

Studies on irrigation regimes, mulches and antitranspirant on yield and water requirement of summer groundnut (*Arachis hypogaea* L.)

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ABSTRACT

A field experiment on response of summer groundnut to irrigation regimes, mulches and antitranspirant was conducted on summer groundnut variety JL-220 (Vyas) at water management project, MPKV, Rahuri. It was observed that, the dry pod yield, haulm yield and kernel yield of groundnut were significantly maximum due to irrigation scheduled at 75 mm CPE than at 100, 125 and 150 mm CPE. Total consumptive use of water was higher with minimum WUE (4.66 Kg/ha/mm) when the irrigation scheduled at 75 mm CPE (736 mm). The water use efficiency was maximum when irrigation scheduled at 100 mm CPE (5.27 kg/ha/mm). On an average evapotranspiration losses reduced to the extent of 25.68, 13.99 and 3.94 per cent due to the use of plastic film, Sugarcane trash @ 5 tonnes/ha and kaoline 8 per cent spray, respectively. The water use efficiency (6.95 kg/ha/mm) was maximum with the use of plastic film + kaoline 8 percent spray and was minimum with control treatment (3.58 kg/ha/mm). The growing of summer groundnut on BBF with irrigation scheduled at 75 mm CPE, using plastic film + kaoline 8 per cent spray was beneficial for achieving higher productivity and reducing evapotranspiration losses in summer groundnut. The use of sugarcane trash mulch @ 5 tonnes /ha was also equally beneficial.

Key words : Irrigation regimes, Mulches, Antitranspirant, Water requirement, Water use efficiency, Consumptive use and Broad bed furrow.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most important oilseed crop of Maharashtra state and predominantly grown in an area of about 1.25 lack hectare with annual production of 1.45 lack metric tonnes and average productivity of 12.60 q/ha Borole (1986) found that irrigation scheduling at 75 mm CPE gave significantly maximum yield of summer groundnut when compared with 100 mm and 125 mm CPE. In recent years, some useful techniques have been evolved to minimize water losses through transpiration and evapotranspiration, such as use of straw mulch, plastic film mulch and antitranspirant. If both of them are used simultaneously, there is possibility of cumulative effect on reducing evapotranspiration losses. Use of straw mulch at 5 tonnes /ha alone with spraying of 8 per cent kaoline from the stage of flowering onwards has proved to produced higher yield in summer groundnut (Anonymous, 1978). Use of plastic film mulch has an important role in increasing the yield and checking weed population. With this background field experiment on response of summer groundnut to irrigation regimes, mulches and antitranspirant was conducted.

MATERIALS AND METHODS

Studies on response of summer groundnut to irrigation regimes, mulches and antitranspirant was carried out during summer season 1999-2000 at water management project, MPKV, Rahuri in a split plot design with four replications, comprising 24 treatment combinations of irrigation regimes placed on cumulative pan evapotranspiration i.e. 75, 100, 125 and 150 mm CPE and 6 sub plot treatments of mulches and antitranspirant viz. sugarcane trash @ 5tonnes/ha, plastic film mulch, kaoline 8 per cent spray, sugarcane trash @ 5tonnes/ha + kaoline 8 per cent spray, plastic film mulch+ kaoline 8 per cent spray and control. The soil of the experimental field was clay in texture, low in available nitrogen (211.70 kg/ha) and phosphorus (8.53 kg/ha), high in available potassium (414.40 kg/ha) and was alkaline in reaction with 44.06 per cent moisture content at 1/3 bar (FC) and 25.45 per cent moisture at 15 bar (PWP). The bulk density of 0-30 cm soil depth was 1.29 g/cm³. The summer groundnut variety JL-220 (Vyas) was dibbled at the spacing of 30 X 6.67 cm on 26.02.1999. The gross and net plot size was 5.00 x 3.60m and 4.00 X 2.70 m respectively. The broad bed furrow was prepared with of 60 cm at the top and 90cm width at the bottom. Four beds in each plot were accomodated and two rows on each bed were sown by dibbling. For

75 mm CPE total 12 irrigation, 100 mm CPE total 10 irrigations, 125 mm CPE total 8 irrigations and for 150 mm CPE total 7 irrigations were given, including pre sowing irrigation, first and second common irrigations.

RESULTS AND DISCUSSION

Effect of irrigation regimes:

The application of irrigation at 75 mm CPE produced significantly higher dry pod yield 34.29 q/ha than rest of irrigation treatments. Further, dry pod yield significantly decreased with increasing levels of CPE. Irrigation at 100, 125 and 150 mm CPE produced 32.96, 30.09 and 27.92 q/ha dry pod yield respectively (Table-1).

The favourable soil moisture condition created in the rhizosphere of summer groundnut at higher irrigation regimes of 75 mm CPE reflected in increasing vegetative growth in form of morphological characters and finally the total biomass production and dry pod yield. The lowest dry pod yield 27.92 q/ha was found with irrigation given at 150 mm CPE and was improved by 7.21, 15.29 and 18.58 per cent with the application of irrigation at 125, 100 and 75 mm CPE respectively. Similar trend was observed in respect of haulm yield and kernel yield. It was also noticed that moisture stress conditions prevailed due to higher CPE values, which adversely affect the production of summer groundnut. Similar increasing in productivity of groundnut was reported by Sabale (1980), Borole(1986), Bachchhav (1990) and Dhamane (1991).

Effect of mulches and antitranspirant

The dry pod yield was maximum to the extent of 35.58 q/ha with the application of plastic film + kaoline 8 per cent spray and was significantly higher than the rest of the treatments. However, this treatment was on par with treatment of plastic film mulch alone. Similarly, sugarcane trash + kaoline 8per cent spray was on par with the treatment of sugarcane trash mulch along. Minimum dry pod yield was recorded in the treatment of control (26.33q/ha) followed by kaoline 8per cent spray alone (27.21q/ha).

The application of plastic film +kaoline 8 per cent spray, plastic film mulch alone, sugarcane trash + kaoline 8 percent spray and sugarcane trash mulch alone increased dry pod yield by 26.00, 23.41, 19.68, 16.67 per cent, respectively, over the treatment of control. This indicates that groundnut crop responded well to application of mulches and antitranspirant. It appeared that various mulches i.e. plastic film and sugarcane trash mulch might have enhanced microbial activities due to favourable soil temperature and

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