

## EFFECT OF WATER STRESS ON THE GROWTH, YIELD AND OIL CONTENT OF SUNFLOWER

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The study was conducted at Latif Experiment Farm, Sindh Agriculture University, Tandojam on a non-saline and non-sodic medium textured soil, to determine the effect of water stress (different irrigation frequencies) on growth, yield and oil content of sunflower variety Hysun-33. There were significant differences among the water stress treatments for all the growth and yield parameters, seed yield and seed oil content. Four regular irrigations with 10-day interval and first irrigation after 40 days after sowing (DAS), produced significantly higher seed yield of 931 kg/ha with 41.81% seed oil content was recorded for four regular irrigations followed by three and two irrigations, giving 918 and 620 kg/ha, respectively. Similar trend was noted for oil content and most of the growth parameters. Key words: sunflower, water stress

### INTRODUCTION

Sun flower (*Helianthus annuus* L.) is an important oil seed crop of the world as well as of Pakistan. It can be grown successfully after cotton and rice both as a spring and autumn crop under irrigated as well as in Daubari and rainfed conditions. In our country it has gained a significant importance due to its nutritive value as its oil has some similarities with olive oil. The area, production and yield per unit area of sunflower is increasing tremendously with passage of time. Among various factors responsible for the low yield, the water requirement for the crop is the most important because water has a direct relationship with the yield of crop as reported by Karam (1978) that increase in the irrigation interval reduced seed yield, plant height, head diameter, seed index, seed oil content and also increased the percentage of unfilled seeds. Reddy *et al.* (1995) reported that low yielding genotypes showed the least reduction in leaf area per plant, seed yield and total dry matter production due to moisture stress. Anwar (1995) stated that all the yield components were affected by the number of irrigations. As the number of irrigations increased, the days to maturity, head diameter, plant height, 1000-seed weight and stalk yield increased, with the exception of seed and seed oil content. Soriano *et al.* (1994) concluded that sunflower seed yield was the most sensitive to water stress after anthesis. He also emphasized the need of irrigation management under limited water supply especially during the reproductive period. Osman and Talha (1979) found that irrigation after every 13 or 15-days resulted significantly higher seed index, oil yield and other parameters. Jadhav and Jadhav (1996) reported that plant growth and seed yield were improved by all irrigation treatments and were the best with irrigation after every 14 days. Keeping all this in view the present study was initiated to determine the effect of water stress on the

agronomic traits and oil content of sunflower under the irrigated condition at Tandojam, Sindh.

### MATERIALS AND METHODS

Field experiments were conducted to determine the effect of water stress on agronomic traits and oil content of sunflower variety Hysun-33 at Latif Experimental Farm, Sindh Agriculture University, Tandojam. The experimental soil was clay loam having pH 7.5, OM 0.56%, nitrogen 0.0450/available P 9 ppm, available K 265 ppm. The experimental design was Randomize Complete Block design, replicated four times. The irrigation treatments were T<sub>1</sub> = one irrigation (45 days after sowing), T<sub>2</sub> = one irrigation (60 days after sowing), T<sub>3</sub> = two irrigations (1st after 45-days and 2nd after 60-days of sowing), T<sub>4</sub> = three irrigations (1st after 45-days, 2nd after 60-days and 3rd after 75-days of sowing), T<sub>5</sub> = four irrigations (1st after 40-days, 2nd after 50-days, 3rd after 60-days and 4th 70-days after sowing). All the agronomic practices were kept uniform for all the treatments and data were statistically analysed on the basis of two years average following the statistical procedure described by Gomez and Gomez (1984).

### RESULTS AND DISCUSSION

The data on growth, yield contributing components and seed oil content as affected by different irrigation frequencies are presented in Table 1. Results revealed that all the growth, yield contributing components and seed content were affected significantly by different irrigation frequencies. The result further demonstrated that maximum plant height (115.25 cm), stem thickness (2.57 cm), days to maturity (90%), head diameter (16.01 cm), number of seeds per head (771.25), seed index (49.25 g), seed yield (1.397 kg per plot) and oil content (41.81%) were recorded under four regular irrigations each given after 40, 50, 60 and 70 days of sowing followed by three irrigations each 45, 60 and 75 days after sowing.

The data showed that all the growth, yield contributing traits and seed oil content were significantly minimum with one irrigation, given either after 45 days of sowing or 60 days after sowing. The yield difference between T<sub>4</sub> (three irrigations) and T<sub>5</sub> (four irrigations) was non-significant and the coefficient of variation ranged from 1.71-8.54% which indicated that the soil under experiment was homogeneous and normal in fertility. The results are supported by the findings of Karam (1978), who reported that increase in the irrigation intervals reduced seed yield,

plant height, head diameter, seed index, seed oil content and also increased the percentage of unfilled seeds. Furthermore the results are in agreement with Anderson (1980), Soriano et al. (1994), Reddy et al. (1995) and Jadhav and Jadhav (1996). From these results it is concluded that sunflower variety Hysun-33 requires four irrigations each given at 10 days interval starting 40 days after sowing for getting the highest seed yield and seed oil content under prevailing agro-climatic conditions at Tandojam.

Table 1. Growth, yield contributing components and seed oil content as affected by different irrigation frequencies

Yield Components	Treatments/Irrigation frequencies				
	(T <sub>1</sub> ) (45 days)	(T <sub>2</sub> ) (60 days)	(T <sub>3</sub> ) (45 & 60 days)	(T <sub>4</sub> ) (45,60 & 75 days)	(T <sub>5</sub> ) 45, 50, 60 & 70 days)
Plant height (cm)	94.00c	99.0bc	105.75b	104.00b	115.25a
Stem thickness	1.63 d	1.90 c	1.95 c	2.20b	2.58 a
Days to maturity (90%)	117.25a	115.5000	115.00b	115.5000	113.00c
Head diameter (cm)	10.65b	11.63b	11.64b	10.95b	16.01a
Seeds per head	610.50b	627.50b	655.25b	670.50b	771.25a
Seed index (g)	42.00d	42.35 cd	43.88bc	44.59b	49.25 a
Yield per plant (kg)	0.68c	0.69c	0.93 b	1.38 a	1.40a
Oil content (%)	34.80c	35.49 c	23.23 c	39.67b	41.81a
		8.E.	Cd1	Cd2	CVO/O.
Plant height (cm)		1.795	5.238	7.159	3.42
Stem thickness		0.052	0.155	0.212	5.10
Days to flowering (90%)		0.815	2.413	---	1.71
Days to maturity (90%)		0.609	1.802	2.464	1.06
Head diameter (cm)		0.520	1.539	---	8.54
Seeds / head		20.958	62.040	84.800	6.28
Seed index (g)		0.438	1.299	1.775	1.98
Yield per plant (kg)		0.011	0.046	0.063	2.26
Oil content (%)		0.354	1.049	1.443	1.88

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