  (16.19) | 4.09  (21.54) | 4.40  (18.86) | 3.07  (8.95) | 3.85  (14.34) | 3.48  (11.64) |
| **W2** | 4.09  (16.22) | 4.76  (22.15) | 4.44  (19.19) | 2.66  (6.55) | 3.32  (10.55) | 3.01  (8.55) | 3.92  (14.88) | 4.30  (18.02) | 4.12  (16.45) | 4.62  (20.83) | 5.21  (26.67) | 4.92  (23.75) | 4.22  (17.33) | 4.67  (21.35) | 4.45  (19.34) |
| **W3** | 4.39  (18.750 | 5.04  (24.93) | 4.73  (21.84) | 3.12  (9.26) | 3.73  (13.42) | 3.44  (11.34) | 4.25  (17.59) | 4.63  (20.92) | 4.45  (19.26) | 5.07  (25.17) | 5.49  (29.63) | 5.28  (27.40) | 4.71  (21.67) | 4.96  (24.14) | 4.84  (22.91) |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **W4** | 4.98  (24.27) | | 5.75  (32.60) | | 5.38  (28.44) | | 4.08  (16.14) | | 4.42  (19.06) | | 4.25  (17.60) | | 4.96  (24.06) | | 5.33  (27.89) | | 5.15  (25.98) | | 5.75  (32.62) | | 6.07  (36.31) | | 5.56  (34.46) | | 5.38  (28.45) | | 5.76  (32.73) | | 5.58  (30.59) | |
| **W5** | 4.69  (21.45) | | 5.41  (28.79) | | 5.06  (25.12) | | 3.52  (11.92) | | 4.06  (16.00) | | 3.80  (13.96) | | 4.62  (20.84) | | 4.97  (24.17) | | 4.80  (22.50) | | 5.37  (28.34) | | 5.75  (32.59) | | 4.65  (30.46) | | 5.07  (25.17) | | 5.30  (27.64) | | 5.19  (26.40) | |
| **W6** | 3.75  (13.56) | | 4.47  (19.46) | | 4.12  (16.51) | | 2.04  (3.66) | | 2.81  (7.39) | | 2.46  (5.53) | | 3.29  (10.31) | | 3.91  (14.81) | | 3.61  (12.56) | | 4.33  (18.22) | | 4.95  (24.01) | | 7.40  (21.11) | | 3.62  (12.63) | | 4.28  (17.80) | | 3.96  (15.22) | |
| **W7** | 5.33  (27.92) | | 5.62  (31.06) | | 5.48  (29.49) | | 6.27  (38.85) | | 6.43  (40.85) | | 6.35  (39.85) | | 6.72  (44.69) | | 6.97  (48.03) | | 6.85  (46.36) | | 7.27  (52.31) | | 7.54  (56.31) | | 3.07  (54.31) | | 6.87  (46.71) | | 7.40  (54.31) | | 7.14  (50.51) | |
| **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±** | 0.36 | | 0.31 | | 0.33 | | 0.29 | | 0.26 | | 0.23 | | 0.32 | | 0.36 | | 0.32 | | 0.34 | | 0.38 | | 0.33 | | 0.33 | | 0.31 | | 0.30 | |
| **C.D.at 5%** | 1.03 | | 0.90 | | 1.03 | | 0.84 | | 0.73 | | 0.66 | | 0.90 | | 1.08 | | 0.88 | | 0.96 | | 1.7 | | 0.99 | | 0.95 | | 0.89 | | 0.96 | |
| **Interaction (DxW)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **D1W1** | | | 4.30 | | 5.39 | | 4.88 | | 2.98 | | 3.51 | | 3.26 | | 3.98 | | 4.67 | | 4.34 | | 4.30 | | 5.39 | | 4.88 | | 2.98 | | 3.51 | | 3.26 | |
|  | | | (17.952) | | (28.602) | | (23.28) | | (8.351) | | (11.851) | | (10.1) | | (15.351) | | (21.351) | | (18.35) | | (17.952) | | (28.602) | | (23.28) | | (8.351) | | (11.851) | | (10.1) | |
| **D1W2** | | | 5.12 | | 5.95 | | 5.55 | | 3.69 | | 4.26 | | 3.98 | | 4.8 | | 5.35 | | 5.11 | | 5.1 | | 5.9 | | 5.55 | | 3.69 | | 4.26 | | 3.98 | |
|  | | | (25.666) | | (34.866) | | (30.27) | | (13.116) | | (17.616) | | (15.37) | | (23.116) | | (28.116) | | (25.62) | | (25.666) | | (34.866) | | (30.27) | | (13.116) | | (17.616) | | (15.37) | |
| **D1W3** | | | 5.34 | | 6.09 | | 5.73 | | 4.04 | | 4.70 | | 4.38 | | 5.13 | | 5.55 | | 5.35 | | 5.34 | | 6.09 | | 5.73 | | 4.04 | | 4.70 | | 4.38 | |
|  | | | (28.028) | | (36.628) | | (32.33) | | (15.822) | | (21.572) | | (18.7) | | (25.822) | | (30.322) | | (28.07) | | (28.028) | | (36.628) | | (32.33) | | (15.822) | | (21.572) | | (18.7) | |
| **D1W4** | | | 5.84 | | 6.69 | | 6.28 | | 4.95 | | 5.29 | | 5.12 | | 6.00 | | 6.20 | | 6.10 | | 5.84 | | 6.69 | | 6.28 | | 4.95 | | 5.29 | | 5.12 | |
|  | | | (33.549) | | (44.299) | | (38.92) | | (23.96) | | (27.46) | | (25.71) | | (35.46) | | (37.96) | | (36.71) | | (33.549) | | (44.299) | | (38.92) | | (23.96) | | (27.46) | | (25.71) | |
| **D1W5** | | | 5.59 | | 6.40 | | 6.01 | | 4.36 | | 4.92 | | 4.65 | | 5.81 | | 5.89 | | 5.85 | | 5.59 | | 6.40 | | 6.01 | | 4.36 | | 4.92 | | 4.65 | |
|  | | | (30.733) | | (40.483) | | (35.61) | | (18.484) | | (23.734) | | (21.11) | | (33.234) | | (34.234) | | (33.73) | | (30.733) | | (40.483) | | (35.61) | | (18.484) | | (23.734) | | (21.11) | |
| **D1W6** | | | 4.77 | | 5.63 | | 5.22 | | 3.26 | | 3.91 | | 3.60 | | 4.36 | | 5.05 | | 4.72 | | 4.77 | | 5.63 | | 5.22 | | 3.26 | | 3.91 | | 3.60 | |
|  | | | (22.258) | | (31.158) | | (26.71) | | (10.116) | | (14.787) | | (12.45) | | (18.537) | | (25.037) | | (21.79) | | (22.258) | | (31.158) | | (26.71) | | (10.116) | | (14.787) | | (12.45) | |
| **D1W7** | | | 6.14 | | 6.40 | | 6.27 | | 6.77 | | 6.92 | | 6.84 | | 7.21 | | 7.48 | | 7.35 | | 6.14 | | 6.40 | | 6.27 | | 6.77 | | 6.92 | | 6.8 | |
|  | | | (37.199) | | (40.523) | | (38.86) | | (45.35) | | (47.35) | | (46.35) | | (51.483) | | (55.483) | | (53.48) | | (37.199) | | (40.523) | | (38.86) | | (45.35) | | (47.35) | | (46.35) | |
| **D1W8** | | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | |
|  | | | (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) | |
| **D2W1** | | | 2.22 | | 2.68 | | 2.46 | | 2.41 | | 1.95 | | 2.19 | | 1.31 | | 1.40 | | 1.53 | | 2.22 | | 2.68 | | 2.46 | | 2.41 | | 1.95 | | 2.19 | |
|  | | | (4.449) | | (6.699) | | (5.57) | | (5.287) | | (3.287) | | (4.29) | | (1.213) | | (1.463) | | (1.84) | | (4.449) | | (6.699) | | (5.57) | | (5.287) | | (3.287) | | (4.29) | |
| **D2W2** | | | 2.65 | | 3.12 | | 2.89 | | 1.64 | | 1.45 | | 1.55 | | 1.97 | | 2.38 | | 2.18 | | 2.65 | | 3.12 | | 2.89 | | 1.64 | | 1.45 | | 1.55 | |
|  | | | (6.505) | | (9.255) | | (7.88) | | (2.188) | | (1.6) | | (1.89) | | (3.4) | | (5.15) | | (4.27) | | (6.505) | | (9.255) | | (7.88) | | (2.188) | | (1.6) | | (1.89) | |
| **D2W3** | | | 3.32 | | 3.90 | | 3.62 | | 1.92 | | 2.38 | | 2.16 | | 3.34 | | 3.45 | | 3.40 | | 3.32 | | 3.90 | | 3.62 | | 1.92 | | 2.38 | | 2.16 | |
|  | | | (10.525) | | (14.725) | | (12.63) | | (3.184) | | (5.184) | | (4.18) | | (10.684) | | (11.434) | | (11.06) | | (10.525) | | (14.725) | | (12.63) | | (3.184) | | (5.184) | | (4.18) | |
| **D2W4** | | | 4.07 | | 4.79 | | 4.44 | | 3.05 | | 3.44 | | 3.25 | | 3.51 | | 4.31 | | 3.93 | | 4.07 | | 4.79 | | 4.44 | | 3.05 | | 3.44 | | 3.25 | |
|  | | | (16.047) | | (22.397) | | (19.22) | | (8.822) | | (11.322) | | (10.07) | | (11.822) | | (18.072) | | (14.95) | | (16.047) | | (22.397) | | (19.22) | | (8.822) | | (11.322) | | (10.07) | |
| **D2W5** | | | 3.71 | | 4.37 | | 4.05 | | 2.52 | | 3.02 | | 2.78 | | 2.66 | | 3.85 | | 3.31 | | 4.04 | | 4.28 | | 4.17 | | 3.37 | | 3.86 | | 3.62 | |
|  | | | (13.231) | | (18.581) | | (15.91) | | (5.846) | | (8.596) | | (7.22) | | (6.596) | | (14.346) | | (10.47) | | (15.846) | | (17.846) | | (16.85) | | (10.846) | | (14.396) | | (12.62) | |
| **D2W6** | | | 2.22 | | 2.68 | | 2.46 | | 2.41 | | 1.95 | | 2.19 | | 1.31 | | 1.40 | | 1.53 | | 1.57 | | 2.73 | | 2.23 | | 2.51 | | 1.22 | | 1.97 | |
|  | | | (4.45) | | (6.70) | | (5.57) | | (5.29) | | (3.29) | | (4.29) | | (1.21) | | (1.46) | | (1.84) | | (1.96) | | (6.96) | | (4.46) | | (5.79) | | (1.00) | | (3.39) | |
| **D2W7** | | | 4.49  (19.70) | | 4.83  (22.80) | | 4.66  (21.25) | | 5.79  (33.00) | | 5.96  (35.00) | | 5.87  (34.00) | | 6.28  (38.98) | | 6.52  (41.98) | | 6.40  (40.48) | | 6.75  (45.04) | | 7.04  (49.04) | | 6.89  (47.04) | | 6.50  (41.79) | | 6.89  (47.04) | | 6.70  (44.42) | |
| **D2W8** | | | 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) | |
| **D3W1** | | | 3.26  (10.12) | | 3.99  (15.42) | | 3.64  (12.77) | | 1.34  (1.29) | | 2.07  (3.79) | | 1.59  (2.04) | | 2.51  (5.79) | | 3.32  (10.54) | | 2.94  (8.17) | | 4.10  (16.29) | | 4.93  (23.79) | | 4.53  (20.04) | | 3.51  (11.79) | | 4.54  (20.09) | | 4.05  (15.94) | |
| **D3W2** | | | 3.88  (14.58) | | 4.60  (20.68) | | 4.26  (17.63) | | 2.56  (6.06) | | 3.33  (10.56) | | 2.97  (8.31) | | 3.75  (13.56) | | 4.27  (17.71) | | 4.02  (15.63) | | 4.36  (18.48) | | 5.10  (25.48) | | 4.74  (21.98) | | 3.88  (14.58) | | 4.60  (20.68) | | 4.26  (17.63) | |
| **D3W3** | | | 4.27  (17.69) | | 4.89  (23.44) | | 4.59  (20.57) | | 3.04  (8.76) | | 3.74  (13.51) | | 3.41  (11.14) | | 4.09  (16.26) | | 4.64  (21.01) | | 4.37  (18.64) | | 5.41  (28.76) | | 5.46  (29.31) | | 5.44  (29.04) | | 5.03  (24.76) | | 5.39  (28.56) | | 5.21  (26.66) | |
| **D3W4** | | | 4.87  (23.22) | | 5.62  (31.12) | | 5.26  (27.16) | | 4.02  (15.65) | | 4.35  (18.40) | | 4.19  (17.03) | | 5.04  (24.90) | | 5.31  (27.65) | | 5.17  (26.28) | | 5.48  (29.57) | | 6.22  (38.15) | | 5.86  (33.86) | | 5.11  (25.57) | | 5.38  (28.40) | | 5.24  (26.99) | |
| **D3W5** | | | 4.57  (20.40) | | 5.27  (27.30) | | 4.93  (23.85) | | 3.45  (11.43) | | 4.02  (15.68) | | 3.75  (13.55) | | 4.81  (22.68) | | 4.94  (23.93) | | 4.88  (23.30) | | 5.54  (30.18) | | 5.82  (33.43) | | 5.68  (31.80) | | 5.35  (28.18) | | 5.52  (29.98) | | 5.44  (29.08) | |
| **D3W6** | | | 3.52  (11.92) | | 4.30  (17.97) | | 3.93  (14.95) | | 1.89  (3.06) | | 3.08  (8.98) | | 2.55  (6.02) | | 3.08  (8.98) | | 3.84  (14.23) | | 3.48  (11.60) | | 4.53  (20.06) | | 4.98  (24.26) | | 4.76  (22.16) | | 3.58  (12.31) | | 4.53  (20.03) | | 4.08  (16.17) | |
| **D3W7** | | | 5.23  (26.86) | | 5.51  (29.86) | | 5.37  (28.36) | | 6.22  (38.19) | | 6.38  (40.19) | | 6.30  (39.19) | | 6.64  (43.62) | | 6.86  (46.62) | | 6.75  (45.12) | | 7.25  (52.09) | | 7.52  (56.09) | | 7.39  (54.09) | | 6.50  (41.79) | | 7.39  (54.09) | | 6.96  (47.94) | |
| **D3W8** | | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.7  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | | 0.71  (0.0) | |
| **SE (m±)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **D\*W** | | | 0.31 | | 0.32 | | 0.315 | | 0.32 | | 0.30 | | 0.31 | | 0.31 | | 0.30 | | 0.305 | | 0.30 | | 0.32 | | 0.31 | | 0.24 | | 0.31 | | 0.28 | |
| **W\*D** | | | 0.32 | | 0.30 | | 0.31 | | 0.24 | | 0.22 | | 0.23 | | 0.30 | | 0.33 | | 0.315 | | 0.31 | | 0.34 | | 0.325 | | 0.31 | | 0.29 | | 0.30 | |
| 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 | |

**Table.2 Effect of dates of sowing and weed management practices on sedge weed density of summer sesame**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Sedge 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** | 5.57  (30.57) | | 5.91  (34.41) | | 5.74  (32.49) | | 5.22  (26.76) | | 5.00  (24.51) | | 5.11  (25.63) | | 6.25  (38.61) | | 5.94  (34.79) | | 6.10  (36.70) | | 6.85  (46.49) | | 6.58  (42.83) | | 6.72  (44.66) | | 6.48  (41.54) | | 6.14  (37.14) | | | 6.31  (39.34) | |
| **D2** | 4.16  (16.80) | | 3.92  (14.83) | | 4.04  (15.81) | | 3.49  (11.67) | | 3.34  (10.67) | | 3.42  (11.17) | | 4.52  (19.95) | | 4.23  (17.36) | | 4.38  (18.65) | | 5.34  (27.99) | | 4.65  (21.14) | | 5.01  (24.57) | | 4.75  (22.10) | | 3.92  (14.89) | | | 4.36  (18.49) | |
| **D3** | 5.08  (25.30) | | 5.18  (26.33) | | 5.13  (25.82) | | 4.38  (18.69) | | 4.58  (20.49) | | 4.48  (19.59) | | 5.31  (27.68) | | 5.50  (29.74) | | 5.40  (28.71) | | 6.32  (39.41) | | 6.08  (36.52) | | 6.20  (37.97) | | 5.83  (33.52) | | 5.74  (32.49) | | | 5.79  (33.00) | |
| **SE (m±)** | 0.16 | | 0.19 | | 0.17 | | 0.14 | | 0.19 | | 0.17 | | 0.18 | | 0.20 | | 0.19 | | 0.25 | | 0.29 | | 0.28 | | 0.30 | | 0.34 | | | 0.33 | |
| **C.D.at 5%** | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | | NS | |
| **Weed management practices** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **W1** | 4.43  (19.13) | | 4.19  (17.04) | | 4.31  (18.09) | | 3.53  (11.99) | | 3.01  (8.54) | | 3.28  (10.27) | | 4.66  (21.26) | | 4.36  (18.53) | | 4.52  (19.90) | | 5.42  (28.93) | | 4.70  (21.61) | | 5.08  (25.27) | | 4.61  (20.76) | | 4.08  (16.13) | | | 4.35  (18.45) | |
| **W2** | 5.04  (24.93) | | 5.17  (26.26) | | 5.11  (25.60) | | 4.17  (16.87) | | 4.09  (16.19) | | 4.13  (16.53) | | 5.32  (27.80) | | 5.18  (26.35) | | 5.25  (27.08) | | 6.16  (37.47) | | 5.63  (31.15) | | 5.90  (34.31) | | 5.79  (32.97) | | 5.04  (24.87) | | | 5.42  (28.92) | |
| **W3** | 5.30  (27.61) | | 5.57  (30.52) | | 5.44  (29.06) | | 4.41  (18.94) | | 4.46  (19.43) | | 4.44  (19.19) | | 5.58  (30.59) | | 5.42  (28.83) | | 5.50  (29.71) | | 6.46  (41.26) | | 6.14  (37.16) | | 6.30  (39.21) | | 6.01  (35.59) | | 5.46  (29.35) | | | 5.74  (32.47) | |
| **W4** | 5.70  (32.03) | | 5.95  (34.94) | | 5.83  (33.49) | | 4.91  (23.64) | | 5.28  (27.36) | | 5.10  (25.50) | | 6.07  (36.34) | | 6.15  (37.35) | | 6.11  (36.84) | | 7.07  (49.50) | | 6.85  (46.44) | | 6.96  (47.97) | | 6.51  (41.84) | | 6.35  (39.87) | | | 6.43  (40.85) | |
| **W5** | 5.52  (29.93) | | 5.81  (33.26) | | 5.67  (31.60) | | 4.65  (21.15) | | 4.84  (22.93) | | 4.75  (22.04) | | 5.89  (34.21) | | 5.77  (32.84) | | 5.83  (33.53) | | 6.88  (46.88) | | 6.49  (41.67) | | 6.69  (44.28) | | 6.34  (39.66) | | 5.99  (35.36) | | | 6.17  (37.51) | |
| **W6** | 4.80  (22.56) | | 4.73  (21.90) | | 4.77  (22.23) | | 3.89  (14.64) | | 3.45  (11.40) | | 3.68  (13.02) | | 5.02  (24.68) | | 4.78  (22.39) | | 4.90  (23.53) | | 5.82  (33.35) | | 5.25  (27.03) | | 5.54  (30.19) | | 5.31  (27.68) | | 4.52  (19.90) | | | 4.93  (23.79) | |
| **W7** | 6.17  (37.60) | | 6.17  (37.60) | | 6.17  (37.60) | | 6.75  (45.10) | | 6.57  (42.60) | | 6.66  (43.85) | | 7.45  (55.07) | | 7.25  (52.07) | | 7.35  (53.57) | | 8.17  (66.33) | | 7.96  (62.90) | | 8.07  (64.62) | | 7.81  (60.57) | | 7.77  (59.90) | | | 7.79  (60.24) | |
| **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±** | 0.14 | | 0.17 | | 0.15 | | 0.17 | | 0.20 | | 0.18 | | 0.18 | | 0.23 | | 0.20 | | 0.21 | | 0.26 | | 0.24 | | 0.27 | | 0.28 | | | 0.24 | |
| **C.D.at 5%** | 0.41 | | 0.49 | | 0.48 | | 0.50 | | 0.66 | | 0.55 | | 0.53 | | 0.64 | | 0.54 | | 0.61 | | 0.81 | | 0.76 | | 0.77 | | 0.81 | | | 0.65 | |
| **Interaction (DxW)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **D1W1** | | | 5.22  (26.8) | | 5.34  (28.05) | | 5.28  (27.43) | | 4.50  (19.77) | | 4.10  (16.3) | | 4.31  (18.04) | | 5.77  (32.77) | | 5.22  (26.77) | | 5.50  (29.77) | | 6.27  (38.77) | | 5.70  (32.02) | | 5.99  (35.4) | | 5.64  (31.27) | | 5.00  (24.52) | | | 5.33  (27.9) | | |
| **D1W2** | | | 5.68  (31.77) | | 6.15  (37.27) | | 5.92  (34.52) | | 5.01  (24.65) | | 4.88  (23.28) | | 4.95  (23.97) | | 6.31  (39.31) | | 5.92  (34.59) | | 6.12  (36.95) | | 6.91  (47.31) | | 6.49  (41.56) | | 6.70  (44.44) | | 6.68  (44.06) | | 5.97  (35.09) | | | 6.33  (39.58) | | |
| **D1W3** | | | 5.98  (35.28) | | 6.48  (41.53) | | 6.24  (38.41) | | 5.37  (28.38) | | 5.20  (26.52) | | 5.29  (27.45) | | 6.53  (42.1) | | 6.17  (37.52) | | 6.35  (39.81) | | 7.18  (51.1) | | 6.97  (48.02) | | 7.08  (49.56) | | 6.83  (46.1) | | 6.37  (40.02) | | | 6.60  (43.06) | | |
| **D1W4** | | | 6.34  (39.7) | | 6.82  (45.95) | | 6.58  (42.83) | | 5.71  (32.08) | | 5.91  (34.45) | | 5.81  (33.27) | | 6.95  (47.85) | | 6.79  (45.6) | | 6.87  (46.72) | | 7.74  (59.35) | | 7.57  (56.85) | | 7.66  (58.1) | | 7.25  (52.1) | | 7.11  (50.1) | | | 7.18  (51.1) | | |
| **D1W5** | | | 6.27  (38.77) | | 6.98  (48.27) | | 6.63  (43.52) | | 5.49  (29.68) | | 5.52  (30.02) | | 5.51  (29.85) | | 6.80  (45.72) | | 6.47  (41.31) | | 6.63  (43.52) | | 7.56  (56.72) | | 7.27  (52.31) | | 7.42  (54.52) | | 7.12  (50.17) | | 6.81  (45.81) | | | 6.96  (47.99) | | |
| **D1W6** | | | 5.54  (30.24) | | 5.72  (32.24) | | 5.63  (31.24) | | 4.73  (21.83) | | 4.36  (18.49) | | 4.55  (20.16) | | 6.06  (36.19) | | 5.58  (30.63) | | 5.82  (33.41) | | 6.61  (43.19) | | 6.16  (37.44) | | 6.39  (40.31) | | 6.22  (38.19) | | 5.53  (30.13) | | | 5.89  (34.16) | | |
| **D1W7** | | | 6.52  (41.97) | | 6.52  (41.97) | | 6.52  (41.97) | | 7.63  (57.71) | | 6.89  (46.97) | | 7.27  (52.34) | | 8.09  (64.91) | | 7.90  (61.91) | | 7.99  (63.41) | | 8.72  (75.47) | | 8.66  (74.41) | | 8.69  (74.94) | | 8.42  (70.41) | | 8.48  (71.41) | | | 8.45  (70.91) | | |
| **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** | | | 3.27  (10.22) | | 2.28  (4.72) | | 2.82  (7.47) | | 2.07  (3.77) | | 1.24  (1.03) | | 1.54  (1.87) | | 3.46  (11.45) | | 2.78  (7.25) | | 3.14  (9.35) | | 4.24  (17.45) | | 2.78  (7.25) | | 3.58  (12.35) | | 3.11  (9.2) | | 1.34  (1.3) | | | 2.40  (5.25) | | |
| **D2W2** | | | 4.18  (16.94) | | 3.80  (13.94) | | 3.99  (15.44) | | 3.02  (8.65) | | 2.73  (6.94) | | 2.88  (7.8) | | 4.30  (17.99) | | 3.95  (15.07) | | 4.13  (16.53) | | 5.15  (25.99) | | 4.16  (16.79) | | 4.68  (21.39) | | 4.55  (20.24) | | 3.10  (9.12) | | | 3.90  (14.68) | | |
| **D2W3** | | | 4.38  (18.69) | | 4.32  (18.19) | | 4.35  (18.44) | | 3.22  (9.88) | | 3.27  (10.19) | | 3.25  (10.04) | | 4.61  (20.77) | | 4.22  (17.32) | | 4.42  (19.05) | | 5.50  (29.77) | | 4.80  (22.57) | | 5.16  (26.17) | | 4.95  (24.02) | | 3.72  (13.37) | | | 4.38  (18.7) | | |
| **D2W4** | | | 4.86  (23.12) | | 4.81  (22.62) | | 4.83  (22.87) | | 3.82  (14.08) | | 4.32  (18.12) | | 4.07  (16.1) | | 5.20  (26.52) | | 5.15  (26.07) | | 5.18  (26.29) | | 6.21  (38.02) | | 5.71  (32.07) | | 5.96  (35.04) | | 5.52  (30.02) | | 4.96  (24.12) | | | 5.25  (27.07) | | |
| **D2W5** | | | 4.57  (20.43) | | 4.41  (18.93) | | 4.49  (19.68) | | 3.49  (11.68) | | 3.77  (13.68) | | 3.63  (12.68) | | 4.99  (24.4) | | 4.69  (21.45) | | 4.84  (22.92) | | 5.99  (35.4) | | 5.26  (27.2) | | 5.64  (31.3) | | 5.35  (28.1) | | 4.47  (19.5) | | | 4.93  (23.8) | | |
| **D2W6** | | | 3.76  (13.65) | | 3.07  (8.9) | | 3.43  (11.28) | | 2.84  (7.58) | | 1.63  (2.15) | | 2.32  (4.87) | | 3.92  (14.86) | | 3.41  (11.1) | | 3.67  (12.98) | | 4.73  (21.86) | | 3.63  (12.66) | | 4.21  (17.26) | | 4.08  (16.11) | | 2.16  (4.15) | | | 3.26  (10.13) | | |
| **D2W7** | | | 5.64  (31.33) | | 5.64  (31.33) | | 5.64  (31.33) | | 6.18  (37.71) | | 6.07  (36.33) | | 6.13  (37.02) | | 6.64  (43.59) | | 6.41  (40.59) | | 6.53  (42.09) | | 7.48  (55.45) | | 7.15  (50.59) | | 7.32  (53.02) | | 7.04  (49.09) | | 6.93  (47.59) | | | 6.99  (48.34) | | |
| **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** | | | 4.57  (20.36) | | 4.34  (18.36) | | 4.46  (19.36) | | 3.60  (12.43) | | 3.44  (11.36) | | 3.52  (11.9) | | 4.48  (19.57) | | 4.70  (21.57) | | 4.59  (20.57) | | 5.57  (30.57) | | 5.11  (25.57) | | 5.35  (28.07) | | 4.72  (21.82) | | 4.80  (22.57) | | | 4.76  (22.2) | | |
| **D3W2** | | | 5.16 | | 5.30 | | 5.23 | | 4.22 | | 4.34 | | 4.28 | | 5.16 | | 5.47 | | 5.32 | | 6.29 | | 5.97 | | 6.13 | | 5.16 | | 5.30 | | | 5.23 | | |
|  | | | (26.08) | | (27.58) | | (26.83) | | (17.32) | | (18.34) | | (17.83) | | (26.11) | | (29.39) | | (27.75) | | (39.11) | | (35.11) | | (37.11) | | (26.08) | | (27.58) | | | (26.83) | | |
| **D3W3** | | | 5.42  (28.84) | | 5.69  (31.84) | | 5.55  (30.34) | | 4.36  (18.55) | | 4.70  (21.58) | | 4.54  (20.07) | | 5.42  (28.9) | | 5.67  (31.65) | | 5.55  (30.27) | | 6.59  (42.9) | | 6.43  (40.9) | | 6.51  (41.9) | | 6.10  (36.65) | | 5.93  (34.65) | | | 6.01  (35.65) | | |
| **D3W4** | | | 5.81  (33.26) | | 6.06  (36.26) | | 5.94  (34.76) | | 5.02  (24.75) | | 5.48  (29.51) | | 5.26  (27.13) | | 5.93  (34.64) | | 6.39  (40.39) | | 6.17  (37.52) | | 7.19  (51.14) | | 7.13  (50.39) | | 7.16  (50.77) | | 6.62  (43.39) | | 6.77  (45.39) | | | 6.70  (44.39) | | |
| **D3W5** | | | 5.57  (30.58) | | 5.75  (32.58) | | 5.66  (31.58) | | 4.75  (22.1) | | 5.06  (25.08) | | 4.91  (23.59) | | 5.75  (32.52) | | 6.02  (35.77) | | 5.89  (34.14) | | 7.00  (48.52) | | 6.78  (45.52) | | 6.89  (47.02) | | 6.42  (40.72) | | 6.42  (40.77) | | | 6.42  (40.74) | | |
| **D3W6** | | | 4.93  (23.8) | | 5.00  (24.55) | | 4.97  (24.17) | | 3.87  (14.5) | | 3.75  (13.55) | | 3.81  (14.02) | | 4.85  (22.99) | | 5.09  (25.43) | | 4.97  (24.21) | | 5.96  (34.99) | | 5.61  (30.99) | | 5.79  (32.99) | | 5.41  (28.74) | | 5.09  (25.43) | | | 5.25  (27.08) | | |
| **D3W7** | | | 6.32  (39.5) | | 6.32  (39.5) | | 6.32  (39.5) | | 6.35  (39.88) | | 6.71  (44.5) | | 6.53  (42.19) | | 7.56  (56.71) | | 7.36  (53.71) | | 7.46  (55.21) | | 8.28  (68.07) | | 8.01  (63.71) | | 8.15  (65.89) | | 7.92  (62.21) | | 7.82  (60.71) | | | 7.87  (61.46) | | |
| **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** | | | 0.13 | | 0.14 | | 0.14 | | 0.10 | | 0.16 | | 0.13 | | 0.15 | | 0.17 | | 0.16 | | 0.21 | | 0.25 | | 0.23 | | 0.36 | | | 0.31 | | 0.34 | |
| **W\*D** | | | 0.11 | | 0.13 | | 0.12 | | 0.13 | | 0.18 | | 0.16 | | 0.14 | | 0.20 | | 0.17 | | 0.18 | | 0.22 | | 0.20 | | 0.24 | | | 0.23 | | 0.24 | |
| **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 | |

## **Table.3 Effect of dates of sowing and weed management practices on broad leaved weed density of summer sesame**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Broad leaved 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** | 5.89  (34.22) | 5.52  (29.92) | 5.71  (32.07) | 5.40  (28.70) | 4.79  (22.48) | 5.11  (25.59) | 6.23  (38.30) | 5.92  (34.51) | 6.07  (36.40) | 6.99  (48.33) | 6.77  (45.38) | 6.88  (46.86) | 6.86  (44.06) | 6.30  (39.19) | 6.49  (41.63) |
| **D2** | 4.21  (17.24) | 3.47  (11.55) | 3.86  (14.39) | 3.77  (13.70) | 2.88  (7.79) | 3.35  (10.75) | 4.71  (21.70) | 3.67  (12.98) | 4.22  (17.34) | 5.49  (29.68) | 4.48  (19.61) | 5.01  (24.65) | 4.92  (23.69) | 3.52  (11.86) | 4.27  (17.77) |
| **D3** | 5.26  (27.18) | 4.63  (20.93) | 4.95  (24.05) | 4.56  (20.32) | 4.12  (16.51) | 4.35  (18.42) | 5.80  (33.18) | 5.07  (25.25) | 5.45  (29.22) | 6.26  (38.66) | 5.81  (33.29) | 6.04  (35.97) | 6.08  (36.42) | 5.51  (29.85) | 5.80  (33.13) |
| **SE (m±)** | 0.14 | 0.18 | 0.17 | 0.16 | 0.19 | 0.18 | 0.21 | 0.23 | 0.23 | 0.16 | 0.21 | 0.19 | 0.17 | 0.29 | 0.16 |
| **C.D.at 5%** | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Weed management practices** | | | | | | | | | | | | | | | |
| **W1** | 4.61  (20.79) | 3.93  (14.94) | 4.29  (17.87) | 3.58  (12.34) | 2.96  (8.24) | 3.28  (10.29) | 4.74  (22.01) | 3.84  (14.24) | 4.32  (18.13) | 5.11  (25.598 ) | 4.72  (21.74) | 4.92  (23.67) | 4.86  (23.10) | 4.09  (16.24) | 4.49  (19.67) |
| **W2** | 5.27  (27.26) | 4.63  (20.97) | 4.96  (24.12) | 4.44  (19.22) | 3.65  (12.82) | 4.06  (16.02) | 5.57  (30.55) | 4.72  (21.79) | 5.16  (26.17) | 6.03  (35.802) | 5.72  (32.26) | 5.88  (34.03) | 5.71  (32.14) | 4.22  (26.76) | 5.47  (29.45) |
| **W3** | 5.59  (30.77) | 4.98  (24.26) | 5.29  (27.51) | 4.64  (21.04) | 3.97  (15.27) | 4.32  (18.16) | 5.77  (32.84) | 5.13  (25.77) | 5.46  (29.31) | 6.61  (43.174) | 6.19  (37.77) | 6.40  (40.47) | 6.28  (38.92) | 5,.59  (30.77) | 5.95  (34.85) |
| **W4** | 6.05  (36.11) | 5.49  (29.68) | 5.78  (32.89) | 5.11  (25.65) | 4.52  (19.97) | 4.83  (22.81) | 6.33  (39.59) | 5.98  (35.22) | 6.16  (37.40) | 7.15  (50.669) | 6.71  (44.47) | 6.93  (47.57) | 6.89  (46.92) | 6.48  (41.47) | 6.69  (44.19) |
| **W5** | 5.75  (32.51) | 5.20  (26.50) | 5.48  (29.50) | 4.85  (23.00) | 4.31  (18.07) | 4.59  (20.54) | 6.08  (36.46) | 5.44  (29.07) | 5.77  (32.77) | 6.95  (47.797) | 6.49  (41.57) | 6.72  (44.68) | 6.56  (42.55) | 6.17  (37.57) | 6.37  (40.06) |
| **W6** | 5.00  (24.48) | 4.22  (17.27) | 4.62  (20.88) | 4.11  (16.41) | 3.32  (10.50) | 3.73  (13.45) | 5.14  (25.93) | 4.22  (17.31) | 4.70  (21.62) | 5.85  (33.763) | 5.11  (25.62) | 5.49  (29.69) | 5.15  (26.01) | 4.45  (19.28) | 4.81  (22.65) |
| **W7** | 6.19  (37.77) | 5.77  (32.77) | 5.98  (35.27) | 7.08  (49.60) | 6.35  (39.88) | 6.73  (44.74) | 7.89  (61.07) | 7.15  (50.60) | 7.51  (55.84) | 8.65  (74.330) | 7.69  (58.66) | 8.18  (66.49) | 8.28  (68.13) | 6.65  (43.66) | 7.51  (55.89) |
| **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  (0.000) | 0.71  (0.00) | 0.71  (0.00) | 0.71  (0.00) | 0.71  (0.00) | 0.71  (0.00) |
| **SEm±** | 0.12 | 0.16 | 0.15 | 0.13 | 0.17 | 0.15 | 0.16 | 0.19 | 0.17 | 0.14 | 0.17 | 0.15 | 0.15 | 0.19 | 0.16 |
| **C.D.at 5%** | 0.34 | 0.44 | 0.42 | 0.39 | 0.46 | 0.46 | 0.46 | 0.60 | 0.50 | 0.41 | 0.48 | 0.41 | 0.44 | 0.53 | 0.49 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Interaction (DxW)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **D1W1** | | 5.55 | | 5.08 | | 5.32 | | 4.58 | | 4.33 | | 4.46 | | 5.52 | | 5.36 | | 5.45 | | 6.08 | | 6.39 | | 6.24 | | 5.88 | | 5.88 | | 5.88 | |
|  | | (30.3) | | (25.3) | | (27.8) | | (20.52) | | (18.27) | | (19.39) | | (30.02) | | (28.27) | | (29.15) | | (36.52) | | (40.27) | | (38.4) | | (34.02) | | (34.02) | | (34.02) | |
| **D1W2** | | 6.10 | | 5.72 | | 5.92 | | 5.28 | | 4.41 | | 4.86 | | 6.25 | | 5.76 | | 6.01 | | 6.93 | | 6.99 | | 6.96 | | 6.60 | | 6.53 | | 6.56 | |
|  | | (36.77) | | (32.24) | | (34.51) | | (27.4) | | (18.93) | | (23.16) | | (38.56) | | (32.65) | | (35.61) | | (47.56) | | (48.37) | | (47.97) | | (43.06) | | (42.12) | | (42.59) | |
| **D1W3** | | 6.39 | | 6.00 | | 6.20 | | 5.51 | | 4.68 | | 5.11 | | 6.43 | | 6.09 | | 6.26 | | 7.39 | | 7.37 | | 7.38 | | 7.10 | | 6.83 | | 6.96 | |
|  | | (40.28) | | (35.53) | | (37.91) | | (29.88) | | (21.38) | | (25.63) | | (40.85) | | (36.63) | | (38.74) | | (54.1) | | (53.88) | | (53.99) | | (49.85) | | (46.13) | | (47.99) | |
| **D1W4** | | 6.85 | | 6.44 | | 6.65 | | 5.86 | | 5.16 | | 5.52 | | 6.94 | | 6.82 | | 6.88 | | 7.88 | | 7.82 | | 7.85 | | 7.64 | | 7.57 | | 7.61 | |
|  | | (46.45) | | (40.95) | | (43.7) | | (33.83) | | (26.08) | | (29.96) | | (47.6) | | (46.08) | | (46.84) | | (61.6) | | (60.58) | | (61.09) | | (57.85) | | (56.83) | | (57.34) | |
| **D1W5** | | 6.52 | | 6.19 | | 6.36 | | 5.63 | | 4.97 | | 5.31 | | 6.71 | | 6.36 | | 6.53 | | 7.70 | | 7.63 | | 7.66 | | 7.35 | | 7.31 | | 7.33 | |
|  | | (42.02) | | (37.77) | | (39.9) | | (31.18) | | (24.18) | | (27.68) | | (44.47) | | (39.93) | | (42.2) | | (58.72) | | (57.68) | | (58.2) | | (53.47) | | (52.93) | | (53.2) | |
| **D1W6** | | 5.87 | | 5.39 | | 5.64 | | 5.01 | | 4.27 | | 4.66 | | 5.87 | | 5.46 | | 5.67 | | 6.72 | | 6.59 | | 6.66 | | 6.12 | | 6.14 | | 6.13 | |
|  | | (33.99) | | (28.55) | | (31.27) | | (24.58) | | (17.77) | | (21.18) | | (33.94) | | (29.33) | | (31.64) | | (44.69) | | (42.89) | | (43.79) | | (36.94) | | (37.14) | | (37.04) | |
| **D1W7** | | 6.67 | | 6.28 | | 6.48 | | 7.92 | | 7.33 | | 7.63 | | 8.45 | | 7.98 | | 8.22 | | 9.16 | | 7.74 | | 8.48 | | 8.82 | | 6.70 | | 7.83 | |
|  | | (43.97) | | (38.97) | | (41.47) | | (62.21) | | (53.21) | | (57.71) | | (70.91) | | (63.21) | | (67.06) | | (83.47) | | (59.38) | | (71.43) | | (77.27) | | (44.38) | | (60.83) | |
| **D1W8** | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | | 0.71 | |
|  | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | | (0) | |
| **D2W1** | | 3.27 | | 2.44 | | 2.89 | | 2.13 | | 1.57 | | 1.23 | | 3.46 | | 1.51 | | 2.57 | | 3.96 | | 2.55 | | 3.33 | | 3.27 | | 1.57 | | 2.15 | |
|  | | (10.22) | | (5.47) | | (7.84) | | (4.02) | | (1.98) | | (1.02) | | (11.45) | | (1.77) | | (6.11) | | (15.2) | | (6.02) | | (10.61) | | (10.2) | | (1.98) | | (4.11) | |
| **D2W2** | | 4.15 | | 3.19 | | 3.70 | | 3.38 | | 2.16 | | 2.84 | | 4.53 | | 2.98 | | 3.83 | | 5.05 | | 3.95 | | 4.53 | | 4.44 | | 2.76 | | 3.70 | |
|  | | (16.69) | | (9.66) | | (13.17) | | (10.9) | | (4.18) | | (7.54) | | (19.99) | | (8.4) | | (14.19) | | (24.99) | | (15.12) | | (20.05) | | (19.24) | | (7.12) | | (13.18) | |
| D2W3 | | 4.55  (20.19) | | 3.67  (12.94) | | 4.13  (16.57) | | 3.59  (12.38) | | 2.67  (6.63) | | 3.16  (9.51) | | 4.77  (22.27) | | 3.59  (12.38) | | 4.22  (17.33) | | 5.77  (32.77) | | 4.60  (20.63) | | 5.22  (26.7) | | 5.15  (26.02) | | 3.41  (11.13) | | 4.37  (18.58) | |
| D2W4 | | 5.06  (25.12) | | 4.34  (18.37) | | 4.72  (21.74) | | 4.22  (17.33) | | 3.44  (11.33) | | 3.85  (14.33) | | 5.43  (29.02) | | 4.73  (21.83) | | 5.09  (25.43) | | 6.39  (40.27) | | 5.28  (27.33) | | 5.86  (33.8) | | 5.88  (34.02) | | 4.73  (21.83) | | 5.33  (27.93) | |
| D2W5 | | 4.74  (21.93) | | 3.96  (15.18) | | 4.37  (18.56) | | 3.90  (14.68) | | 3.15  (9.43) | | 3.54  (12.06) | | 5.14  (25.9) | | 4.02  (15.68) | | 4.61  (20.79) | | 6.16  (37.4) | | 4.99  (24.43) | | 5.61  (30.92) | | 5.49  (29.65) | | 4.29  (17.93) | | 4.93  (23.79) | |
| D2W6 | | 3.79  (13.9) | | 2.54  (5.96) | | 3.23  (9.93) | | 2.93  (8.08) | | 0.99  (0.48) | | 2.07  (3.8) | | 3.98  (15.36) | | 1.44  (1.58) | | 2.99  (8.47) | | 4.88  (23.36) | | 2.58  (6.14) | | 3.91  (14.75) | | 3.69  (13.11) | | 1.36  (1.36) | | 2.32  (4.88) | |
| D2W7 | | 5.51  (29.83) | | 5.03  (24.83) | | 5.28  (27.33) | | 6.54  (42.21) | | 5.81  (33.21) | | 6.18  (37.71) | | 7.08  (49.59) | | 6.61  (43.21) | | 6.85  (46.4) | | 8.00  (63.45) | | 7.60  (57.21) | | 7.80  (60.33) | | 7.60  (57.25) | | 6.54  (42.21) | | 7.09  (49.73) | |
| 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 | | 4.73  (21.86) | | 3.82  (14.06) | | 4.30  (17.96) | | 3.60  (12.48) | | 2.99  (8.43) | | 3.31  (10.46) | | 5.01  (24.57) | | 3.77  (13.68) | | 4.43  (19.13) | | 5.06  (25.07) | | 4.41  (18.93) | | 4.74  (22) | | 5.06  (25.07) | | 4.14  (16.68) | | 4.62  (20.88) | |
| D3W2 | | 5.37  (28.33) | | 4.64  (21) | | 5.02  (24.67) | | 4.46  (19.37) | | 3.98  (15.35) | | 4.23  (17.36) | | 5.80  (33.11) | | 4.98  (24.32) | | 5.40  (28.71) | | 5.95  (34.86) | | 5.81  (33.29) | | 5.88  (34.07) | | 5.37  (28.33) | | 4.64  (21) | | 5.02  (24.67) | |
| D3W3 | | 5.69  (31.84) | | 4.98  (24.29) | | 5.35  (28.07) | | 4.62  (20.85) | | 4.28  (17.8) | | 4.45  (19.33) | | 5.99  (35.4) | | 5.37  (28.3) | | 5.69  (31.85) | | 6.57  (42.65) | | 6.27  (38.8) | | 6.42  (40.72) | | 6.43  (40.9) | | 5.96  (35.05) | | 6.20  (37.97) | |
| D3W4 | | 6.10  (36.76) | | 5.50  (29.71) | | 5.81  (33.24) | | 5.13  (25.8) | | 4.80  (22.5) | | 4.96  (24.15) | | 6.53  (42.14) | | 6.18  (37.75) | | 6.36  (39.95) | | 7.12  (50.14) | | 6.78  (45.5) | | 6.95  (47.82) | | 7.03  (48.89) | | 6.80  (45.75) | | 6.92  (47.32) | |
| D3W5 | | 5.84 | | 5.20 | | 5.53 | | 4.86 | | 4.59 | | 4.73 | | 6.29 | | 5.67 | | 5.98 | | 6.91 | | 6.57 | | 6.74 | | 6.71 | | 6.51 | | 6.61 | |
|  | | (33.58) | | (26.53) | | (30.05) | | (23.15) | | (20.6) | | (21.87) | | (39.02) | | (31.6) | | (35.31) | | (47.27) | | (42.6) | | (44.93) | | (44.52) | | (41.85) | | (43.18) | |
| D3W6 | | 5.10  (25.55) | | 4.22  (17.31) | | 4.68  (21.43) | | 4.13  (16.55) | | 3.83  (14.19) | | 3.98  (15.37) | | 5.38  (28.49) | | 4.64  (21) | | 5.02  (24.74) | | 5.81  (33.24) | | 5.32  (27.81) | | 5.57  (30.52) | | 5.34  (27.99) | | 4.96  (24.06) | | 5.15  (26.02) | |
| D3W7 | | 6.32  (39.5) | | 5.92  (34.5) | | 6.12  (37) | | 6.70  (44.38) | | 5.81  (33.21) | | 6.27  (38.8) | | 7.95  (62.71) | | 6.77  (45.38) | | 7.39  (54.04) | | 8.75  (76.07) | | 7.74  (59.38) | | 8.26  (67.72) | | 8.39  (69.87) | | 6.70  (44.38) | | 7.59  (57.12) | |
| 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** | | 0.12 | | 0.14 | | 0.13 | | 0.13 | | 0.15 | | 0.14 | | 0.19 | | 0.20 | | 0.20 | | 0.12 | | 0.18 | | 0.15 | | 0.14 | | 0.24 | | 0.19 | |
| **W\*D** | | 0.10 | | 0.12 | | 0.11 | | 0.10 | | 0.13 | | 0.12 | | 0.14 | | 0.14 | | 0.14 | | 0.12 | | 0.14 | | 0.13 | | 0.12 | | 0.15 | | 0.14 | |
| **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 | |

**Table.4 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 | o.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 | o.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 | |
| **Interaction (DxW)** | | | | | | | | | | | | | | | | | | | | |
| **D1W1** | | 9.22 | | 7.25 | | | 8.30 | | 7.31 | 7.25 | 7.28 | 8.88 | 8.89 | 8.89 | 9.79 | 10.16 | 9.98 | 9.21 | 8.98 | 9.10 |
|  | | (84.56) | | (52.06) | | | (68.31) | | (52.88) | (52.06) | (52.47) | (78.4) | (78.5) | (78.45) | (95.4) | (102.73) | (99.06) | (84.4) | (80.07) | (82.23) |
| **D1W2** | | 9.77 | | 7.86 | | | 8.87 | | 7.90 | 7.86 | 7.88 | 9.84 | 9.80 | 9.82 | 10.87 | 10.93 | 10.90 | 10.38 | 9.88 | 10.14 |
|  | | (94.97) | | (61.31) | | | (78.14) | | (61.92) | (61.31) | (61.61) | (96.24) | (95.54) | (95.89) | (117.74) | (119.06) | (118.4) | (107.2) | (97.19) | (102.22) |
| **D1W3** | | 10.05 | | 8.19 | | | 9.17 | | 8.13 | 8.19 | 8.16 | 10.25 | 10.12 | 10.18 | 11.36 | 11.27 | 11.32 | 10.84 | 10.28 | 10.56 |
|  | | (100.59) | | (66.65) | | | (83.62) | | (65.59) | (66.65) | (66.12) | (104.52) | (101.86) | (103.19) | (128.52) | (126.59) | (127.56) | (117.02) | (105.13) | (111.08) |
| **D1W4** | | 10.75 | | 8.89 | | | 9.86 | | 8.87 | 8.89 | 8.88 | 10.98 | 10.86 | 10.92 | 12.23 | 12.00 | 12.12 | 11.75 | 11.00 | 11.38 |
|  | | (114.96) | | (78.51) | | | (96.73) | | (78.12) | (78.51) | (78.31) | (120.15) | (117.41) | (118.78) | (149.15) | (143.51) | (146.33) | (137.6) | (120.46) | (129.06) |
| **D1W5** | | 10.36 | | 8.57 | | | 9.50 | | 8.49 | 8.57 | 8.53 | 10.71 | 10.45 | 10.58 | 11.94 | 11.63 | 11.79 | 11.45 | 10.57 | 11.02 |
|  | | (106.78) | | (72.87) | | | (89.83) | | (71.6) | (72.87) | (72.24) | (114.18) | (108.74) | (111.46) | (142.18) | (134.82) | (138.5) | (130.6) | (111.32) | (121) |
| **D1W6** | | 9.51 | | 7.59 | | | 8.60 | | 7.66 | 7.59 | 7.62 | 9.35 | 9.27 | 9.31 | 10.34 | 10.54 | 10.44 | 9.79 | 9.49 | 9.65 |
|  | | (89.99) | | (57.05) | | | (73.52) | | (58.2) | (57.05) | (57.63) | (86.92) | (85.4) | (86.16) | (106.42) | (110.6) | (108.51) | (95.42) | (89.64) | (92.53) |
| **D1W7** | | 11.12 | | 10.92 | | | 11.02 | | 12.88 | 10.92 | 11.94 | 13.70 | 12.13 | 12.94 | 14.81 | 13.45 | 14.14 | 14.26 | 12.69 | 13.50 |
|  | | (123.14) | | (118.8) | | | (120.97) | | (165.27) | (118.8) | (142.04) | (187.31) | (146.55) | (166.93) | (218.75) | (180.38) | (199.56) | (202.9) | (160.49) | (181.74) |
| **D1W8** | | 0.71 | | 0.71 | | | 4.53 | | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 |
|  | | (0) | | (0) | | | (20.04) | | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
| **D2W1** | | 5.56 | | 6.54 | | | 6.07 | | 2.96 | 6.54 | 5.07 | 4.86 | 8.12 | 6.69 | 6.37 | 9.45 | 8.06 | 5.44 | 8.19 | 6.95 |
|  | | (30.38) | | (42.22) | | | (36.3) | | (8.25) | (42.22) | (25.23) | (23.11) | (65.41) | (44.26) | (40.11) | (88.87) | (64.49) | (29.11) | (66.55) | (47.83) |
| **D2W2** | | 6.43 | | 7.21 | | | 6.83 | | 4.22 | 7.21 | 5.91 | 6.44 | 9.01 | 7.83 | 7.93 | 10.28 | 9.18 | 7.24 | 9.17 | 8.26 |
|  | | (40.79) | | (51.46) | | | (46.12) | | (17.28) | (51.46) | (34.37) | (40.95) | (80.62) | (60.78) | (62.45) | (105.19) | (83.82) | (51.95) | (83.67) | (67.81) |
| **D2W3** | | 6.85 | | 7.57 | | | 7.22 | | 4.63 | 7.57 | 6.28 | 7.05 | 9.45 | 8.34 | 8.59 | 10.64 | 9.67 | 7.89 | 9.60 | 8.78 |
|  | | (46.41) | | (56.81) | | | (51.61) | | (20.95) | (56.81) | (38.88) | (49.23) | (88.78) | (69.01) | (73.23) | (112.73) | (92.98) | (61.73) | (91.6) | (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 |

**CONCLUSION**

From the experiment it was concluded that grass weed, sedge weed, broad leaved weed and total weed density of summer sesame was significant influence with weed management practices only. Interactions between dates of sowing and weed management practices were found to be non-significant. Among the weed management practices, weed free check (W8) observed significantly lower grass, weed, sedge weed, broad leaved weed and total weed density (7.94 m-2) were noticed it was followed by (W1) Pendimethalin @ 1 kg a.i. ha-1 (2 DAS) + Hand weeding 30 DAS. The highest total weed density (12.75 m-2) was observed in weedy check (W7).

**REFERENCE**

Abdel, R. A., Mahdi, E., Eldin, S. M., Amin, E. L. and Ahmed, F. G. **(**2007). Effect of sowing date on the performance of sesame (*Sesamum indicum* L.) genotypes under irrigation conditions in northern Sudan. *African Crop Science Conference Proceedings,* **8**: 1943-1946.

Amare, M. (2011). Estimation of critical period for weed control in sesame (*Sesamum indicum* L.) in northern Ethiopia. *Ethiopian Journal of Science and Technology***, 2**(1): 59-66.

Ambika, M. and Sundari, A. (2019). Weed management in irrigated sesame (*Sesamum indicum* L.). *World Scientific News*, **131**: 272-278

Bennett, M., Katherine. and Cond, B. (2003). Sesame recommendations for the Northern Territory. *Agnote*, **657**(C22): 1-4.

Boureima, M., Eyletters, M., Diouf,T., Diop,A.andVan Damme, P. (2011).Sensitivity of seed germination and seedling radicle growth to drought stress in sesame (*Sesamun indicum* L.). *Research Journal of Environmental Sciences*, **5**(6): 557- 564,

Brigham, R.D. (1985). Status of sesamum research and production in Texas and USA. Sesamum and safflower status and potential, Rome, Italy, FAO, pp. 73-74

Dungarwal, H. S., Chaplot, P. C. and Nagda, B. L. (2003). Integrated weed management in sesame (*Sesamum indicum* L.). *Indian Journal of Weed Science,* **35**(6): 236- 238.

EI-Bakheit, I. B. (1985). Effectofsowingdate on theincidenceof thesesameweb worm (*Antigastracatalunalis*Dup)onsesame (*Sesamumindicum* L.).Annual Reportof Kenana Research Station*.* 1985-1986.pp

Erhart, E., Hartl, W. and Putz, B. (2005). Bio waste compost affects yield, nitrogen Apenly during the vegetation period and crop quality of agricultural crops. *European Journal of Agronomy*, **23**(4): 305-314.

Hamza, R. M.and Abd El-Salam. (2015). Optimum planting date for three sesame cultivars growing under sandy soil conditions in Egypt. *American-Eurasian Journal of Agricultural and Environmental Sciences***, 15**(5): 868-877

Ibrahim, A. F., El-wekjil, H. R., Yehia, Z. R. and Shaban, S. A. (1988). Effect of some weed control treatments on sesame and associated weeds. *Journal of Agronomy and Crop Science,* **160**(5): 319-324.

Jefferson, T. (2003). Sesame a high value oilseed. Growing sesame production: Tips, economics and more, [*www.*](http://www/)Jefferson institute.org/pubs/sesame.

Mruthul, M., Halepyati, A. S. and Chittapur, B. M. (2015). Chemical weed management in sesame (*Sesamum indicum* L.). *Karnataka Journal of Agricultural Sciences,* **28**(2): 151-154.

Rajesh, P., Dudhat., M. S., Sunil Kumar, T. and Ganapathi, S. (2024). Growth, yield and weed control of summer sesamum (*Sesamum indicum* L.) under varying sowing dates and weed management practices. *International Journal of Research in Agronomy,* **7**(6): 301-306

Sarkar, M. A., Salim, M., Islam, N. and Rahman, M. M. (2007). Effect of sowing date and time of harvesting on the yield and yield contributing characters of sesame (*Sesamum indicum* L.) seed. *International Journal of Sustainable Crop Production*, **2**(6): 31-35.

Stumpf,H. (1959). Fat metabolism in Niger plants. *Annual Review of Plant Ph*ysiology,

**10**:197-222.

Sujithra , P., Hemalatha, M., Joseph, M. and Sobhana, E. (2018). Effect of different weed management practices on yield ofrainfed sesame (*Sesamum indicum* L*.*) under Vertisol. *International Journal of Advances in Agricultural Science and Technology,* **5**(7): 24-29.

Sutradhar, J., Lokho, A., Das, A. P. (2017). Allelopathic effects of *Trianthema portulacastrum* L. (Aizoaceae) on seed germination and early growth of sesamum (*Sesamum indicum* L.) seedlings. *Bionano Frontiers*, **10**(2): 28-35.

Tahir, M., Saeed, U., Asghar, A., Hassan, I., Naeem, M., Ibrahim, M., Ehman, H. U. and Javeed, H. M. R. (2012). Optimizing sowing date and row spacing for newly evolved sesame (*Sesamum indicum* L.) variety HT-6. *Pakistan Journal of life and Social Science*, **10**(1): 1-4.