

Effect of irrigation schedules and mulches on yield, soil temperature, water use and economic of sunflower (*Helianthus annuus* L.)

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ABSTRACT

A field experiment was carried out during *rabi* 2003-04 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad to study the effect of irrigation schedules and mulches on yield, soil temperature, water use studies and economic of sunflower on medium deep black clayey soil of Northern Transitional Tract of Karnataka. The experiment was laid out in split plot design with three replications. The treatments comprised of four irrigation schedules (0.4, 0.6, 0.8 IW/CPE ratios and critical stages) as main plots and three mulching (control, maize straw mulch and polythene mulch) as sub plots. The results indicated significantly higher seed yield (1938 kg/ha) in 0.8 IW/CPE ratio irrigation schedules as compared to 0.4, 0.6 IW/CPE ratios and critical stages. The significantly higher seed yield (1868 kg/ha) was recorded in mulch with polythene over rest of the treatments. The interaction effect between irrigation schedules and mulches was significant with respect to yield. The significantly higher seed yield of sunflower (2230 kg/ha) was recorded in 0.8 IW/CPE ratio with polythene mulch. The highest soil temperature at the both the depths (5 and 10 cm) was recorded in mulch with polythene over rest of the treatments. The seasonal consumptive use of water were higher (316.0 mm) in 0.8 IW/CPE with polythene mulch. Highest WUE of 8.19 kg per ha mm was recorded in irrigation schedule at critical stages. The soil moisture extraction was highest in the top layers irrespective of irrigation treatments and decreased with increasing depth of soil (35, 24, 20 and 16% in 0-15, 15-30, 30-45 and 45-60 cm depth, respectively). The maximum gross returns and net returns were also high (Rs. 40140 and 29129/ha) in treatment combination of 0.8 IW/CPE with polythene mulch. However, higher B:C ratio was recorded in 0.8 IW/CPE with no mulch. Scheduling irrigation at 0.8 IW/CPE ratio with polythene mulch can be recommended for Northern Transitional Tract of Karnataka during post rainy season.

Key words : Sunflower, Irrigation, Mulche, Soil temperature

INTRODUCTION

Sunflower is an important oil seed crop gaining paramount importance in the world and ranks next only to soybean and groundnut in the total world production of oil seeds. In India, sunflower is being cultivated over an area of 1.34 million ha with total production of 0.733 million tones with an average productivity of 549 kg per ha (Anon., 2002), which constitute 6.17 per cent and 2.72 per cent of worlds area and production, respectively. In Karnataka, safflower occupies an area of 6.9 lakh ha with production of 2.55 lakh tones of seed with an average productivity of 370 kg per ha (Anon., 2002). Its low productivity is mainly due to its cultivation in rainfed condition, can be enhanced to great extent by successfully growing in *rabi* and summer seasons under irrigated conditions, but water for irrigation is a scare resource, therefore, water use optimization is fundamental to water resource use. It permits better utilization of all other production factors thus, leading to increased yield per unit area and time. The judicious application of water to crop is possible only by some scientific basis. One such approach which guides us to apply water in a more scientific manner is climatological approach (IW/CPE

ratio) of scheduling irrigation. Judicious irrigation management is crucial in sunflower production (Andhale and Kalabhar, 1978). Among different conservation measures, mulching is an important practice for crop production. The main objectives of mulching are preventing and control of soil and run-off losses, check on evaporation of water, increase in moisture status of soil and controls fluctuation of soil temperature. The information on irrigation schedules and mulching in sunflower on medium deep black clayey soil of northern Karnataka is limiting. Therefore, present investigation was undertaken to find out the effect of irrigation schedules and mulches on yield, soil temperature, water use studies and economic of sunflower on medium deep black clayey soil of northern Transitional Tract of Karnataka.

MATERIALS AND METHODS

A field experiment was conducted during *rabi* 2003-04 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The experiment was laid out in split plot design with three replications. There were 12 treatment combinations consisting of four irrigation schedules (0.4, 0.6 and 0.8 IW/CPE and critical stages)

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