

Review Article

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Status of Food Grain Crops, Constraints and Measures for Higher Production in Southern Odisha, India

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ABSTRACT

The Southern Odisha comprising of ten districts accounts for 40 per cent of geographical area and 27 per cent (11.46 million) of the population of the state. The region receives more than 200 mm of rainfall in each month from June to September and in October it receives 121 mm rainfall. The net area sown is 1.93 million ha (36% net area of the state) out of 5.42 million ha in the state. In Southern Odisha, 23.73 lakh ha is under food grain crops which constitute 35% of food grain area in the state (67.56 lakh ha). The region contributes 34.4 lakh t of food grain out of 96.3 lakh t in the state and the region contributes 35.3% of cereal production in the state (85.74 lakh t). The fertilizer consumption in the region is less than state average consumption of 57.1 kg/ha. The net irrigated area of Southern Odisha is 6.5 lakh ha constituting 29% of the state net irrigated area (22.53 lakh ha) and 28% of gross irrigated area in Odisha. Kharif rice occupies 88% of the cereal irrigated area (5.43 lakh ha) and 78% of irrigated area in rabi out of 0.97 lakh ha of cereal irrigated area of rabi in the region. The area under irrigation is less under oil seeds and vegetables. The low crop productivity in the region is due to low soil fertility status – low in nitrogen and phosphorus, soil acidity/ salinity, imbalanced fertilizer use and micro nutrient deficiency in crops, use of traditional varieties and practices, low rate of seed replacement, indiscriminate use of pesticide and fungicide, lack of knowledge in improved farm implements. Low yield in rice is due to incidence of pest particularly BPH, stem borer and disease sheath blight and blast and poor weed and irrigation management. The strategies for improving the crop productivity include promoting use of appropriate crop varieties, improving the health of soil, more emphasis on resource conservation/regeneration technology in land and water management, incentivization for irrigation development, land shaping, mechanization, diversification, planning for timely delivery of required production inputs, specifically quality seeds, value addition and putting in place an effective technology transfer system.

Keywords

South Odisha,
Crops and cropping
systems, Low crop
productivity,
Strategies

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Introduction

The state of Odisha is comprised of three regions namely Northern Odisha, Central Odisha and Southern Odisha. Of the 30 districts in the state, 10 districts *viz.*, Ganjam, Gajapati, Nabarangpur, Kalahandi, Kandhamal, Boudh, Nuapada, Koraput, Malkangiri and Rayagada constitute Southern Odisha. The latest agricultural published data for Odisha available is 2013-14. This data was used to draw conclusions on the trends in agricultural areas and production aspects. There may be little variation in area and production. However, the cropped area trend is same as the region occupies large area under paddy. Soil, water, weather, natural vegetation, cultivated crops and human resources constitute basic requirement for agricultural development of a region. The ten districts of Southern Odisha account 40 per cent of geographical area with a population of 11.46 million accounting to 27 per cent of the population of the state (Table 1). More than 80% of the land holdings in Southern Odisha are largely small and marginal.

Rain fall

Rainfall is one of the important location related parameter that determines agricultural production. The South Odisha receives more than 200 mm of rainfall in each month from June to September and in October it receives 121 mm rainfall. The Boudh, Gajapati, Kandhamahal, Koraput, Malkangiri, Nabrangpur receive annual rainfall more than 1400 mm. While Ganjam, Naupada and Rayagada receive 1276 to 1286 mm rainfall and Kalahandi receives 1330 mm of rainfall.

Soils of Southern Odisha

Red soils

Red soils are present in Koraput, Rayagada, Nabarangpur, Malkangiri, Ganjam, Kalahandi

and Nuapada (Mishra, 2005). Presence of excess amount of oxides of iron imparts red colour to the soil. The soils are strongly to moderately acidic with low to medium organic matter status and poor water retentive capacity. The soils are deficient in nitrogen and phosphorous. Micro nutrients like boron and molybdenum are highly deficient in these soils. These soils have low cation exchange capacity with high phosphate and sulphur absorption property and deficient in calcium and magnesium.

Coastal saline and alluvial soil

In Ganjam district, the saline soils occur. They are rich in soluble salts of chloride and sulphate in conjunction with sodium and magnesium. During monsoon a build up of subsoil salinity occurs due to high ground water table under water logging situation. The soils are mostly clay and clay loam in texture and columnar in structure. The pH of these soils varies from 6.0 to 8.0 with a conductivity of 10- 40 ds/m in the summer. The exchangeable sodium percentage varies from 18 to 27. The soils are rich in nitrogen and potassium and low to medium in phosphorous. The saline soils are sufficient in sulphate, boron, molybdenum and chloride.

Brown forest soils

These soils are associated with forest areas and distributed in the districts of Kandhamal, Rayagada and parts of Ganjam. These are brown to grey brown in colour, light texture and acidic in reaction. Organic matter and nitrogen content of soils are medium to high. Phosphorous and potassium content are medium. The contents of most of micro nutrients are high except molybdenum.

Black soil

These soils occur sporadically in the districts of Ganjam, Malkangiri, Kalahandi, Nuapada

and Boudh districts. These soils are heavier in texture having clay content more than 30 per cent. The effective soil depth extends to more than 90 cm. The soils are rich in calcium but deficient in phosphorous, potassium, zinc and Boron.

Land use

The geographical area of ten districts of Southern Odisha constitute 6.24 million ha accounting for 40% of the total area of Odisha state (15.57 million ha) (Table 1). In Southern Odisha, the area under forest constitutes 44%, Culturable wastes 2.5%, Current fallows 2.5% of the geographical area of Southern Odisha. On the other hand, in Odisha, the forests constitute 37 %, culturable waste 2.4%, current fallows 4.85% of the state geographical area (15.57 million ha). The net area sown is 1.93 million ha (36% net area of the state) out of 5.42 million ha in the state.

Crops and cropping systems

In Southern Odisha, 23.73 lakh ha is under food grain crops which constitute 35 % of food grain area in the state of Odisha (67.56 lakh ha) and contribute 34.4 lakh t of food grain out of 96.3 lakh t in the state. The productivity of food grains in South Odisha is 1453 kg/ha while it is 1426 kg/ha in Odisha (Table 2). The productivity in Nabrangpur is 2776 kg/ha followed by Koraput (734 kg/ha) and Rayagada. On the other hand, in Ganjam the productivity is very low (530 kg/ha) and in Gajapati it is 947 kg/ha.

The contribution of cereals to the total food grain production in South Odisha is 31% of the state food grain production. The pulses contribute 4.37% of the total food grain production. The cereal crops grown in Southern Odisha are rice, maize, bajra, ragi and other small millets. Among pulses green gram, black gram and cow pea are cultivated. The oil seed crops grown are ground nut,

sunflower and sesamum. The cropping system followed in south Odisha is mostly rice based. The rice crop in kharif is followed by pulse, ground nut, maize and vegetable and rice crops during rabi. In Odisha, the cereals occupy an area of 46.68 lakh ha with a production of 85.74 lakh tons and productivity of 1837 kg/ha. On the other hand, in Southern Odisha cereal crops occupy 15.92 lakh ha (34% of state cereal area) with a production of 30.25 lakh tons and productivity of 1900 kg/ha. The region contributes 35.3% of cereal production in the state of Odisha (85.74 lakh t).

Productivity

The cereal grain productivity is higher in Nabrangpur and lowest in Ganjam district. Gajapati, Kandamahala and Malkangiri districts the cereal grain productivity is less than 1.5 t/ha (Fig 1).

The pulses productivity is higher in Rayagada followed by Kalahandi and Gajapati districts. In other seven districts, it varied between 418 to 508 kg/ha. In South Odisha, the rice occupies 75% of area (11.29 lakh ha) out of 14.96 lakh ha of area under cereals and 63 % out of 17.83 lakh ha under food grains. The other cereal crops occupy only 21% and pulse crops 16 of the total food grain crops grown.

The Kharif paddy yield in Nabrangpur is higher (4347 kg/ha) followed by Koraput (4052 kg/ha) as compared to other districts in the region (Table 3). In Rayagada and Kalahandi rice yields are 3781 and 3751 kg/ha respectively. The paddy yields are 2 to 3 t/ha in other districts while in Ganjam, the paddy yield is only 550 kg /ha. The Rabi yields are higher than that in kharif yields and the district paddy yields showed similar trend as that of kharif.

Next to rice crop, finger millet is an important crop which occupies 1.62 lakh ha (98% of the

state area) in the Southern Odisha with a production of 1.41 lakh tons (98% of the state). The crop is grown mostly in kharif season (98%). The major finger millet growing districts are Koraput (0.65 lakh ha), Rayagada (0.22 lakh ha), Gajapati (1.0 lakh ha) and Malkangiri (0.8 lakh ha). The productivity of finger millet in the region is 869 kg/ha (Table 4).

The maize crop occupies 1.96 lakh ha in South Odisha accounting 70% of the maize grown in the state (2.79 lakh ha) with a contribution of 75% of the production of Odisha (7.78 lakh t) having a productivity of 3.02 t/ha. It is mostly grown during kharif. Except in Boudh district, this crop occupies considerable area nine districts of south Odisha. The crops like Jowar, Bajra and small millets occupy lesser area in the South Odisha.

In South Odisha, among the pulse crops, green gram occupies higher area than that of other pulse crops. The green gram (mung) crop occupies 43% of area under pulse crops in Odisha (4.1 lakh ha) (Table 5) followed by Arhar crop with an area of 74 thousand ha out of 1.24 lakh ha crop grown in state of Odisha. The other pulse crops grown in South Odisha are gram (19 thousand ha), field pea (12.59 thousand ha), cowpea (6.8 thousand ha) and horse gram (32 thousand ha).

The rabi mung area in South Odisha is higher than that in kharif. The rabi mung constitutes 80% of the mung grown in the region (3.03 lakh ha). The districts growing mung are Ganjam, Kalahandi and Nuapada. The productivity of mung in South Odisha is 458 kg/ha while in Odisha, it is 476 kg/ha.

Fertilizer consumption

The fertilizer consumption of Southern Odisha districts vary from 9.9 to 154.2 kg NPK/ha against the state average

consumption of 57.1 kg/ha. Except Kalahandi, Rayagada and Ganjam, all other districts are consuming the fertilizer less than state average consumption (Fig 2). The fertilizer consumption in Kandamahar is 9.9 kg/ha while in Malkangiri it is 28.2 kg /ha. In other districts it is between 38.5 to 56 kg /ha.

Irrigation

The net irrigated area of 10 districts of Southern Odisha is 6.5 lakh ha constituting 29% of the state net irrigated area (22.53 lakh ha). The gross irrigated area of Southern Odisha is 9.8 lakh ha (28% of Odisha) out of 35.21 lakh ha in Odisha (Fig 3). The irrigation intensity in Southern Odisha is 150% as compared to 156% in Odisha. The per cent gross irrigated area to that of gross cropped area in Southern Odisha and Odisha is 30 and 39% respectively. The districts Gajapati and Kandamahar are having low irrigated area and Kalahandi and Koraput are having higher irrigated area. The crop and district wise irrigated area shows that during kharif the rice irrigated area occupies 88% of the total irrigated area of cereals (5.43 lakh ha) in the region (Fig 3). The area under irrigation is less under oil seeds, vegetables in Southern Odisha. During rabi also rice occupies 78% of irrigated area out of 0.97 lakh ha of irrigated area under cereal crops in the region.

Of the total cereal irrigated area (6.40 lakh ha), rice crop irrigated area is 5.22 lakh ha. Further, of the total rice area of 11.29 lakh ha, only 46% of rice crop area is irrigated. On the other hand, the irrigated area under the crops is much less.

Constraints

Crop production

The productivity of major crops is lower than state and national average. Low yield of cereals, oilseeds, pulses, vegetables, tuber

crops and spices has been observed in the region. Various organizations located in South Odisha like Krishi vignan Kendrs (KVK) – KVK Gajapati (2017); KVK Rayagada (2017); KVK Ganjam (2019); KVK Kandamahar (2017); KVK Koraput (2017) and DE and S (2016) and research stations have made studies and found the reasons for low productivity and strategies to improve it were documented.

The low productivity in the region is summarized below:

Low soil fertility status - low in nitrogen and phosphorus, soil acidity/ salinity, imbalanced fertilizer use and micro nutrient deficiency in crops, use of traditional varieties and

practices, low rate of seed replacement, indiscriminate use of pesticide and fungicide, lack of knowledge in improved farm implements. The low yield in rice is due to incidence of pest particularly BPH and disease sheath blight, poor weed management and poor irrigation management. In some areas there is a problem of water scarcity during peak crop growth period. The finger millet yields are low due to cultivation of local varieties with low yield potential, poor weed and nutrient management and blast disease. The yield of green gram is poor due to growing of local varieties susceptible to yellow mosaic virus and during rabi moisture deficit at critical growth period. In ginger crop, the rhizome rot is severe in Kalahandi district as a result there are low yields.

Table.1 Land utilization statistics, 2013-14 (Area in ‘000 ha)

Sl. No.	Districts of Southern Odisha	GA	FA	MT	PP	CW	LNA	BUL	CF	OF	NAS
1	Boudh	310	128	19	17	20	21	12	4	4	85
2	Gajapati	433	247	8	12	4	12	68	0	6	76
3	Ganjam	821	315	22	20	11	21	20	17	6	389
4	Kalahandi	792	254	8	23	21	35	57	43	16	335
5	Kandhamal	802	571	34	10	14	9	30	21	6	107
6	Koraput	881	188	17	45	44	54	210	32	19	272
7	Malkangiri	579	335	1	21	4	23	38	6	15	136
8	Nabarangpur	529	246	13	8	15	44	9	5	8	181
9	Nuapada	385	185	1	2	2	3	2	3	1	186
10	Rayagada	707	281	18	26	22	124	38	33	5	160
Southern Odisha		6239	2750	141	184	157	346	484	164	86	1927
Odisha State		15571	5813	342	494	375	1298	840	756	229	5424

GA: Geographical Area, FA: Forest Area, MT: Misc. Trees & Groves, PP: Permanent Pasture, CW: Culturable Waste, LNA: Land put to non agricultural use, BUL: Barren & Unculturable Land, CF: Current Fellow, OF: Other Fellow, NAS: Net Area Sown (Odisha Agriculture Statistics, 2013-14)

Table.2 Cereal grain production in Southern Odisha districts (2013-14); Area in ‘000ha, Production in ‘000t and Yield in kg/ ha)

Sl. No.	District	Kharif			Rabi			Total		
		A	Y	P	A	Y	P	A	Y	P
1	Boudh	66.51	1790	119.06	2.37	2101	4.98	68.88	1801	124.04
2	Gajapati	65.45	1140	74.59	1.50	1233	1.85	66.95	1142	76.44
3	Ganjam	310.59	516	160.25	3.99	1850	7.38	314.58	533	167.63
4	Kalahandi	231.85	2572	596.33	43.16	2598	112.12	275.01	2576	708.45
5	Kandhamal	65.59	1656	108.59	0.58	2241	1.3	66.17	1661	109.89
6	Koraput	212.68	2043	434.50	23.86	2676	63.86	236.54	2107	498.36
7	Malkangiri	114.59	1735	198.80	2.34	2615	6.12	116.93	1753	204.92
8	Nabarangpur	211.92	2983	632.06	6.58	3357	22.09	218.5	2994	654.15
9	Nuapada	113.44	1906	216.18	5.86	2761	16.18	119.3	1948	232.36
10	Rayagada	103.27	2266	233.98	6.35	2477	15.73	109.62	2278	249.71
Southern Odisha		1495.89	18607	2774.34	96.59	23909	251.61	1592.48	18793	3025.95
Odisha state		4331.51	1723	7461.87	336.69	3304	1112.44	4668.2	1837	8574.31

Odisha Agriculture Statistics, 2013-14

Table.3 Paddy cropped area in South Odisha districts, ‘000 ha (2013-14)

Sl. No.	District	Cropped area, ‘000ha			Yield, kg/ha	
		Area, 000 ha			Paddy Yield, kg/ha	
		Kharif	Rabi	Total	Kharif	Rabi
1	Boudh	65.98	2.02	66.26	2715	2839
2	Gajapati	37.55	0.47	37.68	1338	1340
3	Ganjam	251.32	0.54	251.86	550	549
4	Kalahandi	209.01	39.51	245.57	3751	4195
5	Kandhamal	45.72	0.34	21.14	2337	2493
6	Koraput	111.86	20.80	118.68	4052	4540
7	Malkangiri	97.97	1.08	72.95	2645	2745
8	Nabarangpur	145.83	1.00	129.02	4347	4615
9	Nuapada	99.69	5.07	98.95	2975	3464
10	Rayagada	64.23	4.04	62.87	3781	4058
Odisha State		3879.68	300.54	3711.30	2572	2634
Southern Odisha		1129.16	74.87	1104.98	28491	30838

Odisha Agriculture Statistics, 2013-14

Table.4 Area, yield and production of finger millet grown in districts of south Odisha (2013-14); Area in ‘000ha, Yield in kg/ha, Production in ‘000t

Sl. No.	District	Finger millet								
		Kharif			Rabi			Total		
		A	Y	P	A	Y	P	A	Y	P
1	Boudh	0.05	805	0.04			0	0.05	805	0.04
2	Gajapati	9.89	923	9.13	0.9	998	0.9	10.79	930	10.03
3	Ganjam	45	895	40.28	2.43	1003	2.44	47.43	901	42.72
4	Kalahandi	2.67	1090	2.91				2.67	1090	2.91
5	Kandhamal	1.9	774	1.47	0.01	812	0.01	1.91	775	1.48
6	Koraput	64.98	900	58.48	0.18	916	0.16	65.16	900	58.64
7	Malkangiri	7.65	638	4.88				7.65	638	4.88
8	Nabarangpur	1.84	822	1.51	0.01	968	0.01	1.85	822	1.52
9	Nuapada	2.96	674	2				2.96	674	2
10	Rayagada	21.86	772	16.88	0.16	969	0.16	22.02	774	17.04
Odisha State		162.1	864	140.05	3.7	997	3.69	165.8	867	143.74
Southern Odisha		158.8	829	137.58	3.69	567	3.68	162.49	831	141.26

Table.5 Area, yield and production of mung grown in districts of south Odisha (2013-14); Area in ‘000ha, Yield in kg/ha, Production in ‘000t

Sl. No.	District	Mung								
		Kharif			Rabi			Total		
		A	Y	P	A	Y	P	A	Y	P
1	Boudh	3.57	468	1.67	9.45	500	4.73	13.02	492	6.4
2	Gajapati	0.48	500	0.24	7.58	498	3.77	8.06	498	4.01
3	Ganjam	3.58	455	1.63	155.84	521	81.19	159.42	520	82.82
4	Kalahandi	20.98	412	8.64	46.91	501	23.5	67.89	473	32.14
5	Kandhamal	1.15	321	0.37	0.38	412	0.16	1.53	346	0.53
6	Koraput	0.23	435	0.1	1.21	428	0.52	1.44	431	0.62
7	Malkangiri	2.73	484	1.32	1.46	422	0.62	4.19	463	1.94
8	Nabarangpur	0.09	316	0.03	0.69	504	0.35	0.78	487	0.38
9	Nuapada	26.14	514	13.44	16.8	434	7.29	42.94	483	20.73
10	Rayagada	1.35	332	0.45	2.96	416	1.23	4.31	390	1.68
Odisha State		213.16	464	98.91	643.91	480	309.08	857.07	476	407.99
Southern Odisha		60.3	4237	27.89	243.28	4636	123.36	303.58	4583	151.25

Odisha Agriculture Statistics, 2013-14

Fig.1 Productivity of cereal grain

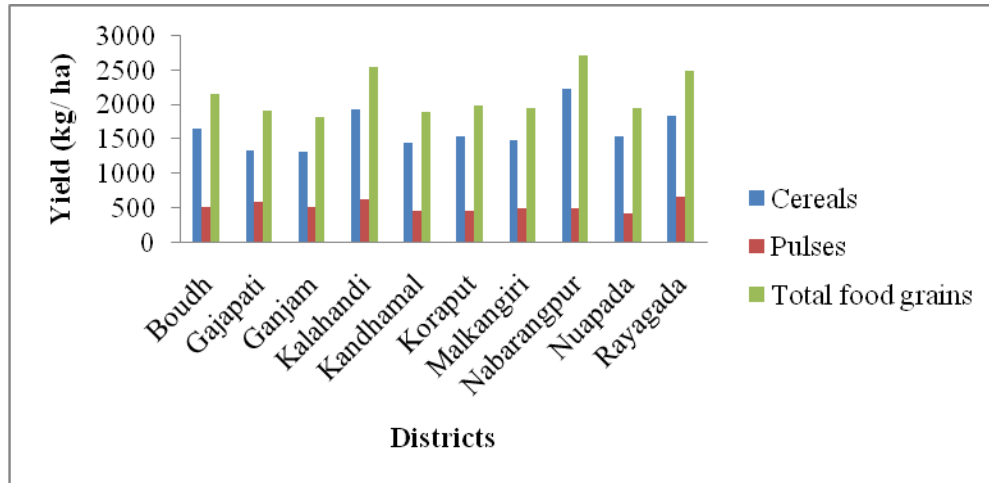


Fig.2 District wise fertilizer consumption

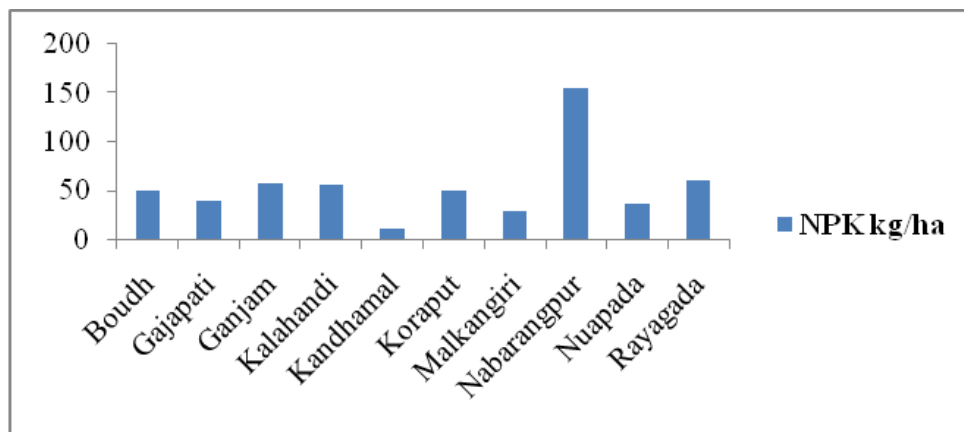
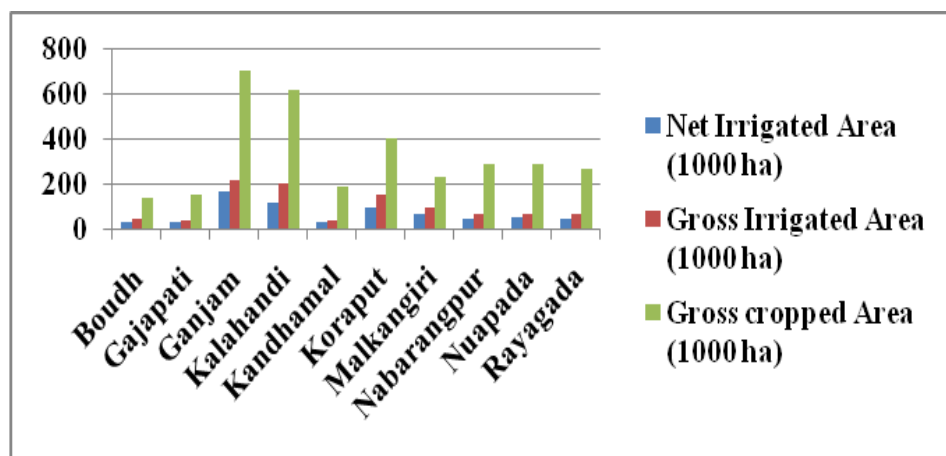


Fig.3 District wise net irrigated area



The Eastern Ghat region sloppy and uneven topography, soil degradation, acidic nature of soil, monocropping in hilly terrain and low irrigated area are contributing to lower yields. Besides biotic stress, some socio economic aspects like greater number of small, marginal and landless farmers, poverty, illiteracy and poor health of farmers, stray cattle and bear menace are the causes for low yield of crops in the region.

Other constraints

There is poor supply chain in Odisha due to small land holdings, limited number of agro industries, and absence of diversification in farming, low income and opportunities in farming, lack of linkage between farmers and consumers and limited post harvest infrastructure. Further there is poor growth of agricultural financing because of small land holdings, non updation of land records and poor awareness of government financial support schemes.

Strategies

A multi disciplinary approach must be adopted and all necessary factors are to be brought together in to a cluster and creation of resources for farming are essential in focusing the desired changes for food security and livelihood improvement.

Improving the health of soil and thereby its productivity, promoting use of appropriate crop varieties, planning for timely delivery of required production inputs, specifically quality seeds and putting in place an effective and innovative technology transfer system, more emphasis on resource conservation in land and water management will increase the productivity of crops. Incentivize development of irrigation, energy, land shaping, mechanization and other infrastructures like threshing floors, godowns,

temporary storage houses, value addition units etc., will add to the development of agriculture.

As recommended by the expert committee (GOI, 2019) on policies and action plan for a secure and sustainable agriculture, the planning for it should involve: enabling policies, strong public-private partnership, farmers and farming must be served under a single window system for which re organization of the institutional mechanisms at the district / block level would be needed. Strengthening of *Krishi Vigyan Kendras* (KVKs), Cooperative Banks, Agri-Clinics, Farmer Producer Organizations (FPOs), Self-Help Groups (SHGs), Custom Hire Centers (CHC), etc. should receive top priority.

References

- DE and S Journal of Socio-Economic Issues. 10th Statistics Day, 2016. *Special Issue on Agriculture & Farmer's Welfare Directorate of Economics and Statistics, Bhubaneswar, Odisha, 2016, Vol. 10.*
- GOI. Report on Policies and Action Plan for a Secure and Sustainable Agriculture. Submitted to The Principal Scientific Adviser to the Government of India Vigyan Bhavan Annexe, New Delhi. 2019.
- KVK. Krishi Vigyan Kendra, Annual Progress Report, April 2016 to March 2017, Gajapati, Odisha. 2017.
- KVK. Krishi Vigyan Kendra, Annual Progress Report, April 2016 to March 2017, Koraput, Odisha. 2017.
- KVK. Krishi Vigyan Kendra, Annual Progress Report, April 2016 to March 2017, Kandamahar, Odisha. 2017.
- KVK. Krishi Vigyan Kendra, Annual Progress Report, April 2016 to March 2017, Rayagada, Odisha. 2017.
- KVK. Krishi Vigyan Kendra, Annual Report, April 2018 to March 2017, Ganjam,

Odisha. 2019.
Odisha Agriculture Statistics. Directorate of
Agriculture and Food Production,
Odisha. Government of Odisha. 2014.

Mishra, A. 2005. Soils of Orissa and their
management. *Orissa Review*, 2005,
LXII: 56-60.

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