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# EFFECT OF DRIP IRRIGATION ON COTTON USING SODIC WATER IN SODIC SOIL.

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ABSTRACT

A study was conducted to find out the efficacy of drip irrigation, in combination with row spacing and plant spacing on the yield of MCU 7 summer cotton. Two levels of irrigation, three levels of row spacing and three levels of plant spacing were incorporated in the study. The water used for irrigation and the field soil type were sodic. The drip irrigated plots registered kapas yield of 730 kg/ac where as the furrow irrigated plots registered 666 kg/ac. The water utilised were 1:3 ratio in drip and furrow methods, though irrigation was non-significant.

In India major portion of the cultivated area is affected by sodicity and salinity. In many cases the well waters are of poor quality with toxic amounts of residual sodium carbonate (sodic water). Their use for irrigation though available in plenty, is restricted due to the fear of spoilage of cultivated land and poor crop yield. Abrol *et al.*, (1975) indicated that supply of water in root zone of the growing crops at appropriate time and in adquate quantities was needed for best results.

Sivanappan (1982) reported that in drip irrigation, 50-60% of water had been saved when compared to ordinary furrow irrigation in cotton and vegetable crops. Sivanappan (1980) has reported that by drip irrigation the cotton kapas yield was increased from 2000 to 3255 kg/ha.

## MATERIALS AND METHODS

To test verify the effect of drip irrigation with sodic water for close spaced crops, a field study was conducted with the test crop of MCU 7 cotton in sodic soil at the Soil Salinity Research Centre, Tamil Nadu Agricultral University, Trichy during the summer season of 1987-88. The experiment was laid out in split plot design with two replications. The treatments consist of two types of irrigation, *viz.*, drip and furrow in main plots. The sub plot treatments were three types of row spacing i.e. 45 cm, 60 cm and 75 cm. The plant spacings of 20 cm, 30 cm and 40 cm were adopted in sub-sub plot treatments. The crop was raised by adopting all the recommended package of practices for irrigated cotton.

The drip system of irrigation was provided to one of the main plots with the water from an overhead tank of 15 M height. The drip system followed was of a low cost one. The water was carried by mans 2" dia black alkathene tube from the tank to the

**Table 1. Mean yield of MCU (kg/ac) Irrigation (M) x Row spacking (R) x Plant Spacing (S)**

| Irrigation | | M1 | | | | M2 | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| RS | PS | S1 | S2 | S3 | Mean | S1 | S2 | S3 | Mean | |
| R1 | | 615.50 | 619.50 | 612.00 | 615.67 | 653.50 | 660.00 | 682.00 | 665.17 | 640.42 |
| R2 | | 643.50 | 582.50 | 750.00 | 658.67 | 653.50 | 837.50 | 636.50 | 709.17 | 683.92 |
| R3 | | 762.50 | 624.00 | 750.50 | 712.33 | 890.50 | 766.30 | 785.00 | 813.93 | 763.13 |
| Mean | | 673.83 | 608.67 | 704.17 | 662.22 | 732.50 | 754.60 | 701.17 | 729.42 | |

RS - Row spacing; PS - Plant spacing

| Rs | PS | Irrigation |
|---|---|---|
| R1 - 45 cm | S1 - 20 cm | M1 - Furrow irrigation |
| R2 - 60 cm | S2 - 30 cm | M2 - Drip irrigation. |
| R3 - 75 cm | S3 - 40 cm | |

**Table 2. Effect of Row spacking and Plant Spacing in yield (kg/ac) Row spacing x Plant spacing.**

| | PS | S1 | S2 | S3 | Mean |
|---|---|---|---|---|---|
| RS | | | | | |
| R1 | | 634.50 | 639.75 | 647.00 | 640.42 |
| R2 | | 648.50 | 710.00 | 693.25 | 683.92 |
| R3 | | 826.50 | 695.15 | 769.75 | 763.13 |
| Mean | | 703.17 | 681.63 | 702.67 | |

| CD at 5% level for : | |
|---|---|
| Irrigation | -NS |
| Row spacing | -NS |
| Irrigation x Row spacing | -NS |
| Plant spacing | -NS |
| Irrigation x plant spacing | -77.85 |
| Row spacing x plant spacing | -136.69 |
| Irrigation x Row spacing x plant spacing | -76.44 |

field In the 2" dia alkathene tube holes were drilled according to the row spacing on top portion of tube by means of 5/8" size drill pit and 1/2" dia polythene 'T'ees were inserted into the drilled hole. In the 1/2" dia 'T' ees, field lateral tubes of 1/2" dia black alkathene tubes were inserted for each row to the entire length of the plots. The other end of the 'T'ees were blocked by means of 10 cm length 1/2" dia alkathene tube with one end open and the other end closed by heating with flame and pressed in field itself. This could have been utilised even to give irrigation to another side of field if needed. In the field lateral tubes, small holes were put by means of sharpened cycle spokes according to the plant spacing hole would be at the bottom of the plant root zone. The same field lateral tubes cut into small pieces were covered on the holes by cutting the small cylindrical piece lengthwise and this could prevent the jetting action of the water. Thus the water was delivered to the root zone of the plant drop by drop. The other end of the lateral tubes were pressed by heating and closed, so that no water could leak the far end. Thus on extra fittings were attached to the drip system for economy point of view. The drip flow was regulated by means of gate valve fitted at the bottom of the supply tank according to the requirement of the plants. The drip discharge per per nozzle was 2 l per hour. Water was allowed in the drip system for 15 minutes duration for every alternate days. The quantity of water delivered for 8 days duration was worked out as 200 l per plot in drip system.

For the furrow system plot, water was pumped out from the sump directly by a 5 HP motor pumpset. The furrow plot took 2 1/2 minutes to complete irrigation in one plot. The pumpdischarge at the field outlet was 4 l/sec. The furrow irrigation had been given once

| Treatments | $SE_M$ | $SE_D$ | CD (%%) |
|---|---|---|---|
| Irrigation | 5.327 | 7.533 | 95.72 |
| Row spacing | 31.190 | 44.110 | 122.45 |
| Irrigation at Row spacing | - | 51.488 | 153.87 |
| Row spacing at Irrigation | - | 62.380 | 163.17 |
| Plant spacing | 14.321 | 20.253 | 44.13 |
| Irrigation at plant spacing | - | 24.569 | 77.85* |
| Plant spacing at Irrigation | - | 28.642 | 62.41 |
| Row spacing at plant spacing | - | 52.593 | 136.69* |
| Plant spacing at Row spacing | - | 35.079 | 76.44 |

in 8 days. Hence for 8 days duration the quantity of water delivered to the furrow plot was 600 l.

The sodic water used for irrigation in both the treatments was having a PH 8.04, EC 1.46 m.mhos/cm. RSC 6.3 and SAR 10.7 and soil was sodic in nature with a PH of 9.6, EC 0.47 m.mhos/cm and ESP 29.2 percent. Irrigation was regularly given once in 8 days in furrow plots and every altenate day in drip plots. The main plot size was 24 x 15 $m^2$, the sub plot was 15 x 4 $m^2$ and sub-sub plot was 5 x 4 $m^2$ and sub-sub plot was 5 x 4 $m^2$. The irrigation had been post poned when rain occurred on particular irrigation day. Total members irrigations given in drip and furrow were 72 and 18 respectively. In drip 50 litres were given for each irrigation whereas in furrow it was 600 litres.

The cotton kapas were picked periodically treatment wise and the weight was recorded. From the respective plot yield values, per acre yield was calculated.

## RESULTS AND DISCUSSION

The statistical analysis of the data of yield of cotton kapas of MCU 7 revealed that there was no significant difference in yield between the drip irrig ot and ordinary furrow irrigated plot (Table 1). Non significant result indicated that there was no difference between irrigating 600 l per irrigation in furrow method and 200 l per irrigation in drip method. Also it indirectly indicated that 400 l of water was wasted in furrow method; otherwise it could be utilised to irrigate tow more plots if drip irrigation was adopted. The above result is in conformity with the findings of Sivanappan (1982) that in drip irrigation 50 to 60% of water was saved when compared to ordinary furrow irrigation method in cotton. Among the interations, irrigation combined with plant spacings was significant. (Table 2) The yield of MCU7 cotton was significantly high at $M_2$ x$S_2$ level, but which was on par with $M_2$ x $S_2$, $M_1$ x $S_3$ and $M_2$ x $S_3$ levels. Similar results were also obtained from the plots treated with drip and furrow plots (Sivanappan, 1980).

The interaction of row spacing with plant spacing was significant (Table 2). $S_1$ x $R_3$ recorded the maximum yield when compared to other treatments but it was on par with $S_3$ x $R_3$, $S_2$ x $R_2$, $S_2$ x $R_3$ and $S_3$ x $R_2$.

Among the interations, rrigation x plant spacing and row spacing (Table 1) were significant. The treatment $M_2$ x $S_1$ x $R_3$ recorded the maximum yield of 890.50 kg/ac

and which was on par with $M_2 \times S_2 \times R_2$. The lowest yield of 582.50 kg/ac was recorded in the treatment $M_1 \times R_2 \times S_2$. The increase in the yield of cotton kapas was due to the drip irrigation and all other cultural operations were common to both the method of irrigation. This increase due to drip has been well documented by Sivanappan (1980) and Abro *et al.*, (1975). The reason for increased yield in drip plot might be that the drip induces the stress of plants frequently whereas in furrow the stress of the plant could be induced once in a week. Owing to the frequent inducement, the yield could be increased. Also in drip irrigation with salt water, the entry of salt to the plant is minimum when compared to furrow Irrigation. In furrow irrigation the entry of salt is more.

The study clearly brought out that the drip irrigation increases the cotton yield under sodic soil with sodic water when compared to ordinary furrow irrigation is sodicity condition. The highest yield was recorded in drip irrigated plot with row spacing 75 cm with plant spacing 20 cm and this was on par with the yield in the treatment of drip plot with row spacing 60 cm and plant spacing 30 cm. The drip plot consumed 200 l of water whereas the furrow plot consumed 600 l of waterpar irrigation.

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# STUDIES ON IMPAIRED SEED-SET IN THE MOTHER PLANT DURING SORGHUM HYBRID SEED PRODUCTION.

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ABSTRACT

Studies on the impaired seed-set during $CoH_2$ hybrid seed production in Coimbatore District during December-January season revealed that 61 per cent of female (ms 2219A) plants exhibited the symptom of impaired seed-sed. Cent per cent of the affected plants were producing side shoot from any of the leaf axils. The problem of impaired seet-set relative to observations recorded is discussed.

In Tamil Nadu, hybrid sorghum seed production is undertaken in an area of 600 ha of which $CoH_2$ hybrid occupies 25 per cent of the area. Problem of impaired seed-set was encountered in the seed production plots sown during December-January season Coimbatore District. Krishnasamy (1982) found the non-synchronised flowering between the parental lines might result in poor seed-set. According to Niu and In(1981), abortion of florets in the male-sterile line 3197A increased with decreasing light intensity. Hence, detailed observations were recorded in a field under Co $H_2$ hybrid seed production, situated near the Agricultural College and Research Institute, Coimbatore.

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