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SUSTAINABLE AGRICULTURAL PRODUCTION IN WATERSHED AREAS OF SOUTHERN RAJASTHAN

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ABSTRACT

The present study was conducted in tribal area of Dungarpur and Banswara disticts, where National Watershed Development Programme (NWDP) for rainfed areas was launched. Total of 120 beneficiaries were randomly selected from four watershed area. The respondents were personally interviewed with the help of pretested interview schedule. After implementation of the project the result of study revealed that the drastic change was noted in agricultural production. Regarding change in area of crop it was found that before implementation of the project, maize(53%)was the principal crop followed by black gram (14%), pigeon pea (8.5%) and gram (5.6), whereas after the project completion maize (41.3%) was followed by wheat (10.4%), gram (10.1%) and paddy (9.7%) were major crops Further total cropped area and cropping intensity were increased to the tune of 48.7 and16.7 per cent respectively. Regarding yield, maximum yield was increased in case of paddy (91.7%) followed by cluster bean (74.6%) and pigeon pea (54.6%).

INTRODUCTION

National Watershed Development Programme (NWDP) for rain fed areas was launched by the department of Watershed development and soil conservation in year 1990-91. The objective of the project was restoration of ecological balance in rain fed areas and sustainable biomass production. Project has an important role in the present context because water management alongwith judicious use of water for raising crop is going to be instrument in sustainable agricultural production in our country and more, especially in Rajasthan. The problem of soil erosion is very severe in the state as most of the part of the state is rain fed and dry. NWDP was completed in 1996-97. Keeping this in view a study was conducted to asses critically the impact of NWDP on the implementing functionaries and policy makers. The study was undertaken with specific objectives to assess impact of NWDP in terms of cropping pattern and yield levels.

RESEARCH METHODOLOGY

The present study was conducted in tribal sub-plan region of Southern Rajasthan where maximum tribal population resides in Banswara and Dungarpur districts, these districts were selected purposively. Among the watersheds of these districts, the study was confined to four watersheds viz. two from Banswara :Bilaria and Tambesara and remaining two i.e. Nandali and Samliya Pandya from Dungarpur district were randomly selected. Thereafter a list of beneficiaries in selected watershed area was obtained from the concerned watershed project office .From the list , randomly 10 big, small and marginal farmers from each of the watershed were chosen thus making a total of 120 respondents. The respondents were personally interviewed with the help of pretested interview schedule. For measurement of the change in cropping pattern observed before and after implementation of programme by individual beneficiary through their memory recall method.

RESULTS AND DISCUSSION

1. Changes in area under major crops: Table-1 reveals the cultivated area under different crops in Kharif and rabi season during watershed project. Before initiation of the Programme ,in kharif ,maize, pigeonpea and cotton occupied major acreage, while after implementation of project maize, paddy urd and cotton contributed major total cropped areas.

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Table 1. Changes in area of important crops after implementation NWDP.

S. No.	Crops	Before (1991-92)		After (1997-98)		Percent increase / decrease
		Area	Percent	Area	Percent	
A	Kharif					
1	Maize	75.04	53.08	86.61	41.27	15.46
2	Black gram	19.60	11.86	19.92	09.19	01.63
3	Paddy	5.41	3.81	20.12	09.68	273.53
4	Pigeon pea	12.00	8.49	9.28	04.42	22.66
5	Cotton	7.20	5.10	15.04	07.16	108.89
6	Cluster bean	1.76	1.25	5.60	02.67	218.19
7	Sesame	3.81	2.72	1.60	00.76	-58.13
8	Sorghum	1.44	0.02	-	-	-144.00
9	Soybean	0.00	-	2.32	1.11	232.00
	Total	**126.32**	**89.36**	**160.72**	**76.56**	**27.23**
B	Rabi					
1	Wheat	5.60	3.96	21.76	10.36	288.57
2	Gram	7.92	5.60	21.20	10.10	167.67
3	Mustard	0.61	0.45	1.84	00.88	187.5
4	Barley	0.80	0.57	-	-	80.00
5	Lucerne	0.08	0.06	3.12	01.49	1800.00
6	Vegetables	-	-	0.48	00.23	48.00
7	Rabi-maize	-	-	0.80	00.38	48.00
	Total	**15.04**	**10.64**	**49.20**	**21.44**	**227.12**
	Gross cropped area	141.36	160.00	269.92	100.00	48.50
	Cropping intensity percent	111.90	-	130.61	-	16.71

Soybean and rabi maize were not grown in the study area at the time of project implementation. It was introduced as a new crop in the area and was cultivated in only 3.32 and 0.80 ha whereas it was observed that sorghum and barley were not grown after implementation of the project. Similarly, paddy, cluster bean and cotton crop area increased by 273.5, 218.2 and 108.9 per cent respectively over pre implementation stage of project, whereas seasmum and pigeonpea crop area were decreased over the previous situations. The possible reasons for this changes could be on account of utilization of fallow land for cultivation after taking up of different soil and water conservation activities .

In case of rabi, wheat and gram occupied major cropped acreage. After implementation of the project it drastically increased by 288.5 and 167.7 per cent respectively, as compare to previous situations. Similar trend was observed in mustard, lucerne and vegetable crops. Further analysis of the table shows that the change in the cropping intensity was 16.71 per cent. This can be attributed to better utilization of resources of the area after execution of the work. Similar results have been reported by Singh *et al.*1995 and Mohod *et al.* 1997.

Changes in cropping pattern

The cropping pattern in the watershed area prior to implementation and after completion of NWDP has been depicted in table 2. The maximum area was noted under cereal crops. As far as cropping pattern in the watershed area is concern maximum area switch over to cotton crop (108%) followed by cereals (46.56%) pulses (33.24%) and oilseed (28.57%) respectively.

Changes in yield level of major crops

Table 3 shows that yield of maize and wheat were 675 and 1885 kg/ha respectively. Prior to the project initiation the same increased into 1025 (51.58%) and 2175 (15.38%) kg/ha after project implementation. Among crops, maximum increase in average yield (91.67%) was recorded in paddy as prior to project initiation, it was 720 kg/ha and after implementation of the project a yield level of 1380 kg/ha was recorded. Similarly, increase in yield of pigeonpea and cluster bean were high i.e. 54.63 and

74.59 per cent respectively. Similarly increased average yield of other crops i.e. urd (49.43%), cotton (41.92%), mustard (14.77%) and gram (3.36%).

Table 4. Changes in cropping pattern after implementation of NWDP

S. No.	Crops	Before (1991-92)	After (1997-98)	Percent increase
1	Cereals and millets	88.32 (62.48)	129.52 (61.70)	46.65
2	Pulses	41.28 (29.20	56.00 (26.28)	33.24
3	Oil seed	4.48 (3.17)	5.70 (2.74)	28.57
4	Cotton	7.20 (5.10)	15.04 (7.16)	108.88
5	Other crops	0.08 (0.05)	3.60 (1.72)	4000.00
	Total cropped area	**141.36 (100.00)**	**209.92 (100.00)**	**48.50**

Note: Figures in parentheses shows percentage

Table 5. Changes in yield level of different crops after implementation of NWDP

S. No.	Crops	Yield (kg/ha)		Percent increase
		Before (1991-92)	After (1997-98)	
A	Kharif			
1	Maize	675	1025	51.85
2	Paddy	720	1380	91.67
3	Urd	445	665	49.43
4	Cotton (Desi)	229	325	41.92
5	Ougeinpea	540	835	54.63
6	Cluster bean	925	1615	74.59
B	Rabi			
1	Wheat	1885	2175	18.35
2	Gram	785	835	6.36
3	Mustard	643	738	14.77

Above findings indicate that overall production of different crops of beneficiaries increased in the watershed area in rabi as well as kharif season. However, the noticeable change was observed in the four crops namely maize, paddy, pigeonpea and cluster bean. The new crops introduce in rabi reason account of better utilization of the resources of the areas after the execution of the work. The yield of the various crops were increased from (6.36%) to (91.67%) as shown in table 3.

The factors which were responsible for this change are crops being given priority in the project, a small portion of land which was left fallow since long was taken under cultivation by the beneficiary farmers as these lands were treated through watershed technology like growing of vegetative barriers on contour line, alley cropping bunding, construction of V ditches, pasture development and in situ moisture conservation through proper tillage operation etc. In addition to this distribution of improved variety seeds of maize, paddy, urd and cluster bean and distribution of fertilizers and other inputs were also responsible for this remarkable change in the yield levels.

Increase of rabi season yield of wheat crop was due to assure irrigation facilities and used high yielding varieties seeds, whereas gram and mustard showed a marginal increase in yield due to more than half of area still grown in conserved moisture and less use of fertilizer in dry land areas.

Overall improvement in yield of major kharif crops particularly paddy, cluster and, pigeonpea, maize and urd is appreciable. Hence, crop productivity is the prime indicator of technologies change and impact of soil and water conservation work. The project activities have improved water potential and soil condition resulted moisture available at the stress period during requirements of crop. These findings are in accordance with the findings of Gowda and Jayaramiah (1996) and Kushwah and Bajpai (1998).

CONCLUSION

After implementation of soil and water conservation measures in watershed areas, there has been enhancement in agricultural production. Regarding change in area of crop it was found that before implementation of the project main crop was maize which share 53 per cent of the total cropped area. These were followed by Black gram (14%), pigeon pea (8.5%) and gram (5.6%). Whereas after implementation of project maize (41.3%), followed by wheat (10.4%), gram (10.1%) and paddy (9.7%) were major crops. Further total cropped area and cropping intensity were increased after implementation of project i.e. 48.7 and 16.7 per cent respectively. As far as cropping pattern in watershed area, it was found that maximum area shifted in cotton crop (108%) followed by cereals (46.6%), pulses (33.3%) and oilseed (28.6%). It was found that maximum yield was increased in case of paddy (91.7%) followed by cluster bean (74.6%) and pigeon pea (54.6%). While soybean and Rabi maize were introduced as new crops in the watershed area.

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