

## Acceptable dry land moisture conservation practices for western agroclimate sub zone of Tamil Nadu

S. NATARAJAN, T. N. BALASUBRAMANIAN, K. VAIYAPURI AND M. AYYASAMY  
Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore - 641 003

**Abstract:** Eight field experiments (one on station trial, seven on-farm research trials) were conducted both during North east monsoon and South west monsoon of 1998 and 1999 in sorghum, groundnut, sunflower and maize in alfisol drylands of western agro climate subzone. The results revealed that sorghum responded well for the moisture conservation practice 'basin listing', when it was sown during South west monsoon 1998 at Research Station, Bhavanisagar. Similarly in the same season of 1999 under farmers condition, *in situ* moisture conservation practice namely contour sowing, followed by ridging three weeks later was the best for dry land groundnut crops. Of the two crops sown during North east monsoon 1999 tying alternate furrows with mulching of locally available material seemed to be the best soil moisture conservation methods for the dryland maize crops. In the same season sunflower responded highly when the moisture conservation practices namely sowing in contour followed by ridging three weeks later was adopted. The result further indicated that *in situ* moisture conservation practices to be adopted varied with seasonal rainfall and within season it varied between crops indicating the need of the development of location specific technology. (**Key words:** Acceptable, dryland, *in situ* moisture conservation practices).

Among the seven agroclimatic subzones of Tamil Nadu, western agroclimatic sub zone is one among them and it has occupied about 24567 km<sup>2</sup> and this works to 16 per cent of the total State area. Majority of the cultivable lands of the zone is under dryland cropping. Among the different soil types in the zone, red non-calcareous soil is the most predominant soil type, which has available water holding capacity of 100 mm per metre depth of soil. Even though annual rainfall of the zone varied from 524 to 1428 mm, the average rainfall is being 780 mm. Of the total, about 50 per cent is being received during North east monsoon (October-December) and hence dryland cropping is possible only during this season. Under farmer's situation, groundnut, maize, sorghum and sunflower were important crops being raised during Northeast monsoon season. Katyal and Das (1992) documented many soil moisture conservation practices that could be practiced under farmers condition. Hence the study was under taken with due participation from farmers through on farm research trials.

### Materials and Methods

Eight experiments were conducted in four villages (7 OFR trials and one on station trial). The studied treatments were as follows.

- T<sub>1</sub> : Farmers method. (One ploughing followed by sowing behind the country plough)  
T<sub>2</sub> : Formation of furrow 30 cm depth across the slope at 3 m interval by country plough with wooden plank attached at the base of the plough.

- T<sub>3</sub> : Forming section bunds (0.1m<sup>2</sup>) across slope at 3 m interval with cenchrus grass as vegetative barrier.  
T<sub>4</sub> : Tying alternate furrow with mulching of locally available material.  
T<sub>5</sub> : Compartmental bunding.  
T<sub>6</sub> : Sowing along the contour and ridging later 3 weeks after sowing. (WAS)  
T<sub>7</sub> : Sowing with minimal tillage.  
T<sub>8</sub> : Forming basin listing three week after sowing.

Each trial was conducted in a randomised block design with three replications.

The details on the trials conducted are given in the Table 1.

Standard procedures were adopted for the formation of different moisture conservation practices listed in the treatments schedule.

### Results and Discussion

The data on crop's yield are presented in Table 2.

In trial 1 the sorghum grain yield was higher with treatment T<sub>8</sub> and it was on par with treatments T<sub>3</sub> and T<sub>4</sub>. The increase in yield under treatment T<sub>8</sub> over T<sub>3</sub> and T<sub>4</sub> treatments was 2.08 and 3.86 per cent respectively. The yield recorded under treatment T<sub>1</sub> (Farmers method) was 24 per cent lesser than that of treatment T<sub>8</sub>. In the trial 2, higher pod yield was obtained in treatment T<sub>6</sub> (940 kg ha<sup>-1</sup>) and it was at par with treatment T<sub>5</sub>, T<sub>2</sub> and T<sub>1</sub>. However about 10<sup>7</sup> kg additional

Table 1. Details of trials conducted

Experiment No.	Season	Test crop and variety	Name of the farmers and village	Date of sowing
1	South west monsoon 1998	BSR 1 Sorghum	Agriculture Research Station, Bhavanisagar	16-8-98
2	South west monsoon 1999	Groundnut Co 1	S.P. Muthukrishnan, Sakkumaripalayam	21-8-99
3	South west monsoon 1999	Groundnut Co 1	Mr. T. Periyasamy Gounder, Sakkumaripalayam	21-8-99
4	South west monsoon 1999	Groundnut Co 1	Mr. M. Chinnasamy Gounder, Nilakadu	22-8-99
5	North east monsoon 1999	Sunflower morden	Mr. P.Ponnam, Usilampatty	12-11-99
6	North east monsoon 1999	Maize deccan	S. Nanjappan, No. 10 Muthur	9-12-99
7	North east monsoon 1999	Maize deccan	Mr. R. Somasundaram, No. 10 Muthur	25-11-99
8	North east monsoon 1999	Maize deccan	Mrs. S.Rani, No. 10, Muthur	24-12-99

Table 2. Crops yield under various treatments

Name of the treatments	Sorghum grain yield at							
	ARS Bhavani Sagar (kg ha <sup>-1</sup> )		Dry Groundnut pod yield (kg ha <sup>-1</sup> )		Sunflower grain yield (kg ha <sup>-1</sup> )		Maize grain yield (kg ha <sup>-1</sup> )	
	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5	Experiment 6	Experiment 7	Experiment 8
T <sub>1</sub> Formers method	2104	833	833	1433	575	3416	3193	3110
T <sub>2</sub> Formation of furrows at 3 m intervals	2508	933	666	1441	575	3300	3320	3178
T <sub>3</sub> Formation section bund with growing cenchrus as vegetative barrier	2686	733	700	1323	599	3370	3158	2900
T <sub>4</sub> Tying alternative furrow with mulches	2640	720	785	1483	650	4476	3580	3233
T <sub>5</sub> Compartmental bunding	2532	908	808	1375	601	3356	3308	4175
T <sub>6</sub> Sowing along the contour and ridging later 3 WAS	2368	940	900	1608	935	3280	3091	3141
T <sub>7</sub> Minimal tillage	2342	693	713	1341	680	3197	3278	3196
T <sub>8</sub> Basin listings 3 WAS	2742	716	683	1350	650	3308	3316	3290
SEd	49.0	84.89	88.44	60.78	56.39	164.33	241.69	175.25
CD (p=0.05)	124	182.09	190.58	30.38	120.96	352.49	518.44	375.91



yield was obtained in treatment T<sub>6</sub> as compared to farmers method (T<sub>1</sub>). Hence, it is inferred that the treatment T<sub>6</sub> was most suitable for this area (sowing along the contour and ridging later at 3 weeks after sowing). While in the trial 3, highest pod yield was recorded with treatment T<sub>6</sub> and it was at par with treatments T<sub>7</sub>, T<sub>5</sub>, T<sub>4</sub> and T<sub>1</sub>. Considering the yield, the treatment T<sub>6</sub> (sowing along the contour and ridging 3 weeks after sowing) would be a best method for this area. In respect of trial 4, the highest pod yield was recorded in treatment T<sub>6</sub> and it was at par with T<sub>4</sub>. For sunflower (trial 5) the treatment T<sub>6</sub> (sowing along the contour and ridging 3 WAS), recorded significantly highest yield of 935 kg ha<sup>-1</sup> which was 56 per cent higher than T<sub>3</sub> and 44 per cent higher than T<sub>8</sub>. In respect of maize (trial 6) the treatment T<sub>4</sub> (tying alternate furrow with mulching of locally available material) had recorded the highest yield of 4476 kg ha<sup>-1</sup> which was the highest record under rainfed situation in this location. The increased yield obtained by the treatment T<sub>4</sub> over T<sub>3</sub>, T<sub>1</sub>, T<sub>6</sub> and T<sub>8</sub> was 33, 31, 36 and 35 per cent respectively. Under trial 7 the treatment T<sub>4</sub> (Tying alternate furrow with mulching of locally available material) had given significantly higher yield of 3580 kg ha<sup>-1</sup> which was 12 per cent higher than the farmers method (T<sub>1</sub>) 17 per cent higher than the treatment T<sub>6</sub> and in the last trial (trial 8) the treatment T<sub>5</sub> (compartmental bunding) had given higher yield of 4175 kg ha<sup>-1</sup> which was 34 per cent higher than T<sub>1</sub>, 29 per cent higher than T<sub>4</sub> and 33 per cent higher than T<sub>6</sub>.

It may be inferred from the above results that under farmer's condition when groundnut was sown during Southwest monsoon in alfisol the best conservation practices would be sowing along the contour and ridging three weeks later. In this area as compared to Northeast monsoon rainfall relatively lesser amount rainfall was received. Hence betterment of technology is to conserve soil moisture. Hedge, et al. (1987) reported that for red soil especially for maize during SWM the moisture conservation practice flat on grade and ridging up later found to register higher grain yield.

Even though sunflower was sown during North east monsoon which was with higher rainfall, the treatment sowing along the contour and ridging three weeks later had given higher sunflower grain yield. This might be due to even distribution rainfall throughout the cropping period in that particular area.

In respect of North east monsoon, a maize the superiority of the treatment T<sub>4</sub> (Tying alternate furrows with mulching of locally available material) resulted in higher grain yield followed by compartmental bunding. Under heavy rainfall situation drainage is mostly required and especially for maize which doesn't like water stagnation. Since the moisture conservation method under T<sub>4</sub> treatment served the purpose of draining the excess rain water during Northeast monsoon, the treatment had given higher yield. At Kovilpatti (Tamil Nadu) compartmental bunding was superior for conserving soil moisture for cotton and black gram inter cropping system (Balasubramanian and Subramanian, 1990). Elswaify, et al. (1987) reported that installation of field drains was essential and tied ridging was best. With reference to on station trial especially for sorghum the treatment T<sub>8</sub> (forming basin listing 3 weeks after sowing) had come with higher grain yield possibly due to micro level dam created by basin listing. This might have supplied optimum soil moisture to sorghum crop on its demand for ET, whenever required.

## References

- Balasubramanian, T.N. and S. Subramanian. 1990. Agronomic options for stabilizing crop production in vertisols under rainfed. *Indian J. Dryland Agri. Res. And Dev.*, 5: 16-22.
- Elswaify, Singh, S. and P. Pathak. 1987. Physical and conservation constraints and management component for SAT alfisols. In : Proceeding of the alfisols in the semiarid tropics, a consultant workshop. 1-3 Dec 1983, ICRISAT, Hyderabad (Ed. N.Raghavan and S.R. Beckerman) pp. 33-48.
- Hegde, B.R., T.C. Channappa and B.K. Ananda Ram. 1987. Management alternatives for increased productivity of red soils : Experience in Karnataka. In : Proceedings of the alfisols in the semiarid tropics, a consultants workshop. 1-3 Dec 1983 ICRISAT, Hyderabad (Ed. N. Raghavan and S.R.Beckerman) pp. 137-144.
- Katyal, J.C. and S.K. Das. 1992. Stability in dryland agriculture, potential and possibilities. *Indian J. Dryland Agric. Res and Dev.* 7: 1-4.