Major crops, cropping systems and farming systems in mid central table land zone of Odisha

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SUMMERY

The Mid-central table land zone of Odisha state covers the district Angul, Dhenkanal, part of Cuttack and Jajpur. Rice is the major crop in the district but maximum net return gained in cultivation of vegetables like brinjal. Rice-vegetables and rice-groundnut is the predominant cropping systems in the district and rice-brinjal cropping system provides maximum gross return with net return owing to higher system productivity over other cropping systems. Maximum profit has gained from crop-horticulture-poultry farming system which are viable system in productivity and economical point of view. Thus, the existing rice based cropping system can effectively be diversified with the inclusion of vegetables like brinjal in cropping sequences and crop-horticulture-poultry farming system which are viable system for sustain production and higher profit.

Key words: *Crop, cropping system, farming system, farming situation, Economics*

1. INTRODUCTION

Odisha state comprises of ten Agroclimaic zones considering the prevailing soil, climate, topography, cropping, farming system and water resources, out of which mid-central table land zone covers district of Angul, Dhenkanal, part of Cuttack and Jajpur. The total geographical area of the Angul district is 6.38 lakh hectares. The total cultivated land in the district is 2.16 lakh hectares, out of which high, medium and lowland covers 59.2, 25.5 & 15.3 % respectively. Various crops, cropping pattern and farming systems are being adopted by farmers in different farming situations in the district. Cereals like rice; pulses like pigeonpea, greengram, blackgram; vegetables like brinjal, tomato, chilli and also various farming systems are practiced by the farmers. Based on variation in topography, soil type, availability of irrigation and cropping pattern the zone(Anonymous, 1996) has further divided into seven farming situations with a view to generate location specific technologies more relevant to farmer's need, namely,

- Red loam soil, medium rainfall− covering the blocks: Angul, Athamalik, Kishorenagar, Kaniha; soil type: Red; rainfall:1382 mm; Major crops grown: rice, greengram,blackgram, groundnut, sesamum, pigeonpea, onion and vegetables.
- Medium textured red loam soil, low rainfall− covering the blocks: Chhendipada, Kishorenagar, Talcher, Kaniha; soil type: Red; rainfall:1030 mm; Major crops grown: rice, groundnut, sesamumu, greengram,blackgram, pigeonpea, maize, onion and vegetables.

- Black soil, medium rainfall− covering the blocks: Angul, Banarpal, Athamallik, Pallahara

  soil type: Black; rainfall:1344 mm; Major crops grown: rice, greengram,blackgram, pigeonpea, groundnut, sesamum, onion and vegetables.

- Black soil, low rainfall − covering the blocks: Banarpal,Chhendipada, Talcher, Kaniha

  soil type: Black; rainfall:1086 mm; Major crops grown: rice, greengram,blackgram, groundnut, sesamum, pigeonpea, groundnut, horsegram, onion and vegetables.

- Light textured laterite, medium rainfall −− covering the blocks:Kishorenagar

  soil type: Lateritic; rainfall:1335mm; Major crops grown: rice, greengram, blackgram, groundnut, sesamum, and vegetables.

- River valley alluvial medium rainfall − covering the blocks:Athamalik, Kishorenagar, Talcher

  soil type: Alluvial; rainfall:1300mm; Major crops grown: rice, groundnut, sesamum, greengram,blackgram, groundnut and vegetables.

- Red laterite, high rainfall− covering the blocks: Sukinda of Jajpur district

  soil type: Lateritic; rainfall:2200 mm; Major crops grown: rice, greengram,blackgram, pigeonpea, groundnut, sesamum, maize and vegetables.

2. Major crops, cropping systems and farming systems in the district

2.1. Major crops

Kharif is the main cropping season in district and rice is the principal crop which occupies 42 % of the total cultivated land. The total coverage area of rice during the year 2013-14(Figure 1) is

78130 ha with a productivity of 19.29 q/ha. But cropping during *rabi* season is confirmed to the irrigated tracts and land with available residual moisture in soil. The oilseed crop sesamum occupies next to rice covering 39330 ha with a productivity of 4.06 q/ha. The pulse like blackgram is the third crop covering 37330 ha with a productivity of 4.38 q /ha. (Anonymous, 2014). Groundnut, greengram and pigeonpea are cultivated 11130, 31960 and 9610 ha respectively in both the season. Important vegetables like onion, tomato, brinjal and chilli cultivated in district covering about 20.8, 19.0, 18.4 and 15.6% respectively of total vegetables cultivated area.

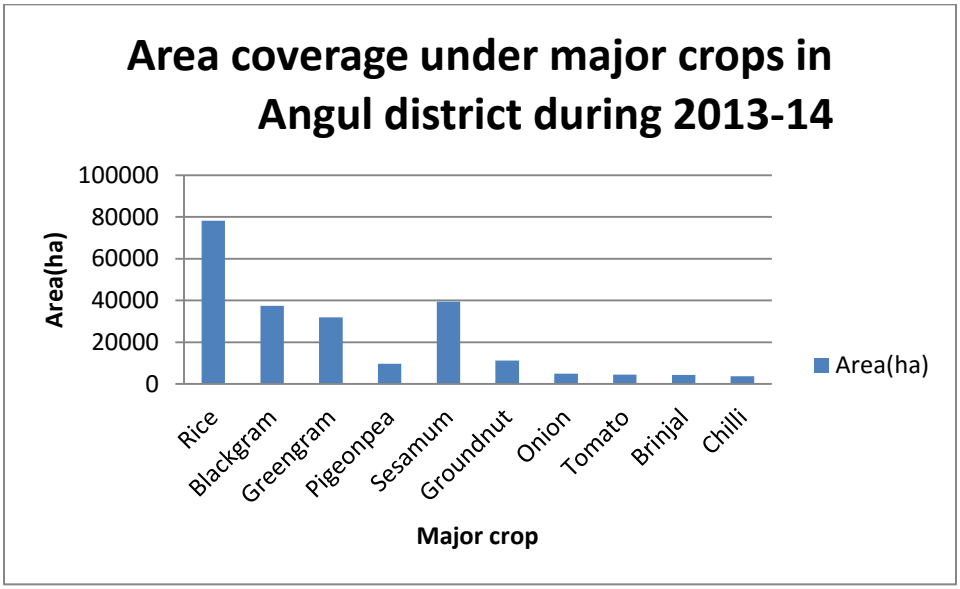

Figure 1: Area coverage under major crops in Angul district during 2013-14

2.1.1. Economics of major crops

Economic analysis revealed (Table 1) that vegetables like brinjal provides the maximum net return of Rs.44997/ha with B:C ratio 1.82 followed by tomato. Oilseeds like groundnut and pulse like greengram are next profit making crops with net return Rs.29983/ha & Rs.10406/ha respectively adopted by farmers in the district.

Table 1: Economics of major crops adopted by farmers in the district

Sl No	Crop	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
1	Rice	50	35990	56000	20010	1.56
2	Blackgram	10	15200	25000	9800	1.89
3	Greengram	10	15994	26400	10406	1.65
4	Pigeonpea	9	20836	28800	7964	1.54
5	Sesamumn	8	17981	27200	9219	1.56
6	Groundnut	20	37517	67500	29983	1.8
7	Onion	200	52754	85000	32246	1.8
8	Tomato	250	50353	88000	37647	1.75
9	Brinjal	250	55003	100000	44997	1.82
10	Chiili	20	48578	80000	31422	1.65

2.2. Major Cropping systems

Paddy is the main crop of the district with a total coverage of 78130 ha grown in both the seasons which is about 36 % of the total cultivated area of district. Kharif paddy is predominant in the district which contributes about 90% of total paddy area of the district. Rabi paddy is grown only in irrigated pockets, especially in areas where there is facilities of flow irrigation. Rabi rice in lift irrigated area is quite rare due to the high cost of lifted water and less remuneration in paddy. There are areas where paddy is grown in *kharif* season with facility to provide life saving irrigation. Here the water source is a dugwell and the second crop is a non paddy crop, particularly a vegetable crop/greengram/groundnut is taken up in *rabi* season (Figure 2). The third crop is not possible due to the fact the dugwell is of shallow depth & cannot provide irrigation in summer season. Hence, paddy-vegetables and Paddy-groundnut is the predominant cropping systems in the district (Samant, 2015). Intercropping *i.e.* pigeonpea with groundnut and cropping sequences *i.e.* rice-fallow, rice-greengram, rice-groundnut, rice-brinjal, rice-tomato are normally practiced by the farmers.

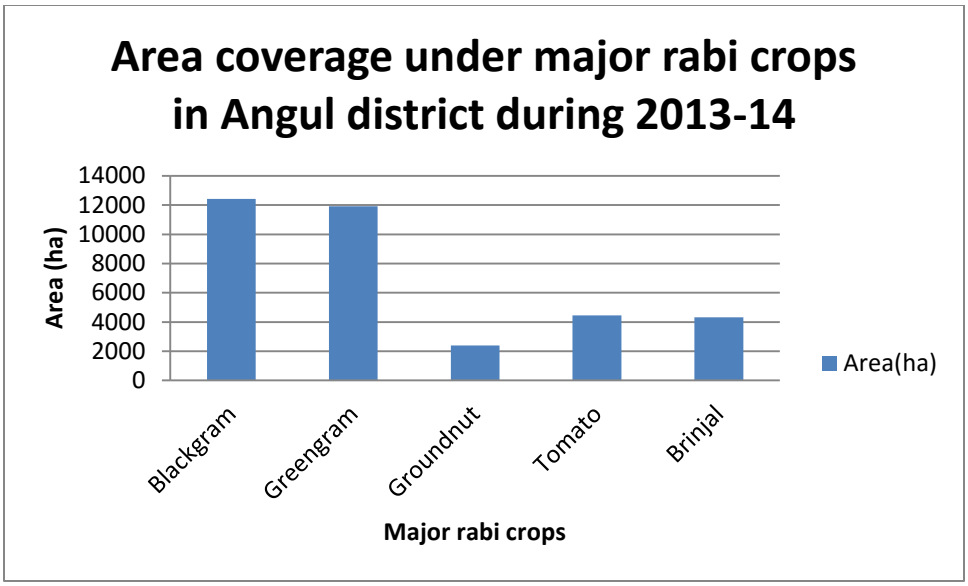

Figure 2: Area coverage under major *rabi* crops in Angul district during 2013-14

2.2.1. Economics of major cropping systems

Considering the economics and other parameters of various cropping systems adopted under various farming situations of the district, the rice-brinjal cropping system provides (Table 2) maximum gross return (Rs.156000/ha) with net return(Rs.65007/ha) owing to higher system productivity over other cropping systems(Table 2). The same cropping system also recorded the maximum B:C ratio(1.71), Profitability(Rs.178.1/ha/day) and Relative Economic efficiency(276.6 %) which was followed by rice-tomato and rice-groundnut cropping system(Prasad *et al*., 2011). The rice-fallow cropping system provides the minimum net return(Rs.20010/ha) with B:C ratio(1.56) and profitability(Rs.54.8 /ha/day).

Table 2: Economics of major cropping systems

Sl No	Cropping system	Duration of cropping system (days)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ ha)	B:C ratio	Profitability (Rs/ha/ day)	Relative Economic efficiency (%)
1	Rice-Fallow	120	35990	56000	20010	1.56	54.8	-
2	Rice-Greengram	185	51984	82400	30416	1.59	83.33	52.0
3	Rice-Groundnut	230	73507	123500	49993	1.68	136.97	149.84

4	Rice-Brinjal	235	90993	156000	65007	1.71	178.10	276.6
5	Rice-Tomato	225	86343	144000	57657	1.66	157.96	248.11
6	Pigeonpea + Groundnut	180	29370	56500	27130	1.92	74.33	35.58

**Sale price(Rs/ha) of Rice-1120,greengram-3500; groundnut-3700; pigeonpea-3200;brinjal-400; tomato-350.*

2.3. Major farming systems

Sustainable income from agriculture depends on adoption of suitable farming system with inclusion of crop, animal and other allied enterprises. Major farming systems in Angul district is mainly Rice based cropping systems coupled with horticultural crops , rearing of dairy animals and poultry.

2.3.1. Economics of major cropping systems

Among the various farming system(Nanda and Sahoo, 2012) adopted by farmers in the district, horticulture-dairy-poultry provides the maximum net return of Rs.141500 /ha with B:C ratio 2.54 followed by crop-horticulture-poultry(Table 3).

Table 3: Economics of major farming systems

Sl No	Farming system	Area (ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net profit (Rs./ha)	B:C ratio
1	Crop-horticulture-dairy					
	Crop component	0.6	15600	34100	18500	2.19
	Vegetables	0.4	12500	36500	24000	2.92
	Dairy (*Desi* cows)	2 Nos	6000	14600	8600	2.43
	Total	*1.0*	*34100*	*85200*	*51100*	*2.50*
2	Crop-horticulture-poultry					
	Crop component	0.5	13000	28000	15000	2.15
	Vegetables	0.5	15500	45500	30000	2.94

	Poultry	500 nos	46000	106000	60000	2.30
	Total	*1.0*	*74500*	*179500*	*105000*	*2.41*
3	Crop-horticulture-pisciculture					
	Crop component	0.5	13000	28000	15000	2.15
	Vegetables	0.3	9500	27500	18000	2.89
	Pisciculture	0.2	2000	7000	5000	3.5
	Total	*1.0*	*24500*	*62500*	*38000*	*2.55*
4	Horticulture-dairy-poultry					
	Vegetables	1.0	31000	91000	60000	2.94
	Dairy	5 nos	15000	36500	21500	2.43
	Poultry	500 nos	46000	106000	60000	2.30
	Total	*1.0*	*92000*	*233500*	*141500*	*2.54*

3. CONCLUSION

Thus, the existing rice based cropping system can effectively be diversified with the inclusion of vegetables like brinjal in cropping sequences. Maximum profit has gained from crop-horticulture-poultry farming system which are viable system in productivity and economical point of view and have still scope to sustain productivity in long term basis due to better market price.

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