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Enhancement of Agricultural Production through Sustainable Agriculture and Poverty Alleviation in Kot, Manazary Baba (Malakand Agency) Pakistan

Sardar Khan and M. Nafees
Department of Environmental Sciences, University of Peshawar, Pakistan

Abstract: The sustainable agriculture can bring both environmental and economic benefits for farmers, communities and nations. Sustainable agriculture plays a vital role for poverty alleviation through enhancement of crops and vegetable production. The present study was conducted to compare the production of traditional agriculture (existent) with sustainable agriculture and to demonstrate its economic role. The project area (12500 acres) consists on both irrigated and non-irrigated land. Keeping in mind the climatic condition, the wheat, maize and different vegetable was cultivated in ways of sustainable agriculture. The wheat production increased from 40-50% on irrigated land but 20-30% on rain-fed land, the maize production enhanced from 20-25% on irrigated land and 10-15% on rain-fed land. Similarly, the vegetable like okra, onion, garlic and tomato production were increased form 30-32% on irrigated land while 28-30% on rain-fed land. If the sustainable agriculture practices are carried out on the whole agriculture land of the project area properly then it is possible that the inhabitants will not only meet the food requirements form their local fields but they will also be able to export to the market of other areas. From experimental result, it is concluded that this practice will reduce the consumption of money for food requirements and can be used for poverty alleviation.

Keywords: Sustainable Agriculture, Environmental and Economic Benefits, Community Uplift Poverty Alleviation

Introduction

Modern crop production is the application of the principles of chemical, physical, biological and social sciences for growing domestic plants to meet a diversity of needs in profitable manner.

During the past 50 years, agricultural development policies have been remarkably successful at emphasizing external inputs as the means to increase food production. This has produced remarkable growth in global consumption of pesticides, inorganic fertilizer, animal foodstuffs, tractors and other machinery. (Nazir *et al.*, 1994)

The external inputs have, however, substituted for natural control processes and resources, rendering them more vulnerable. Pesticides have replaced biological, cultural and mechanical methods for controlling pests, weeds and diseases. Organic fertilizers have substituted for livestock manure, composts and nitrogen-fixing crops. Information for management decisions comes from input suppliers, researchers and extensions rather than from local sources; and fossil fuels have substituted for locally generated energy sources. (Petry, 1993, 1995).

Agriculture development faces some unprecedented challenges. By the year 2020, the World will have to support some 8.4 billion people. Even though enough food is produced in aggregate to feed everyone, some 800 million people still do not have access to sufficient food. This includes 180 million under-weight children suffering from malnutrition. The gap between the wealthy and poor have widened. Despite a doubling in global income in the past three decades, the number of people living in poverty has continued to rise, from 944 million to 1300 million. (Crosson and Anderson, 1995; Leach, 1995; FAO. 1993 and 1995).

Although the production has been improved through the modernization of agriculture but has adverse environmental and social impacts. Many environmental problems have increased dramatically in recent years. These include:

- Contamination of water by pesticides and fertilizer
- Contamination of food and fodder by residues of pesticides, nitrates and antibiotics; workers and public, disruption of ecosystems and harm to wildlife;
- Damage to farm and natural resources by pesticides, causing harm to frame workers and public, disruption of ecosystems and harm to wildlife.
- Contamination of the atmosphere by ammonia, nitrous oxide, methane and the products of burning, which play a role in ozone depletion, global warming and atmospheric pollution;
- Overuse of natural resources, causing depletion of ground water and loss of wild foods and habitats, and of their capacity to absorb wastes, causing water logging and increased salinity;
- The tendency in agriculture to standardize and specialize by focusing on modern varieties, causing the displacement of traditional varieties and breeds;
- New health hazards for workers in the agro-chemical and food-processing industries.

The sustainable agriculture was introduced to avoid environmental problems and alleviate the poverty through maximum production and employment. A number of countries have adopted sustainable agriculture like in Brazil, 223,000 households started maize and wheat cultivation on 1,330,000 hectares land. Similarly Mexico, Ethiopia, Kenya, Zambia, China, India, Indonesia, Thailand and Vietnam have initiated the cultivation of wheat, maize, rice, coffee and millet/sorghum on sustainable basis and their production have been increased from 50-100% (Petry, 1996).

The basic changeless of sustainable agriculture is to make better use of available physical and human resources. This can be done by minimizing the use of external inputs by regenerating internal resources more effectively or by combination of both (World Bank,

1999). A sustainable agriculture is any food production system that systematically pursues the following goals:

- Integration of natural process such as nutrient cycles, pest-predator relationship etc.
- Ensuring profitable and efficient food production
- The minimization of external and non-renewable inputs
- Protection of environment from pollution and degradation
- A good productive uses of local knowledge/practices of farmers
- Protection of consumers and worker health

In the present study Kot Manzary baba was selected to develop it as a model for poverty alleviation through sustainable agriculture.

Materials and Methods

Participation and Motivation: The proper participation and collective action of the community are the basic needs for sustainable agriculture. In order to have full participation of farmers village development committees (VDC's) were establishment, in the project area. There were different types of participation like in passive participation, people were told what is going to happen, they participated by giving information, by providing resources and also in a consultative process.

An-other necessary condition for sustainable agriculture is motivation of farmers for co-ordinate resources management. Through meetings and discussion a number of farmers were motivated for taking steps towards sustainable agriculture.

Training : To import and enhance the skills and knowledge of the farmers for sustainable agriculture, different training were arranged with collaboration of Agricultural university of Norway (NLH) and Agricultural Research institutions of project area.

Formation of Local Groups and Committees: The success of sustainable agriculture depends not only on the motivation, skill and knowledge of individual farmers but also on the action taken by community and groups as a whole. The VDC's were divided into different groups for collective efforts and action, which were needed for sustainable agriculture like:

- Natural Resources Management (NRM) groups
- Farmer research group
- Farmer to farmer extension group
- Credit management groups
- Information collection group

Planning and Implementation: After collection of all relevant data of the exiting agriculture pattern, and willingness of the farmers for sustainable agriculture the planning was done and fields were selected, for cultivation.

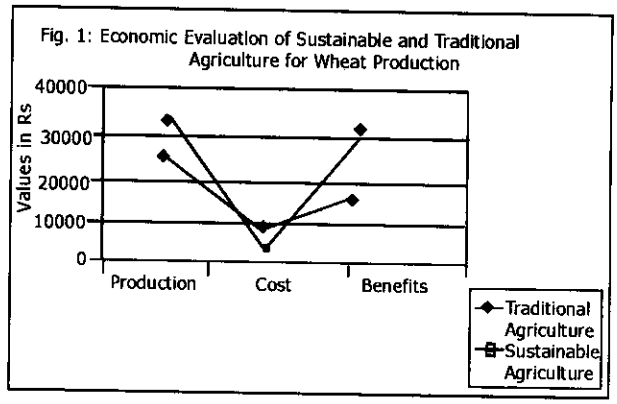
Fields Preparation: The fields were selected for different crops and vegetables on the basis of farmers willing and suitability of the fields for concerned crops and vegetation. The each field was divided into two parts, one of for sustainable and other for traditional agriculture.

Results and Discussion

In the project area sustainable agriculture was initiated on experimental basis and was much more familiarized among the farmers. The production was increased with low cost of external impute. The main objective of sustainable agriculture was not only to enhance the production but also to protect the environment from degradation, and to maintain the soil fertility.

Wheat: Wheat is the staple food grain and important crop of the project area. The climate and soil is suitable for wheat production/cultivation. The wheat was cultivated on both irrigated and rained area.

A best varity of wheat (Inqilab) was cultivated on five plots. The results are given in Table 1. As can be seen from table that the production of sustainable agriculture was 50% maximum on plot-I of the irrigated land, as compared to traditional agriculture plot. Similarly the production on plot-II was increased up to 49% and plot-III production enhanced by 40%. On rainfed land of the plot-IV and V showed 30 and 21% increase in production respectively as compared to traditional agriculture. The economic evaluation was indicated that the benefits of the sustainable agriculture were 50% higher than then the benefits of traditional agriculture (Fig. 1).



Maize: Maize is an important Kharif crop, both for human and animal uses. The soil texture, pH and fertility of the project area suitable for maize cultivation. Four plots were selected for Maize cultivation, two plots were irrigated lands and other two plots were non-irrigated lands. The total production of sustainable agriculture on both irrigated and non-irrigated Maize fields was higher than the production of the fields cultivated traditionally (Table 2). The economic evaluation was indicated that the benefits of the sustainable agriculture were 50% higher than the benefits of traditional agriculture Fig. 2.

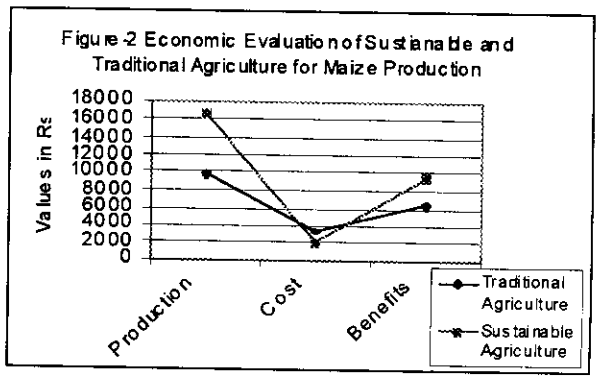


Table I: Comparison of Wheat Production Through Sustainable and Traditional Agriculture

Parameters	Agriculture Types	Area (Canal)	Total Production (Kg)	Enhancement of Products (%)
Irrigated land				
	Traditional Agriculture	4	600	
Plot-I	Sustainable Agriculture	4	900	50
Plot-II	Traditional Agriculture	4	620	
	Sustainable Agriculture	4	904	49
Plot-III	Traditional Agriculture	4	615	
	Sustainable Agriculture	4	861	40
Rainfed land	Traditional Agriculture	3	300	
Plot-IV (Okra)	Sustainable Agriculture	3	390	30
Plot-V	Traditional Agriculture	4	410	
	Sustainable Agriculture	4	497	21

Table 2: Comparison of Maize Production Through Sustainable and Traditional Agriculture

Parameters	Agriculture Types	Area (Canal)	Total Production (Kg)	Enhancement of Products (%)
Irrigated land				
	Traditional Agriculture	4	400	
Plot-I	Sustainable Agriculture	4	500	25
Plot-II	Traditional Agriculture	3	300	
	Sustainable Agriculture	3	360	20
Rainfed land	Traditional Agriculture	4	250	
Plot-III	Sustainable Agriculture	4	287.5	15
Plot-IV	Traditional Agriculture	2	130	
	Sustainable Agriculture	2	143	10

Table 3: Comparison of Vegetable Production Through Sustainable and Traditional Agriculture

Parameters	Agriculture Types	Area (Canal)	Total Production(Kg)	Enhancement of Products (%)
Irrigated land				
	Traditional Agriculture	2	300	
Plot-I (Onion)	Sustainable Agriculture	2	390	30
Plot-II	Traditional Agriculture	3	450	
(Tomato)	Sustainable Agriculture	3	585	30
	Traditional Agriculture	2	300	
Plot-III (Garlic)	Sustainable Agriculture	2	384	28
Rainfed land	Traditional Agriculture	2	200	
Plot-IV (Okra)	Sustainable Agriculture	2	264	32

Table 4: Economic Evaluation of Sustainable and Traditional Agriculture

Crops	Types of agriculture	Production (Rs)	Cost (Rs)	Benefits(Rs)
Wheat	Traditional Agriculture	25450	8500	16950
	Sustainable Agriculture	35070	4000	31070
Maize	Traditional Agriculture	9750	3400	6350
	Sustainable Agriculture	16614	2000	9614
Onion	Traditional Agriculture	1800	900	900
	Sustainable Agriculture	2340	500	1840
Tomato	Traditional Agriculture	3600	1600	2000
	Sustainable Agriculture	4680	600	4080
Garlic	Traditional Agriculture	9000	2000	7000
	Sustainable Agriculture	11520	1600	9920
Okra	Traditional Agriculture	1400	600	800
	Sustainable Agriculture	1848	400	1448

On irrigated land two plots were cultivated with good variety of maize (Sarhad White and Azam). The sustainable agriculture production of the plot-I and Plot-II were increased by 25% and 20% respectively. Similarly the Plot-III and Plot-IV, on rainfed land, showed enhancement in production by 75% and 10% respectively as compare to traditional agriculture (Table 2).

Vegetable: Among vegetables, the Okra (Sarhad green), Onion (Swat-1), Garlic (Peshawar local) and Tomato (Roma V.F) were cultivated on both irrigated lands and rainfed land, with sustainable and tradition practices. The results are given in the Table 3.

Onion, tomato and garlic were cultivated on plot-I, II, III on irrigated land. The production was showed an increase by 30%, 30% and 28% respectively as compared to traditional practices. Okra was cultivated on rainfed area and its production showed enhancement only of 28%, due to unfavorable climatic condition.

The cost-benefit analysis of the production of sustainable and traditional agriculture was conducted and the results are given in Table 4. The cost of the external inputs, of sustainable agriculture was lowest as compared to traditional agriculture and sustainable agriculture more benefited the farmers through highly production and low inputs cost.

Condition for Sustainable Agriculture: The resource-conserving technologies, local institutions and groups, external institution and favourable environmental policy were condition, adopted for sustainable agriculture. Agriculture practices can only be sustainable when resource conservation technologies are developed and used by local institutions and groups, who are supported by external research, extension and development institutions and environmental control policies are incorporated. As shown in the Fig. 3.

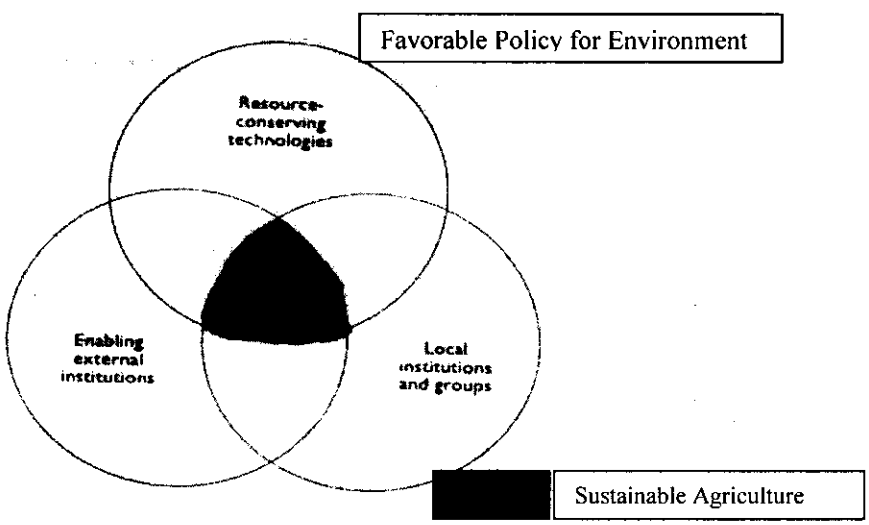


Fig. 3: The Conditions for Sustainable Agriculture

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Conclusion

Sustainable agriculture is economically, environmentally . and socially viable. The resource-conserving technologies, local institutional structures and enabling external institutions that are all know to work for Sustainable Agriculture. The sustainable agriculture increases agricultural production with less cost and also protects the environment from degradation. The cost-benefit study revels that poverty could be effectively alleviated by adopting sustainable agriculture and would also lead to a better world for living.

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