

# Effect of different Irrigation Regimens on the Growth and Yield of Sunflower

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## ABSTRACT

A field experiment was conducted to study the effect of different levels of irrigation (2, 4 and 6 irrigations) on growth and yield characteristics of sunflower varieties Gimsun-94 and Gimsun-256. Head diameter, number of filled seeds per head and 1000 seed of both varieties were affected significantly by various irrigation frequencies. However, significantly higher seed yield was obtained from Gimsun-94 than Gimsun-256. The maximum seed yield of 3119 kg per hectare was obtained with six irrigations against 2200 kg per hectare with two irrigations.

**Key Words:** Growth; Irrigation regimens; Sunflower; Yield

## INTRODUCTION

Irrigation is an important factor which directly influences the yield of sunflower, and practically all the farmers realize its importance. Judicious and timely application of irrigation at critical growth stages of sunflower increase yield considerably. The crop uses only 20-25% of its total water needs during the 1<sup>st</sup> 30 days. However, the peak demand is during its reproduction. Shortage of water during this period not only reduce seed yield but also seed oil contents.

Rawson and Turner (1983) reported that frequently irrigated hybrids resulted in maximum yield. Similarly, Vasiliu (1986) reported that seed yield ranged from 2.64 ton per hectare with no irrigation to 3.34 ton per hectare with irrigation at 50% field capacity. He further observed that irrigation was essential at flowering. El-Naggar (1991) grew sunflower CV. Mayak that was irrigated at 7, 14 or 21 day intervals or not irrigated. Plant growth and seed yield were improved by all irrigation treatments and were the best with irrigation every 14 days. The present study was under taken to determine the effect of different irrigation regimens on the agronomic traits of two sunflower varieties.

## MATERIALS AND METHODS

A quadruplicated experiment was laid out in a split plot design using a net plot size of 3.6×7 m. The varieties and irrigation regimens were randomize in main and sub plots, respectively. The crop was sown in the last week of February with a single row hand drill in 90 cm apart double row strips with 30 cm space between the rows in a strip.

Nitrogen and Phosphorus was applied @ 100 and 75 kg per hectare in the form of urea and Single Super

Phosphate, respectively. Full dose of phosphorus and half of nitrogen was applied at the time of sowing, while rest of nitrogen was applied at flowering. An inter plant distance of 2.5 cm was maintained by thinning at two to four leaf stage. The crop was earthed up at flowering. All other agronomic practices were kept uniform for all the treatments.

The irrigation regimens comprised two, four and six irrigations. While sunflower varieties used for this study were Gimsun-94 and Gimsun-256. The time of irrigation for each treatment was maintained as two irrigations (15 days after sowing and at flowering), four irrigations 15 days after sowing, bud formation flowering and seed formation stages, six irrigations (15 days after sowing, before budding, flowering, fertilization and seed formation).

Data on growth and yield components were reported by using standard procedures and were subjected to fisher's analysis of variance technique and means were compared by least significant differences test at 0.05 (Steel & Torrie, 1984).

## RESULTS AND DISCUSSION

The data on head diameter showed that irrigation frequencies had a significant effect on this parameter. Six irrigations gave significantly large head diameter (17.16 cm) against the minimum (13.91 cm) recorded in case of two irrigations (Table I). These results are in agreement with those of Jana *et al.* (1982). Both the varieties also differed significantly from each other. The Gimsun-94 produced bigger head diameter of 16.07 cm against 15.31 cm recorded in Gimsun-256. This increase could be due to higher net assimilation by Gimsun-94 due to better utilization of the available water, which ultimately led to better development of head.

**Table I. Effect of irrigation on yield and yield components of two Sunflower varieties**

Irrigation Regimens	No. of Plants (36* 7m)	Head Diameter (cm)	No. of Filled Seed/ Head.	1000 seed weight /gram	Seed Yield (kg/ha)
2	161.00	13.94c	637.42c	54.07c	2200c
4	162.12	16.00b	841.84b	58.93b	2353b
6	161.25	17.16a	971.85a	60.59a	3119a
Varities					
Ginmus-256	161.25	15.31b	778.96b	57.18b	2596b
Gimsun-94	161.00	16.07a	655.00a	58.59a	2788a

Means not sharing a letter in common differ significantly at 5% level of probability

The number of filled seeds increased linearly with each increase in irrigation frequency. Six irrigations gave significantly higher number (971.85) of filled seed per head. While the two irrigations resulted in the minimum number of 637.42. The increased number of filled seed per head under four and six irrigations may be attributed to the recognized role of timely and adequate availability of irrigation water which favorably affects the plant growth and development and helps in uptake of more nutrients. This ultimately enables the plants to show up their inherent potential to the maximum extent.

These results are also similar to the finding of Jana *et al.* (1982). Both the varieties also differed significantly from each other. Gimsun-94 produced more filled seeds head than Gimsun-256. The data on 1000 filled seed weight revealed that irrigation regimens significantly influenced this parameter. Six irrigations gave the maximum 1000 filled seed weight of 60.59 g. The plant receiving two irrigations produced minimum seed weight of 54.07 g. Increased 1000 seed weight resulting from more frequent irrigation might be due to the availability of adequate soil moisture and assimilates from source to sink during seed formation and seed rippling stages. These results agree with those of Kandil (1984).

The two varieties also differed significantly in respect of 1000 seed weight. Gimsun-94 gave significantly higher 1000 seed weight of 58.59 g than Gimsun-256 (57.18). Seed yield data indicated that the maximum seed yield of 3119 kg ha<sup>-1</sup> was obtained by applying six irrigations, while two irrigations produced the minimum (2200 kg ha<sup>-1</sup>) seed yield. Maximum seed yield with six irrigations might be due to increased number of filled seeds and maximum 1000 seed weight. Among the varieties Gimsun-94 produced significantly

higher seed yield (2788 kg ha<sup>-1</sup>) than Gimsun-256 (2596 kg ha<sup>-1</sup>). Mungse and Bhapkar (1983) and Moraou *et al.* (1986) have also reported increased seed yield with higher moisture regimens.

## CONCLUSION

Sunflower variety Gimsun-94 has higher production potential and to realize its maximum potential, six irrigations appear to be more appropriate.

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