CROP PDODUCTION MANAGEMENT FOR SUSTAINABLE AGRICULTURE: A STUDY IN ANGUL DISTRICT OF ODISHA

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Abstract

The study was carried out to know the influence of crop crop management for sustainable agriculture in Angul district of Odisha in India. The study indicates that crop production depends on the successful implementation of the soil, water, and nutrient management technologies. Sustainable agriculture integrates three main goals — environmental health, economic profitability**,** and social and economic equity. Different strategies like natural resources management, increasing Agricultural inputs use efficiency, sustainability of crop production resource base could be done for efficient crop production management. Thus, Krishi Vigyan Kendra had taken different steps through on farm testing and front line demonstration for horizontal spread of different varieties, technologies in crop production.

Keywords: Crop production, Sustainable Agriculture, Agricultural inputs use efficiency

1. Introduction

Crop production management refers to the various processes applied toward the effective cultivation and harvesting of crops. Such a management system usually includes considerations regarding the selection of the crop to plant, the preparation of the land where the crop will be planted, the application of fertilizers and pesticides, and other practices aimed at improving crop yields like irrigation. Crop production depends on the successful implementation of the soil, water, and nutrient management technologies. Food production by the year 2020 needs to be increased by 50 percent more than the present levels to satisfy the needs of around 8 billion people. Much of the increase would have to come from intensification of agricultural production. Importance of wise usage of water, nutrient management, and tillage in the agricultural sector for sustaining agricultural growth and slowing down environmental degradation calls for urgent attention of researchers, planners, and policy makers(Sharma and Abrol, 2012). Sustainable agriculture integrates three main goals — environmental health, economic profitability**,** and social and economic equity**.** The goal of sustainable agriculture is to meet society's food and textile needs in the present without compromising the ability of future generations to meet their own needs. Practitioners of sustainable agriculture seek to integrate three main objectives into their work: a healthy environment, economic profitability, and social and economic equity(*Feenstra, G)*

2. District Scenario

Angul district was a separate administrative unit during the British period, but became a part of Dhenkanal district after independence. However, on 1st April 1993 it was carved out as a separate district. Angul lies between 20° 31′ N & 21° 40′ N latitude and 84° 15′ E & 85° 23′ E longitude. The total geographical area of Angul is 6232 sq.kms, thus it is the 11th largest district

among 30 districts of Orissa. Angul shares its borders with Sundargarh in the north, Deogarh, Sambalpur & Sonepur in the west, Boudh & Nayagarh districts in the south, Dhenkanal & Cuttack in the south-east and Keonjhar in the east.

2.1. Crop coverage in district

Most of the cultivated area of the district is covered with double crops like kulthi (kolath), bengalgram (harad), coriander, field pea; and vegetables are taken after harvest of ground nut and early kharif paddy.The *kharif* crops include paddy, maize, ragi, small millets, arhar, biri, mung, gound nut, til, castor, cotton, turmeric, ginger and vegetables like brinjal, tomato, and early cauliflower. On the other hand, *rabi* crops include paddy, wheat, maize, field pea, mung, biri, mustard, sunflower, safflower, niger, potato, onion, garlic, coriander, vegetables, tobacco, sugar cane etc.

The crop rotation practice followed by the farmers in the district are:

a) In Upland region: Kulthi and vegetables are taken after harvest of short duration paddy, gram, coriander and groundnut crop.

b) In Mid land region: Wheat, onion, garlic, mung, biri, vegetables and groundnut are taken after harvesting of kharif season paddy.

c) In Low land region: Paddy and pulses are taken after harvest of rabi season paddy crop. In assured irrigation farmlands, three crops like paddy-vegetable-pulses, paddy-potato-til and paddy-pulses-groundnut are taken.

Table 1: Land Utilisation Statistics (Year 2012-13)

Block	Geographical area (ha)	Net sown area(ha)	Gross cropped area(ha)	Cropping intensity (%)
Angul	109379	33110	46650	140.89

Banarpal	62863	24904	36537	146.71
Chhendipada	59746	34651	51015	147.22
Athamallik	133440	35930	45899	127.74
Kishornagar	79092	24250	36595	150.90
Talcher	33625	11921	17339	145.44
Kaniha	66678	26865	36303	135.13
Pallahara	111700	20460	37098	181.31
Total	**656523**	**212091**	**307436**	**144.95**

Datas on Table 1, reveals that the average cropping intensity in the district is around 145 percent. The highest cropping intensity is found in Pallahara block followed by Kishorenagar block, whereas, in Athamalik block the cropping intensity is lowaest. This is mainly due to the inadequate irrigation facilities in the block.

2.2. Crop Diversification

During the year 2012-13, 20 % of paddy area was diversified to pulses like green gram (500 ha) , black gram (3040 ha) ; fruits like cashew (5810 ha) as against 2009-10 in Angul district.

Table 2: Area coverage under different crops

Crop	Area(ha) during 2009-10	Area(ha) during 2012-13	Deviation %
Total cereals	109430	89230	-18.5
Paddy	104670	83960	-19.8
Total Pulses	98370	101920	+3.66
Total oilseeds	58280	58160	-0.20
Total Fibres	820	880	+7.30
Total Fruits	20490	24270	+18.40

Table 3: Seed Replacement Ratio (%)for different crops

Crop	2009-10	2012-13
Paddy	19.07	22.15
Maize	3.63	20.25
Ggram	1.16	2.88
B.gram	3.55	2.19
Arhar	2.54	4.14
Ground nut	31.28	31.17
Sesamum	0.87	0.04
Sunflower	48.53	70.67

2.3. Soil status

The farmers use cow-dung (FYM), oil cakes, and silt of tanks as manure. But, insufficiency of bio-fertilizer, need for intensification of productivity, and popularization strategy of various agencies for chemical fertilizers has substantially increased the dependency on the latter over the years. However, short supply of chemical fertilizers and/or financial limitations may be some of the factors responsible for low consumption of chemical fertilizers in some regions of the district. Fertiliser consumption in district is 23.15 kg/ha (2012-13) against 28.48 kg /ha (2009-10)

Table 4: Soil Fertility Indices 2014-15

Block	PH %			EC (ds/m)			Organic Carbon			Available P (Kg/ha)			Available K (Kg/ha)		
	Acidic	Neutral	Alkaline	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High

	%	%	%			%									
Angul	27	42	31	99	01	00	19	26	55	32	23	45	06	34	60
Banarpal	30	35	35	99	01	00	15	25	60	26	33	41	12	40	48
Chhendipada	55	33	12	100	00	00	16	22	62	33	27	40	19	47	34
Athamallik	40	40	20	98	02	00	08	20	72	17	24	59	07	32	61
Kishornagar	35	27	38	97	01	02	12	26	62	29	23	48	12	38	50
Talcher	73	24	03	100	00	00	09	15	76	37	17	46	18	42	40
Kaniha	79	18	03	100	00	00	29	35	36	32	31	37	35	45	20
Pallahara	76	21	03	100	00	00	21	35	44	53	23	24	06	41	53
Total	**50**	**31**	**19**	**99**	**01**	**00**	**17**	**26**	**57**	**32**	**26**	**42**	**13**	**40**	**47**

Source: 1. 10,179 samples test results from STL, Angul for 2014-15.

2. 620 samples test results from KVK, Angul.

2.4. Weather situation

The climatic condition of Angul is much varied. It has mainly 4 seasons. The summer season is from March to Mid June, the period from Mid June to September is the Rainy season, October and November constitute the post monsoon season and winter is from December to February. The average annual rainfall of the district is 1421 mm. However there is a great variation of rainfall from year to year. The rainfall in the district during the last 10 years varied between 896 mm & 1744 mm. There are 70 rainy days on an average in a year, but it varies from 66 at Athamallik to 80 at Pallahara. The distribution of rainfall is also quite erratic causing wide spread drought year after year.

The hot season commences by beginning of March. May is the hottest month with a mean daily maximum temperature at 44 degree Celsius. With the onset of monsoon, early in June day temperature drops appreciably. After outset of monsoon by the 1st week of October both day and night temperature began to fall steadily. December is usually coldest month of a year with a mean daily minimum temperature of 12° degree Celsius. The highest maximum temperature recorded at Angul was 46.90° Celsius on 30th May 1998 whereas the lowest minimum

temperature was 6° Celsius on 16th January 2003. The summer temperature has shown as increasing trend in recent past. The humidity of the air is generally high, especially during the South West monsoon and post monsoon months. In other months, the afternoons are comparatively drier. In the summer afternoons the relative humidity varies between 25 and 40 percent.

2.5. Water Resources

The river Mahanandi marks the southern boundary of this district. River Brahmani enters the district through Rengali reservoir and passes through Talcher sub- division. Both these great rivers have innumerable tributaries large and small. Pallahara & Talcher Sub-Divisions, a major portion of Angul Sub-division form a part of Brahmani basin. The basin of Mahanadi is spread over Athamallik Sub-division & part of Angul Sub-division. Mahanadi and the Brahmani are perennial rivers. A multi purpose dam has been constructed over the Brahmani at Rengali. 250 MW of electricity is generated at Rengali hydropower station. A barrage has been constructed 35 Kms. down stream at a place called Samal. This irrigation project is poised to irrigate 3,36,400 Ha. of land in Angul, Dhenkanal, Cuttack , Jajpur & Keonjhar districts. Other rivers of Angul are mountain streams, which are torrents in the rains and in the summer contain little or no water. Their banks in the most part are high. Their beds are rocky and they cannot be used for the purpose of navigation

The total irrigation potential of the district is 23 percent with the net irrigated area 38867 hectares kharif and 24120 hectares rabi. Lack of irrigation facilities is the major constraint in the development of agriculture in many parts of the district. Athamallik, Pallahra, Kaniha, Kishorenagar, and Talcher blocks do not have any major or medium irrigation scheme (2004-05) whereas, minor irrigation schemes have maximum coverage in Chhendipada and Kaniha blocks. Lift irrigation from bore wells is a failure in mining areas due to depletion of ground water level

and as such in these areas rain water harvesting structures have been suggested (District Vision, 2020).

Table 5: Source wise area irrigated *(Hectares)*

By channels	By wells	By LIPs	By miscellaneous sources
17544	5636	3644	12043

Source: NABARD, Potential Linked Credit Plan 2008-09, Angul

3. STATERGIES FOR CROP PRODUCTION MANAGEMENT

3.1. Management of natural resources compatible for sustainable crop production

- By maintaining soil health through soil amendment, organic nutrient management & soil test based fertilizer application.
- By practicing conservation Agriculture like zero tillage, Direct seeded rice

3.2. Sustainability of crop production resource base

- Successful crop diversification through suitable varietal substitution, Shifting the upland paddy to non paddy crops and intercropping of pulses with cereals for stabilizing the land productivity, profitability and sustainability crop production.
- Adopting crop contingency measures through maintaining climate change & mitigation of its adverse effect on crop production

3.3. Increasing Agricultural inputs use efficiency

- By practicing Integrated Plant Nutrient Management and Site Specific Nutrient Management

- By appropriate weed management practices involving herbicide mixture, mechanical and biological control for predominant production system and eradication of problematic weeds.
- By Integrated Farming System through scientific management of available resources and recycling of agricultural wastes with profit maximization, employment generation and sustainable yield.

4. Achievement by KVK during last five years

Numbers of On farm Testings (OFT) and Front line demonstrations (FLD) have conducted in farmers field by Krishi Vigyan Kendra, Angul for horizontal spread of different varieties, technologies in crop production during last five years.

4.1. OFTs and FLDs conducted on HYV and Hybrid varieties

- Short duration HYV rice :Satyabhama, Sahabhagidhan, Udaygiri, Jyotirmoyee.
- Medium duration HYV rice : Manaswini, Heeranmoyee, Pratikshya
- Aromatic rice : Geetanjali, Nua acharmoti
- Hybrid rice: Rajalaxmi
- Greengram: OBGG 52
- Blackgram: Prasad, Ujala
- Toria: Sushree, Anuradha, Parbati
- Sesamum: Amrit, Prachi
- Groundnut: Debi

4.2. OFTs and FLDs conducted on innovative technologies

- SRI method of rice cultivation
- Bud chip methods of sugarcane cultivation

- Brown manuring in direct seeded rice
- .INM in greengram, sesamum, groundnut.
- Weed management in direct sown and transplanted paddy, Maize, groundnut.
- Crop based Integrated Farming system

5. Conclusion

Thus, efficient crop production management could be done through different strategies like natural resources management, increasing Agricultural inputs use efficiency, sustainability of crop production resource base for a sustainable Agriculture in future.

Reference

Abrol V, Sharma P. (2012). Crop production Technologies. *ISBN 978-953-307-787-1, 288* pages, Publisher: In Tech, Chapters. DOI: 10.5772/1109.

Anonymous (2010). *Odisha Agriculture Statistics 2009-10*. Directorate of Agriculture and Food production, Bhubaneswar, Odisha.

Anonymous (2013). *Odisha Agriculture Statistics 2012-13*. Directorate of Agriculture and Food production, Bhubaneswar, Odisha.

District Vision (2020). Angul district Odisha, District Planning Office, Angul

Feenstra G (2011).UC Sustainable Agriculture Research and Education Program, University of California, Davis, CA 95616, (530) 752-7556

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