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An Advanced Irrigation Method for Better Yield in Cotton

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An attempt has been made to explain the differences in yields between plants irrigated by drip method using different emitters along with furrow irrigation. The cost per hectare by using the hole and socket as well as microtube emitter is about Rs. 6250/-. The cost per hectare of the polythene hose is about Rs. 3600/-. But in this method, the yield is not upto the mark and is also not suitable for areas of high wind velocity Besides this can be used for a long time. By adopting drip irrigation with hole and socket or microtube emitters using alkathene pipes, the area of cultivation can be increased by three times with the available water and is one of the best methods for achieving high yield as well as better water use efficiency.

In recent years drip irrigation has become widely introduced as an improved method of water application. It is a system of irrigation by which water is supplied under pressure through outlets to individual plants. As the cost of alkathene, plastic and polythene pipes is low, the system has been extensively tried in different parts of the world. By this method precise control of irrigation water is possible particularly increasing the frequency to a degree not obtained in most other conventional methods. The research findings reported here is part of the study to compare the drip irrigation with different types of emitters and the conventional furrow irrigation practised for cotton crop.

MATERIAL AND METHODS

A field experiment was conducted at the Tamil Nadu Agricultural University on cotton CBS.156 variety during summer, 1977. The soil type is clay loam. The following four treatments were tried in a simple randomized block experimental design with six replications :

i) Drip irrigation through alkathene pipes with holes protected with sockets

ii) Drip irrigation through alkathene pipes with 5 cm. long microtubes

iii) Drip irrigation with a tube of 2.5 cm. wide made of polythene film

iv) Furrow method of irrigation (control).

All the plots were of size 8m x 8m sq. The water was delivered to the lateral pipes which were directly connected to a 3 HP motor. The head at the inlet was about 2 psi. In the first treatment, 1 mm diameter holes on the laterals were covered with small alkathene sockets to prevent the clogging of the holes and to dissipate the energy of water for easy dripping at the root

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zone of the plants. In the 2nd treatment, instead of providing the socket, a small 1 mm diameter microtube to a length of 5 cm was inserted. In treatment three, water was allowed to ooze out along the entire length of the polythene hose since the tube is made of polythene film where the edges were stiched to form into a tube. In treatment four, furrows were made at 75 cm centre to centre. A basal application of 12 tonnes/hectare of farm yard manure was applied to the experimental plot before sowing. In the field, furrows were made only in the control plots. All the drip plots were levelled without any furrows. Cotton seeds of variety CBS. 156 were sown near the holes on the laterals in drip method. The spacing, plant population maintained were the same in all treatments.

The discharge rate of drip was adjusted to give four litre/hour and about one litre of water was given to each plant in all the drip treatments. The water flow was adjusted by gate valves and by noticing the time. The evaporation was measured in a class A pan evaporation and irrigation was given based on the evaporation and no watering was given when there was rain of more than 6 mm. In the control plot, irrigation was given as soon as 50 per cent of the available moisture was depleted from the soil. First weeding was taken after one month of sowing. Thedressing was given with 8 kg of urea through the fertiliser applicator apparatus in a period of two weeks in split doses in all the drip plots. In the control plot proportionate quantity of urea was given by hand.

RESULTS AND DISCUSSION

The yield, water used and other details are given in Table. It is seen that the water used in the drip and microtube plots was nearly 1/3 of the water used compared to the control plot. But the yield was found to be much greater than that obtained in all the control plots in every replication. From the statistical analysis of yield in different treatments it was found that the drip method using one mm hole and socket was much superior to the control and polythene hose methods. But the drip with hole and socket was found to be on par with microtube treatments. For ground conditions having sloping or unequal terrain the microtube conveni-

TABLE. Water used yield and Crop Particulars in Drip and Control Plots

Treatment	Average yield kg/ha	Water applied in cm.	Rain fall	Yield in Kg/unit of water used in Kg/ha	Weed growth	Max. root length in cm.	Average No. of bolls per plant
Drip with 1 mm. hole and socket	3250	15	13	116	30	45	69
Drip with 1 mm. dia microtube	2664	15	13	102.2	40	56	66
Drip with polythene hose of 2.54 cm. wide	2315	26	13	59	23	38	45
Control with furrows	2601	70	13	21.4	70	60	45
CD at 5%	497.5						
SE	233.48						

ently used to adjust uniform flow rates by adjusting the length of tube.

By comparing the yield in different methods in the first picking it was seen that the yield was nearly double in drip and microtube plots compared to the weight of cotton obtained in the control plot. This indicated that early maturity is also a notable feature in the drip and microtube methods.

By comparing the total number of bolls in the different methods, the drip irrigated plants had an average of 69 bolls whereas the control plots had only 55 bolls. The weed growth was about 50 per cent in the drip and microtube plots compared to control plot. The water use efficiency is five times more in drip plots compared to control plot. From the root studies it was observed that in the treatment with drip with hole and socket as well as microtubes, 90 per cent of the roots were concentrated in the first 30 cm. depth. In the control plot the tap roots were more than 60 cm in depth. The side roots were spread alround. In the polythene hose plots, the roots were found to grow in the direction of the rows in the first 30 cm depth. The number of roots was less in the polythene hose and control plots compared to the other treatments.