



Impact Assessment of Organic and SCI methods: Paddy - Chickpea cropping sequence in Sakri block of Dhule District, Maharashtra



Introduction

WOTR has implemented Pro-Soil project funded by GIZ in 5 villages of Pimpalner Cluster (Sakri block) of Dhule district. The primary aim of the project is to promote sustainable and inclusive approaches for soil conservation, rehabilitation of degraded lands and improve soil health to enhance the crop productivity. Sakri block comes under the Western Maharashtra Plain Zone/Transition-2. This area suffers from the twin problems of low productivity and high instability as a result of unpredictable rainfall. The average annual rainfall is about 700 to 1200 mm. The zone is predominantly a kharif track suitable for rainfed crops. Major crops grown here are Paddy, Finger millet, Soybean, Maize, Groundnut and Pigeonpea during kharif season whereas Wheat and Chickpea in rabi season.

Soil Testing and soil health card

Five villages from Sakri block in Dhule district, which cover an area of 5203 hectares, were selected under the project. From these villages about 1934 soil samples were collected and tested for its primary nutrients like Nitrogen (N), Phosphorous (P) and Potassium (K) along with soil organic carbon (OC), potential of Hydrogen (pH), electrical conductivity (EC) and some of the selected secondary and micro-nutrients such as Sulphur (S) and Iron (Fe).

Soils in the selected villages of Sakri Block ranging between moderately acidic to neutral with normal range of soluble salt content (EC), medium to high in organic carbon. Soils were predominantly low in available Nitrogen, medium to very high in Phosphorus and high in Potassium. Secondary nutrient like Sulphur and micro-nutrients like Iron are available in high quantity (Table 1).

Based on the soil test results plot and crop specific recommendations on nutrient management preferably through organic were reported in soil health card and given to the farmers.

Table 1: Soil fertility status of Pimpalner cluster

Elements	Range		Average	Remark
	Min	Max		
pH	5.10	8.61	6.59	77% -slightly acidic to neutral category 12.36% -moderately acidic
EC (ds/m)	0.02	1.0	0.29	All soil samples are in normal range of soluble salt content
OC (%)	0.11	1.25	0.63	58.65% -slightly high to very high availability of organic carbon 12.15% -low to very low levels of organic carbon.
N (kg/ha)	91.7	490.4	227.51	87.69% - low nitrogen availability 11.15% - average soil nitrogen
P (kg/ha)	2.68	83.11	27.71	63.97% -slightly high to very high phosphorous availability 16% -low to very low soil phosphorous category
K (kg/ha)	15.32	678.30	279.69	75.22% -slightly high to very high potassium availability 7.36% -low to very low soil potassium
S (mg/kg)	3.08	98.50	31.65	74% -sufficient Sulphur availability 21% - average soil Sulphur
Fe (mg/kg)	1.56	60.28	19.83	89.37% -sufficient Iron availability 9.89% -average soil Iron.

Crop Demonstrations

WOTR has conducted field crop demonstrations on Paddy in kharif season followed by Chickpea in rabi season of 2016-2017 and 2017-2018. Farmers plots of about 0.20 ha area were selected for the demonstrations. The same plots were used for the demonstrations in kharif and rabi season every year.



Types of crop Demonstration

- A. Organic crop demonstration
- B. System of crop intensification (SCI) demonstration
- C. Farmers' practices

A. Organic crop demonstration

- a. Seed treatment with Bio-fertilizers
- b. Use of Green manure
- c. Use of 50% Compost and 50% Vermicompost to supply recommended nutrient
- d. Eco-friendly pest and disease management

B. SCI crop demonstration

- a. Use of traditional/local varieties of selected crops
- b. Seed treatment with bio-fertilizers
- c. Recommended crop geometry as per the crop
- d. Integrated nutrient management
- e. Integrated pest and disease management
- f. Use of micro irrigation system if available

C. Farmers' Practice

The plots under this treatment were managed as per the current farmer's practice in the region, with the same fertilizer source and crop protection treatments as being applied by local farmers.

Paddy crop demonstrations

WOTR has conducted 40 Organic and 40 SCI Paddy crop demonstrations in kharif season of 2016-17 and 40 Organic and 237 SCI demonstrations in 2017-18 in five villages of Pimpalner cluster.



SCI Demo Plot

Agro techniques followed in Paddy crop demonstrations

Particulars	Organic	SCI	Farmers Practice (Control)
Variety	Indrayani	Suruchi and Daptari	Poonam, Rupali
Seed rate (kg/ha)	5	5	70
Seed treatment	3% brine solution <i>Trichoderma viridi</i> @ 8 g/kg of seed <i>Azotobactor</i> and PSB each of @ 25 g/kg	3% brine solution - Thirum @ 3 g/kg of seed <i>Azotobactor</i> and PSB each of @ 25 g/kg	No seed treatment followed
Trap Crop	Marigold	Marigold	Trap crops are not sown
Method of sowing	Transplanting	Transplanting	Transplanting
Plant Spacing (cm)	25 x 25	25 x 25	No proper plant spacing followed
Nutrient Management	- Green leaf manuring with glyricidia @ 3 t/ha - Compost: 5 t/ha - Vermicompost: 2.5t/ha <i>Jeevamrut</i> application at 30, 45 & 60 DAT - Spray of <i>amrutpani</i> at 20 and 40 DAT	- Green leaf manuring with glyricidia @ 3 t/ha - Compost: 3 t/ha - Vermicompost: 1 t/ha <i>Jeevamrut</i> application at 30 & 45 DAT - Apply Urea DAP briquettes @ 175 kg/ha after second or third day of transplanting	- Approximately apply 50 kg N/ha as top dressing. - Organic manure application as per availability
Pest Management	- Spray of 5% NSKE at 15 & 35 DAT - Spray of <i>Dashparni ark</i> at 30 & 60 DAT - Use of pheromone traps & yellow sticky traps	- Spray of 5% NSKE at 15 & 35DAT - Spray of <i>Dashparni ark</i> at 30 & 60 DAT - Use of pheromone traps & yellow sticky traps - Use of pesticides when pest cross economic threshold level	No control measures followed.
Diseases Management	Spray of <i>Amritpani</i> + butter milk at 45 and 65 DAT	Spray of <i>Amritpani</i> + butter milk at 45 and 65 DAT	No control measures followed.



Result and Discussion

Table 2: Mean grain yield of Paddy in kharif season (2016-17 and 2017-2018)

Village	Mean grain yield (kg/ha)		
	Organic	SCI method	Farmers Practice
Chorwad	3725	4310	3793
Manjari	4945	4670	4474
Mohagaon	3468	3972	3314
Pimpalpada	4270	4365	3897
Shendwad	5386	4931	4454
Average	4300	4450	3986

The data in Table 2 indicates that the average grain yield of Paddy in kharif season was higher in SCI demonstrations (4450 kg/ha) as compared farmers practice (3986 kg/ha). It means that there was increase in grain yield of paddy by 11.6% in SCI demo plots and 7.88% in Organic demonstrations as compared farmers practice.

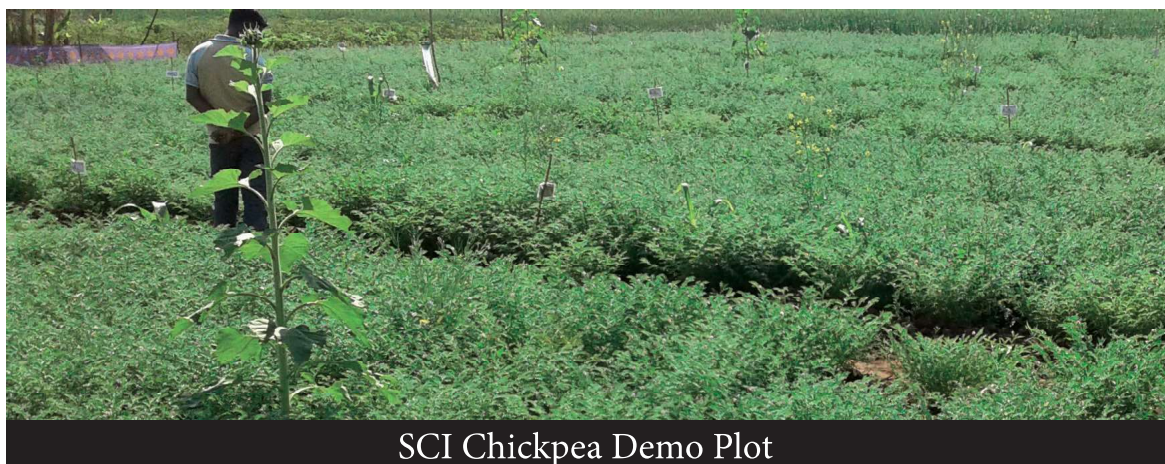


Chickpea crop demonstrations

Pimpalner cluster has conducted 40 organic and 156 SCI crop demonstrations for Chickpea cultivation in 2016-17 while 41 organic and 169 SCI demonstrations in 2017-18.

Agro techniques used in Chickpea crop demonstrations

Particular	Organic	SCI	Farmers Practice
Variety	Vijay, Virat and Vishal	Vijay, Virat and Vishal	Local
Seed rate (kg/ha)	60-75	60-75	100
Seed treatment	<i>Trichoderma viridi</i> @ 5 g/kg of seed <i>Rhizobium</i> and PSB each of @ 25 g/kg	Thirum + carbendazim each of 2 g/kg of seed <i>Rhizobium</i> and PSB each of @ 25 g/kg	No seed treatment followed
Trap Crop	Sorghum, Mustard and coriander	Sorghum, Mustard and coriander	Trap crops are not sown
Method of sowing	Drilling	Drilling	Drilling
Plant Spacing (cm)	45 x 15	45 x 15	Sowing behind baliram plough
Nutrient Management	Compost @ 5 t/ha Vermicompost @ 2.5t/ha <i>Jeevamrut</i> application at 30 and 45 DAS	Compost @ 3t/ha Vermicompost @ 1 t/ha <i>Jeevamrut</i> application at 30 DAS RDF through chemical: 25:50 NP kg/ha	Farmers apply chemical fertilizers but do not follow the RDF given by SAUs. As per the availability organic manures are applied
Pest Management	Spray of 5 % NSKE at 15 & 30 DAS Spray of <i>Amritpani</i> at 20 and 40 DAS Spray <i>Dashparni ark</i> at 45 & 60 DAS Use of pheromone traps, yellow sticky traps and bird peaches	Spray 5 % NSKE at 15 & 30 DAS Spray of <i>Amritpani</i> at 20 and 40 DAS Spray of <i>Dashparni ark</i> at 45 & 60 DAS Use of pheromone traps, yellow sticky traps and bird peaches Use of pesticides when pest cross economic threshold level	No control measures followed. Some farmers used only pesticides.
Diseases Management	Spray of <i>Amritpani</i> + butter milk at 45 and 65 DAT	Use of resistance variety 5 % NSKE Use of fungicides when diseases cross economic threshold level	No control measures followed. Some farmers used only fungicides.



SCI Chickpea Demo Plot

Result and Discussion

Table 3: Mean grain yield of Chickpea in rabi season of Pimpalner Cluster

Village	Mean grain yield (kg/ha)		
	Organic	SCI	Farmers practice
Chorwad	829	972	689
Manjari	746	723	635
Mohagaon	673	681	428
Pimpalpada	582	579	592
Shendwad	644	677	645
Average	695	726	598

The data in Table 3 indicates that the average grain yield of Chickpea in rabi season was higher in SCI demonstrations (726 kg /ha) as compared to Organic (695 kg/ha) demonstrations and Farmers practice (598 kg/ha). It means that, on an average Chickpea yield was increased by 16.2% and 21.40% in Organic and SCI methods respectively, over the farmer's practice.

Conclusion

Based on these results, we recommend that organic and SCI cultivation practices for Paddy and Chickpea increases the crop productivity as compared to farmer's practice. These practices reduce the cost of cultivation by about 12% and also help to enhance the soil health. It showed that organic and SCI practices are more resilient under adverse climatic conditions like dry spells and wet spells which are more common in Sakri block of Dhule district.

About Us

Watershed Organisation Trust, (WOTR) is a non profit that engages at the intersection of practice, knowledge and policy across scales and in collaboration with stakeholders from across sectors. Headquartered in Pune, WOTR has supported and carried out developmental work in over 4522 villages across 7 states of India.

WOTR assists rural communities to assess their vulnerability to climate and non climatic risks. It organizes them in a socially and gender inclusive manner to help themselves out of poverty by regenerating their ecosystems in a holistic and integrated manner, conserving and optimising resource use, especially water and undertaking climate smart sustainable livelihoods.

Being a Learning Organisation, WOTR undertakes applied research and closely engages with institutions and governance actors so that insights and good practices derived from ground experience contribute to shaping enabling policies and effective programs. With a view to up-scale successful interventions, WOTR develops pedagogies for implementation and organizes a variety of knowledge sharing and capacity building events for stakeholders across the civil society, developmental and governance spaces, from India and other countries.

This publication has built on experiences from the project “Soil protection and rehabilitation of degraded soils for food security in India” funded by GiZ and implemented by WOTR.

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