

## SOIL MOISTURE CONSERVATION STUDIES IN DRY FARMING

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A field study was conducted to evaluate suitable soil moisture conservation systems using 'Long Furrow', 'Check basin' and 'Broad bed and furrow systems' in dry farming in Tamil Nadu Agricultural University, Coimbatore. The results indicate that among three systems 'Long furrow' conserves more moisture when compared to 'Check basin' and 'Broad bed and furrow system' in dry farming.

Realising the importance of moisture and soil conservation as in dryland crop production, India has taken concrete action since the inception of the first five year plan provide a strong research and training base in soil and water conservation programmes. The investment made for the moisture conservation programme has been 508 million rupees and 21 mha of land have been treated with soil and water conservation measures up to 1978. To conserve the moisture in dry farming, the contour bunding is found to be very useful. Bunding has increased yields of Setaria, Cotton and Sorghum by 18.11 and 17 percent respectively in large scale field trials in Tamil Nadu State. Bhushan *et al.* (1977-80) has reported on the increased yield of maize due to deep ploughing.

The black cotton soil has remained problematic to the soil and water conservation Engineers. Contour bunding which is beneficial in the shallow and medium soils and which is recommended as a potential moisture conservation technique (Kanikkar *et al.*, 1960) has totally failed in its applicability to the deep Black cotton soils. This is due to the problems of water stagna-

tion, frequent breaking of bunds and the resultant excessive channelised erosion in the inter bunded area. It is in this context the Tillage systems viz 'Long furrow' 'check basin' and 'Broad bed and furrow systems' were tested to workout the suitable soil moisture conservation techniques in dry farming for the black cotton soil.

### MATERIALS AND METHODS

Soil moisture conservation systems Viz., Long furrow, Check basin and broad bed and furrow systems were laid out in the Black soils of Tamil Nadu Agricultural University Farm Coimbatore during June 1982. The experimental field is almost level and is of the heavy clay soil. The soil has a wilting point of 13% and field capacity of 26%. The long furrow system was designed for 100 m length, 0.6 m top width and 0.3 m depth. The slope of the system was maintained 0.6% to avoid Velocity of scouring. The check basins were designed for 5 m length and 2 m width. The broad bed and furrow system were designed for an interval of 1.5 m, the furrow having a width and depth of 0.30 m. The layout cost of the systems 'Long furrow',

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Table 1. Monthly Total Rainfall in 'mm' (82-83)

<i>Month</i>	<i>Rainfall in 'mm'</i>
June '82	32.0
July	36.8
August	50.6
September	36.3
October	107.4
November	237.3
December	8.4
January '83	—
February	—
March	—

'Broad bed furrow' and check basin were worked out Rupees 41/ha, 50/ha and 95/ha respectively.

Neutron access tubes were installed in three locations in each of the three systems for measuring the soil moisture depletion. Rainfall data from the near-by raingaguge installed in the open field laboratory of soil and water conservation department was utilised in the analysis. The fields of the different systems were planted with Sorghum Co. 24 having cowpea Co. 2 as inter-crop during Kharif (June — August) season and with MCU. 10 cotton as the test crop in Rabi season (October-March). The sorghum was harvested as fodder as there was failure of rains. The profile moisture readings at 30 cm, 45 cm and 60 cm depths were observed by the the Neutron moisture probe. The rainfall received during the Kharif and Rabi seasons (1982-1983) are given in Table-1.

The amount of weekly average moisture retained in 0.6 m of soil profile during the Kharif and rabi seasons

were worked out and are given in Tables 2 and 3. The date of monthly average soil moisture are given in Table 4 and 5. The yield details of cotton in Rabi season in relation to three system are given in Table 6.

## RESULTS AND DISCUSSION

The data on soil moisture conservation for Sorghum (Table 4) demonstrates of the beneficial effects of Long furrow in conserving the soil moisture in dry farming. In long furrow system the seasonal average (Kharif) soil moisture conserved was 17.43 cms: where as it was 14.92 cms in check basin system and 13.17 cm in broad bed and furrow system.

The data on soil moisture conservation for Cotton MCU. 10 (Table-5) brings out the beneficial effects of Long furrow in conserving the soil moisture in dry farming. In long furrow system, the seasonal average (Rabi season) of the conserved soil moisture was 15.29 cms. whereas in cheeck basin system, it was 12.86 cms and in broad bed and furrow system 11.77 cms.

Table 2 Weekly average moisture conservation in the three systems. Sorghum Co. 24 with cowpea.

S. No.	Month & week	Broad bed furrow 'cm'	Check basin 'cm'	Long furrow 'cm'
1	June 1st week	12.29	13.99	16.15
2	" 2nd week	12.75	15.62	19.91
3	" 3rd week	13.22	16.82	19.56
4	" 4th week	13.39	16.06	19.28
5	July 1st week	13.52	15.94	19.07
6	" 2nd week	13.10	15.01	18.46
7	" 3rd week	12.95	14.57	17.27
8	" 4th week	13.00	14.46	17.63
9	August 1st week	13.86	14.41	16.16
10	" 2nd week	13.83	14.57	15.88
11	" 3rd week	13.33	14.21	15.65
12	" 4th week	12.80	13.45	15.04

The amount of moisture retained in 1m<sup>3</sup> of soil profile during the Kharif and Rabi season are given in Table 2 and 3.

Table 3 : Weekly average moisture conservation in three systems for MCU. 10 cotton

Sl. No.	Month & Week	Broad bed furrow 'cm'	Check basin 'cm'	Long furrow 'cm'
1	December 1st week	12.25	14.30	16.69
2	" 2nd week	12.24	14.03	16.42
3	" 3rd week	12.22	13.95	16.08
4	" 4th week	12.15	13.85	16.22
5	January 1st week	12.08	13.63	15.61
6	" 2nd week	11.96	13.135	15.15
7	" 3rd week	11.82	12.08	14.63
8	" 4th week	10.70	11.62	14.60
9	February 1st week	11.63	11.56	14.28
10	" 2nd week	11.53	11.32	14.08
11	" 3rd week	11.36	11.28	13.97
12	" 4th week	11.23	11.09	13.83

Table 4 : Monthly average moisture conservation for sorghum Co. 24 with cowpea

Sl. No.	Month	Broad bed furrow system 'cm'	Check basin system 'cm'	Long furrow system 'cm'
1	June	12.91	15.62	18.72
2	July	13.14	14.99	17.88
3	August	13.45	14.16	15.69
	Seasonal average moisture content	13.17	14.92	17.43

Table 5: Monthly average moisture conservation for MCU 10 cotton

S. No.	Month	Broad bed furrow system 'cm'	Check basin system 'cm'	Long furrow system 'cm'
1	December	12.25	14.50	16.33
2	January	11.64	12.61	14.99
3	February	11.43	11.31	14.40
	Seasonal average moisture content	11.77	12.86	15.29

The data of soil moisture are averaged and the summary tables are given in table 4 and 5

Table 6: Yield details of cotton in rabi season in relation to moisture in three systems

S. No.	Systems	Seasonal average moisture content in 'cm'	Yield of cotton MCU 10 Kg/ha
1	Broad bed furrow	11.77 'cm'	706
2	Check basin	12.86 'cm'	726
3	Long furrow	15.29 'cm'	740

In long furrow system, the yield of cotton MCU, 10 (Rabi season) was 740 kg/ha where as in check basin system it was 726 kg/ha and in broad bed and furrow system, 706 kg/ha. (Table-6)

The additional yield in long furrow is due to additional moisture conserved due to better absorption of the rain. The run off from long furrow was considerably intercepted and the soil was offered with more time of retention. This additional moisture would be useful for plant growth and would result in higher productivity,

Further the labour requirements for long furrow system is less when compared with the check basins and Broad bed furrow systems. So it can be widely adopted in dry farming to conserve more moisture and to get maximum production in dry farming. Among the three systems tested Viz., Long furrow,

check basin system and Broad bed and furrow systems, the long furrow conserves more moisture and give more yield.

#### REFERENCES

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