



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
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NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(12): 171-176
Received: 23-09-2025
Accepted: 25-10-2025

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Growth and yield parameters of summer sesame (*Sesamum indicum* L.) as influenced by drip irrigation levels and water soluble fertilizer

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DOI: <https://www.doi.org/10.33545/2618060X.2025.v8.i12c.4359>

Abstract

A field study was carried out during the summer seasons of 2023 and 2024 at the Instructional Farm, Junagadh Agricultural University to evaluate the response of sesame (*Sesamum indicum* L.) to different drip irrigation levels and doses of water soluble fertilizers (WSF). The experiment was carried out in a split-plot design with four irrigation levels (0.6 PEF, 0.8 PEF, 1.0 PEF, and surface irrigation at 0.8 IW/CPE ratio) and three fertigation levels (100%, 80% and 60% RDF through WSF). The results demonstrated that irrigation at 1.0 PEF significantly enhanced plant height, branches/plant, dry matter buildup, yield characteristics, and yields of seeds and stalks. Fertigation with 100% RDF recorded the maximum growth and yield. The interaction of 1.0 PEF × 100% RDF (WSF) produced maximum yield. However, irrigation at 0.8 PEF combined with 80% RDF resulted in the highest water use efficiency (WUE) and economic returns. The study concludes that for optimum productivity and profitability in summer sesame, drip irrigation at 0.8 PEF along with 80% RDF through WSF is ideal.

Keywords: Sesame, drip irrigation, PEF, fertigation, water-soluble fertilizer, growth, yield

Introduction

One of the most significant and ancient edible oilseeds is sesame (*Sesamum indicum* L.) crops and is valued globally for its high oil content (50%) and protein content (25%). Despite its economic importance, sesame yields in India remain low due to poor nutrient management, limited irrigation, and cultivation under rainfed conditions. Water scarcity is increasing due to climate change and competition among sectors, making efficient irrigation technologies essential. Micro-irrigation systems, particularly drip irrigation, improve water distribution, reduce losses, and enhance crop productivity through precise moisture regulation. Fertigation using water-soluble fertilizers (WSF) allows uniform, efficient nutrient availability in the root zone. Although sesame is known for drought tolerance, its response to precise irrigation and fertigation is not well documented for summer conditions in Gujarat. Therefore, the present study was attempted to assess the impacts of drip irrigation levels and WSF on growth and yield parameters of summer sesame.

Materials and Methods

“Response of summer sesame (*Sesamum indicum* L.) to drip irrigation levels and water soluble fertilizer” was conducted in the summer of 2023 and 2024 at the Instructional Farm, Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, on clayey and somewhat alkaline soil. Four replications and a split plot design were used to set up the experiment. There were twelve treatment combinations. The primary plot treatments are drip irrigation at 0.6 PEF (I₁), drip irrigation at 0.8 PEF (I₂), drip irrigation at 1.0 PEF (I₃), and surface irrigation at 0.8 IW/CPE ratio (I₄). The subplot comprises three levels of water soluble fertilizer: 100% RDF through F₁, 80% RDF through F₂, and 60% RDF through F₃ (RDF for sesame is 50-25-40 N, P₂O₅, and K₂O kg/ha). The sesame (GJT 5) was grown with adopting recommended package of practices. The soil in the experimental plot had a clayey texture, a medium amount of organic carbon (0.60 and 0.59% in 2023 and 2024, respectively), and a

slightly alkaline reaction (pH 7.9 and 8.1, EC 0.44 and 0.41 dS/m). The soil was medium in available nitrogen (258.3 and 255.8 kg/ha 2023 and 2024, respectively), phosphorus (38.48 and 36.89 kg/ha 2023 and 2024, respectively) and potash (252.1 and 260.2 kg/ha 2023 and 2024, respectively).

Results and Discussion

The data regarding plant height at harvest (Table 1) showed that significantly maximum plant height of 73.90, 70.68 and 72.29 cm were recorded under drip irrigation scheduled at 1.0 PEF (I_3) during 2023, 2024 and in pooled results, respectively which was found statistically at par with drip irrigation scheduled at 0.8 during 2023, 2024 and in pooled results. Significantly lower plant height of 66.60, 58.75 and 62.67 cm were detected with drip irrigation at 0.6 PEF (I_1) during 2023, 2024 and in pooled findings, respectively. The data presented in Table 2 indicated that there was a notable impact of drip irrigation schedules on dry matter accumulation/plant at harvest during 2023, 2024 and in pooled results. Notably, the maximum dry matter/plant of 16.57, 16.02 and 16.29 g/plant was recorded at harvest under drip irrigation scheduled at 1.0 PEF (I_3) during 2023, 2024 and in pooled results, respectively. However, it continued to be on par with treatment I_2 (drip irrigation scheduled at 0.8 PEF) during 2023, 2024 and in pooled results, respectively. Whereas, significantly lower dry matter accumulation/plant at harvest of 14.60, 14.03 and 14.31 g was noted with drip irrigation scheduled at 0.6 PEF (I_1) during 2023, 2024 and in pooled results, respectively. The data (Table 1) clearly indicated that different water soluble fertilizer levels produced their significant effect on plant height at harvest. The higher plant height of 72.61, 68.41 and 70.51 cm were recorded when crop was fertilized with 100% WSF through drip fertigation during 2023, 2024 and in pooled results which was statistically at par with 80% RDF during 2023 and 2024. Significantly lower plant height of 67.95, 61.28 and 64.61 cm were recorded when crop

was fertilized with 60% RDF (F_3) through drip fertigation during individual years and in pooled results, respectively. It was revealed from the results presented in Table 2 on dry matter accumulation/plant at harvest that different water soluble fertilizer levels produced their significant effect on dry matter accumulation/plant at harvest. The treatment F_1 (100% RDF through drip fertigation) recorded higher dry matter accumulation/plant of 16.26, 16.01 and 16.13 g/plant being at par with treatment F_2 (80% RDF) during both the years and in pooled results, respectively. Minimum dry matter accumulation/plant at harvest of 14.52, 13.64 and 14.08 g was observed under the treatment F_3 (60% RDF) during 2023, 2024 and in pooled results, accordingly.

Table 1: Effect of drip irrigation schedules and water soluble fertilizer levels on plant height of sesame at harvest

Treatments		Plant height at harvest (cm)		
		2023	2024	Pooled
Drip irrigation schedules (I)				
I_1	Drip irrigation 0.6 PEF	66.60	58.75	62.67
I_2	Drip irrigation 0.8 PEF	71.10	69.21	70.15
I_3	Drip irrigation 1.0 PEF	73.90	70.68	72.29
I_4	Surface irrigation	68.51	61.37	64.94
S.E.m. $\pm$		1.52	1.65	1.12
C.D. (P=0.05)		4.85	5.28	3.33
C.V. (%)		7.50	8.80	8.13
Water soluble fertilizer (F)				
F_1	100% RDF	72.61	68.41	70.51
F_2	80% RDF	69.52	65.31	67.42
F_3	60% RDF	67.95	61.28	64.61
S.E.m. $\pm$		1.08	1.17	0.80
C.D. (P=0.05)		3.14	3.42	2.26
C.V. (%)		6.14	7.21	6.66
I x F interaction				
S.E.m. $\pm$		2.15	2.34	1.59
C.D. (P=0.05)		NS	NS	NS

Table 2: Effect of drip irrigation schedules and water soluble fertilizer levels on dry matter accumulation of sesame at harvest

Treatments		Dry matter accumulation at harvest (g/plant)		
		2023	2024	Pooled
Drip irrigation schedules (I)				
I_1	Drip irrigation 0.6 PEF	14.60	14.03	14.31
I_2	Drip irrigation 0.8 PEF	16.40	15.90	16.15
I_3	Drip irrigation 1.0 PEF	16.57	16.02	16.29
I_4	Surface irrigation	15.02	14.59	14.81
S.E.m. $\pm$		0.40	0.39	0.28
C.D. (P=0.05)		1.28	1.25	0.83
C.V. (%)		8.83	8.96	8.89
Water soluble fertilizer (F)				
F_1	100% RDF	16.26	16.01	16.13
F_2	80% RDF	16.17	15.76	15.96
F_3	60% RDF	14.52	13.64	14.08
S.E.m. $\pm$		0.29	0.26	0.19
C.D. (P=0.05)		0.83	0.75	0.55
C.V. (%)		7.29	6.79	7.05
I x F interaction				
S.E.m. $\pm$		0.57	0.51	0.38
C.D. (P=0.05)		1.67	1.50	1.09

The interaction impact between drip irrigation schedules and water soluble fertilizer levels (I x F) on dry matter accumulation/plant at harvest was found to be significant during 2023, 2024 and in pooled results (Table 3, 4 and 5). Application of irrigation through drip at 0.8 PEF and treated the crop with 80% RDF through drip fertigation (I_2F_2) generated considerably

maximum dry matter accumulation/plant at harvest of 18.28 g/plant during 2023 which was remained statistically at par with treatment combination I_3F_1 and I_3F_2 during 2023. Drip irrigation was applied at 0.6 PEF, and the crop was fertilized with 60% RDF (I_1F_3) recorded significantly minimum dry matter accumulation/plant at harvest of 13.13 g during 2023. During the

year 2024, application of irrigation by drip at 0.8 PEF and fertilized the crop with 80% RDF using drip fertigation (I_2F_2) yielded considerably higher dry matter accumulation/plant at harvest of 17.58 g/plant and it was remained statistically at par with treatment combination I_3F_1 and I_3F_2 . Significantly minimum dry matter accumulation/plant at harvest of 12.49 g/plant was recorded with the application of irrigation at 0.6 PEF through drip and fertilizing the crop with 60% RDF (I_1F_3). Crop fertilization with drip irrigation at 0.8 PEF Drip fertigation (I_2F_2) with 80% RDF produced noticeably more dry matter accumulation/plant at harvest of 17.93 g/plant on pooled data basis which was at par with I_3F_1 . Significantly lower dry matter accumulation/plant at harvest of 12.81 g/plant was recorded with application of irrigation at 0.6 PEF through drip irrigation and application of 60% RDF (I_1F_3).

Table 3: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on dry matter accumulation (g/plant) of sesame at harvest during 2023

Drip irrigation schedules Fertigation	Seed yield (kg/ha)			
	I ₁	I ₂	I ₃	I ₄
F ₁	16.46	15.80	16.70	16.06
F ₂	14.21	18.28	17.37	14.82
F ₃	13.13	15.13	15.64	14.19
S.E.m. ±				0.57
C.D. (P=0.05)				1.67

Table 4: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on dry matter accumulation (g/plant) of sesame at harvest during 2024

Drip irrigation schedules Fertigation	Seed yield (kg/ha)			
	I ₁	I ₂	I ₃	I ₄
F ₁	15.53	15.62	17.24	15.63
F ₂	14.06	17.58	16.76	14.63
F ₃	12.49	14.51	14.05	13.52
S.E.m. ±				0.51
C.D. (P=0.05)				1.50

Table 5: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on dry matter accumulation (g/plant) at harvest of sesame (pooled)

Drip irrigation schedules Fertigation	Seed yield (kg/ha)			
	I ₁	I ₂	I ₃	I ₄
F ₁	16.00	15.71	16.97	15.84
F ₂	14.13	17.93	17.07	14.72
F ₃	12.81	14.82	14.84	13.86
S.E.m. ±				0.38
C.D. (P=0.05)				1.09

Seed Yield and Stalk Yield

An examination of data supplied in Table 6 revealed that different drip irrigation schedules had a major impact on seed yield in 2023, 2024, and pooled findings. Considerably greater seed yields of 1580, 1538, and 1559 kg/ha in 2023, 2024, and in combined results, respectively were recorded when sesame was irrigated using drip at 1.0 PEF (I_3) which was at par with 0.8 PEF during 2023, 2024 and pooled findings, respectively. Irrigating the crop through drip irrigation at 0.6 PEF produced achieved considerably minimum seed yield of 1145, 1047 and 1096 kg/ha during 2023, 2024 and in pooled data, respectively. Different drip irrigation schedules had a substantial impact on sesame stalk yield for both years and in pooled findings,

according to the data shown in Table 10. Drip irrigation at 1.0 PEF (I_3) produced significantly higher stalk yields of 1799, 1742, and 1770 kg/ha during 2023, 2024, and in pooled results, respectively. It was found to be statistically comparable to I_2 (drip irrigation scheduled at 0.8 PEF) during 2023, 2024, and in pooled results. Significantly reduced stalk yield of 1465, 1393 and 1429 kg/ha was obtained when crop was irrigated through drip at 0.6 PEF (I_1) during 2023, 2024 and in pooled findings, respectively.

Table 6: Effect of drip irrigation schedules and water soluble fertilizer levels on seed yield

Treatments		Seed yield (kg/ha)		
		2023	2024	Pooled
Drip irrigation schedules (I)				
I ₁	Drip irrigation 0.6 PEF	1145	1047	1096
I ₂	Drip irrigation 0.8 PEF	1578	1534	1556
I ₃	Drip irrigation 1.0 PEF	1580	1538	1559
I ₄	Surface irrigation	1225	1202	1213
S.E.m. ±		43.91	36.64	28.62
C.D. (P=0.05)		140	117	85
C.V. (%)		11.01	9.54	10.33
Water soluble fertilizer (F)				
F ₁	100% RDF	1432	1382	1408
F ₂	80% RDF	1424	1374	1399
F ₃	60% RDF	1287	1235	1261
S.E.m. ±		29.09	25.02	19.19
C.D. (P=0.05)		85	73	54
C.V. (%)		8.42	7.52	8.00
I x F interaction				
S.E.m. ±		58.18	50.05	38.37
C.D. (P=0.05)		170	146	109

Table 7: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on seed yield (kg/ha) of sesame during 2023

Drip irrigation schedules Fertigation	Seed yield (kg/ha)			
	I ₁	I ₂	I ₃	I ₄
F ₁	1182	1585	1681	1287
F ₂	1157	1696	1567	1274
F ₃	1095	1450	1491	1111
S.E.m. ±				61.58
C.D. (P=0.05)				179

Table 8: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on seed yield (kg/ha) of sesame during 2024

Drip irrigation schedules Fertigation	Seed yield (kg/ha)			
	I ₁	I ₂	I ₃	I ₄
F ₁	1087	1512	1676	1252
F ₂	1063	1685	1480	1269
F ₃	993	1405	1457	1087
S.E.m. ±				50.05
C.D. (P=0.05)				146

Table 9: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on seed yield (kg/ha) of sesame (pooled)

Drip irrigation schedules Fertigation	Seed yield (kg/ha)			
	I ₁	I ₂	I ₃	I ₄
F ₁	1135	1548	1678	1269
F ₂	1109	1690	1523	1271
F ₃	1044	148	1474	1099
S.E.m. ±				38.37
C.D. (P=0.05)				109

An appraisal of data reported in Table 6 suggested that different water soluble fertilizer levels exhibited their considerable influence on seed yield during the year 2023, 2024 and in pooled results. When the crop was fertilized with 100% RDF using drip fertigation, significantly higher seed yields of 1432, 1382, and 1408 kg/ha were recorded in 2023, 2024, and in pooled data, respectively (F_1). However, it was found at par with 80% RDF (F_2) applied through drip fertigation during both the years and in pooled findings, respectively. On the contrary, application of 60% RDF using drip fertigation (F_3) showed considerably minimum seed yield of 1287, 1235 and 1261 kg/ha during 2023, 2024 and in pooled findings, respectively. Results presented in Table 10 indicated that water soluble fertilizer levels significantly influenced stalk yield during the year 2023, 2024 and in pooled analysis. Fertigation level F_1 (i.e. 100% RDF through drip fertigation) recorded considerably higher stalk yield of 1697, 1677 and 1687 kg/ha during 2023, 2024 and in pooled findings, respectively which was at par with F_2 (i.e. 80% RDF through drip fertigation) during 2023, 2024 and in pooled results. Application of 60% RDF through drip fertigation (F_3) produced considerably minimal stalk yield of 1520, 1468 and 1494 kg/ha during 2023, 2024 and in pooled findings, respectively.

Drip irrigation schedules and water soluble fertilizer levels ($I \times F$) had a substantial interaction effect on seed output in 2023 and 2024, as well as in pooled results (Tables 7, 8, and 9). Application of irrigation through drip at 0.8 PEF and fertilized the crop with 80% RDF through drip fertigation (I_2F_2) produced significantly greatest seed yield of 1696 kg/ha during 2023 which was remained statistically at par with treatment combination I_2F_1 , I_3F_1 and I_3F_2 (Table 7). A notably low seed production of 1095 kg/ha was obtained when drip irrigation was applied at 0.6 PEF and the crop was treated with 60% RDF (I_1F_3). In 2024, applying drip irrigation at 0.8 PEF and fertilizing the crop with 80% RDF via drip fertigation (I_2F_2) resulted in a maximum seed production of 1685 kg/ha (Table 8), which was comparable to I_3F_1 . Applying drip irrigation at 0.6 PEF and feeding the crop with 60% RDF resulted in a notably low seed production of 993 kg/ha (I_1F_3). Application of irrigation through drip at 0.8 PEF and fertilized the crop with 80% RDF through drip fertigation (I_2F_2) produced significantly higher seed yield of 1690 kg/ha on pooled data basis (Table 9) and which was remained statistically at par with treatment combination I_3F_1 . Significantly decreased seed production of 1044 kg/ha was obtained with drip irrigation set at 0.6 PEF and application of 60% RDF.

In 2023 and 2024, as well as in pooled results, the interaction impact between drip irrigation schedules and water soluble fertilizer levels ($I \times F$) on stalk yield was shown to be significant (Table 11, 12, and 13). Significantly greatest stalk production of 1869 kg/ha during 2023 (Table 11) was obtained with irrigating the crop through drip at 0.8 PEF and fertilizing the crop with 80% RDF through drip fertigation (I_2F_2) and it was found on par with I_1F_1 , I_2F_1 , I_3F_1 , I_3F_2 and I_3F_3 . The treatment combination I_1F_3 recorded significantly lower stalk yield of 1234 kg/ha. Application of drip irrigation at 0.8 PEF and fertilizing the crop with 80% RDF through drip fertigation (Table 12) recorded significantly maximum stalk yield of 1926 kg/ha during 2024 and it was remained at par with I_2F_1 and I_3F_1 . Significantly lower stalk of 1236 kg/ha was produced under the treatment combination I_1F_3 . Significantly maximum stalk yield of 1898 kg/ha on pooled data basis was recorded with irrigating the crop through drip at 0.8 PEF and fertilizing the sesame with 80% RDF through drip fertigation I_2F_2 (Table 13) which was found at

par with drip at 1.0 PEF and 100% RDF (I_3F_1). Treatment combination I_1F_3 recorded significantly lower stalk yield of 1235 kg/ha.

Table 10: Effect of drip irrigation schedules and water soluble fertilizer levels on stalk yield

Treatments		Stalk yield (kg/ha)		
		2023	2024	Pooled
Drip irrigation schedules (I)				
I_1	Drip irrigation 0.6 PEF	1465	1393	1429
I_2	Drip irrigation 0.8 PEF	1721	1730	1726
I_3	Drip irrigation 1.0 PEF	1799	1742	1770
I_4	Surface irrigation	1560	1531	1546
S.E.m. $\pm$		53.33	47.24	35.62
C.D. (P=0.05)		170	151	105
C.V. (%)		11.29	10.23	10.78
Water soluble fertilizer (F)				
F_1	100% RDF	1697	1677	1687
F_2	80% RDF	1692	1653	1672
F_3	60% RDF	1520	1468	1494
S.E.m. $\pm$		34.88	32.59	23.87
C.D. (P=0.05)		101	95	67
C.V. (%)		8.53	8.15	8.35
I x F interaction				
S.E.m. $\pm$		69.77	65.18	47.74
C.D. (P=0.05)		203	190	135

Table 11: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on stalk yield (kg/ha) of sesame during 2023

Drip irrigation schedules Fertigation				
	I_1	I_2	I_3	I_4
F_1	1680	1692	1817	1599
F_2	1481	1869	1782	1635
F_3	1234	1603	1777	1445
S.E.m. $\pm$				69.77
C.D. (P=0.05)				203

Table 12: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on stalk yield (kg/ha) of sesame during 2024

Drip irrigation schedules Fertigation				
	I_1	I_2	I_3	I_4
F_1	1480	1761	1900	1565
F_2	1463	1926	1704	1518
F_3	1236	1503	1622	1510
S.E.m. $\pm$				65.18
C.D. (P=0.05)				190

Table 13: Interaction effect between drip irrigation schedules and water soluble fertilizer levels on stalk yield (kg/ha) of sesame (pooled)

Drip irrigation schedules Fertigation				
	I_1	I_2	I_3	I_4
F_1	1580	1727	1858	1582
F_2	1472	1898	1743	1577
F_3	1235	1553	1709	1478
S.E.m. $\pm$				47.74
C.D. (P=0.05)				135

Discussion

Growth Parameters

The functional behaviour of water in relation to photosynthesis process occurring in the plant may likely increase in plant height with increased irrigation frequency. Therefore, the plant's

moisture status and cycles are directly related to the amount of water available in the soil as well as its capacity for absorption. Reduced water availability also causes the stomata to remain closed, which hinders photosynthesis and eventually crop growth. The fact that higher irrigation frequency increased nutrient availability and consequently, nutrient uptake, which in turn improved sesame growth, further findings supports the response of various drip irrigation levels in terms of overall improvement in growth parameters. Similar results were obtained by Damdar *et al.* (2015) in sesame, Chauhan *et al.* (2016)^[2], Khadse *et al.* (2017)^[9] and Fadadu and Shrivastava (2020)^[4]. Scheduling drip irrigation at 1.0 PEF had substantial improvement in dry matter/plant at different growth stages of sesame seems to an account of better vegetative growth which is well reflected by rise in plant height. It is an established fact that the soil water deficiency affects leaf expansion and stem elongation in plants through its reduction of relative turgidity. Under lower drip irrigation at 0.6 PEF, reduced water supply also results in stomata closing, which elevates plant temperatures and increases respiration. This leads to a higher breakdown of assimilates, poor development, and decreased dry matter accumulation. Kamble *et al.* (2017)^[7], Khadse *et al.* (2017)^[9], and Karthika and Ramanathan (2019)^[8] also reported similar results

A higher RDF rate resulted in taller plants, which may have beneficial effects on sesame plant height due to improved photosynthate formation and stem partitioning. The reason for the rise in plant height with increasing fertigation level could be attributed to improved nutrient availability, improved root uptake and an increase in internode and internodal distance. Thus, on the basis of the roles played by these nutrients, it could easily be envisaged that their direct or indirect engagement in cell division, cell enlargement and tissue as well as organ formation would be predicted to result in improvement in these structures. Consequently, this leads to an increase in sesame growth. Jain and Meena (2015)^[10], Solanki *et al.* (2022)^[11], Navdeep *et al.* (2023)^[13], and Sharma and Thakral (2023)^[12] all found similar findings.

The improvement in the dry matter production which could be ascribed to the increase in plant growth (i.e. plant height and number of branches) and cumulative effect of all these parameters on yield attributes. Instant assimilation of nutrients supplied through the soil meeting the required nutrient demand of the crop during growth period of sesame. These results are in line with the findings of Jain and Meena (2015)^[10], Jamdhade *et al.* (2017)^[5] Navdeep *et al.* 2023^[13] and Sharma and Thakral (2023)^[12].

Seed Yield and Stalk Yield

The greater seed yield might be attributable to the maintenance of adequate soil moisture within the root zone during the crop growth cycle, which facilitated efficient uptake of water and nutrients. Increased photosynthate synthesis and its efficient transfer towards the sink were the results of this favorable moisture situation, which also increased vegetative growth, especially plant height. Consequently, this resulted to better dry matter accumulation and improvement in yield attributing metrics such as the number of capsules per plant and seeds per capsule, thereby contributing to enhanced seed output. Tripathy and Bastia (2012)^[14], Chauhan *et al.* (2016)^[2], Khadse *et al.* (2017)^[9], and Ranjitha *et al.* (2018)^[15] have reported similar results. Lower seed output was reported under deficit drip irrigation set at 0.6 PEF; might be related to moisture stress leading to reduced test weight, no. of capsules and no. of

seeds/capsule.

The degree to which planned drip irrigation at 1.0 PEF (I3) has raised sesame stalk yield may be attributed to the beneficial effects of irrigation on plant growth, and since sesame is highly sensitive to water and nutrients, the sesame crop may have responded favorably to the higher irrigation applied through drip. The availability and maintenance of higher soil moisture in the root zone over the crop season were enhanced by the irrigation level. This resulted in higher relative leaf water content, which in turn led to the development of yield components and seed and stalk yields. The available moisture content drops as water tension rises, requiring those roots to work harder to extract water from the soil particles. enhanced seed and stalk yields were the result of ideal crop development conditions created by the enhanced irrigation, which never caused water stress. This may be attributed under more favorable soil moisture availability, greater vegetative development; more dry matter production resulting in higher biological yield as compared to less often irrigation schedule treatments. Kamble *et al.* (2017)^[7], Khadse *et al.* (2017)^[9], Ranjitha *et al.* (2018)^[15], and Rojh *et al.* (2022)^[16] all reported similar reactions.

Increased nutrient intake brought about by a higher solubility percentage of WSF tends to improve photosynthate generation and their effective transfer for the growth of reproductive parts. Under 100% WSF, the yield components number of capsules, number of seeds per capsule, and 1000 grain weight were higher. Jain and Meena (2015)^[10], Deepthi *et al.* (2018)^[3], Solanki *et al.* (2022)^[11], and Navdeep *et al.* (2023)^[13] all found similar findings

The increase in stalk yield under higher fertigation might be attributed to build-up of soil fertility, which enhanced nutrient availability and accelerated the processes of cell division, enlargement, and elongation. This, in turn, promoted vigorous vegetative growth, resulting in higher stalk yield in sesame. In addition to that water soluble fertilizers could improve the decrease leaching and improve nutrient utilization by applying less fertilizer to the soil. Consequently, the yield is high. The current results closely align with Batta's conclusions. (2020)^[1], Jajoo (2022)^[6] and Solanki (2022)^[11] in case of soil and foliar application.

Conclusion

Based on the findings of two years of experimentation, it can be concluded that in order to achieve higher seed and stalk yields sesame should receive two common surface irrigations (one immediately after sowing and the other seven days after the first irrigation) at a depth of 50 mm. This should be followed by drip irrigation at 0.8 PEF (operating pressure: 1.2 kg/cm² and lateral spacing: 60 cm) on alternate days for 59 minutes. The crop should be fertilized with 80% RDF using water soluble fertilizer, with four equal splits at intervals of 15 DAS.

References

1. Batta S. Effect of foliar application of NPK and micronutrients on summer groundnut (*Arachis hypogaea* L.). Junagadh Agricultural University, Junagadh, India. 2020.
2. Chauhan S, Rao P, Reddy P, Jayasree, Reddy N. Response of sesame (*Sesamum indicum* L.) to irrigation scheduling based on climatological approach and N fertigation levels. J Oilseeds Res. 2016;33(1):38-44.
3. Deepthi CH, Ramana AV, Rao AU, Murthy PG. Effect of soil and foliar applied fertilizers on yield attributes and

- yield of rabi sesame. J Pharmacogn Phytochem. 2018;7(4):2824-2827.
4. Fadadu MH, Shrivastava PK. Efficacy of drip irrigation on summer sesame grown in Narmada district of Gujarat. J Soil Water Conserv. 2020;19(1):73-82.
 5. Jamdhade K, Chorey A, Bharti T, Bhale VM. Influence of irrigation regimes and nitrogen levels on growth, yield and economics of summer sesame. Int J Curr Microbiol Appl Sci. 2017;6(3):2389-2393.
 6. Jajoo M. Effect of foliar application of water soluble macro and micro nutrient fertilizer on growth, yield and quality of kharif soybean (*Glycine max* L.). M.Sc. (Agri.) Thesis, Junagadh Agricultural University, Junagadh, India. 2022.
 7. Kamble DR, Gokhale DN, Nagrare IM, Jadhav PB. Response of summer groundnut (*Arachis hypogaea* L.) to different irrigation level and mulches under drip irrigation. Agric Update. 2017;12(3):697-702.
 8. Karthika N, Ramanathan SP. Influence of drip fertigation on the physiological and yield parameters of groundnut (*Arachis hypogaea* L.) in light textured soils of Cauvery command in Tamil Nadu. Int J Chem Stud. 2019;7(3):3008-3011.
 9. Khadse VA, Ghatol PU, Bhale VM. Performance of summer sesame under different irrigation scheduling and nutrient levels in Vidarbha region. Int J Curr Microbiol Appl Sci. 2017;6(11):1988-1993.
 10. Jain NK, Meena HN. Improving productivity of groundnut (*Arachis hypogaea* L.) by using water soluble fertilizer through drip irrigation. Indian J Agron. 2015;60(1):109-115.
 11. Solanki KH, Vaghasia PM, Viroja PB. Effect of foliar application of water soluble fertilizer on growth, yield and quality of Indian mustard (*Brassica juncea* L.). Int J Curr Microbiol Appl Sci. 2022;11(5):125-130.
 12. Sharma SK, Thakral SK. Assessment of yield and profitability of Indian mustard (*Brassica juncea*) with foliar fertilization under rainfed condition. Indian J Agron. 2023;68(3):300-304.
 13. Navdeep K, Chovatia PK, Sandeep K, Deshmukh A, Agarwal D. Effect of foliar application of NPK and micronutrients on growth, yield and quality parameters of summer sesame (*Sesamum indicum* L.). Pharma Innov J. 2023;12(6):4299-4303.
 14. Tripathy S, Bastia DK. Irrigation and nutrient management for yield augmentation of summer sesame (*Sesamum indicum* L.). J Crop Weed. 2012;8(2):53-57.
 15. Ranjitha PS, Ramulu V, Jayasree G, Reddy SN. Growth, yield and water use efficiency of groundnut under drip and surface furrow irrigation. Int J Curr Microbiol Appl Sci. 2018;7(9):1371-1376.
 16. Rojh MK, Anchra S, Bhunia SR, Kumari N. Effect of irrigation levels and intervals on yield and quality of groundnut (*Arachis hypogaea* L.) cultivars. Pharma Innov J. 2022;11(1):1521-1524.