RESEARCH PAPER

Regional Disparities in Crop Productivity of Odisha: A Study

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ABSTRACT

The disparities in the productivity of some of the important crops such as Ceareals, Pulses, Oilseeds and Cash crops across various districts of Odisha at two period of time i.e. 1993-97 and 2010-15 have been analysed in this paper. The classifications of districts based on the Productivity of the crops under study have been made by using Yang's Yeild index. It is found that the disparities in the productivity of cereal crops and Pulses have been increasing , it is unchanged for oilseeds and the disparity is reducing for cash crops over time.However the overall result (Composite index) reveals that the disparities in productivity of varios crops across the districts in Odisha is increasing over time. Hence, suitable policy measures may be designed to overcome the problems.
Key words: Regional Disparities, Crop Productivity, Odisha

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INTRODUCTION

The value of crop has a very substantial share in the total agricultural income of the state. It is suggested that increase in agricultural productivity (per unit of land) is related to poverty reduction in India. In Orissa Rice is the most important crop in the kharif season which covers near about 49 percent of the gross cropped area. Pulses and oil seeds are also important crop sown in Rabi season. However, the disparities in the productivity of different crops across various districts Orissa often hinder the equitable agricultural development in the state.

Thus, in this paper an attempt has been made to examine variations in agricultural productivity and relative changes that have occurred in agricultural production at two different periods of time viz. 1993-1997 and 2010-2015 in the districts of Orissa by using secondary sources of data and constructing a suitable index to analyse the level of disparities in crop productivity.

Agricultural productivity means the varying relationship between the agricultural output and one of the major inputs such as land, labour and technology or total factor productivity .In this chapter productivity means land productivity or output per hectare of land. The output indicators of development are generally subject to a physical upper and lower limit and change in it occurs at a very slow speed and therefore they are usually measured with a time interval of 5 to 10 years. Analysis of continuous time series data for such changes would not make much sense as our objective is to compare the changes in output over time to trace out the regional disparities. Therefore two time periods 1993-1997 and 2010-2015 have been taken into consideration to measure inter-district disparities in agricultural productivity. Again as agriculture is influenced by nature such

as climate, weather, and rainfall etc., with a view to minimize these effects, average of the period is computed for each crop and area for both the periods. For this purpose crops have been divided into four groups such as (1) Cereals (2) Pulses (3) Oilseeds and (4) Cash crops. A total of 24 crops have been selected for the study, taking 6 crops from each group in order of importance as mentioned in table 1. All these crops cover near about 91.7 percent of the gross cropped area.

The area (average) under different crops such as Cereals (Rice, Ragi, Maize, Jawar, Wheat, Bazra), Pulses (Mung, Biri, Kulthi, Arhar, Gram, Cowpea), 0ilseeds (Til, Groundnut, Nizer, Mustard, Linseed, Sunflower), Cash crop (Chillies, Onion, Sugercane, Turmeric, Ginger, Patato) at two periods of time such as 1993-97 and 2010-15 has been shown in the table 1. It is observed from table 1 that Rice and other cereals are the major crops of Orissa followed by pulses, oilseeds and cash crops. It is also observed that the area under all crops has declined except pulses which has increased from 1840.72 thousand hectares in 1993-97 to 1868.17 thousand hectares in 2010-15. The area under oilseed has declined more sharply than other crops. The overall decline in cropped area may be due to more and more use of land for non-agricultural purposes. Therefore the only way to meet the future requirement of food for increasing population is to increase productivity by efficient management of inputs

Table 1: Area under different Crops in Orissa (from 1993-97 and 2010-15)

S.No.	Cereal	Area 1993-97	Area 2010-15	Pulses	Area 1993-97	Area 2010-15	0ilseeds	Area 1993-97	Area 2010-15	Cash crop	Area 1993-97	Area 2010-15
1	Rice	4513.4	4453.18	Mung	755.72	748.24	Til	366.02	305.61	Chillies	98,61	75.25
2	Ragi	196.35	186.59	Biri	489.37	601,01	Groundnut	318.38	248,15	Onion	47.2	29.64
3	Maize	167.98	199.41	Kulthi	373.70	258.16	Nizer	202.81	109.82	Sugercane	40.46	38.84
4	Jawar	22.46	9,23	Arhar	166.39	136.02	Mustard	167.38	110.17	Turmeric	25.78	24.88
5	Wheat	20.32	18.80	Gram	34.88	38.24	Linseed	32.45	26.33	Ginger	11.17	16.31
6	Bazra	6.06	2.70	Cowpea	20.66	86.5	Sunflower	3.18	16.18	Patato	9.65	8.00
Total		4926.57	4869.91		1840.72	1868.17		1090.22	816.26		232.87	192.92
Difference			-56.56			27.45			-273.96			-39.95

CROP PRODUCTIVITY INDEX

To compute productivity index, in this chapter Yang's "Crop Yield Index" method is used due to the fact that it considers the yield of all crops compared with the average yield of crops in the region.For the computation of an index, it is needed to take the yields of all crops considered in the district and compare them with the average yield of the same crops grown in the state. Before computing the crop yield index the average yield of each crop cultivated in the entire state should be considered. Then dividing the yield per hectare of a crop in the district by the average yield of the same crop in the state, a percentage figure is obtained, which when multiplied by 100 gives an index number. By incorporating the area devoted to each crop as a weight to multiply this with percentage index, the products are obtained. Then by adding these products and dividing the sum of products by the total of crop area in the district, the average index thus obtained is the desired crop index for the district, using area devoted for the cultivation of crop as a weight. Crop yield indices for various groups of crops have been shown in Table 2 (for 1993-97) and Table 3 (for 2010-15).

For the sake of easy comparison across different districts over time, the study classified all districts into three categories namely high, moderate and low productivity regions. This classification is made by assuming that the worked out crop yield indices follow a normal distribution with a mean and standard deviation. The groups are classified by using the following cut off regions-

Highly productive ≥ Mean + S.D.
Moderately productive ≤ Mean+ S.D But ≥ Mean.
Low productive ≤ Mean.

Table 2: Crop Productivity Index of Selected Crops for various Districts (During 1993-97)

Rank	Name of the district	Cereal Index (X1)	Name of the district	Pulses Index. (X2)	Name of the district	Oilseed Index. (X3)	Name of the district	Cash crop index (X4)
1	Bargarh	131.47	Dhenkanal	116.22	Bargarh	116.43	Nayagarh	110.47
2	Nayagarh	127.54	Balasore	114.81	Nawarangpur	114.93	Ganjam	109.50
3	Jharsuguda	122.23	Maikangiri	113.91	Sambalpur	114.83	Cuttack	109.49
4	Ganjam	122.10	Deogarh	113.05	Deogarh	114.52	Malkangiri	108.92
5	Puri	117.97	Koraput	112.00	Sonepur	113.46	Jagatsinghpur	107.90
6	Sonepur	116.99	Nawarangpur	109.74	Puri	112.22	Angul	107.88
7	Sambalpur	113.25	Khorda	108.11	Jajpur	112.00	Kendrapara	107.46
8	Gajpati	109.95	Gajpati	107.72	Nayagarh	111.94	Khorda	104.70
9	Rayagada	109.67	Sundargarh	107.53	Cuttack	111.61	Sambalpur	103.67
10	Kendrapara	106.38	Keonjhar	106.91	Khorda	111.29	Jajpur	103.16
11	Koraput	105.38	Sambalpur	105.05	Gajpati	106.18	Balasore	102.96
12	Cuttack	103.42	Puri	105.04	Malkangiri	105.90	Kandhamal	102.68
13	Khorda	102.26	Angul	103.81	Mayurbhanj	105,37	Sonepur	102.43
14	Bhadrak	101.64	Cuttack	103.57	Bolangir	105.10	Koraput	102.26
15	Bolangir	99.85	Nayagarh	103.08	Keonjhar	103.16	Deogarh	101.08
16	Balasore	98.00	Bargarh	103.04	Dhenknal	102.38	Dhenkanal	100.63
17	Dhenkanal	97.89	Bhadrak	101.92	Rayagada	101.19	Bolangir	99.59
18	Kandhamal	97.64	Jharsuguda	101.84	Balasore	100.02	Bhadrak	99.02
19	Nawarangpur	95.19	Rayagada	100.92	Bhadrak	99.57	Gajapati	97.93
20	Jagatsinghpur	95.03	Jajpur	96.79	Kendrapara	99.82	Jharsuguda	97.48
21	Deogarh	94.27	Mayurbhanj	94.28	Jharsuguda	98.88	Puri	97.28
22	Jajpur	93.75	Sonepur	91.40	Koraput	98.19	Mayurbhanj	96.66
23	Malkangiri	91.33	Kalahandi	87.17	Jagatsinghpur	97.84	Sundargarh	96.99
24	Mayurbhanj	90.25	Ganjam	86.73	Sundargarh	97.30	Bargarh	95.67
25	Boudh	89.45	Bolangir	84.56	Angul	97.19	Rayagada	92.80
26	Angul	87.42	Nuapada	84.18	Kalahandi	90.97	Nawarangpur	89.53
27	Keonjhar	81.67	Jagatsinghpur	83.36	Ganjam	88.33	Keonjhar	86.18
28	Kalahandi	80.55	Kendrapara	82.40	Nuapada	83.06	Kalhandi	83.76
29	Sundargarh	71.77	Kandhamal	73.84	Kandhamal	77.80	Nuapada	83.22
30	Nayagarh	68.71	Boudh	58.97	Boudh	66.91	Boudh	67.51
µ (Mean)		100,74		92.54		101.95		98.96
S.D (Standard Deviation)		16.24		14.63		11.46		9.32
CV (Coefficient of Variation)		9.32		16.12		15.80		11.24

The classification of districts (crop wise) has been shown in Table 4 to 7 and the classifications of districts absed on Composit Index (All crops together) has been represented in table 8 and Table 9.

1. Productivity Regions- Based on Cereal Crops:

Cereals are most important crop of Odisha, accounted for 56.57 percent of the gross cropped area. In fact there were six districts which formed high productivity region during 1993-97. These districts were namely Bargarh, Nayagarh Jharsuguda, Ganjam, Puri and Sonepur. The districts classified as moderately productive category were namely Sambalpur, Gajpati, Rayagada, Kendrapara, Koraput, Cuttack, Khorda and Bhadrak. The rest of the districts were included in low productivity group. Nuapada had the lowest index value of 68.71.

During the period 2010-15 the number of highly productive districts reduced from 6 to 5. Three districts Bargarh, sambalpur and Ganjam retained their previous position and the two districts namely Puri and Nayagarh slipped to low productive region and Jharsuguda to medium productive region. Two new districts namely Sambalpur and Nawarangpur moved up to high productive region. This is due to comparatively high productivity of rice in Sambalpur and Maize in Nawarangpur. The number of moderately productive districts

also reduced from 8 in 1993-97 to 6 in 2010-15. The number of low productive districts increased from16 in 1993-97 to 19 in 2010-15. It reveals that disparities in crop productivity has increased over the years and the agricultural development programme taken by the government needs to be revisited to bridge the gap between rich and poor regions.

Table 3: Crop Productivity Index of Selected Crops for various Districts (During 2010-15)

Rank	Name of the district	Cereal Index	Name of the district	Pulses Index	Name of the district	Oilseed Index	Name of the district	Cash Crop Index
1	Sambalpur	132.28	Bhadrak	141.92	Bhadrak	143.39	Koraput	109.36
2	Bargarh	129.18	Kalahandi	141.48	Kendrapara	127.46	Ganjam	106.04
3	Sonepur	125.88	Cuttack	118.58	Kalahandi	122.60	Deogarh	105.33
4	Ganjam	122.21	Gajpati	115.68	Malkangiri	121.11	Kendrapara	105.08
5	Nawarangpur	114.29	Kendrapara	108.37	Jagatsinghpur	117.44	Kandhamal	104.75
6	Jharsuguda	113.40	Balasore	108.13	Sambalpur	116.95	Keonjhar	103.08
7	Bhadrak	112.91	Sonepur	107.88	Sonepur	112.41	Puri	101.37
8	Jagatsinghpur	109.59	Boudh	104.52	Jajpur	111.40	Angul	101.32
9	Rayagada	105.62	Ganjam	104.38	Boudh	108.75	Balasore	101.13
10	Koraput	104.23	Bargarh	102.36	Puri	108.72	Gajpati	100.69
11	Dhenkanal	102.42	Mayurbhanj	101.51	Cuttack	106.48	Sambalpur	100.69
12	Mayurbhanj	97.89	Jagatsinghpur	99.77	Koraput	106.37	Rayagada	100.20
13	Gajpati	97.54	Jharsuguda	98.06	BOLANGIR	102.44	Bolangir	99.90
14	Bolangir	97.60	Sundargarh	97.65	Balasore	102.22	Sonepur	99.70
15	Nayagarh	96.69	Rayagada	97.13	Deogarh	102.00	Jagatsinghpur	99.64
16	Cuttack	95.66	Khorda	97.09	Jharsuguda	101.66	Jharsuguda	98.50
17	Khorda	94.89	Jajpur	95.40	Ganjam	100.60	Bargarh	98.15
18	Boudh	94.79	Angul	95.12	Khorda	99.54	Malkangiri	98.15
19	Balasore	93.46	Nawarangapur	91.06	Kandhamal	93.82	Dhenkanal	99.26
20	Jajpur	91.90	Sambalpur	87.70	Angul	92.43	Bhadrak	97.55
21	Nuapada	90.45	Nuapada	87.58	Nawarangpur	91.88	Jajpur	96.25
22	Keonjhar	85.47	Malkagiri	687.55	Nuapada	90.72	Cuttack	95.84
23	Puri	85.00	Dhenkanal	87.44	Rayagada	90.23	Boudh	94.24
24	Malkangiri	84.21	Keonjhar	86.99	Sundargarh	89.69	Nuapada	93.59
25	Sundargarh	82.74	Deogarh	85.82	Mayurbhanj	89.14	Mayurbhanj	93.43
26	Kandhamal	82.63	Kandhamal	80.16	Bargarh	85.01	Sundargarh	92.85
27	Kendrapara	81.60	Puri	79.50	Dhenkanal	82.04	Khorda	92.46
28	Deogarh	80.70	Bolangir	78.91	Nayagarh	80.07	Nayagarh	91.31
29	Kalahandi	77.23	Nayagarh	75.19	Gajpati	78.30	Kalahandi	91.15
30	Angul	73.04	Koraput	75.14	Keonjhar	70.25	Nawarangapur	82.96
μ (Mean)		98.52		95.25		101.49		92.10
S.D (Standard Deviation)		15.53		16.36		15.82		8.33
CV (Coefficient of Variation)		15.76		17.17		15.58		9.04

Table 4: Crop Yield Index and Classification of Districts for Cereal Crops

1993-97				2010-15			
Index Range	Category	No.of Districts	Name of the Districts	Index Range	Category	No.of Districts	Name of the Districts
Above 116.98	High	6	Bargarh, Nayagarh, Jharsuguda, Ganjam, Puri, Sonepur	Above 114.05	High	5	Sambalpur, Bargarh, Sonepur, Ganjam, Nawarangpur
116.98-100.74	Moderate	8	Sambalpur, Gajpati, Rayagada, Kendrapara, Koraput, Cuttack, Khorda. Bhadrak	114.05-98.52	Moderate	6	Jharsuguda, Bhadrak, Jagatsinghpur,Rayagada, Koraput, Dhenakanal
Below 100.74	Low	16	Bolangir, Balasore, Dhenkanal, Kandhamal Nawarangpur, Deogarh Jagatsinghpur, Jajpur, Malkangiri, Boudh, Mayurbhanj, Angul, Keonjhar, Kalahandi, Sundargarh, Nuapada	Below 98.52	Low	19	Mayurbhanj, Gajpati, Bolangir, Nayagarh, Cuttack, Khordha, Boudh, Balasore Jajpur, Nuapada, Keonjhar, Puri, Angul, Malkangiri, Sundargarh, Kandhamal, Deogarh Kendrapara, Kalahandi

Table 5: Crop Yield Index and Classification of Districts for Pulses Crops

1993-97				2010-15			
Index Range	Category	No.of Districts	Name of the Districts	Index Range	Category	No.of Districts	Name of the Districts
Above 113.41	High.	5	Bargarh, Nawarangpur, Sambalpur, Deogarh, Sonepur	Above 117.31	High.	5	Bhadrak, Kendrapara, Kalahandi, Malkangiri, Jagatsinghpur
113.41-101.95	Moderate	11	Puri, Jajpir, Nayagarh, Cuttack, Khorda, Gajpati, Malkangiri,Mayurbhanj, Bolangir, Keonjhar, Dhenkanal	117.31-101.49	Moderate	11	Sambalpur, Sonepur, Jajpur, Boudh, Puri, Cuttack, Koraput, Bolangir, Balasore, Deogarh,Jharsuguda
Below 101.95	Low	14	Rayagada, Balasore, Bhadrak, Kendrapara, Jharsuguda, Koraput, Jagatsinghpur, Boudh Sundargarh, Angul, Kalahandi, Ganjam, Nuapada, Kandhamal	Below 101,49	Low	14	Ganjam, Khorda, Kandhamal, Angul, Nawarangpur, Nuapada, Rayagada, Sundargarh, Mayurbhan, Bargarh, Dhenkanal, Nayagarh, Gajpati, Keonjhar

Table 6: Crop Yield Index and Classification of Districts for Oil Seed Crops

1993-97				2010-15			
Index Range	Category	No.of Districts	Name of the Districts	Index Range	Category	No.of Districts	Name of the Districts
Above 113.41	High	5	Bargarh,Nawarangpur, Sambalpur,Deogarh, Sonepur	Above 117.31	High.	5	Bhadrak, Kendrapara, Kalahandi, Malkangiri, Jagatsinghpur
113.41-101.95	Moderate	11	Puri, Jajpir, Nayagarh, Cuttack, Khordha, Gajpati, Malkangiri, Mayurbhanj, Bolangir, Keonjhar, Dhenkanal	117.31-101.49	Moderate	11	Sambalpur, Sonepur, Jajpur, Boudh, Puri, Cuttack, Koraput, Bolangir, Balasore, Deogarh, Jharsuguda
Below 101.95	Low	14	Rayagada, Balasore, Bhadrak, Kendrapara, Jharsuguda, Koraput, Jagatsinghpur, Sundargarh, Angul, Kalahandi, Ganjam, Nuapada, Kandhamal, Boudh	Below 101.49	Low	14	Ganjam, Khorda, Kandhamal, Angul, Nawarangpur, Nuapada, Rayagada, Sundargarh, Mayurbhan, Bargarh, Dhenkanal, Nayagarh, Gajpati, Keonjhar

Table 7: Crop Yield Index and Classification of Districts for Cash Crops

1993-97				2010-15			
Index Range	Category	No.of Districts	Name of the Districts	Index Range	Category	No.of Districts	Name of the Districts
Above 108.28	High.	4	Nayagarh, Ganjam, Cuttack, Malkangiri	Above 100.43	High	11	Koraput, Ganjam, Deogarh, Kendrapara, Kandhamal, Keonjhar, Puri, Angul, Balasore, Gajpati, Sambalpur
108.28-98.96	Moderate	14	Jagatsinghpur, Angul, Kendrapara, Khorda, Sambalpur, Jajpur, Balasore, Kandhamal, Sonepur, Koraput, Deogarh, Dhenkanal, Bolangir, Bhadrak	100.43-92.10	Moderate	16	Rayagada, Bolangir, Sonepur, Jagatsinghpur, Jharsuguda, Bargarh, Malkangiri, Dhenkanal, Bhadrak, Jajpur, Cuttack, Boudh, Nuapada, Mayurbhanj, Sundargarh, Khorda
Below 98.96	Low	12	Gajpati,Jharsuguda, Puri, Mayurbhanj,Sundargarh, Bargarh, Rayagada, Nawarangpur, Boudh, Keonjhar, Kalahandi, Nuapada	Below 92.10	Low	3	Nayagarh, Kalahandi, Nawarangpur

2. Productivity Regions- Based on Pulses Crops:

Pulses are the second most important crop grown in the state. They occupied 22.83 percent of the gross cropped area. One important trend about pulses area is that it has

increased from 1840.72 thousand hectares in 1993-97 to 1868.17 in 2010-15. During the period 1993-97, 9 districts namely Dhenkanal, Bhadrak, Malkangiri, Deogarh, Koraput, Nwarangpur, Khorda, Gajpati and Sundargarh were found as highly productive districts, 12 districts were in medium productive region and the rest 9 districts were in low productive region. During 2010-15 the number of high productive districts reduced to 4 and the districts which were highly productive in 1993-97 did not retain their positions except Gajpati. New districts namely Bhadrak, Kalahandi and Cuttack became highly productive in pulses production. The number of low productivity districts which were 9 in 1993-97 increased to 13 in 2010-15. This clearly indicates that inter-district disparities in pulses production has increased over time.

3. Productivity Regions-Based on Oilseeds Crops:

Cultivation of oilseed crop is the third important crop in the agricultural economy of Orissa. They covered 9.63 percent of gross cropped area. Oliseed and Pulses are mainly cultivated in rainfed highland area of the state during kharif season. During 1993-97, 5 (five) districts were in highly productive region namely Bargarh, Nawarangpur, Sambalpur, Deogarh and Sonepur. The districts namely Sambalpur, Sonepur and Deogarh slipped to Medium productivity region and Bargarh and Nawarangpur to low productivity region in 2010-15. The first position is occupied by new districts such as Bhadrak, Kendrapara, Kalahandi, Malkangiri and Jagatsinghpur. The number of districts in high, moderate and low productivity region remains the same as it was in 1993-97. The overall position remains unchanged.

4. Productivity Regions–Based on Cash Crops:

Though the percentage share of cash crops in gross cropped area is very low (i.e. nearly 2.67 percent), still it is an important crop for some districts namely Kandhamal and Koraput. Out of 30 districts 11 are included in highly productive region in 2010-15 which was only 4 in 1993-97.The districts which were in high productive region namely Nayagarh, Ganjam, Cuttack and Malkangiri in 1993-97 slipped to medium productivity region in 2010-15 except Ganjam. The number of districts in high productivity region increased from 4 to 11, medium productivity districts increased from 14 to 16 and the low productivity districts fall from 5 to 3. In cash crop disparities among the districts has been reduced to some extent over the years.

PRODUCTIVITY REGIONS BASED ON COMPOSITE CROP YIELD INDEX

To delineate the general pattern of productivity and demarcate high, moderate and low productivity regions a composite index (Year 1993-96 & 2010-13) has been computed for the districts of Odisha. Since different crop yield indices do not have equal importance in the agricultural economy of the state, it is necessary to assign unequal weights to different indices for the construction of composite index. In this case contribution of each group of crop towards NSDP is considered as the most suitable weight. But such data is not available. In practice the weights assigned are dependent upon the value judgment of the researcher and hence normative weights can also be given. But such process appears to be arbitrary. So statistical weight to different indices has been assigned by the method of proportional standardized mean, that is to say that weight assign to one group of crop yield index is measured by calculating Mean/S.D for any index where mean is the mean of the series of one particular index and S.D. is the standard deviation of the series. It is assumed that weights vary inversely with variations in the respective crop yield indices. The advantage of such statistical weight lies in the fact that large variations in one index do not undermine the contribution of other indices and distort comparisons.

To determine the overall positions of the districts in crop productivity over the years they are classified into high, moderate and low productivity regions as shown in table 8. It is evident from table 8 that there were only two districts namely Bargarh and Nayagarh in

the high productivity region in 1993-97 which has increased to six in 2010-15. Bargarh slipped to medium productivity region and Nayagarh to low productivity region. In Nayagarh both cereal and sugarcane (cash crop) productivity was very low in 2010-15 as compared to state average. Hence it slipped to low productivity region. The number of moderate productivity districts was 16 in 1993-97 which has reduced to 7 in 2010-15. The number of low productivity districts increased from 12 in 1993-96 to 17 in 2010-15.

Table 8: Composite Crop Yeild Index for varios Districts

	1993-97		2010-15	
Rank	**Nama of the Districts**	**Index**	**Name of the Districts**	**Index**
1	Bargarh	116,67	Bhadrak	119.47
2	Nayagarh	112.81	Sonepur	109.66
3	Sambalpur	108.89	Sambalpur	108.43
4	Cuttack	107.73	Ganjam	107.99
5	Puri	106.96	Jagatsinghpur	105.98
6	Khorda	106.72	Kendrapara	105.97
7	Sonepur	106.13	Kalahandi	104.57
8	Deogarh	105.85	Bargarh	102.71
9	Malkangiri	105.66	Cuttack	102.57
10	Gajpati	104.48	Jharsuguda	102.28
11	Koraput	103.65	Balasore	101.09
12	Dhenkanal	103.66	Koraput	100.89
13	Balasore	103.52	Boudh	99.51
14	Jharsuguda	103.52	Rayagada	98.59
15	Jajpur	102.53	Jajpur	98.42
16	Ganjam	101.70	Gajpati	98.11
17	Nawarangpur	101.66	Malkangiri	98.05
18	Bhadrak	100.25	Bolangir	95.83
19	Kendrapara	100.18	Deogarh	95.50
20	Angul	100.14	Khorda	95.42
21	Rayagada	99.99	Puri	95.23
22	Bolangir	98.20	Mayurbhanj	95.04
23	Jagatsinghpur	97.77	Dhenkanal	93.88
24	Mayurbhanj	97.36	Nawarangpur	93.18
25	Sundargarh	94.27	Kandhamal	92.81
26	Keonjhar	94.11	Angul	92.12
27	Kandhamal	89.10	Nuapada	91.11
28	Kalahnadi	83.18	Sundargarh	90.94
29	Nuapada	80.55	Keonjhar	89.04
30	Boudh	69.90	Nayagarh	86.86
Mean		**100.23**	**Mean**	**99.01**
S.D		**9.36**	**S.D**	**6.95**
CV		**9.33**	**CV**	**7.01**

The analysis made above reveals that some districts have moved upward and some downward during the study period. Though this study may not able to bring out the economic performance of districts in terms of agricultural development still it has an important aspect i.e. potential for crop productivity growth. Various indices suggest that there is a vast potential for growth of agricultural output in the state. This follows from-

1. Inter-regional variations in agricultural productivity.
2. Gap between actual yield and average yield in the state.
3. Improved technology to break ceilings in productivity.

This study also reveals that regions where rain fed agriculture is predominant are in low productivity regions and less developed in agriculture ,making them more vulnerable to any environmental or external shocks, poor soil management and low rainfall together limit the length of growing period, less yield and crop choice. Frequent incidence of

draught and flood poses a threat to realization of potential yield as well as to the investments. Occurrence of external climate events especially in recent years and incidents of insects, pests and diseases in some of the districts such as Bargarh, Jharsuguda and sambalpur are the other important factors that limit productivity in the state.

Table 9: Classification of Districts based on Composite Crop Yield Index

1993-97				2010-15			
Index Range	Category	No of Districts	Name of the Districts	Index Range	Category	No of Districts	Name of the Districts
Above 109.59	High	2	Bargarh, Nayagarh	Above105.96	High	6	Bhadrak, Sonepur, Sambalpur, Ganjam, Jagatsinghpur, Kendrapara
109.59-100.23	Moderate	16	Sambalpur, Cuttack, Puri, Khordha, Sonepur, Deogarh, Malkangiri, Gajpati, Koraput,Bhadra, Jharsuguda, Balasore, Dhenkanal, Jajpur, Ganjam,Nawarangpur,	105.96-99.01	Moderate	7	Kalahandi, Bargarh, Cuttack, Jharsuguda, Balasore, Koraput, Boudh
Below 100.23	Low	12	Kendrapara, Angul, Rayagada, Bolangir, Jagatsinghpur, Boudh, Mayurbhanj, Nuapada, Sundargarh, alahandi, Keonjhar, Kandhamal,	Below 99.01	Low	17	Rayagada, Jajpur, Gajpati, Malkangiri, Bolangir, Deogarh, Khordha, Puri, Nayagarh, Mayurbhanj, Dhenkanal, Nawarangpur, Kandhamal, Angul, Nuapada, Sundargarh, Keonjhar

FINDINGS AND CONCLUSION

Cereals crop accounted for around 56.57 percent of the gross cropped area in orissa. The six districts found high productivity during 1993-97 has reduced to 5 during 2010-15. The number of moderately productive districts also reduced from 8 in 1993-97 to 6 in 2010-15 whereas the number of low productive districts increased from 16 in 1993-97 to 19 in 2010-15. It reveals that disparities in cereal crop productivity have increased over the years.

Pulses area in the state occupies around 22.83 percent of the gross cropped area. The area under pulses is found slightly increasing during 2010-15 compared to the period 1993-96. During the period 1993-97, 9, 12 and 9 districts were found highly productive, medium productive and low productive districts respectively. During 2010-15 the number of high productive districts reduced to 4 and the number of low productivity districts increased to 13. This indicates an increase in inter-district disparities in the production of pulses over time.

The area under oilseed crop constitutes around 9.63 percent of gross cropped area. Oliseed and Pulses are mainly cultivated in rainfed highland area of the state during kharif season. The number of districts in high, moderate and low productivity region remains the same in 2010-15 as it was in 1993-97 even thogh a few variation is found in the positioning of districts. The overall position remains unchanged.

Though the percentage share of cash crops in gross cropped area is very low (i.e. nearly 2.67 percent), still it is an important crop for some districts like Kandhamal and Koraput. Out of 30 districts the number of districts in high productivity region increased from 4 to 11, medium productivity districts increased from 14 to 16 and the low productivity districts fall from 5 to 3. In cash crop disparities among the districts has been reduced to some extent over the years.

The overall positions of the districts in crop productivity over the years (based on composite index) reveal that only two districts found in the high productivity region in

1993-96 has increased to six in 2010-15. The number of moderate productivity districts has reduced to 7 in 2010-13 from 16 in 1993-97. The number of low productivity districts increased from 12 in 1993-96 to 17 in 2010-15. It indicates wide disparities in the overall agricultural productivity and inequitable development of regions.

Thus the agricultural development programme taken by the government needs to be revisited to bridge the gap between rich and poor regions and special emphasis on the improvement of area, production and productivity of cash crops should also be looked in through appropriate policy measures.

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