Constraint Analysis in Adoption of Land Care Techniques for Saline-sodic Soils of Purna Valley in Vidarbha Region of Maharashtra

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ABSTRACT

The present study entitled "Constraints in adoption of land care techniques for saline-sodic soils of Purna Valley in Vidarbha Region of Maharashtra" was carried out as Research Review Committee Project for the 2010-2011 in salt affected tract of Akola, Buldana and Amravati districts of Vidarbha. An exploratory design of social research was used. The total 120 farmers were selected by random sampling method, it covers 12 villages and 06 Tahsils *of three districts of Purna Valley. The data were collected through structured and unstructured interview schedule by personal interview. The salient findings revealed that from all age and land holding groups respondents were interviewed, near bout 50.00 per cent farmers educated upto high school level. Cent per cent farmers having very deep type of land and majority (76.67%) of the farmers not having any source to access the irrigation. Out of the 120 farmers only 4 (3.33%) farmers has done the soil testing. Cent per cent of the farmers have low level of extension contacts. Cropping intensity during 2010-2011 was comes to 121.00 per cent. Cropping pattern was dominated by cotton, green gram, sorghum, soybean, red gram and gram crops. In all 11 land care techniques for saline-sodic soils of Purna Valley has been studied the results revealed that majority (70.00%) of the farmers have medium level of knowledge with low level of adoption (79.07%) regarding all selected land care techniques for* Purna Valley. *Major constraints faced by the farmers were unavailability of gypsum, unavailability of soil testing lab at near by places and lack of knowledge about the importance of micronutrients in study area and majority of the farmers suggested that government should provide Gypsum on 100.00 per cent subsidy in salt affected tract of Purna Valley. In view of low adoption of various land care techniques by the farmers in Purna Valley this study implied that it is necessary to diagnose the problem in soils based on soil testing and adopt proper land care techniques like fertilizers, amendments, green manures and soil and water conservation practices by the farmers for maintaining soil health in Purna Valley. The government should enhance the Gypsum availability to the farmers and create more soil testing facilities in Purna Valley.*

***Key words** : Constraints, Adoption, land care techniques, Saline-sodic soils, Puna valley*

Soil is a finite, non-elastic and nonrenewable natural resource. The per capita availability of land in India decreased from 0.48 ha in 1951 to 0.15 ha in 2000 and is likely to reduce further to 0.08 ha in 2020 AD because of demographic pressure. Beside reduction in land quantity, there is also a decline in land quality, what we call land degradation, either quantitatively/ qualitatively or both as a result of processes such as soil erosion by water and wind, salinisation, water logging, depletion of plant nutrients, depletion of soil structure, desertification and pollution. In Purna Valley particularly part of Akola, Amravati and Buldana districts salinity/ sodicity developed geologically. This creates so many problems at farmer's field level. There are so many reclamation practices/technologies for improving salt affected soils. Whether the farmers were aware and using these technology or not. If not using the technologies what are the constraints at farmer's level? For finding the answers to these questions the present study was undertaken by conducting detail survey in 12 villages of six Tahsils in Akola, Buldana and Amravati districts with the help of following objectives:

1) To study the personal, socio-economic and situational characteristics of the farmers of Purna Valley.

2) To study the land use and cropping pattern of thefarmers of Purna Valley.
3) To study the knowledge and adoption of land care techniques by the farmers for salt affected soils.
4) To ascertain the constraints in adoption of land care techniques by the farmers.

METHODOLOGY

The present investigation was carried out in salt affected tract of Akola, Buldana and Amravati districts of Vidarbha region of Maharashtra. An exploratory design of social research was used. The total 120 farmers were selected by random sampling method, it covers 12 villages and 06 *Tahsils* of three districts of Purna Valley. The data were collected through structured and unstructured interview schedule by personal interview.

RESULTS AND DISCUSSION

The detail research report with all relevant data has been furnished herewith.

I) Profile of farmers : The data with respect to various characteristics of the selected farmers have been furnished as follows.

Age: The distribution of the respondents according to their age has been presented in Table 1.

Table 1. Distribution of selected respondents according to their age

S.No.	Age category	Age in Years	No	Percentage
1.	Young	Up to 35	31	25.83
2.	Middle	36-50	51	42.50
3.	Old	Above 50	38	31.67
		Total	120	100.00

It is observed from Table 1, that 42.50 per cent of the selected respondents were under middle age category having age between 36 to 50 years. It was followed by 31.67 per cent respondents were in old age category i.e. above 50 years and over one fourth (25.83) respondents were found in young age group. The age profile analysis of respondents indicated that more or less all age group respondents were selected for the study.

Educational level: The education level of the selected farmers of salt affected *Purna Valley* has been presented in Table 2.

It is observed from the Table 2 that out of the total respondents, nearly half (49.17%) per cent having high school level education, 15.83 per cent had higher secondary school level and 10.00 per cent each were educated up to primary, middle school, and college level education. While 5.00 per cent were illiterates.

Table 2 : Distribution of selected respondents on the basis of educational level

S.No.	Educational level	Number	Percentage
1.	Illiterate	06	5.00
2.	Primary school	12	10.00
3.	Middle school	12	10.00
4.	High school	59	49.17
5.	Higher secondary school	19	15.83
6.	College	12	10.00
	Total	120	100.00

3. Land holding It is assumed that land owned by an individual explains his ability to bear risk, to adopt innovations and to invest the land in cultivation of various crops. It was found that, more was the land holding, more was the knowledge, adoption and income from farming business, and hence this variable has been considered in the present study. The distribution of the respondents according to land holding is presented in Table 3 as follows.

Table 3. Distribution of selected respondents according to land size

S.No.	Holding group	Number	%
1.	Marginal (Upto 1.00 ha.)	14	11.67
2.	Small (1.01 to 2.00 ha.)	39	32.50
3.	Semi-medium (2.01 to 4.00 ha)	33	27.50
4.	Medium (4.01 to 10.00 ha.)	24	20.00
5.	Large (Above 10.00)	10	08.33
	Total	120	100.00

Average land holding 4.28 Ha.

Table 3 shows that near about one third (32.50%) per cent of the respondents were having land holding between 1.01 to 2.00 hectares (Small), followed by over one fourth (27.50%) per cent farmers were semi medium possessing land 2.01 to 4.00 ha. Whereas 20.00 per cent selected farmers were medium (2.01 to 4.00 ha.) land holders, followed by 11.67 per cent of the respondents had marginal (Upto 1.00 ha.) and 8.33 per cent comes under large (Above 10.00 ha.) land holding group. Thus it is concluded that all categories of the farmers have been selected for the present study. The average holding in *Purna* Valley was observed on higher side i.e. 4.28 ha.

Type of land: Crops yield depends on various factors, out of which type of land is one of the important

prerequisites for better yield of the crops. The data regarding the type of land of the selected farmers has been presented in Table 4.

Table 4. Distribution of respondents according to their type of land

S.No.	Type of land	Number	Percentage
1.	Very deep (Above 60 cm)	120	100.00
2.	Deep (46-60 cm)	0	00.00
3.	Moderately deep (22.6-45)	0	00.00
4.	Shallow (7.5 to 22.5 cm)	0	00.00
5.	Very shallow (Below 7.5)	0	00.00
	Total	120	100.00

The data regarding the type of land of the selected farmers has been presented in Table 4 revealed that cent per cent (100.00%) farmers were having very deep (Above 60 cm) type of land. This character of the soil might be responsible for poor drainability results in water stagnation in *kharif*.

5. Farming experience : Farming experience plays an important role in bearing various risks in farming business. The distribution of the respondents according to their farming experience has been presented in Table 5 as follows.

Table 5. The distribution of the selected respondents according to their farming experience

S.No.	Farming experience in years	Number	Percentage
1	Up to 10	25	20.83
2	11 to 20	44	36.67
3	21 to 30	25	20.83
4	Above 30	26	21.67
	Total	120	100.00

From Table 5, it is observed that 36.67 per cent of the respondents had farming experience between 11 to 20 years, followed by 21.67 per cent farmers were having more than 30 years experience in *Purna* Valley. Each 20.83 per cent of the respondents were having up to 10 years and between 21 to 30 years farming experience. Thus it is concluded that more or less in all categories of farmers having farming experience in Purna Valley have been selected for the study.

6. Irrigation facilities : It is observed from Table 6 that majority (76.67.00%) farmers did not have any source to access the irrigation. They solely depended on monsoon rains. While 15.00 per cent farmers were having tube well as irrigation source, followed by 7.50 per cent have river as a source of irrigation. Whereas 20.00 per cent farmers have farm pond as a source for protective irrigation.

Table 6. Distribution of respondents according to their available Irrigation sources

S.No	Irrigation sources	Number	Percentage
1.	No source	92	76.67
2.	River	9	07.50
4.	Tube well	18	15.00
6.	Farm pond	24	20.00

It is therefore concluded that majority (76.67%) farmers were not having any source to access the irrigation. They were mostly depend on monsoon rains only.

Table 7. Distribution of respondents according to their quality of tube well water

S.No	Irrigation source	Number N=18	Percentage
4.	Salt affected	18	100.00
6.	Good	0	00.00
	Total	18	100.00

7. Quality of tube well water : It is observed from Table 6 that 18.00 per cent farmers have a tube well as source of irrigation, but almost all tube well water is salt affected.

8. Soil testing **:** Soil testing is an important indicator for knowing the nutrient status of soil. The distribution of the farmers according to soil testing done has been furnished in Table 8 as follows.

Table 8. Distribution of respondents according to their soil testing

S.No	Soil testing	Number	Percentage
1.	Done	04	3.33
2.	Not done	116	96.67
	Total	120	100.00

Table 8 shows that very negligible (3.33%) per cent of the farmers had done the soil testing and remaining majority (3.33%) have not done the soil testing.

9. Annual income (2010-11) : The distribution of selected farmers of Purna Valley according to their annual income is presented in Table 9.

Table 9. Distribution of the respondents according to their annual income (2010-11)

S.No.	Annual income	Number	Percentage
1.	Up to 50,000	42	35.00
2.	50,001 to 1, 00,000	41	34.17
3.	1,00,001 to 2,00,000	14	11.67
4.	2,00,001 to 4,00,000	11	09.16
5.	4,00,001 to 8,00,000	12	10.00
	Total	120	100.00

Average income. = Rs 1, 40,158

From table 9 it is observed that over one third of the farmers each having annual income up to Rs. 50,000

(35.00%) and between Rs. 50,001 to Rs. 1,00,000 (34.17%). This was followed by 11.67 per cent respondents belonging to income group with annual income between Rs. 1,00,001 to Rs. 2,00,000. Whereas 10.00 per cent farmers had annual income between Rs. 4,00,001 to Rs. 8,00,000 and 9.16 per cent farmers had annual income between Rs. 2,00,001 to Rs. 4,00,000. The average annual income of selected farmers comes to Rs. 1,40,158.

10. Extension contacts : It is presumed that the farmers having more contacts with extension workers and other agencies may derive more information and benefits from developmental agencies and hence it was necessary to study in the present case.

Result presented in the Table 10, indicated that the majority of the selected farmers never contacted with various sources of extension contacts except sizable group of the farmers kept sometime contact with Krishi Sevak (26.67%) and 10.83 per cent always contacting to Krishi Sevak for seeking information. This was followed by 20.83 per cent and 20.00 per cent of the farmers having some time contact with TAO (Taluka Agril Officer) and proprietor of Krishi Seva Kendra respectively. Whereas 10.83 per cent farmers having some extension contacts with University scientists / SMS follwed by 4.16 per cent always in contact with university scientists. While 8.33 per cent farmers were observed having always contacts with SMS of KVK and TAO (5.00%). Thus this study concludes that majority of the farmers having no extension contact with various sources. Overall extension contacts of the selected farmers have been also analysed and presented in Table 11 as follows.

Table 10. Distribution of the respondents according to their Extension contacts with different sources

S. No.	Sources	Extension contact n=120 respondents		
		Always	Sometime	Never
1	Gram sevak	1(0.83)	2 (1.67)	117 (97.50)
2	Extension officer	0 (0.00)	0 (0.00)	120 (100.00)
3	Block development officer	0 (0.00)	0 (0.00)	120 (100.00)
4	Agriculture officer	1(0.83)	3(2.50)	116 (96.70)
5	Krushi Sevak	13(10.83)	32 (26.67)	75 (62.50)
6	TAO	6 (5.00)	25 (20.83)	89 (74.20)
7	Proprietor of Krishi seva kendra	2 (1.67)	24 (20.00)	94 (78.30)
8	University scientist/ SMS	5 (4.16)	13 (10.83)	102 (85.00)
9	SMS of Krishi Vidyan Kendra	10 (8.33)	4 (3.33)	106 (88.30)

(Figures in parenthesis indicate percentage)

Result presented in the Table 11, indicated that the cent per cent (100.00%) of the selected farmers having low extension contacts level.

Table 11. Distribution of the respondents according to their Extension contact level

S.No.	Extension contact level	Respondents (n=150)	
		Number	Per cent
1	Low (Upto 33.33)	120	100.00
2	Medium (33.34 to 66.66)	0	0.00
3	High (Above 66.67)	0	0.00
	Total	120	100.00

11. Land use pattern : While studying land utilization pattern of selected farmers of Purna Valley, it was noted from Table 17 that 93.57 per cent area was observed under rainfed condition. Whereas, very negligible i.e. 4.09 per cent area was observed under seasonal irrigation only. Though percentage of irrigated area was observed very negligible but due to good rain received after September farmers sown the gram crop and hence cropping intensity was 121.00 per cent.

Table 12. Land utilization pattern of selected respondents (2010- 11)

S.No.	Particulars	Total area in ha.
1.	Total land holding	513.00 (100.00)
2.	Total fallow land	12.00 (2.34)
3.	Total net sown/ cultivated area	501 (97.66)
4.	Total irrigated area (seasonal)	21.00 (4.09)
5.	Total rain fed area	480 (93.57)
6.	Total area sown more than once	103 (20.08)
7.	Total gross cropped area (Area under Kharif & Rabi crops)	604 (117.74)
8.	Cropping intensity (%) = 7÷3×100	121.00 %

(Figures in parenthesis indicate the percentage to total land holding.)

The area sown more than once was 20.08 per cent to total land holding area. It is due to absence of irrigation facilities that restricts the respondents from double and triple cropping. Thus it is revealed that out of total land holding area, majority 93.57 per cent area was under rainfed condition and 4.09 per cent area was observed under seasonal irrigation.

Cropping pattern: Cropping pattern of selected farmers of Purna Valley during the year 2010-2011 was worked out in terms of percentage share of individual crops in gross cropped area and presented in Table 18. An examination of data presented in Table 18, shows that kharif cotton, mung, Jowar, soybean crops dominated the cropping pattern of selected households. The proportion of area under kharif for various crops have

been shown in brackets i.e. cotton (29.40%), cotton + mung intercropping (7.39%), mung (10.48%), mung + tur (1.75%), Jowar (9.70%), soybean + tur intercropping (9.60%), soybean (6.95), tur (3.11%) during the year 2010-2011. Whereas sizable 17.05 per cent area was observed under Rabi crop, it might be due to the good rains received after September and farmers sown gram crop in study area.

Table 13. Cropping pattern of selected respondents during 2010-11

S.No.	Particulars	Area in ha. 2010-11
	A. Kharif	
1.	Cotton	177.50 (29.40)
	Cotton + Green gram	44.60(7.39)
2.	Green gram	63.30(10.48)
	Green gram + Red gram	10.60(1.75)
3.	Sorghum	58.60(9.70)
4.	Soybean	42.00 (6.95)
	Soybean + Red gram	58.00 (9.60)
5.	Red gram	18.80 (3.11)
6.	Sunflower	12.80 (2.12)
7.	Others	14.80(2.45)
	Total Kharif	501(82.95)
	B. Rabi	
8.	Gram	95.00 (15.72)
9.	Wheat	07.00 (1.16)
10.	Others	1.00 (0.17)
	Total Rabi	103.00(17.05)
	Gross cropped area	604 (100.00)

(Figures in parenthesis indicate the percentage to total gross cropped area.)

Knowledge, adoption & constraints in adoption of land care techniques: Following 11 packages of practices has been considered for finding out the knowledge, adoption and constraints in adoption. The results have been presented in subsequent tables as follows.

Deep ploughing at every year or alternate years: Distribution of the respondents according to their knowledge and adoption of deep ploughing at every year or alternate years has been studied and the data were presented in Table 19.

Table 19. Distribution of the respondents according to their knowledge and adoption of deep ploughing at every year or alternate years

N=120	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	120	0	115	05	0
%	100.00	00.00	95.83	4.17	00.00

It was observed from Table 19 that cent percent (100.00%) of the respondents have knowledge about deep ploughing of these problematic land every year or alternate year, whereas majority (95.83%) of the farmers adopt this practice to full extent, while 4.07 per cent respondents adopt it partially. There is no major constraint was observed in adoption of this practice.

Incorporation of Gypsum 2.5 t/ha in combination with FYM 5t per ha.: The knowledge and adoption about the incorporation of Gypsum 2.5 t/ha in combination with FYM 5 t per ha of selected respondents have been studied and the data is depicted in Table 20 as follows.

Table 20. Distribution of the respondents according to their knowledge and adoption of incorporation of Gypsum 2.5t / ha in combination with FYM 5 t per ha

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	57	63	01	01	118
%	47.50	52.50	0.83	0.83	98.34

It was observed from Table 20 that 47.50 per cent of the respondents having knowledge about this land care technique and remaining over half (52.50%) of the respondents have no knowledge about the incorporation of Gypsum 2.5 t / ha in combination with FYM 5 t per ha. While seeing the adoption of this practice majority (98.34%) of the farmers not incorporate Gypsum 2.5 t / ha in combination with FYM 5 t per ha. Most of the farmers were interested to add Gypsum, but it was not available to them. We have also studied the knowledge and adoption of this practice separately and data regarding this presented in Table 21 and Table 23.

A. Incorporation of Gypsum 2.5 t / ha

Table 21. Distribution of the respondents according to their knowledge and adoption of incorporation of Gypsum 2.5 t / ha

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	57	63	01	01	118
%	47.50	52.50	0.83	0.83	98.34

From Table 21 nearly same picture has been observed about the knowledge and adoption of Gypsum, but while considering the FYM it was observed from Table 22 that majority (83.33%) of the farmers have knowledge about incorporation of FYM 2.5 t/ha and 16.67 per cent farmers have no knowledge about the recommended dose of FYM.

B. Incorporation of FYM 5 t per ha.

Table 22. Distribution of the respondents according to their knowledge and adoption of incorporation of FYM 5 t per ha.

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	100	20	20	90	10
%	83.33	16.67	16.67	75.00	8.33

While studying the actual use of FYM 2.5 t/ha majority three fourth (75.00%) of the farmers adopting it partially, it might be due to the non availability FYM with them, whereas 16.67 per cent farmers using recommended dose FYM 2.5 t/ha and 8.33 per cent not applied FYM in their land.

Constraints in adoption of Gypsum 2.5 t / ha in combination with FYM 5 t per ha

Constraints faced by the respondents in adoption of Gypsum 2.5 t / ha in combination with FYM 5 t per ha had been depicted in Table 23 as follows.

It was observed from Table 23 that unavailability of the gypsum is main constraint faced by the farmers with highest (1.73) mean severity score and ranked first. While discussing this issue with the farmers group they revealed that they are ready to incorporate but due to non availability they can't use the Gypsum. It was followed by lack of knowledge about gypsum with severity score 1.07 and ranked second. Whereas unavailability of FYM (0.63) and high cost of FYM (0.25) have been the important constraints in non adoption of FYM and ranked on three and fourth respectively.

Table 23. Distribution of the respondents according to their constraints in adoption of Gypsum 2.5 t / ha in combination with FYM 5 t/ha

S. No.	Constraints	Mean Constraints Severity Score	Ranking of constraint
1	Unavailability of gypsum	1.73	I
2	Lack of knowledge about gypsum	1.07	II
3	Unavailability of FYM	0.63	III
4	High cost of FYM	0.25	IV

3. Major and micro nutrients should be applied on the basis of soil test analysis : This is an important practice based on the soil testing report they have to diagnose the soil problem and use major and micronutrient. The data regarding this has been analysed and depicted in Table 24.

Table 24. Distribution of the respondents according to their knowledge and adoption of application of major and micro nutrients on the basis of soil test analysis

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	50	70	02	02	116
%	41.67	58.33	1.66	1.66	96.68

It was observed from Table 24 that 58.33 per cent of the farmers in Purna Valley having no knowledge about application of major and micro nutrients on the basis of soil test analysis and 41.67 per cent have knowledge about this practice. While considering actual use majority (96.68%) of the respondents not adopt this practice while 1.66 per cent each daopt it full and partially.

Constraints in adoption of application of Major and micro nutrients on the basis of soil test analysis : The data regarding the Constraints in adoption of application of Major and micro nutrients on the basis of soil test analysis has been analysed and the results are presented in Table 25.

It was observed from Table 25 that unavailability of soil testing lab at nearby places (1.67 Rank -I), lack of knowledge about the importance of micronutrients (1.67 Rank –I), high cost of fertilizers (0.90), low credit supply (0.33) and no enough capital for costly fertilizers (0.19) were the constraint in non adoption of this practice mentioned by the farmers.

Table 25. Distribution of the respondents according to their constraints in adoption of application of major and micro nutrients on the basis of soil test analysis.

S. No.	Constraints	MCSS	Ranking of constraint
1	Unavailability of soil testing lab at near by places	1.67	I
2	Lack of knowledge about the importance of micronutrients	1.67	I
3	High cost of fertilizers	0.90	II
4	Low credit supply	0.33	III
5	No enough capital for costly fertilizers	0.19	IV

4. Application of Zinc Sulphate 10-50 kg depending on the zinc status of soil : Data regarding the knowledge and adoption of 10-50 kg Zinc Sulphate depending on the zinc status of the soil is an important practice and farmers have to adopt it because as per the past research Purna Valley soil are deficient in Zink. The data regarding this practice has been presented in Table 26.

Table 26. Distribution of the respondents according to their knowledge and adoption of application of Zinc Sulphate 10-50 kg depending on the zinc status of soil

N=120	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	6	114	2	3	115
%	05.00	95.00	1.67	2.50	95.83

The data in respect of this practice revealed that majority (95.00) per cent of the farmers have no knowledge and only 5.00 per cent having the knowledge about the application of the Zink Sulphate. While considering adoption of this practice majority (95.83%) have not adopted this practice, whereas 2.50 per cent and 1.67 per cent have adopted it partially and full extent respectively.

Constraints in adoption of application of Zinc Sulphate 10-50 kg depending on the zinc status of soil

The data from Table 27 revealed that lack of knowledge is the main constraint faced by the farmer for non adoption of Zinc Sulphate and having high MCSS 1.90.

Table 27. Constraints in adoption of application of Zinc Sulphate 10-50 kg depending on the zinc status of soil

S. No.	Constraints	Mean Constraints Severity Score	Ranking of constraint
1	Lack of knowledge	1.90	I

5. Deep furrows after 2 or 3 rows of crops should be opened after 30 days of sowing to enhance efficiency of amendments and fertilizers : The data depicted in Table 28 revealed majority (95.00%) of the farmers having knowledge about the opening of deep furrows after 2 or 3 rows after 30 days of sowing, while negligible (5.00%) does not know this practice. Whereas 35.00 per cent farmers adopting this practice fullest level and 5.83 per cent adopt it partially and more than half (59.17%) of the respondents have not adopted it on their farm.

Table 28. Distribution of the respondents according to their knowledge and adoption of opening deep furrows

N=120	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	114	6	42	7	71
%	95.00	5.00	35.00	5.83	59.17

Constraints in adoption of opening deep furrows :

Table 29. Constraints in adoption of opening deep furrows

S. No.	Constraints	MCSS	Ranking of constraint
1	Water logging during excess rainfall	0.30	I
2	Formation of gullies in the furrows	0.16	II
3	Lack of knowledge	0.10	III
4	Lack of labour	0.03	IV

Water logging during excess rainfall (0.30), formation of gullies in the furrows when intensity of rainfall is more (0.16), lack of knowledge (0.10) and lack of labour (0.03)were the constraints mentioned by the farmers in adoption of opening deep furrows.

6. *Preparation of farm ponds to conserve moisture & rainwater harvesting :* Conserve the excess water in a micro watershed and to reduce the salinity/sodicity from the adjacent area was the important objective behind the farm pond technology . It was observed from Table 30 that near about cent per cent (99.17%) of the farmers having knowledge about farm pond technology. While considering adoption sizable (20.00%) group of the farmers have dug the farm pond from Govt. scheme and remaining 80.00 per cent has not adopted this technology.

Table 30. Distribution of the respondents according to their knowledge and adoption of farm ponds

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	119	01	24	0	96
%	99.17	0.83	20.00	0.00	80.00

Constraints in adoption of farm pond technology :

Various constraints have been analyzed in adoption of farm technology by the farmers and data regarding this has been furnished in Table 31.

Table 31. Constraints in adoption of farm pond technology by the farmers

S. No.	Constraints	MCSS	Ranking of constraint
1	Less land holdings and loss of land due to farm pond	1.10	I
2	High evaporation	0.40	II
3	Deposition of clay & silt in on stream farm pond	0.30	III
4	Disturbance by wild animals due to vicinity of farm pond	0.12	IV
5	Govt. scheme is not made available	0.10	V

Less land holding and loss of land due to farm pond was the main constraint identified with MCSS 1.10 and Ranked-1, followed by high evaporation (0.40), deposition of clay & silt in on stream farm pond (0.30), disturbance by wild animals due to vicinity of farm pond (0.12) and government scheme is not made available (0.30) were the analyzed constraints in adoption of farm pond technology by the farmers.

7. Natural grass or Vetiver bunds at field boundaries : Distribution of the respondents according to their knowledge and adoption of demarcating field boundaries with natural grass or Vetiver bunds has been studied and data is presented in Table 32.

Table 32. Distribution of the respondents according to their knowledge and adoption of natural grass or Vetiver bunds at field boundaries

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	85	35	22	04	94
%	70.83	29.17	18.33	03.33	78.34

It is observed from Table 32 that 70.83 per cent of the farmers have knowledge about adoption of natural grass or Vetiver bunds at field boundaries and over one fourth (29.17%) have no knowledge about this practice. While knowing the adoption status over three fourth (78.34%) of the respondents have not adopted this practice, followed by 18.33 per cent made full use and negligible (3.33%) per cent farmers adopted partially or on some part of the total holding.

Constraints in adoption natural grass or Vetiver bunds :

The data regarding the constraints in adoption of demarcating field boundaries with natural grass or Vetiver bunds has been analyzed and the data is put-up in Table 33. Absence of Vetiver grass or stones to construct bunds was the constraint analyzed in adoption of demarcating field boundaries with natural grass or Vetiver bunds (MCSS 0.70, Rank I) followed by lack of knowledge about this practice ((0.40, Rank-II), stagnation of water on the soil surface due to flat land & in case of heavy rainfall (0.33, Rank-III), labour problem (0.30, Rank-IV) and high intensity rainfall within few period damages the bunds (0.10, Rank-V) were the important constraint were found in adoption of this technology by the farmers in *Purna* Valley.

Table 33. Constraints in adoption of natural grass or Vetiver bunds at fiel boundaries

S. No.	Constraints	MCSS	Ranking of constraint
1	Absence of Vetiver grass or stones to construct bunds	0.70	I
2	Lack of knowledge	0.40	II
3	Stagnation of water on the soil surface due to flat land & in case of heavy rainfall	0.33	III
4	Labour problem	0.30	IV
5	High intensity rainfall within few period damages the bunds	0.10	V

8. Planting of salt tolerant crops : Knowledge and adoption about planting of salt tolerant crops like cotton, sorghum, bajra, soybean, safflower, beat, spinach, etc. have been studied the data is presented in Table 34.

Table 34. Distribution of the respondents according to their knowledge and adoption of planting of salt tolerant crops

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	120	0	120	0	0
%	100.00	00.00	100.00	00.00	00.00

It was observed from Table 34 that cent per cent of the farmers know this practice and they also cultivating these crops hence no constraints in adoption.

9. Planting of salt tolerant trees **:** The regarding the knowledge and adoption of planting of salt tolerant trees like Pomogranate, Guava, Chiku, Ber, etc has been studied and the is presented in Table 35.

Table 35. Distribution of the respondents according to their knowledge and adoption of planting salt tolerant trees

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Non
No	50	70	0	0	120
%	41.67	58.33	00.00	00.00	100.00

From the data presented in Table 35 it was observed that 41.67 per cent of the farmers knows about salt tolerant trees, whereas over half (58.33%) of the farmers having no knowledge. While studying the adoption of salt tolerant trees not a single respondent was found who planted salt tolerant fruit trees and they mentioned various constraints as presented in Table 36.

Table 36. Constraints in adoption of planting salt tolerant trees

S. No.	Constraints	MCSS	Ranking of constraint
1	Insufficient and irregular rainfall for tree establishment	1.51	I
2	Lack of knowledge	0.88	II
3	Trees are not established due to Termites	0.33	III

Insufficient and irregular rainfall for tree establishment was the important constraint analysed with farmers (1.51 and Ranked -1), lack of knowledge (0.88), trees are not established due to Termites and have no longer life (0.33) were the constraints expressed by farmers in planting the fruit trees.

10. Application of alkali water through gypsum bed:

Table 37. Distribution of the respondents according to their knowledge and adoption of gypsum bed technique

(N=120)	Knowledge		Adoption		
	Yes	No	Full	Partial	Not
No	0	120	0	0	120
%	00.00	100.00	00.00	00.00	100.00

From the Table 37 it was observed that cent per cent (100.00%) of the selected farmers have no knowledge about the Gypsum bed technique and all of them mentioned that they have no knowledge about the gypsum bed technique probably due to the non availability of the irrigation sources to the most of the farmers they have not created interest about this technology.

Table 38. Constraints in adoption of gypsum bed technique

S. No.	Constraints	MCSS	Ranking of constraint
1	Lack of knowledge	2.00	I

11. Green manuring with Dhaincha/Sunhemp (Sole): Knowledge and adoption about the sowing of Dhaincha / Sunhemp as a sole crop for green manuring has been studied and data is depicted in Table 39.

Table 39. Distribution of the respondents according to their knowledge and adoption of Green manuring with Dhaincha / Sunhemp (Sole)

N=120	Knowledge		Adoption		
	Yes	No	Full	Partial	Not
No	78	42	0	7	113
%	65.00	35.00	00.00	05.83	94.17

It was observed from Table 39 that near about two third (65.00%) of the farmers have knowledge about the sowing of Dhaincha / Sunhemp as a sole crop for green manuring and 35.00 per cent farmers were observed have no knowledge about this practice. Adoption data revealed that majority (94.17) of the farmers have not sown Dhaincha / Sunhemp as a sole crop for green manuring in recent years and few of them expressed that before ten years we have adopted this practice. Secondly 16.67 per cent of the farmers were observed they sow mung crop between two rows of cotton (Please see the cropping pattern table). Whereas 5.83 per cent adopted this practice partially. Various constraints about the non adoption of green manuring has been analysed and data has been presented in Table 40.

Constraints in adoption of Green manuring :

Table 40. Constraints in adoption of Green manuring with Dhaincha / Sunhemp (Sole)

S. No.	Constraints	MCSS	Ranking of constraint
1	Loss of season	0.90	I
2	Lack of knowledge	0.67	II
3	Labour problem	0.15	III
4	Lack of seed	0.12	IV

The data presented in Table 40 revealed that loss of season was the important constraint mentioned by the farmers (0.90, Rank-I), followed by lack of knowledge (0.67), labour problem (0.15),and lack of seed (0.12) were the analysed constraints in adoption of green manuring with Dhaincha / Sunhemp (Sole).

Overall knowledge and adoption

Overall knowledge level

Overall knowledge and adoption level of all selected practices has been analysed and data is presented in Table 41 and 42 respectively. It was observed from the data depicted in Table 41 that majority (70.00%) of the farmers have medium level of knowledge, followed by over one fourth (29.17%) of the farmers having high level of knowledge and only one respondent (0.83%) was found have low knowledge level.

Table 41. Distribution of the respondents according to their overall knowledge level about the selected land care techniques

S.No.	Knowledge level	No	Per cent
1.	Low	01	0.83
2.	Medium	84	70.00
3.	High	35	29.17
	Total	120	100.00

Overall adoption level

The data regarding overall adoption level of all selected land care techniques for *Purna Valley* has been analysed and presented in Table 42.

Table 42. Distribution of the respondents according to their overall adoption level of all practices

S.No.	Adoption level	No	%
4.	Low	95	79.17
5.	Medium	25	20.83
6.	High	0	00.00
	Total	120	100.00

It was observed from Table 42 that over three fourth of the farmers (79.17%) comes under low level of adoption and remaining 20.83 per cent farmers belongs to medium level regarding overall adoption of all selected land care techniques under study. No respondent was found having high level of adoption in study area.

Suggestions comes from the farmers group

While discussing the various land care techniques with the farmer's majority farmers gave suggestion that they want Gypsum on 100.00 per cent subsidy from government and create irrigation facilities in *Purna Valley*.

CONCLUSION

From the results this study concludes that majority (70.00%) of the farmers have medium level of knowledge with low level of adoption (79.07%) regarding all selected land care techniques for *Purna Valley*. Major constraints faced by the farmers were unavailability of gypsum, unavailability of soil testing lab at near by places and lack of knowledge about the importance of micronutrients in study area.

In view of low adoption (79.17%) of various land care techniques by the farmers in *Purna Valley* it is necessary to diagnose the problem in soils, based on soil testing and adopt proper land care techniques like fertilizers, amendments, green manures and soil and water conservation practices for maintaining soil health.

The government should enhance the Gypsum availability to the farmers and create more soil testing facilities in Purna Valley.

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