ADOPTION OF SOIL AND WATER CONSERVATION PRACTICES FOR NON-ARABLE LANDS BY THE FARMERS OF SEMI-ARID INDIA

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By definition, the dominant characteristic of drylands is insufficient water supply to support stable agriculture. Not only is there insufficient rainfall but it's occurrence is also highly erratic between years, during any one year and specially, during any single rainfall event. Much of the rain in dryland areas falls in high intensities, causing runoff and erosion and thus, a significant amount of water does not enter the soil. This happens even though the water storage capacity of the soil is far from full. It is not generally realized that runoff losses from a field can amount to 20-40% of storm rainfall. While increase of agricultural production depends on numerous factors, the adoption of soil and water conservation measures will enable farmers to make more efficient use of the available water and therefore, is an essential prerequisite (Pathak and Laryea K.B. 1995).

The National Policy on Agriculture (2000) aims at growth that is based on efficient use of resources and conservation of soil, water and biodiversity and growth that is sustainable technologically, environmentally and economically. Treatment of the rainfed areas on watershed basis, therefore, important for optimum use of available rain water through soil and water conservation measures. Thus the optimal management of soil and water resources with minimal adverse environmental impact is essential not only for sustainable development but also for human survival. Realising the importance of rainfed agriculture, the National Watershed Development Project for Rainfed Areas (NWDPRA) was started in 1986 by Government of India and restructured as Integrated Watershed Development Programme in 1996 (Yadav and Sharma, 2003).

With this backdrop, the present study was undertaken as a part of the NATP research project 'Collection and Documentation of Indigenous Technological Knowledge on Soil and Water Conservation Measures with the following specific objectives :

To measure the extent of adoption of Soil and Water Conservation Measures for non-arable lands by the farmers of semi arid India and to find out the constraints for poor or non adoption.

METHODOLOGY

The project was carried during 2000-2002 at Central Research Institute for Dryland Agriculture (CRIDA),Hyderabad with 18 cooperating centres all over India. These centres cut across various states and rainfall zones of the country.

Two to three treated villages and 2 untreated villages were selected from each centre thus, constituting 4 to 5 villages and the sample size constituted 88 villages, out of which 54 were treated with soil and water conservation practices and the remaining 34 villages were untreated. Simple random

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sampling procedure was followed for selection of villages. To find out the extent of adoption of soil and water conservation practices by the respondents, a well-structured interview schedule was developed. Pretested interview schedule was employed for the data collection. The interview schedule consisted of questions relating to the adoption of various soil and water conservation practices for arable lands and the questions were closed ended. The data were collected through group interview method and minimum of 15 farmers in groups were interviewed from each village. The groups consisted of all catogeries of farmers including women and experienced senior citizens who were well aware of village statistics.

The respondents were queried about their adoption or non-adoption of the practices against each item. A score of three was awarded for adoption on all fields, two for adoption on at least one field and one for nonadoption. Percentage analysis was worked out to study the practice wise adoption of the villages. Constraints for partial or no adoption were also elicited in similar way.

RESULTS AND DISCUSSION

It is apparent from the table-1 that the horticulture was much under practice which was adopted by the farmers of two third villages compared to other soil and water conservation practices for non-arable lands which were adopted by the farmers of less than one third villages of both treated and untreated villages.

Table 1. Adoption of Soil and Water Conservation Practices for Non-arable Lands

	Practice	Adoption (treated) n=54						Adoption (untreated) n=34					
		Not adopted		Adoption on at least one filed		Adoption on all fields		Not adopted one field		Adoption on at least fields		Adoption on all	
		F	%	F	%	F	%	F	%	F	%	F	%
1.	**Prevailing Alternate Land Use system**												
	(i) Farm Forestry	35	64.81	7	12.96	2	3.70	25	73.52	15	14.71	1	2.94
	(ii) Horticulture	18	33.33	24	44.44	2	3.70	14	41.17	16	47.05	2	5.88
	(iii) Agri-silviculture	38	70.37	5	9.26	–	–	23	76.64	4	11.76	8	23.53
	(iv) Agri- horticulture	26	48.15	14	25.93	3	5.56	17	50	13	38.24	1	2.94
	(v) Silvi pasture	32	59.26	11	20.37	2	3.70	24	70.58	5	14.71	–	–
2.	**Trenching stone bunding micro catchments**												
	(i) semi cicular/Crescent bunds	39	72.22	9	16.67	1	1.85	28	82.35	–	–	–	–
	(ii) V bunds	37	68.52	11	20.37	3	5.56	27	79.41	–	–	–	–
	(iii) Continous trench/continuous contour ditch	33	61.11	12	22.22	3	5.56	27	79.41	–	–	–	–
	(iv) Circular bund	37	68.52	8	14.81	–	–	28	82.35	–	–	–	–
	(v) Double ring bund	39	72.22	9	16.67	2	3.70	28	82.35	–	–	–	–
	(vi) Staggered trench	41	75.96	8	14.81	–	–	27	79.41	1	2.94	–	–
	(vii)Micro relief system	39	72.22	7	12.96	1	1.85	26	76.47	2	5.88	–	–

Note : All figures are in percentage F=Frequency, %=Percentage

Alternate Land Use Systems–Around 17 per cent of treated villages and around 18 per cent of untreated villages adopted farm forestry. Majority of the treated villages and around half of the untreated villages adopted horticulture. More than 9 per cent of treated

villages and around 35 per cent of the untreated villages adopted agri-silviculture. More than 31 per cent of the treated villages and around 24 per cent of the untreated villages adopted agri-horticulture. Silvi-pasture was adopted by 24 per cent of treated and around 15 per cent of the untreated villages. Tewari (1994) observed that about 175 m.ha. of 329 m.ha. of geographical area is degraded due to various reasons resulting in the loss of 6000 m.t. of fertile top soil and 8.4 m.t. of nutrients by erosion every year. Most of the forest land also is degraded and has low productivity. These lands can be reclaimed by agro-forestry and silvi-pastoral models in different situations. Rao and Osman (1994) observed that the silvi-pasture is the most appropriate agro-forestry system for wastelands. Planting of species like *Leucaena* on contour trenches at 7.5 m x 2 m on sloppy lands plus semi perinnial forages like *Cenchrus* plus *Stylo* are ideal for rehabilitation of wastelands. The system gives 3t/ha/year of *Cenchrus* plus 6 t/ha/year of stylo plus 5t/ha/year of *Leucaena* as fuel wood besides increasing organic carbon from 0.56 to 0.66% after 5 years over the initial value of 0.15%.

Table 2. Reasons for Partial/non adoption of Soil & Water Conservation Practices for non-arable Lands

N=54 for treated villages, 34 for untreated villages

Practice	Reasons for non/partial adoption									
	Not technically suitable to their specific location		Prohibitive cost		Not convenient		Neighbouring farmers do not cooperate		Non availability of power/ implement/ labour	
	T	UT	T	UT	T	UT	T	UT	T	UT
1. Prevailing Alternate Land Use system										
(i) Farm Forestry	22.22	23.53	11.11	2.59	25.93	44.12	3.70	2.94	1.85	5.88
(ii) Horticulture	11.11	17.65	22.22	14.71	11.11	32.35	5.56	-	1.85	5.88
(iii) Agri-silviculture	12.96	23.53	12.96	14.71	37.04	47.05	3.70	-	1.85	5.88
(iv) Agri-horticulture	11.11	11.76	18.52	11.76	27.78	47.05	1.85	-	1.85	2.94
(iv) Silvi pasture	14.81	14.71	5.56	8.83	24.07	44.12	5.56	-	1.85	2.94
2. Trenching stone bunding/micro catchments										
(i) Semi circular/Crescent bunds	14.81	8.82	33.33	32.35	38.89	29.41	-	-	5.56	14.71
(ii) V bunds	12.96	11.76	35.29	38.89	29.41	-	-	5.56	14.71	
(iii) Continuous contour ditch	11.11	14.71	33.33	29.41	35.19	38.24	-	-	1.85	11.76
(iv) Circular bund	16.67	14.71	38.81	38.24	46.30	32.35	-	-	1.85	11.76
(v) Double ring bund	20.37	11.76	30.74	38.24	42.59	29.41	-	-	1.85	11.76
(vi) Staggered trench	22.22	14.71	35.19	32.35	42.59	32.35	1.85	-	1.85	11.76
(v) Micro relief system	16.67	20.59	33.33	29.41	46.30	26.47	-	-	1.85	11.76

T= Treated villages, UT=Untreated villages

Trenching/Stone Bunding/Micro Catchments–Around 19 per cent of the treated villages adopted semi-circular/crescent bunds and no adoption was found by untreated villages. Around 26 per cent of the treated villages adopted V bund and no adoption was recorded by untreated villages. Around 28 per cent of the treated villages adopted continuous trench/ continuous contour ditch and no adoption was found in case of untreated villages. Around 15 per cent of treated villages adopted circular bund atleast on one field and no adoption was found by untreated villages. More than 20 per cent of the treated villages adopted double ring bund whereas no adption was found in case of untreated villages. Around 15 per cent of treated villages and 3 per cent of untreated villages adopted

staggered trench atleast on one field. Micro relief system was adopted by around 15 per cent of treated villages and 6 per cent of the untreated villages.

The adoption of trenching/stone bunding/ micro catchments was more in case of treated villages than untreated villages. It is significant to note that most of these practices were not adopted by the untreated villages. The reason for this ttype of trend might be due to the fact that the farmers of the untreated villages were not aware of these practices.

Constraints–The reasons for low adoption of various alternate land use systems were not convenient, prohibitive cost and technically not suitable to their specific locations in decreasing order of importance by the farmers of treated villages whereas not convenient, not technically suitable to their specific locations and prohibitive cost in decreasing order of importance by the farmers of untreated villages.

The reasons for low adoption of trenching/ stone bunding/micro catchment structures were not convenient, prohibitive cost and not technically suitable in decreasing order of importance by the farmers of treated villages and prohibitive cost, not convenient and not technically suitable by the farmers of untreated villages. According to Rao (2003) resource poor nature of the farmers, higher initial investment, long gestation period for generation of income, lack of improved planting material and techniques, credit and suitable marketing facilities act as constraints. Social factors like education and social status, informal groups and lack of awareness also contributed for non adoption of the soil and water conservation measures (Bagdi, Samra and Kumar,2001). These constraints need to be given priority by the personnel involved in watershed development programmes and extension agency.

CONCLUSION

The overall adoption of soil and water conservation practices for non-arable lands was not impressive. The average land holding is small and the large majority of the farmers may tend to grow only field crops on the limited available land. Therefore, it is necessary to intensify the extension programmes particularly for small and marginal farmers to increase their knowledge and adoption of the recommended practices. Farmers should be made more aware of the benefits that accrue out of adoption of SWC practices. Second point is that, SWC practices suited to specific locations should be recommended or developed, if needed. Yet another view expressed is that government support should be extended for better adoption of SWC practices.

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