Soil management for Sustained and Higher Productivity in the Adarsha Watershed

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Abstract

Kothapally watershed is a typical representative of rain-fed (800 mm rainfall) semi-arid tropics (SAT) with varying soil depth in the watershed and widespread soil degradation as the major challenge coupled with low crop yields and family incomes. Before the onset of initiative during 1999, soil health mapping and baseline surveys showed varying soil depth in fields at different topo-sequence, macro-/micronutrient deficiencies along with low soil carbon (C) levels and heavy soil loss through erosion that compromised with crop production in the watershed. Inappropriate fertilizer management decisions leading to negative budget for primary nutrients in major crops/cropping systems highlighted suboptimal fertilizer use. Unawareness about micro-/secondary nutrient deficiencies like sulphur (S), boron (B) and zinc (Zn) and lack of addition of such fertilizers contributed to low crop yields and declining fertilizer and water use efficiency. Farmers participatory trials highlighted yield loss of 13–39% in crops like sorghum and maize in the absence of deficient micro-/secondary nutrient fertilizers. Recycling of on-farm wastes through vermicomposting and biomass generation using N-rich *Gliricidia* on farm boundaries were promoted for fertilizer savings and crop yield benefit alongside soil carbon building for developing resilience. The impact of integrated soil health management practices cumulatively observed over 13 years was demonstrated during 2012 soil health mapping that showed improved mean level of soil organic C; available nutrients, viz. phosphorus (P), B, Zn and S; and significantly reduced number of fields with low nutrient/C levels. Along with yield advantage, soil loss was significantly reduced from 3.48 t ha^{-1} in untreated area to 1.62 t ha^{-1} in treated watershed area.

Keywords

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AQ3

4.1. Characterization of Soil Health and Issues in Kothapally Watershed

Kothapally watershed represents dryland areas which are categorized by varying soil depth, prone to severe land degradation, erratic rainfall, high soil erosion, inherently less fertile soils and low rainwater use efficiency. Farmers in dryland areas, in general, are poor, and their ability to take risk and invest in necessary inputs for optimizing production is low (Joshi et al. 1996). Watershed programmes in India therefore are instrumental and silently revolutionalizing the rain-fed agriculture for improving the productivity in dryland areas with major focus on natural resource conservation (Joshi et al. 2006; Wani and Garg 2015; Wani and Patil 2018). Maintaining proper soil health is one of the essential elements of sustainable agriculture and safeguarding ecosystem services (Wani et al. 2018). The depletion of soil nutrients often leads to land degradation and low fertility levels that limit production and reduce water productivity. The impact of land degradation is especially severe on livelihoods of the poor who heavily depend on natural resources. In case of Kothapally watershed, with a population of around 1500, around 270 families depend on cultivation and 4 are non-cultivators. The average landholding per household was 1.4 ha (Shiferaw et al. 2002). Soil health management is not only a prerequisite to strengthen agri-based enterprises but also a very effective entry point intervention to quickly harness the productivity benefits while bringing on board the majority farmers because of common interest and benefits to all (Wani et al. 2002, 2009; Dixit et al. 2007; Chander et al. 2016).

AQ4

Initial baseline surveys in Kothapally watershed pointed out to poor fertilizer management practices and declining fertilizer use efficiency. Therefore, to undertake precise diagnosis, representative soil samples were collected from the watershed following the stratified soil sampling method (Sahrawat et al. 2008). Detailed soil characterization showed low levels of nitrogen (N) (11 mg kg^{-1} soil), phosphorus (P) (1.4–2.2 mg kg^{-1} soil) and micro-/secondary nutrients like sulphur (S), boron (B) and zinc (Zn) along with low soil organic carbon. Soils are predominantly Vertisols and associated soils (90%) with dominance of clay (42%, range of 5.16–65.61% across fields). Average composition of other mechanical separates was 18% (10.21–29.75% range) silt, 24% (8.33–45.71 range) fine sand and 16% (3.22–43.14 range) coarse sand. The soil depth ranges from 30 to 90 cm and watershed is characterized by an undulating topography with an average slope of about 2.5% (Wani et al. 2003a, b).

AQ5

These assessments clearly highlighted to focus on promoting need-based sustainable nutrient management including that of micro-/secondary nutrients and soil C building measures through effectively using on-farm biomass. The soil type and texture observed also needed broad-bed and furrow (BBF) or conservation furrow (CF) landform systems for addressing the barriers of conveniently taking two crops in a year and storing more soil moisture while reducing runoff. Actually, these Vertisols have poor hydraulic conductivity and consequently are frequently poorly drained. The land management practices like CF at 3–4 m interval or BBF landform system comprising of 1.05 m width raised bed with 0.45 m furrow can effectively address the existing barriers to effectively draining excess water via furrows, enabling land preparation by providing compact furrows to move on while keeping intact the surface bed soil and infiltrating and storing more soil water through intact surface bed soil.

4.2. Nutrient Budgeting of Production Systems

Nutrient budgeting is an important tool in addition to soil health mapping for insight into the balance between inputs and outputs during the crop-growing period. It helps evaluate nutrient management scenarios and identify any production or environmental issues arising out of nutrient excesses or deficits. This technique was adopted in Kothapally watershed for understanding major nutrient-related issues. For this, the watershed was divided into three topo-sequences and nutrient budgets were done using stratified random sampling proportionately for major crops/cropping-system across topo-sequences in both the landforms of flat cultivation (normal practice) as well as broad bed and furrow (BBF, improved practice). The balances showed that all the systems were depleting nitrogen (N) and potassium (K) from soils and that P is applied almost equal to the requirement or more than what is removed by crops (Table 4.1). N, phosphorus (P) and K nutrient uptake was in general greater in the improved BBF system compared to that on the flat landform, apparently because of more crop yield on the BBF landform (Fig. 4.1).

Table 4.1

Soil health status of farmers' fields (263 field samples) in Kothapally watershed after the watershed works, May 2012

	pH	EC (dS m^{-1})	Available nutrients (mg kg^{-1})								Total N	Carbon (%)	
		dS/m	P	K	S	Zn	B	Fe	Cu	Mn		Organic	Inorganic
% deficient farmers			31	0	37	68	52	0	0	0			
Mean	8.0	0.27	12.1	242	14.1	0.73	0.63	15.15	4.57	12.06	868	1.53	0.41
Range	6.8–8.6	0.01–0.94	0.3–83.9	55–615	3.1–62.0	0.14–4.69	0.22–1.83	5.6–44.9	1.4–18.4	4.4–33.0	329–1821	0.13–3.11	0.00–1.84

Fig. 4.1

Nutrient budgeting studies in farmers' fields, Adarsha watershed, Kothapally, 1999–2000. (Derived from Wani et al. 2006)

4.3. Scaling Up Balanced Nutrients and Building Soil Carbon

Based on soil analysis results, fertilizer recommendations were discussed with the farmers and promoted for all major crops to take care of incurring soil nutrient deficits. Alongside suboptimal fertilizer use of primary nutrients, the observed deficiencies of micro- and secondary nutrients like B, Zn and S were major constraints for productivity improvement and sustainability. To introduce new practice is always a challenge and collective participatory learning is the best way to bring in desired change in current practice. Therefore, farmer participatory trials were conducted to evaluate micro-/secondary nutrients in crops like sorghum and maize. Amendments with B, alone and in combination, resulted in 13–39% increase in sorghum and maize grain yield (Table 4.2). This tangible benefit was a good trigger to adopt use of micro- and secondary nutrient fertilizers by majority farmers in the watershed (Sreedevi et al. 2004; Wani et al. 2006; Dixit et al. 2007) (Fig. 4.2).

Table 4.2

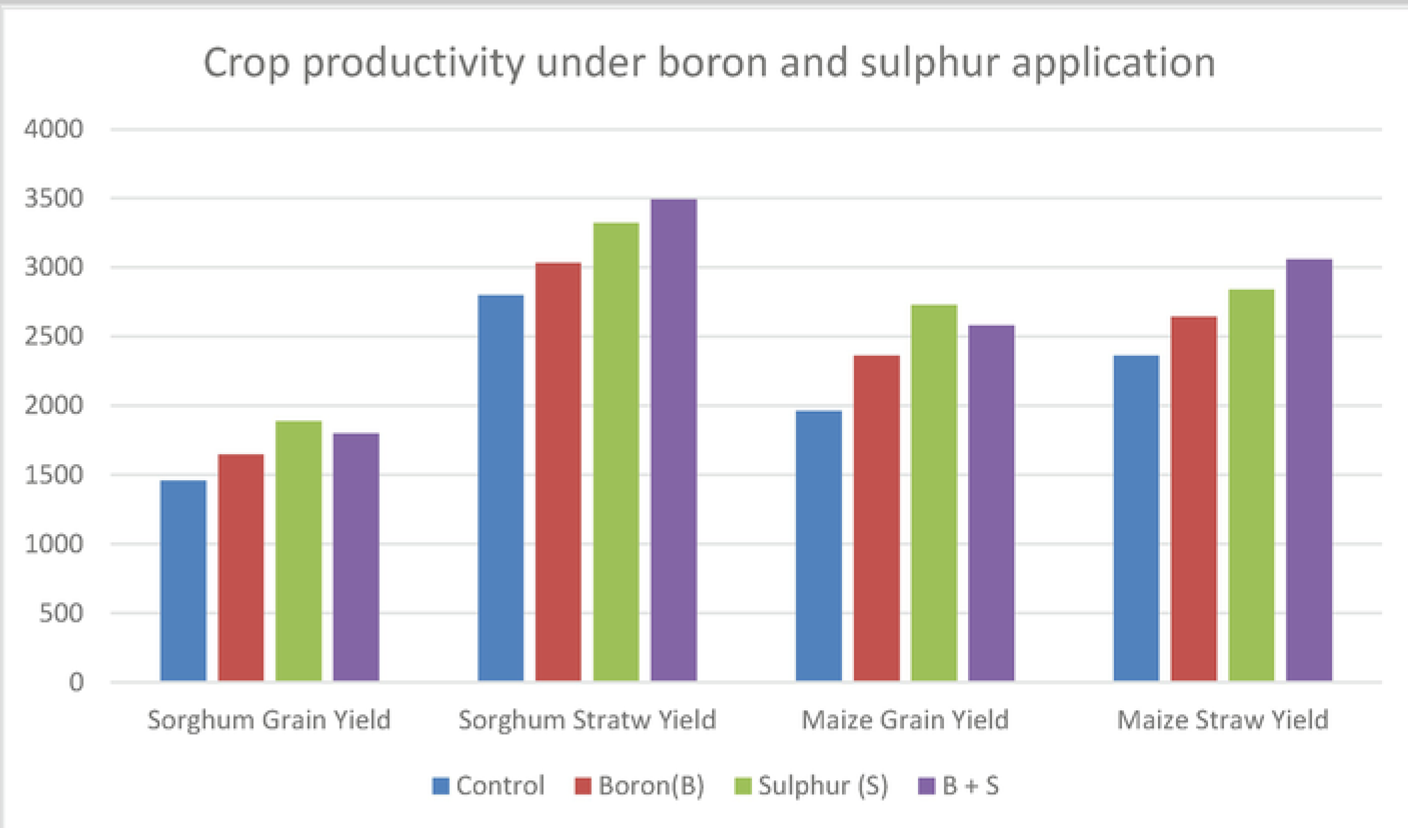
On-farm (medium soil depth) evaluation of landform management in Adarsha watershed, Kothapally, during 2001

System	**Soil type**	**Landform**	**Yield (kg ha^{-1})**		**System productivity (1 + 2)**
			Main crop (maize/sorghum) – 1	**Component crop (PP) – 2**	**(kg ha^{-1})**
Maize/PP	Shallow	BBF	1750	380	2130
Maize/PP	Shallow	Flat	1680	290	1970
Maize/PP	Medium	BBF	2830	1070	3900
Maize/PP	Medium	Flat	2780	820	3600

BBF broad bed and furrow, *pp* pigeon pea

Fig. 4.2

Total productivity of sorghum and maize with boron and sulphur amendments at Adarsha watershed, Kothapally, 2001. (Derived from: Sreedevi et al. 2004; Wani et al. 2006)



In post-green revolution era, fallout of the fertilizer subsidy is that chemical fertilizers are cheaper than organic fertilizers and, so, farmers are tempted to move away from using organic manure for rain-fed agriculture, which is very critical for preserving good soil health (Wani et al. 2016, 2018). Little or no addition of organics coupled with imbalanced use of mineral fertilizers has led to depletion of soil organic carbon (C) resulting into its low levels which is one of the major factors for declining soil productivity. Soil organic matter has long been suggested as the single most important indicator of soil productivity (Wani et al. 2003a, 2018). Even small changes in total C content can have large impact on soil biological and physical properties and crop yields.

Recycling large quantities of carbon (C) and nutrients contained in agricultural and domestic wastes (~700 million t organic wastes are generated annually in India) are needed to rejuvenate soil health for enhancing productivity (Nagavallemma et al. 2006; Chander et al. 2013; Wani et al. 2014). Vermicomposting is a simple process of composting with the help of earthworms to produce a better enriched end product. It is one of the easiest methods to recycle organic wastes to produce quality compost for farm requirements (Wani et al. 2014). Vermicompost is, in general, rich in nutrients than other compost due to passage of material through the guts of the worms and gets enriched with nutrients and hormones. Earthworms consume various organic wastes and reduce the volume by 40–60% (Nagavallemma et al. 2006) in 8 weeks after releasing the worms. Vermicompost prepared through decomposing sorghum straw and dung biomass (80:20 ratio, primed with 0.5% urea and 4% rock phosphate) has recorded reasonably high concentration of various nutrients, like 11,100 mg kg^{-1} N, 4300 mg kg^{-1} P, 9600 mg kg^{-1} K, 31500 mg kg^{-1} Ca, 6000 mg kg^{-1} Mg, 17 mg kg^{-1} S, 88 mg kg^{-1} Zn, 17.9 mg kg^{-1} Cu, 7525 mg kg^{-1} Fe, 395 mg kg^{-1} Mn, 91 mg kg^{-1} B and C: N ratio of 11.7 (Chander et al. 2018).

In the background of poor soil health and availability of on-farm biomass, vermicomposting was promoted in the watershed both for field use as well as a microenterprise to generate income through sale (Fig. 4.3). Training was imparted to farmers and women SHG groups. The raw material used was *Parthenium* (locally known as congress weed) which is an obnoxious invasive weed in the country. The *Parthenium* growing in the village was uprooted by the community through voluntary work for a day in a year and made available to women SHGs for composting. The women group collectively undertook the vermicomposting using the earthworms and enriched with rock phosphate (Nagavallema et al. 2006). Participatory evaluation trials by the farmers showed application of 3 and 5 t ha^{-1} of vermicompost increased tomato yield to 4.8–5.8 t ha^{-1} as compared to the plots (3.5 t ha^{-1}), which received conventional compost. In onion, the application of 2.5 t ha^{-1} of vermicompost + chemical fertilizers gave additional yield of 3.75 t ha^{-1} when compared to fields which received only chemical fertilizers. Similarly, response of vermicompost was recorded for turmeric. It was also observed that the effect of vermicompost was seen even in the next year crops. In addition, for biomass generation, *Gliricidia* plantations were promoted on farm boundaries and N-rich leaves are used in making vermicompost or incorporating in field. Farmers have planted about 50,000 *Gliricidia* saplings on bunds for generating N-rich organic matter in the watershed. On-station watershed studies at ICRISAT have shown that *Gliricidia* loppings provide around 30 kg N ha^{-1} $year^{-1}$ without adversely affecting crop yield (ICRISAT 2002; Wani et al. 2003b).

Fig. 4.3

Vermicomposting by women self-help groups in Adarsha watershed, Kothapally, in Telangana state (erstwhile undivided Andhra Pradesh), India

AQ6

The impact of integrated soil health management practices continued for 13 years was evident in Kothapally watershed during 2012 soil health mapping. Soil health mapping during 2012 showed improved mean level of soil organic C; available nutrients, viz. phosphorus, B, Zn and S; and significantly reduced number of fields with low nutrient/C levels.

4.4. Conservation of Soil Resources

According to NBSS&LUP, around 146.8 M ha is degraded land in India and water erosion is the major factor (Bhattacharyya et al. 2015). There is annual total soil loss of 5.3 billion tons in India at ~16.4 t ha^{-1} $year^{-1}$ and direct estimated cost of land degradation is around Rs 450 billion equivalent to $6.4 billion (crop productivity, high-input use, lost nutrients, land use intensity, changing cropping pattern) annually. Watershed management is one of the most trusted and eco-friendly approaches to managing soil loss. In this context, the salient impacts that resulted due to the implementation of this watershed were substantial reductions in runoff and soil loss. Soil and water conservation measures implemented by farmers in individual fields were broad-bed and furrow (BBF) landform, land smoothening, field drains, flat cultivation with conservation furrows and contour planting to conserve in situ soil and water and planting *Gliricidia* on field bunds to strengthen bunds and supply nitrogen (N)-rich organic matter for in situ application to crops. Common wasteland treatment was done by planting *Pongamia pinnata, Jatropha curcas*, custard apple saplings, G*liricidia* saplings and avenue plantation as part of village afforestation programme. The direct benefits of BBF landform were observed over traditional flat landform treatments (Table 4.2). Farmers obtained 250 kg more pigeon pea and 50 kg more maize per hectare using BBF on medium-depth soils than from the flat landform treatment. The farmers with shallow soils reported similar benefits from BBF landform and improved management options for other cropping systems. The BBF system increased the yield of cotton by 32%, pigeon pea by 17%, maize by 25% and sorghum by 21% compared to traditional flat practice. The flat cultivation along with conservation furrow system has increased the yield of cotton by 22%, pigeon pea by 16%, maize by 20% and sorghum by 15% compared to traditional flat practice. The benefits of these in situ soil and water management practices were found better during low- and high-rainfall years. These practices were also found effective in improving soil moisture and controlling runoff, peak runoff rate and soil loss.

Community-based interventions were implemented on common resources like 14 water storage structures (one earthen and 13 masonry) with a capacity of 300–2000 m^3, 97 gully control structures, 60 mini percolation pits, 1 gabion structure (Fig. 4.4) for increasing groundwater recharge, a 500 m long diversion bund and field bunding on 38 ha that were completed. Due to these watershed interventions, the groundwater recharge and its availability increased substantially. Despite of several fold increase in the numbers of borewells, the groundwater levels in the watershed were maintained. Even during the post-rainy and summer seasons, the performance of open wells improved substantially. For example, during the post-rainy season, the average area irrigated by each open well increased from 0.6 to 1.1 ha. The data from 2000 to 2014 clearly show that the watershed interventions resulted big increase in groundwater availability. Increase groundwater availability had led to increased investments as well as better adoption of improved agricultural technology (improved crop varieties, chemical fertilizers, drip irrigation, cultivation of high-value crops and others) by watershed farmers. It has contributed in increasing agricultural productivity and income as well as in increasing cropping intensity and crop canopy, thereby controlling soil loss and land degradation and improving soil health.

Fig. 4.4

Water storage structure in Adarsha Watershed, Kothapally, in Telangana state, India

One of the benefits of soil/water conservation measures in the watershed was significant reduction (34.6%) in runoff and soil loss from the treated watershed area compared to the untreated area (Table 4.3). In case of untreated watershed area, 12% of rainfall was lost as runoff, whereas in treated area only 7.8% of rainfall was lost as runoff indicating 4% more rainwater was stored in soil which would have benefitted crop as well as part groundwater recharge. Data during 1999–2017 show soil loss of 2.75 t ha^{-1} in untreated area compared to 1.41 t ha^{-1} in treated watershed area recording 48.8% reduction in soil loss due to integrated watershed development in Adarsha watershed, Kothapally. Due to watershed development activities, Kothapally field retained on an average 1.34 t soil per ha per year which works out to be 25.5 t soil retention storing 0.4 t valuable organic carbon per ha in soil in 19 years since development contributing significantly to minimizing land degradation and sustainable crop yields. When considered at watershed level, in 19 years 11,840 t soil was retained in the watershed which contained 186 t of valuable soil organic carbon along with associated soil nutrients like N, P, K, Zn, B, Fe, S, Ca, Mn, Mg, etc., which are critical for sustainable crop yields.

Table 4.3

Seasonal rainfall, runoff and soil loss from the sub-watershed in Adarsha watershed, Kothapally during 1999–2017

Year	Rainfall	Runoff	Soil loss
	(mm)	(mm)	(t ha^{-1})

[a]*Untreated*, control with no development work, *treated* with improved soil/water/crop management, *NR* not recorded

Year	Rainfall	Untreated Runoff	Treated	Untreated Soil loss	Treated
	(mm)	(mm)		(t ha^{-1})	
1999	584	16 Untreated	NR Treated	NR Untreated	NR Treated
2000	1161	118	65	4.17	1.46
2001	612	31	22	1.48	0.51
2002	464	13	Nil	0.18	Nil
2003	689	76	44	3.2	1.1
2004	667	126	39	3.53	0.53
2005	899	107	66	2.82	1.2
2006	715	110	75	2.47	1.56
2007	841	115	82	4.5	2.09
2008	1387	281	187	8.94	4.5
2009	710	130	83	2.30	1.90
2010	984	150	89	2.50	2.10
2011	574	40	26	2.10	1.10
2012	716	105	71	2.45	1.90
2013	775	98	60	3.06	1.67
2014	453	10	2	1.00	0.50
2015	491	50	3	0.90	0.10
2016	762	82	30	1.10	0.30
2017					
Mean	749	90.2	59.0	2.75	1.41

[a]*Untreated*, control with no development work, *treated* with improved soil/water/crop management, *NR* not recorded

Scientists from National Remote Sensing Agency (NRSA), Hyderabad and ICRISAT jointly, developed a remote sensing and GIS-based model for estimating soil loss from the small agricultural watersheds (Dwivedi et al. 2005). This model was used to assess the impact of watershed interventions on soil loss and land degradation. In this model, the digital elevation map was derived from panchromatic sensor (PAN) stereo data of Indian Remote Sensing Satellite IRS-1C and aerial photographs. The input parameters (soil erodibility, drainage density, length and degree of slope, surface cover, vegetation index, agricultural practices and flow routing) required for the model have been derived through visual interpretation of aerial photographs. The slope factor was derived from digital elevation model generated from aerial photographs and PAN stereo images. This remote sensing and GIS process-based model was used to assess the impact of watershed interventions on soil loss and land degradation. The data from Kothapally watershed from 2000 to 2007 was used to assess the impact of watershed interventions on soil loss, vegetative cover and area under waterlogging flooding especially during high-rainfall events. It estimated that during 1999–2007 about 3820 tons of soil loss was saved due to various watershed interventions. This has significantly contributed to improving soil health and reducing land degradation. Due to various watershed interventions, the vegetative index in watershed improved by 38% compared to start of the project (1999). The watershed interventions were also found effective in reducing downstream flooding and formation of new rills and gullies in the watershed areas.

4.5. Overall Impacts of Soil Health and Other Management Practices on Crop Productivity

The impacts of integrated improved watershed management practices were evaluated in on-farm crop yields that included integrated nutrient management along with crop and water management as important intervention (Table 4.4). With improved watershed technologies during 1999–2002, farmers obtained two- to threefold higher crop yields in case of major crops like maize and sorghum as compared with the base year during 1998. In the case of maize intercropped with pigeon pea, improved practices resulted in two- to fourfold increase in maize yield compared with farmers' traditional practices where the yields ranged between 0.7 and 1.8 t ha^{-1}. Of all the cropping systems studied in Adarsha watershed, maize/pigeon pea intercropping systems proved to be the most beneficial where farmers could gain about Rs 16,500 and Rs 19,500 from these two systems, respectively.

Table 4.4

Average yields with improved technologies in Kothapally watershed, 1999–2007

Crop/system	Crop yield (kg ha^{-1})											
	Before – 1998	**1999–2000**	**2000–2001**	**2001–2002**	**2002–2003**	**2003–2004**	**2004–2005**	**2005–2006**	**2006–2007**	**Mean**	**CV %**	
Improved system												
1. Sole maize	–	3250	3756	3300	3481	3920	3421	3920	3635	3585	16.15	7
2. Maize/pigeon pea intercrop system	–	5263	6483	5596	5652	6292	4989	6388	6165	5853	17.67	1
3. Sorghum/pigeon pea intercrop system	–	5010	6524	5826	–	5782	4795	5288	5308	5505	13.69	1
4. Sole sorghum	–	4358	4590	3574	2964	2745	3022	2864	2503	3327	23.90	1
Farmers' practice												
5. Sole maize	1500	1700	1601	1630	1661	1721	1951	2250	2151	1833	33.09	1
6. Sorghum/pigeon pea intercrop system	1983	2329	2174	2763	3188	3311	2998	3359	3118	2904	19.17	1

Source: Wani et al. (2006)

Crop/system	Crop yield (kg ha^{-1})											
	Before – 1998	1999–2000	2000–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2006–2007	Mean	CV %	
7. Hybrid cotton	–	2295	7047	6605	[illegible]	[illegible]	–	–	–	5876	28.48	2
8. BT cotton								[illegible]	[illegible]	5899		
CV%		24.9	30.1	10.0	8.0	15.6	20.5	11.5	11.0			
SE±		867	1497	383	323	752	748	529	475			
Source: Wani et al. (2006)												

4.6. Water Quality

Unabated N-fertilizer use and N-fertilizer-based pollution due to leaching of nitrates into groundwater is an issue of concern globally. An assessment of holistic approach adopted in Adarsha watershed, Kothapally, during 1999–2016, showed a significant decrease in nitrate-N loss to 7.1 kg ha^{-1} in the treated watershed area compared to 13.5 kg ha^{-1} in untreated area. Adarsha watershed, Kothapally, is a site of learning that holistic and integrated interventions like conservation of soil/water resources along with soil-C building, INM and good practices in crop management are instrumental in enhancing N-use efficiency for more food production, while enhancing the water quality through reduced nitrate levels.

4.7. Creating Awareness and Capacity Building: Key for Success

Creating awareness and strengthening capacity of stakeholders is crucial in scaling out the impacts of soil management. Following the principle of “seeing is believing”, the exposure visits of farmers to on-station watersheds at ICRISAT campus that improved management practices helped them understand and believe the unexploited potential in agriculture. Participatory approach was adopted to bring in the ownership by farmers. Participatory soil sampling and use of stress-tolerant pigeon pea cultivar were taken as an entry point activity because it involved majority stakeholders leading to tangible economic benefits as a result of soil health mapping-based fertilizer management. Farmer meetings and specialized training programmes on nutrient recommendations and fertilizer management, recycling wastes through composting, biomass generation through *Gliricidia* and soil conservation measures built specialized skills amongst the farmers’ community. Lead farmers especially played a key role in liaising between experts and farmers who generally follow other fellow farmers.

4.8. Summary and Important Findings

In rain-fed areas in real-world field situation, the soil depth varies based on the location of the fields on different topo-sequence and the soil fertility as well as water holding capacity differed a lot. Such situation calls for site-specific fertilizer management strategies rather than the crop or agro-ecoregion-based fertilizer recommendations. In order to meet the growing demand for food and nutrition security, available but untapped potential of dryland agriculture need to be harnessed. There are large and economically exploitable yield gaps in the drylands. These gaps can be easily abridged with current levels of technologies if holistic and integrated solutions adapted to local conditions are made available to farmers. Kothapally watershed is a typical example of such a pilot. In the watershed, it became evident that soil resources are badly deteriorated and can no longer be ignored to meet the challenges of increasing productivity and incomes on a sustainable basis. The focus was on addressing the issues of soil erosion and loss of soil fertility aggravated by uninformed decisions leading to mismanagement of fertilizers. An accurate diagnosis leading to need-based use of resources not only led to high productivity and profitability but also efficient and sustainable resource use that resulted in improving soil health over the years. It also demonstrated that state-of-the-art facilities are essential for diagnosing the nutrient deficiencies, or else it may just be a futile exercise. Policy support that focuses on conserving soil loss due to erosion by adopting on-farm and community-based interventions such as integrated watershed management strategy along with promoting balanced and integrated use of chemical fertilizers and recycling of on-farm wastes showed tangible economic benefits as well as conserved the natural resources in the watershed. Adarsha watershed, Kothapally, is an exemplar of pilot site of learning for soil health management for higher and sustained productivity and has helped in scaling up the learnings and strategies for adaptation to climate variability as well as climate change impacts. Soil management is a topic that has major implications on various ambitious sustainable development goals like no poverty, zero hunger, good health and well-being, clean water and sanitation, decent work and economic growth, life on land, climate action and thereby needs major focus.

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AQ7

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