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Pattern and Distribution of Agricultural Crops A Case Study of Deoghar District (Jharkhand)

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Abstract

Agriculture in Deoghar district has witnessed a gradual transformation from subsistence farming of early nineties to the present extensive agriculture. This has due to widespread adoption of modern cropping system particularly rice in the irrigated areas, which has resulted in remarkable increase in food grain production in the district. The area and production of paddy, wheat, maize has increased in the last two decades whereas area and production of pulses and oilseeds have decreased in the concerned years. The current food grain production in the district is 245116.75 tones, however the growth in production of cereal on based of intensive cropping system remaining more or less stagnant in the recent past because of the total factor productivity, imbalance in plant nutrient use, limited water availability and frequent outbreak of pest and diseases. As a result, this has become a serious challenge to the Extensionists, the Agricultural Scientists, and the Policy Makers to sustain food security in the near future.

Nearly 44 percent of the total area of the district is utilized for cultivation, out of which only 14.98 percent is irrigated. The most common sources of irrigation are dug well, surface flow water, lift irrigation etc. Rice is the main crop followed by maize and wheat. Pulses, oilseeds and vegetables are also grown on a limited scale.

Keywords: Agriculture, Pattern, Distribution, Production, Prosperity.

Introduction

Agriculture is an important economic activity for the farmers of the district. Thus importance of Agricultural land is very significance for the farmers. Agriculture is based on land and the contribution of land in agriculture is much more as compared to its contribution in other sectors of economy such as secondary and tertiary activities. Thus, lack of access to land is directly correlated with incidence of poverty in rural areas. Agricultural productivity directly depends on the quality of land which is not true for other activities.

There is one agro climatic conditions prevailing in the district; warm climate with high rainfall. On the other hand the district enjoys the benefit of good infrastructural facilities. The Howrah-Delhi Main Railway line passes through the district. Asansol is major market of the district which is only 75 km away from the district head quarters. Most of the villages are connected by road and are easily accessible to rails. All the blocks headquarters are a few minutes' drive from the district headquarter. The district is rich in water resources both surface and sub-surface, which can be exploited more judiciously for production of more food grains. Although the forest resources are diminishing day by day; still efforts are being taken for conservation of bio diversity of the district.

The pattern and distribution of agricultural crops are determined by two factors:

1. Physical factors like topography, climate and soils Which are broadly determine the capabilities of the land, and
2. Human factors like the length of occupancies, density of population, economic and social status coupled with accessibility to markets, transport and communication control the extent to which the resources of land are utilized.

Study Area

Deoghar district is located in the north eastern part of Jharkhand state. Deoghar town is the administrative headquarters of this district. The district is known for the Baidyanathdham Jyotirlinga shrine. The district is part of Santhal Pargana Commissionary. The district extends between $24^{o}02'$N to $24^{o}36'$ N latitude and $86^{o}27'$E to $87^{o}04'$ E longitude. The study

area are bounded by Banka and Jamui district (Bihar) in north, Dumka in east, Jamtara in south and Giridih in west of Jharkhand state. The Deoghar district covers an area of 2478.61 sq. km. It has population of 14,91,879 persons (census-2011). The population features is also having some specialty as only 20% of the total population living in the urban areas and remaining 80% living in rural areas.

Administratively the study area is divided into ten community development (C.D.) blocks viz, Madhupur, Sarath, Margomunda, Karon, Sarwan, Sonaraithadi, Deoghar, Mohanpur, Devipur and Palojori and two important towns viz. Baidyanathdham and Madhupur.

The district has a dissected surface represented by an old land surface uplifted during Tertiary times. It is true that the earliest geological formations of the area had been reduced to peneplain; but later structural disturbances have created unevenness in land surface. Most of the area has an elevation exceeding 200m with a great part rising above about 550m above the mean sea level. There is also a river valley which is only 120m high. The climate of the district is humid tropical with moderate rainfall (100-125cm annually) mainly from south-west monsoon wind.

Objectives

The objectives of the present study are as follows

1. To find out the changes in pattern and distribution of agricultural crops in variations of crop productivity in the Deoghar district that has occurred in two time periods i.e. 1990-91 to 2010-11.
2. To assess the spatio-temporal variation in agricultural distribution and production in the Deoghar district.
3. To identify the deficient areas and to formulate a policy to increase their production and productivity.
4. To asses correlations between productivity and different related variables.

Significance of the Study

Deoghar is an agrarian district of Jharkhand. About 80 percent of working populations are engaged in agricultural sector either as cultivators or as agricultural labours. Agriculture in the district is backward in comparison with that of the other districts of Jharkhand. In spite of high cropping intensity, Deoghar district is still lacks far Behind in an agricultural production and productivity in comparison to the other districts of Jharkhand. Comprehensive work in this regard has now initiated. As The agricultural sector of the villages of the district needs the attention of appropriate planning for improvement.

Sources of Data

The database used in the present study has been collected from primary as well as secondary sources. The required data of the district for the year 1990-91 and 2010-11 have been collected from District Agriculture Office, Deoghar, Krishi Vigyan Kendra Sujani, Deoghar, Agricultural Technology Management Agency (ATMA), Deoghar, District Statistics Office, Deoghar etc. I have also visited the some villages in the district and collected the data through questionnaire scheduled survey by me from namely Chormara, Banarchutta, Paniyara, Pathra, Dindakoli, Dhamna, Barasoli, Dorhi, Lakarbindha, Jagmanidih & Madhwadih situated in the different parts of the district.

Methodology

Field survey and observation has been carried to understand the actual physical condition and the socio-economic-agriculture issues of the study area. Cropping pattern means the proportion of area under various crops at a point of time. The crop statistics published by the government are used to denote the cropping patterns. Cropping pattern is however a dynamic concept as it changes over space and time. The cropping patterns of a region are closely influenced by the geo-climatic, socio-cultural, economic, historical and political factors. The area and average yield of crops have been taken into account to find out agricultural productivity. This has been further elaborated with the help of maps, charts and diagrams.

Depending upon terrain, topography, slope, temperature, amount and reliability of rainfall, soils and availability of water for irrigation; the pattern, distribution and production of crops vary from region to region. The perception and assessment of environment also guide to grow certain crop in a region. In those areas where physical diversities are less, the cropping patterns are less diversified.

Cropping Season in Deoghar

Deoghar has following three cropping seasons.

Kharif

This season starts with the onset of monsoons and till the beginning of winter. Major crops of this season are rice, maize etc. Kharif cropping in this district is divided into two seasons i.e. Bhadai and Aghani.

Rabi

This season starts in the beginning of winter and continues till the end of winter or beginning of summer. Major crops of this season are wheat, gram, mustard, potato etc.

Zaid

This is summer cropping season and major zaid crops are maize, fruits and vegetables like cucumber, water melon, musk melon, mango etc.

Cropping Pattern

There are two main types of crops namely food crops and non-food crops. Food crops are divided into three groups.

1. Cereals and Millets
2. Pulses and Oilseeds
3. Fruits and vegetables (horticultural crops)

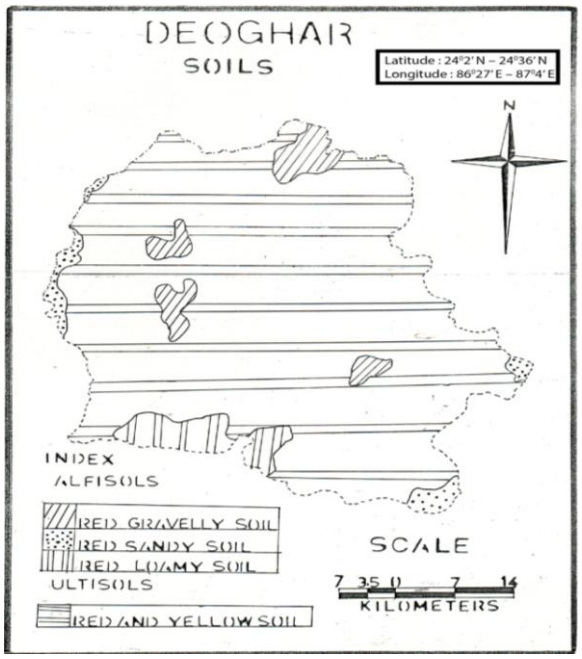
Cereals, millets and pulses are collectively known as food-grains.

Distribution and Production of Major Crops in the District

A varied soil group in different parts of the district enables to produce a large variety of crops. A brief description of major crops is given here. During 1990-91 to 2010-11 distribution and production of major crops in Deoghar district have considerable changes taken place. Areas involved in forests have tremendously decreased in the district especially on gentle sloping of land and in the plains, where people have developed agricultural land and other uses

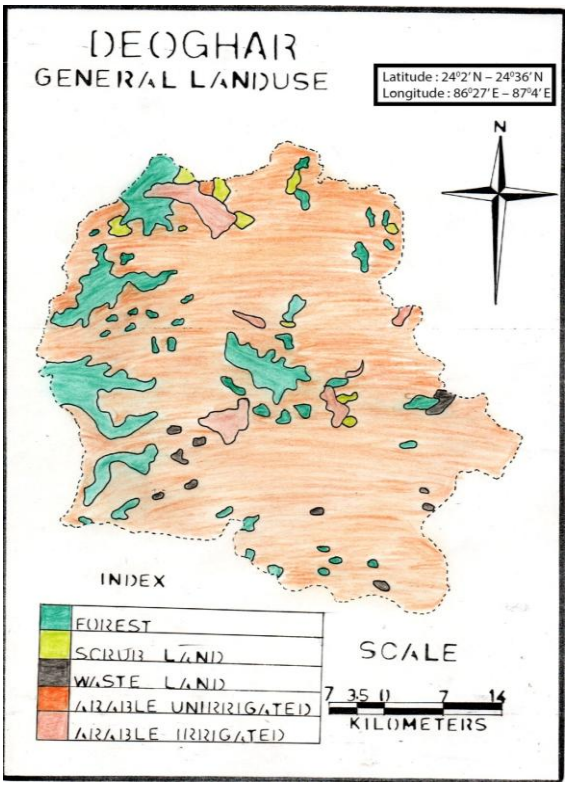
whereas net sown areas have increased. In the plains of Deoghar district more areas are now given to cultivation, residential purposes and other non-agricultural uses. In view of this, in the present exercise an attempt has been done to examine the changes of distribution and production of major crops in the district in the concerned years.

Map-1
Deoghar: Soil



Source: National Atlas Maps

Map-2
Deoghar: General Land Use and Cropping Pattern



Source: Survey of India Maps and National Atlas Map

Table 1
Acreage Report on Different Crops of Kharif for the Year 1990 – 1991 District – Deoghar

S. N.	Name of Crops	Acreage		Production		Productivity
		Target (In Hec.)	Achievement (In Hec.)	Target (In Tons)	Achievement (In Tons)	(In Quintal/Hec)
1	2	3	4	5	6	7
1	**Paddy**	75000	75927	85800	136668.6	18.0
2	**Maize**	11000	10016	10260	11017	11.0
3	**Pulses**					
	Arhar	2500	2354	3000	1883	8.00
	Urad	1000	818	650	409	5.00
	Moong	1000	717	600	286	4.00
	Kaupi	2500	2222	1625	889	4.00
	Kulthi	3500	3942	2275	1971	5.00
	Total	10500	10053	8150	5438	5.40
4	**Oil Seeds**					
	Groundnut	100	44	100	30	7.00
	Sarguja	350	361	140	108	3.00
	Soyabean	25	-	26	-	-
	Til/Sesame	140	123	56	24	2.00
	Total	615	528	322	162	4.93
5	Vegetables	600	918	-	7344	80
6	Marua	511	522	255.5	626	12.0
7	Gondli	164	34	65.6	47	14.0
8	Jowar	25	189	15.0	434	23.0

Source: D.A.O., Deoghar

Table 2
Acreage Report on Different Crops of Rabi for the Year 1990 – 1991 District – Deoghar

S. N.	Name of Crops	Target (In Hec.)	Achievement (In Hec.)	Production (In Tons)	Productivity (In Q/Hec)
1	**2**	**3**	**4**	**5**	**6**
1	**Wheat**				
	Highly Productive	5000	4790	7185	15.0
	Productive	1000	1175	940	8.0
	Total	**6000**	**5965**	**8125**	
2	Maize	270	137	191.8	14.0
3	Potato	2750	3735	2801.2	75.0
4	**Pulses**				
	Gram	5000	4840	2662	5.50
	Masoor	2000	1880	752	4.00
	Peas	700	590	265	4.50
	Others	3000	3502	1402	4.00
	Total	**10700**	**10812**	**5079**	**4.69**
5	**Oil Seeds**				
	Rye/ Mustard	6080	6850	3767.50	5.50
	Tissi	1200	1050	367.00	3.50
	Kusum	50	45	13.50	3.0
	Total	**7330**	**7925**	**4148.00**	**5.23**
6	Vegetables	1800	1864	13514	72.50

Source: D.A.O., Deoghar

Table 3
Report of Kharif Crops 2010-2011: Acreage, Production & Productivity

S.N.	Name of Crops	Target (In Hec.)	Acreage (In Hec.)	Production (In Tons)	Productivity (In Q/Hec.)
1	**2**	**3**	**4**	**5**	**6**
1	**Paddy**				
	Highly Productive	50000	52290	150490.60	28.78
	Productive	25000	25000	50025	20.01
	Total	75000	77290	200515.60	-
2	**Maize**				
	Highly Productive	9700	8370	7189.60	8.6
	Productive	5850	5112	3266.50	6.39
	Total	15550	13482	10456.10	-
3	**Pulses**				
	Arhar	4833	2859	2859	10.0
	Urad	1000	438	245.20	5.6
	Moong	750	249	144.40	5.8
	Kulthi	1000	437	225.05	5.15
	Other Pulses	1400	352	135.50	3.85
	Total	8983	4335	3609.15	-
4	**Oilseeds**				
	Groundnut	865	102	76.50	7.5
	Til	275	116	44.00	3.8
	Soyabean	150	40	-	-
	Sunflower	100	35	-	-
	Sarguja	442	78	23.40	3.0
	Arandi	41	11	6.00	5.5
	Total	1873	382	149.90	-

Source: D.A.O., Deoghar

Table 4
Report of Rabi Crops 2010–2011: Acreage, Production & Productivity

S. N.	Name of Crops	Acreage (In Hec.)		Production (in Tons)		Productivity (in Q/Hec)	
		Target	Actual	Target	Actual	Target	Actual
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	**Wheat**	10000	7967	20000	15336	20.0	19.25
2	**Maize**	1000	114	25000	213	25.0	18.75
3	**Pulses**						
	Gram	8000	4204	12000	3834	15.0	9.12
	Masoor	3500	1210	2800	825	8.0	6.82

	Peas	2200	1176	3300	840	15.0	7.15
	Other Pulses	500	100	300	52	6.0	5.25
	Total Pulses	14200	6690	18400	5551	-	-
4	**Oil Seeds**						
	Rye/Mustard	10750	10135	6450	9020	6.0	8.90
	Tissi	2300	508	1380	266	6.0	5.25
	Kusum	227	-	118	-	5.0	-
	Sunflower	400	-	320	-	8.0	-
	Total Oil Seeds	13677	10643	8268	9286	-	-

Source: D.A.O., Deoghar

Rice

Rice is the most important food crop of Deoghar district which feeds more than 90% of population of this district. Rice is a tropical plant which requires high temperature and high humidity. It grows well in areas having mean monthly temperature of 24 ^{o} C and an average annual rainfall of 125cm. Deep fertile clayey or loamy soils are considered ideal for rice cultivation.

Rice occupies about 90 percent of the total area under cereals and 71 % of the total cropped area of the district (2010-11). The area has increased from 75927 hectares in 1990-91 to 77290 hectares in 2010-11. The production of rice has witnessed much faster increase than its area. The production of rice has increased from 136668.60 tons to 200515.60 tons in concerned years.

The average yield of rice in the district was 18 Quintal per hectare in 1990-91, which has been increased to about 29 Quintal per hectare in 2010-11. It is roughly 1.5 times more than that of previous period. The highest per hectare yield of rice is obtained in Sarwan and Sonaraithadi block of the district.

Wheat

Wheat is the second important food crop after rice in the district. It is a Rabi crop. It requires 10^{o} C temperature at the time of sowing and 20 ^{o}C temperature at the time of ripening. It requires 50 to 75 cm rainfall. It can be grown even in areas of 20 cm rainfall provided sufficient irrigation is available.

Wheat occupies only 5 percent of the total area under cereals and 3 % of the total cropped area of the district (2010-11) The area has increased from 5965 hectares in 1990-91 to 7967 hectares in 2010-11. The production of wheat has increased from 8125 tons to 15336 tons. The annual rate of increase in wheat has been about 1%. Most of this recent increase is due to the expansion of wheat cultivation to non-traditional areas. There has been block level changes in wheat cultivation in the district.

The average yield of wheat in the district was 15.0 Quintal per hectare in 1990-91, which has been increased to about 20.00 Quintal per hectare in 2010-11. The highest per hectare yield of wheat is obtained in Sarwan, Sonaraithadi and Devipur blocks of the district.

Maize or Corn

Maize is mainly cultivated as Kharif crop but in some part of the district it is also grown as a Rabi and Zaid crop. The production of Maize has increased in the last 25 years from 191.80 tons to 213 tons in 2010-11. The per hectare yield of maize was 14 quintal in 1990-91. Now the per hectare yield of maize is 19 quintal. Maize is grown in almost whole parts of the district. Highly concentration is found in Mohanpur, Sarwan, Palojori and Sarath blocks of the district.

Potato

Potato is the principal vegetable crop in the district which is grown in Rabi season. It requires mild cool weather with average temperature between 12 ^{o}C to 25 ^{o}C. It requires low to moderate rainfall of 75-100 cm; although it can be cultivated on a number of soils but friable sandy loam soil are suitable for this crop. Frost is harmful for this crop. It occupies about 30 per cent of the total area under vegetables in the district. It is used in various ways for human food. Potato contains 71.5% of carbohydrates, 11% fat and 556 calories (in 100 gram).

The area under potato cultivation was 3735 hectares in 1990-91 which has been increased upto 4500 hectares in 2010-11. The production has also increased from 2801.2 tons to 3669 tons. The production with some fluctuations has doubled during these years. Some of the popular varieties of potatoes are Nanital, Jyotish Jhalandar, and Sindari Kopri etc. The average per hectare yield of potato was 75 quintal in 1990-91 to 200 quintal in 2010-11.

Although potato is cultivated in different blocks of the district but its highest concentration is found in Sarath, Sarwan, Sonaraithadi and Madhupur. These four blocks together provide 72 per cent of the total area and 76 per cent of its total production in the district. Almost entire produce of potato is consumed within the district.

Pulses

Pulses are the major source of protein in the diet of predominantly vegetarian population of the district. The production of pulses has not kept pace with the increase in the production of cereals. The share of pulses in the gross cropped area of the district level has declined. However, area under pulses can be increased by practicing crop rotation. About 90% of the area under pulses is rainfed.

Gram

Gram is the principal pulse crop in the district which is grown in Rabi season. It occupies about 40 per cent of the total area under pulses in the district. It is used in various ways for human food and for animal fodder. Gram contains 61.5% of carbohydrates, 21% protein and 358 calories (in 100 gram). Gram requires mild cool weather with average temperature between 20 ^{o}C to 25 ^{o}C. Frost is harmful for this crop. It requires low to moderate rainfall of 35-50 cm; although it can be cultivated on a number of soils but well drained loamy soils are suitable for this crop.

The production of Gram has increased from 2662 tons in 1990-91 to 3834 tons in 2010-11. The average per hectare yield of gram was 5.50 quintal in 1990-91. Now the per hectare yield of gram is 9.10 quintal. Although gram is cultivated in different blocks of the district but its highest concentration is found in Sarath, Palojori, Mohanpur and Deoghar blocks.

Arhar

It is the second most important pulse crop in the district. It is chiefly grown as a kharif crop. Arhar requires average temperature between 25 ^{o}C to 30 ^{o}C. Arhar is an annual crop sown between May and July (kharif season) and harvested between January and April. The total area under Arhar cultivation was 2354 hectares in 1990-91 to 2859 hectares in 2010-11. The production has increased from 1883 tons to 2859 tons in 2010-11. The average per hectare yield of Arhar was 800 kg in 1990-91. Now the per hectare yield of Arhar is 1000 kg.

Urad

It is chiefly grown in kharif season. Urad requires average temperature between 20 ^{o}C to 25 ^{o}C. It requires low to moderate rainfall of 40-60 cm; although it can be cultivated on a number of soils but well drained loamy soils are suitable for the crop. The total area under Urad cultivation was 818 hectares in 1990-91 which has decreased to 438 hectare in 2010-11. The Production has also decreased from 409 tons to 245.20 tons in 2010-11. The average per hectare yield of Urad was 5 quintal in 1990-91. Now the per hectare yield of Urad is 5.60 quintal.

Moong

It is chiefly grown in kharif season. The total area under Moong cultivation was 717 hectares in 1990-91 to 249 hectares in 2010-11. The production has also decreased from 286 tons to 144.40 tons in 2010-11. The average per hectare yield of Moong was 400 kg in 1990-91. Now the per hectare yield of Moong is 580 kg. The production with some fluctuations has more than halved during these years.

Kulthi

It is chiefly grown as a kharif crop. The area under Kulthi has sharp decreased with some fluctuations between 1990-91 to 2010-11. The total area under Kulthi cultivation was 3942 hectares in 1990-91 to 437 hectares in 2010-11. The production has also decreased from 1971 tons to 181.30 tons in 2010-11. The production of Kulthi has ten times decreased during these years. The average per hectare yield of Kulthi was 500 kg in 1990-91. Now the per hectare yield of Kulthi is 515 kg.

Masoor

Masoor is cultivated as a single crop or mixed with gram in Rabi season. The area under Masoor has been decreased to 1880 hectares in 1990-91 to 1210 hectares in 2010-11. But due to the increase in productivity, production has increased during these years. The production has increased from 752 tons to 825 tons. The average per hectare yield of Masoor was 400 kg in 1990-91. Now the per hectare yield of Masoor is 682 kg.

Peas

Peas are cultivated as a single crop in Rabi season. Its production has been increased from 265 tons in 1990-91 to 840 tons in 2010-11. The average per hectare yield of Peas was 450 kg in 1990-91. Now the per hectare yield of Peas is 715 kg.

Oilseeds

Oilseeds constitute a very important group of commercial crops in Deoghar district. The oils extracted from oilseeds form an important item of our diet and are used as raw material for manufacturing large number of items. Oil-cake which is the residue after the oil is extracted from the oilseeds, forms an important cattle-feed and manure. Five major oil seeds viz., Mustard, Tissi, Groundnut, Sarguja and Til are produced here. They occupied 10772 hectares which is over 10 per cent of the net area sown. It must, however, be noted that the production of oilseeds has always fallen short of our demand and there has always been a need to import oilseeds or their products for meeting the demand of our overgrowing population.

Mustard

Mustard is the most important oilseed which is grown in the district in Rabi season. It is cultivated as a single crop or mixed with wheat and barley. The oil content of these seeds is 25-45% which is used as a cooking medium, preservative for pickles and lubricants. The area under Mustard has been increased from 6850 hectares in 1990-91 to 10135 hectares in 2010-11. The production has also increased from 3767.50 tons in 1990-91 to 9020 tons in 2010-11. The average per hectare yield of Mustard was 550 kg in 1990-91. Now the per hectare yield of Mustard is 890 kg.

Tissi

Tissi is cultivated as a single crop or mixed with gram and Masoor in Rabi season. The area under Tissi has been decreased from 1050 hectares in 1990-91 to 508 hectares in 2010-11. The production has been also decreased from 367.00 tons in 1990-91 to 266 tons in 2010-11. The average per hectare yield of Tissi was 350 kg in 1990-91. Now the per hectare yield of Tissi is 525 kg.

Groundnut

Groundnut is primarily a rainfed crop and there are bound to be fluctuations its area, productions and yield depending upon the amount of rainfall and its temporal distribution. The area under Groundnut has decreased from 44 hectares in 1990-91 to only 02 hectares in 2010-11. The production has been also decreased from 30 tons to only 1.50 tons in 2010-11. The average per hectare yield of groundnut was 700 kg in 1990-91. Now the per hectare yield of groundnut is 750 kg.

Til (Sesame)

Sesame is primarily a rainfed crop; grown in Rabi season. There are bound to be fluctuations its area, productions and yield depending upon the amount of rainfall and its temporal distribution. The area under Til has been decreased from 123 hectares in 1990-91 to only 116 hectares in 2010-11. But its production has increased from 24.00 tons in 1990-91 to 44 tons in 2010-11. This is due to the average per hectare yield of Sesame was 200 kg in 1990-91. Now the per hectare yield of Sesame is 380 kg.

Findings and Conclusion

From a detailed study of the paper we can conclude that the pattern and distribution of the agricultural crops is changing in the district. The

cropping intensity and productivity has increased rapidly in the last 20 years. This shows good farm management and better use of farming techniques. Till the decades of 1990 Marua, Gondli and Jowar are cultivated in the district. Now it has been totally vanished in the district. The most remarkable feature is that there is not much change in the net sown area. This show that agriculture has not much flourished in the district rather people are moving towards non-agricultural practices or migrate to the urban areas for better employment opportunities.

In the recent years; Government of Jharkhand has took several steps to increase the production of food grains in the district which are as follows:

1. Intensification of cropping over already cultivated land.
2. Increasing cultivated area by bringing uncultivable land, fallow land under plough. Initially, this strategy helped in increasing food grains production.
3. To build Ajay barrage and Punasi dam in the river of Ajay and Burhai Jalasai in the river of Pathro the progress of irrigation in the district has improved a lot.

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