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Research Paper in Geography

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CROPPING PATTERN AND ROLE OF IRRIGATION OF GONDIA DISTRICT, MAHARASHTRA

ABSTRACT

Agriculture occupies a dominant position in the economy of India. But this major economic activity is rendered hazardous by scant rainfall in large areas and by erratic monsoon elsewhere. Agriculture has suffered a great deal on account of the character of rainfall. The utilization of the land according to its use capability ensures that this resource is utilized to the best advantage. The total geographical area of the district is 585895 ha which is basically comprised on plateau and river valley region. The study reveal that has there is a decrease in the area of forest covered region in Gondia District and 34% of the land in the district was under the cultivation in the year 2001. As per the record of 2010-11 socio economic review the district is having 236744 ha area under various crops.

Keywords: Cropping Pattern, Irrigation, Land Utilization.

1. Introduction

Agriculture is the mainstay of the people in the district as district basically agricultural predominate district where more than 80% population is depend on land for its living. Agriculture is not merely an occupation or a business proposition for the people, it is a tradition, a way of life which for countries has shaped their thoughts, outlook and culture.

To obtained maximum output from the land the introspection of the potentials & utilization of this resource is very important & from this point of view irrigation plays a vital role. In fact irrigation forms the datum line for sustain & successful agriculture. The purpose of the irrigation is to increase the agricultural production from the land & from this point of view irrigation is important from two angles, one is to the protective measure as its supply additional water at the time of deficiency of the moisture to ensure proper & sustain crop growth & crop production. It plays the role of additional land use aspect as multiple cropping is only possible when the additional source of irrigation is available to the land, particularly during to the post monsoon period.

2. Objectives

a) The present study is aimed at finding out the state of existing irrigation in the district.

b) Potentiality will be determined by using different techniques-both of the surface and ground water source.

c) After making a brief survey of the existing management practices.

d) An attempt will be made of find out what further management is required and the management practices useful for the study area.

e) Finally while suggesting the strategy for further the conservation of water resources will be discussed.

3. Research Methodology

Data has been collected basically from the secondary source i.e. socio-economic review of various years and executive engineer irrigation department Gondia district. Temporal analysis has been made by applying quantitative techniques mainly mean and standard deviation. Maps have been prepared applying GIS Techniques using Arc GIS 9.3 Software.

4. Study area

Gondia district is situated on north-eastern side of Maharashtra state covers an area of about 5859 sq.km and lies between latitude 20 39' N to 21° 39' N and longitude 79° 52' E to 30® 32' E. The joining district of Gondia district is Balaghat of MP in northern border, Ranjnandgaon of Chattisgarh in eastern border. To the south Chandrapur and in the west Bhandara district of MS are located.

5. Result and Discussion

5.1 Land utilization

Land resources form the most important natural wealth of any region and their proper utilization are a matter of utmost concern of its people. The utilization of the land according to its use capability ensures that this resource is utilized to the best advantage. According to FOX (1956) "land utilization is the process of exploiting the

land use i.e. applied to specific objectives in terms of inherent land use characteristics "According to Mamoria C.B.(1975) Improper use of land leads to wastage and can lead to progressive deterioration and loss of productivity of this vital resource." As per the National planning board (1941) "classification of land is a process which assigns each body of track of land in a area to its proper class in a system of classes in India. The land categories are divided in major five classes which are subdivided into nine categories.

In the present context, as the focus is irrigation, the availability of agriculture land is the most important part of general land use.

5.1.1 Geographical area

The total geographical area of the district is 585895 ha which is basically comprised on plateau and river valley region. The distribution clearly indicates that the distribution of geographical area in various talukas is very dissimilar and uneven. (Table no & Fig no 5.1.1)

5.1.1 Land utilization statistics (in ha) of Gondia district 2010-2011

Land Use Particulars	Geo-graphical area	Forest	Non Agril. Land	Waste land	Other un-cultivated land including pasture & grazing	Total fallow land	Net area sown	Area sown More than once	Total cropped area
Tiroda	48605	4752	2218	2536	6145	2429	30224	4163	34387
Goregaon	47155	14797	1082	989	8501	2587	19199	2496	21614
Gondia	64832	3213	7152	4658	4950	4933	39926	1163	41089
Amgaon	32112	4153	1072	923	4232	1322	20410	36	20446
Saleksa	44686	15081	663	5907	5735	2007	15293	0	15293
S. Arjuni	55428	23154	2421	3728	5811	763	19551	4840	24391
M. Arjuni	67984	26278	5436	6398	5324	1068	23480	3626	27106
Deori	103381	57098	2372	8570	9321	3058	22962	2487	25449
Total	464804	148526	22416	33709	50019	18167	191045	19731	210776

5.1.1 Land utilization statistics (in%) of Gondia district 2010-2011

Taluka	Forest	Non Agri. Land	Waste land	Un-cult.with pasture & grazing	Total fallow land	Net area sown	Area sown more than once	Cropping intensity
Tiroda	9.84	4.59	5.25	12.72	5.03	62.57	12.11	113.77
Goregaon	31.38	2.29	2.10	18.03	5.49	40.71	11.55	112.58
Gondia	4.96	11.03	7.18	7.63	7.61	61.58	2.83	102.91
Amgaon	12.93	3.34	2.87	13.18	4.12	63.56	0.18	100.18
Saleksa	33.75	1.48	13.22	12.83	4.49	34.22	0.00	100
Arjuni/S	41.77	4.37	6.72	10.48	1.38	35.27	19.84	124.76
Arjuni/M	38.65	8.00	9.41	7.83	1.57	34.83	13.38	115.44
Deori	55.23	2.29	8.29	9.02	2.96	22.21	9.77	110.83
Total	31.95	4.82	7.25	10.76	3.91	41.10	9.36	110.33

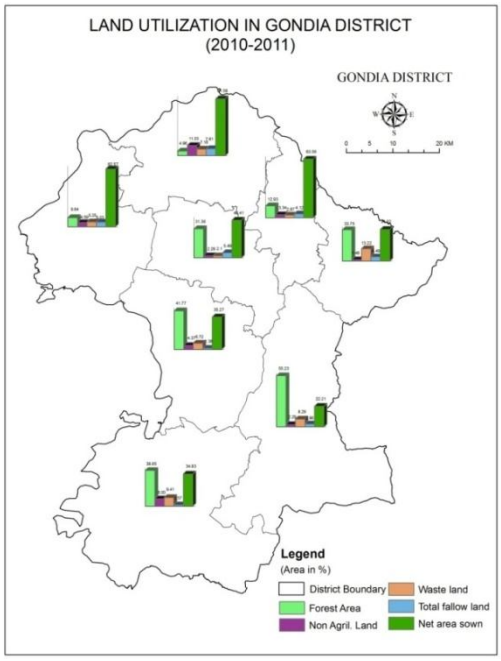


Fig no 5.1.1 Land utilization in Gondia district 2010-2011

5.1.2 Area under forest

Out of the total geographical area of the district in the year 2010-11 total forest in the district was 215555 comprising 36.71% of the geographical area. Out of the total geographical area 45694 ha (7.80%) area is under reserved forest. (Table no & Fig no 5.1.1)

The high between 300 to 600 m. the slope is decreasing from north to south. The forest area is basically concentrated in the hilly part of the district.

The study reveal that has there is a decrease in the area of forest covered region in Gondia District. In the 1991 it was 13% but in the year 2011 it decreased up to 7.80% the reason for this decrease is the urban development of the taluka.

5.1.2 **Area not available for Cultivation**

Normally the land put to non agriculture use i.e. land under settlement and cultural use like transport means of communication is under this category in the year 1991, 9% of the total geographical area of the district was under this category which it reached up to 13 %. If we compare the area not available for agriculture in 1991 and 2011.

5.1.3 Barren Land

Barren land is a land not ideally suited for agriculture. It is a racy marshy area. As per 1991 covered the barren land in the district was 4% which decreased to 2% in the year 2011. It indicates that the barren land is used for cultivation. Maximum conversion of the land is in Gondia taluka where the ratio was 7% in 1991. The decreased of barren land in the district shows that the land was utilized which is good sign for the district.

5.1.4 Land not under cultivation excluding Barren Land

Under this category is the land which is not utilized for few specific period of time for some natural or human reason. In 1991 the land under this category was 16% which decreased up to 11% in 2011. It shows that in problems of land have been solved at some levels and as a result of that the area is decreasing.

5.1.5 Fellow land

It can be defined as the land which not available and utilized for agriculture purpose short period. There are two category of fellow land, current fellow land and permanent fellow. Out of the total geographical area 12310 ha (20.10%) area was under this category in the year 2010-11. This land maximum was under Gondia taluka 12608 ha (4.43%). This is an indication that cultivators of the district are using their land maximum for kharif crop only.

5.1.6 Net sown area

This is the important category of land use as it fulfills the basic needs of human being i.e. food. It is the area where actual crops are grown. In 1991, 39% of the land in the district was under the cultivation in the year 2001 this ratio was 34% it shows that in the span of 10 years there is a 5 % of decrease in land under cultivation. The land was used for non agriculture purpose. It indicates that the land under for housing, industrialization and other than agriculture use. Gondia taluka of the district where ratio increased from 57% to 71% indicates the success of various irrigation schemes and projects.

The above discussion reveals that land use of the district has been changed. On one side the forest area has increased and the other side there is a decreased in land under cultivation.

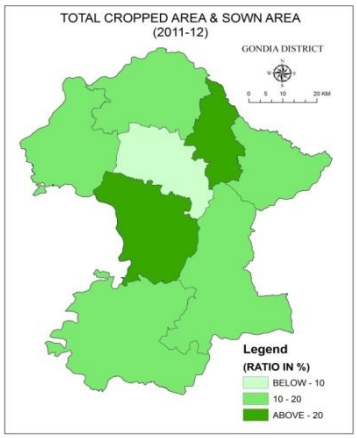
5.2 Cropping Pattern of Gondia district

5.2.1 Gross cropped area

As per the record of 2010-11 socio economic review the district is having 236744 ha area under various crops. Out of the total cropped area the land is basically used for kharif crop only. Out of the district total only 15.31% area is where the second or third crops are grown. This ranges from minimum 8.54% in Goregaon to maximum 25.29%. (Table & Fig no 5.2.1)

Table & Fig no 5.2.1 Gross cropped area of Gondia district

SN	Taluka	Total Cropped area	Area sown more than once	Ratio in %
1	Tirora	35481	4305	12.13
2	Goregaon	26348	2250	8.54
3	Gondia	42112	4732	11.23
4	Amgaon	27153	6868	25.29
5	Salekasa	23363	4076	17.44
6	S.Arjuni	24532	5061	20.63
7	M.Arjuni	29265	5742	19.62
8	Deori	28496	3211	11.27
	District	**236744**	**36245**	**15.31**



5.2.2 Gross irrigated area

In the part analysis has been made to compare the role of irrigation in the cropped area. Out of the total gross cropped area of the district i.e. 236744, 115519 ha area is gross irrigated sharing 48.79%. it indicates that round about 50% area under agriculture is based only on natural rainfall availability and that's why crop failure and formers suicide are commencing in the district.

Table No 5.2.2 Gross irrigated area in the district

SN	Taluka	Gross Cropped area	Gross Irrigated	%	Area sown More than once	Irrigated	%	Net sown	Net	%
1	Tirora	35481	24254	68.36	4305	859	19.95	31176	23395	75.04
2	Goregaon	26348	8438	32.02	2250	0	0	24098	8438	35.01
3	Gondia	42112	22027	52.30	4732	1266	26.75	37380	20761	55.54
4	Amgaon	27153	15034	55.37	6868	3364	48.99	20285	11670	57.53
5	Salekasa	23363	10149	43.44	4076	1	0.01	19287	10148	52.61
6	S. Arjuni	24532	11759	47.80	5061	1432	28.29	19471	10327	53.04
7	M. Arjuni	29265	17776	60.74	5742	2474	43.09	23523	15302	65.05
8	Deori	28496	6082	21.35	3211	190	5.92	25279	5892	23.31
	District	**236744**	**115519**	**48.79**	**36245**	**9586**	**26.45**	**200499**	**105933**	**52.83**

Source land record and annual crop report district report 2010-11

5.2.3 Net Sown Area and Net Irrigated Area

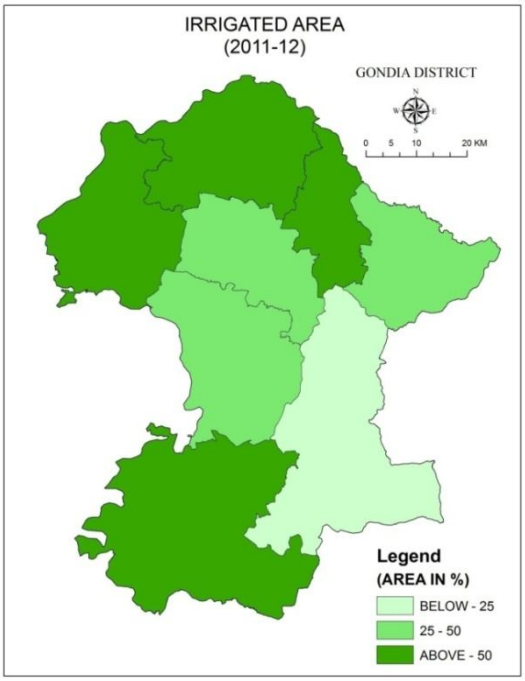
Out of the district total net sown area 105933 ha area is irrigated (52.83%) of the total net sown area. Net irrigated area in the district varies in different talukas ranging from 23.31 % in Deori taluka to maximum 75.04% in Tirora taluka. In Goregaon, gondia, Amgaon and Salekasa taluka the ratio is round about the same as district average i.e. 53% to 55%.

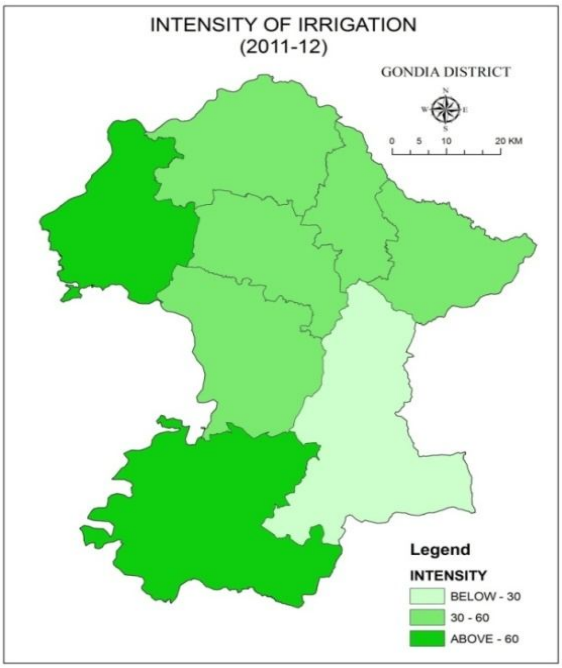
5.2.4 Gross cropped area and Gross irrigated area

The Gross cropped area of the district in the year 2010-11 was 236744 out of which 115519 ha crop area is irrigated comprising 48.79% out of the total cropped area. The ratio of irrigated area varied on taluka basis the record of land revenue shows that the maximum irrigated cropped area located in Tirora and Arjuni Morgaon.

5.2.5 Area sown more than once and more than once irrigated area

It is clear from the table that in the year 2010 – 11, 36245 ha area out of the total cropped area in the district was sown more than once out of which only 9586 ha. (26.45%) was irrigated.





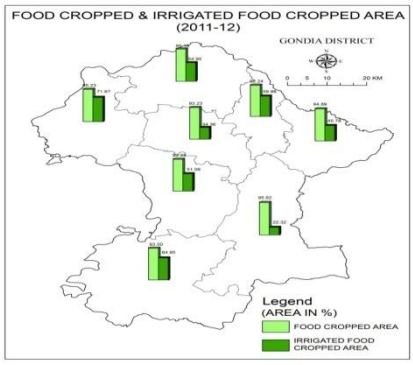
5.2.2 Food cropped area and irrigated area

As stated in the above part that district is basically agricultural dominant district, where kharif crops important rather than Rabi crops in the district. Food crops shared about 94.33 % and here of the taluka of the district sharing less than 92% area under food crops. It ranges between 92 to 96%. It also indicates the subsistence economy of the region.

Out of the district total food crop area 115502 ha (51.71%) food cropped area feed by various source of irrigation (Table & Fig no. 5.2.2). It indicates that on and average about half of the food crop area is dependent on the natural rainfall accuracy. As the result when the rainfall failures the crop failures.

Table & Fig no. 5.2.2 Food cropped area and irrigated area

SN	Taluka	Total Cropped area	Food cropped area	%	Irrigated food cropped area	%
1	Tirora	35481	33841	95.23	24254	71.67
2	Goregaon	26348	32558	93.23	8438	34.36
3	Gondia	42112	40083	95.18	22027	54.95
4	Amgaon	27153	25046	92.24	15022	59.98
5	Salekasa	23363	22169	94.89	10149	45.78
6	Sadak Arjuni	24532	23019	93.83	11759	51.08
7	M. Arjuni	29265	27363	93.50	17771	64.95
8	Deori	28496	27246	95.62	6082	22.32
	District	**236744**	**223325**	**94.33**	**115502**	**51.72**



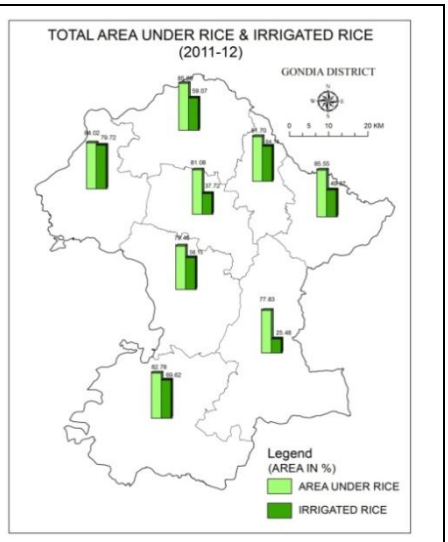
Source- Land record Gondia District Annual Season Crop Report 210-2011

5.2.2.1 Area under Rice

Rice is the staple crop of the district, which occupies 82.54% area of the gross cropped area. It indicates the importance of the crop in the district. The districts physico – ecological condition of the district are very much suitable for the crop, particularly the temperature, rainfall, terrain and soil condition of the district. The ratio of the crop though show the intra – regional variation, but not varying very much all over the region as the table indicates in the year 2010-2011, rice was occupying the least (77.83) per cent of the district. (Table & Fig no 5.2.2.1).

Table & Fig no 5.2.2.1 Area under Rice

SN	Taluka	Area under Rice	%	Irrigated Rice area	%
1	Tirora	29812	84.02	23766	79.72
2	Goregaon	21363	81,08	8058	37.72
3	Gondia	36170	85.89	21366	59.07
4	Amgaon	22185	81.70	14235	64.16
5	Salekasa	19988	85.55	9868	49.37
6	S.Arjuni	19492	79.46	11335	58.15
7	M. Arjuni	24227	82.78	16867	69.62
8	Deori	22174	77.83	5650	25.48
	District	**195411**	**82.54**	**111145**	**56.85**



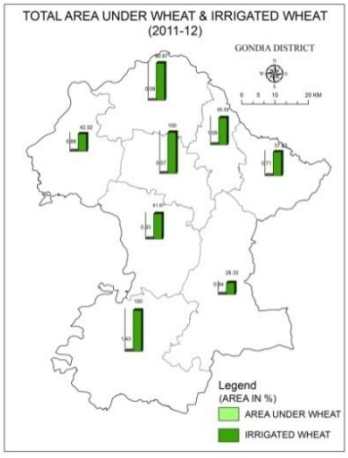
5.2.2.2 Area under Wheat

Wheat is a second crop of the district which is grown in the rabi season though the share of very less i.e. only 0.77% out of total gross cropped area. The major source of irrigation in the district is the surface water, basically by the tanks. It is very much clear from the table where only 1830 ha area is under the crop.

Out of district total area under Wheat 76.55%.Wheat is grown on the basis of applying various means of irrigation. One of the important phenomena characteristic of the district is that various malgujari and private tanks located amongst the fields of cultivators become dry in rabi season, but the moisture is a available in the tanks and that is available to the soil. On the basis of that moisture, the cultivators of the district are having the practice to grow Wheat and grow in those areas and that's why some of area of the district is under Wheat, without using the means of irrigation there.

Table & Fig no 5.2.2.2 Area under Wheat and Irrigation Percentage

SN	Taluka	Area underWheat	%	IrrigatedWheat area	%
1	Tirora	314	0.88	132	42.02
2	Goregaon	150	0.57	150	100.00
3	Gondia	236	0.09	214	90.67
4	Amgaon	297	1.09	183	65.59
5	Salekasa	166	0.71	96	57.83
6	S.Arjuni	227	0.93	140	61.67
7	M. Arjuni	418	1.43	418	100.00
8	Deori	240	0.84	68	28.33
	District	**1830**	**0.77**	**1401**	**76.55**

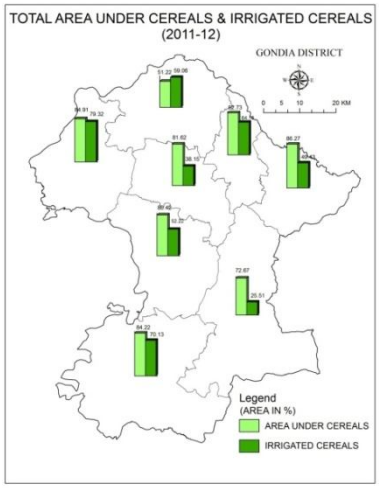


5.2.2.3 Area under cereal and irrigation

In the district, in the area under cereals apart from rice and Wheat some other crops like Jawar, Bajari, corn are included but these crops are not significant in the district. Out of the total gross cropped area of the district area under cereals comprise 03.45% which also is also indicates the importance of grains and subsistence economy in district (Table & Fig no 5.2.2.3).

Table & Fig no 5.2.2.3 Area under cereal and irrigation

SN	Taluka	Area under cereal	%	Irrigated cereal area	%
1	Tirora	30127	84.91	23898	79.32
2	Goregaon	21513	81.62	8208	38.15
3	Gondia	36536	51.22	1580	59.06
4	Amgaon	22464	82.73	4418	64.18
5	Salekasa	20156	86.27	9964	49.43
6	Sadak Arjuni	19729	80.42	11475	52.22
7	M. Arjuni	24647	84.22	7285	70.13
8	Deori	22414	72.67	5718	25.51
	District	**197586**	**83.45**	**112546**	**56.96**



Source – District land record Gondia annual season and crop report – 2010-11

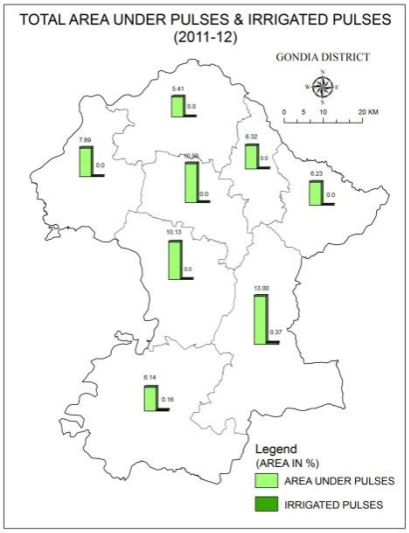
5.2.2.4 Area under Pulses and Irrigation

In the district Moong, Urid, Kudid, Moth, Val, Peas are some of the pulses grown in the district. Out of the district gross cropped area. Area under pulses in the year 2010-11 was 19090 ha representing 8.03% of the gross cropped area.

The table feature of the pulses in the district is that is year 2010-11 only 17 ha area under pulses was irrigated, out of the 19090 ha area. It indicates that pulses in the district are not grown on the basis of irrigation facility and the factor responsible for growing their crops is that the major pulses which are grown are Kharif crop.

Table & Fig no 5.2.2.4 Area under Pulses and Irrigation

SN	Taluka	Area under Pulses	%	Irrigated Pulses area	%
1	Tirora	2728	7.69	0	0
2	Goregaon	2766	10.50	0	0
3	Gondia	2277	5.41	0	0
4	Amgaon	1716	6.32	0	0
5	Salekasa	1455	6.23	0	0
6	Sadak Arjuni	2484	10.13	0	0
7	M. Arjuni	1876	6.41	3	0.16
8	Deori	3788	13.00	14	0.37
	District	**19090**	**8.03**	**17**	**0.09**

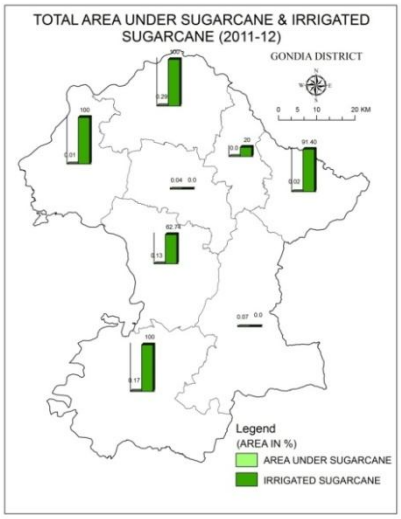


5.2.2.5 Area under Sugarcane and irrigation

Sugarcane is a meager crop in the district as it comprises only 245 ha area representing only 0.10% of the gross cropped area. It is basically produced in the Bagh and Wainganag valley part in Gondia taluka of district. This crop is gaining the economic importance in the district due to the sugar factory installation in Madgi near Tumsar and Lakhandur in Bhandara taluka. (Table & Fig no 5.2.2.5)

Table & Fig no 5.2.2.5 **Area under Sugarcane and Irrigation**

SN	Taluka	Area under Sugarcane	%	Irrigated Sugarcane area	%
1	Tirora	2	0.01	2	100
2	Goregaon	11	0.04	0	0
3	Gondia	123	0.29	123	100
4	Amgaon	10	0	15	20
5	Salekasa	35	0.02	32	91.43
6	Sadak Arjuni	51	0.13	32	62.74
7	M. Arjuni	51	0.17	32	100
8	Deori	20	0.07	0	0
	District	**245**	**1.10**	**226**	**92.24**

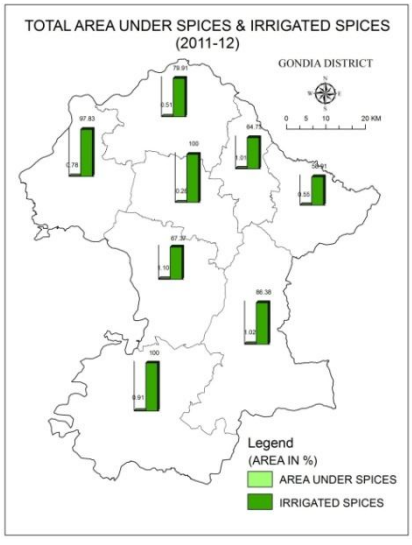


5.2.2.6 Area under Condiments and Spices

In the district in some amount of Garlic and Chilies and other spices are grown though this crop are not highly significant in the district. Out of the district total cropped area 1809 ha area (0.76%) is under the various spices. It indicates that this crops are again not significant crop in the district. As the percentage share of these crops are negligible in the district.(Table & Fig no 5.2.2.6)

Table & Fig no 5.2.2.6 Area under Spices and Irrigation

S.N.	Taluka	Area under Spices	%	Irrigated Spices area	%
1	Tirora	277	0.78	271	97.83
2	Goregaon	74	0.28	74	100
3	Gondia	214	0.51	171	79.91
4	Amgaon	275	1.01	176	64.73
5	Salekasa	129	0.55	76	58.91
6	S.Arjuni	285	1.10	192	67.37
7	M. Arjuni	265	0.91	265	100
8	Deori	290	1.02	206	86.38
	District	**1809**	**0.76**	**1476**	**81.59**

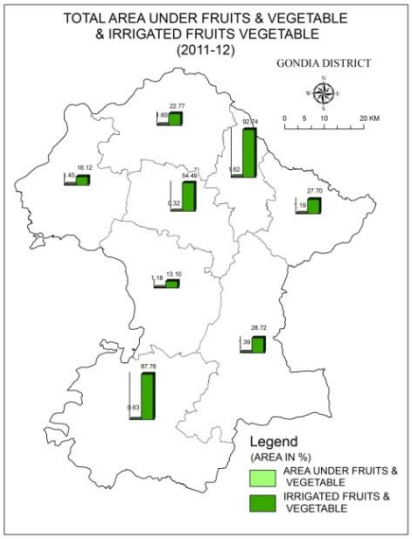


5.2.2.7 Area under Horticulture and Irrigation

In the Gondia district various fruits and vegetables are grown like Lime, Orange, Banana, Papaya, Mango and in Vegetables come of the important crops like Potato, Onion, Brinjal, tomatos, pinach, letups, reddish, cucumber are grown in view of the demand in the market. Though this crops are again not very important as the percentage share and area under those crops are very less i.e. 2862 ha comprising 1.21 % of the gross cropped area.

Table & Fig no 5.2.2.7 Area under Horticulture and Irrigation

SN	Taluka	Area under Horticulture	%	Irrigated Horticulture area	%
1	Tirora	515	1.45	83	16.12
2	Goregaon	156	0.32	85	54.49
3	Gondia	672	1.60	153	22.77
4	Amgaon	441	1.62	409	92.74
5	Salekasa	278	1.19	77	27.70
6	Sadak Arjuni	290	1.18	38	13.10
7	M. Arjuni	205	0.63	184	87.76
8	Deori	297	1.39	114	28.82
	District	**2862**	**1.21**	**1235**	**43.15**

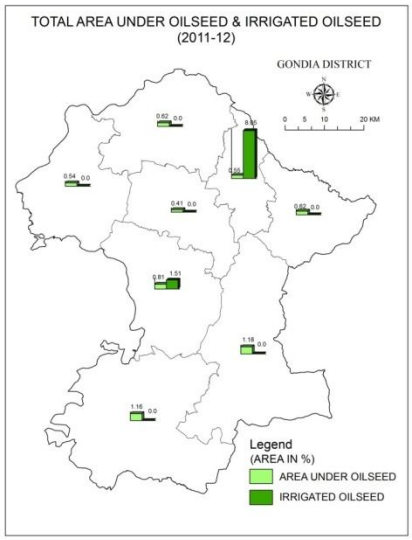


5.2.2.8 Area under Oilseed and Irrigation

In the some part of the district few oilseed like Sunflower, Seasum, Kardi etc. are grown. The area under these crops in the year 2010-11 was 1733 ha (0.73%) of the gross cropped area. Maximum area under oilseed in the district is in Morgaon Arjuni and Deori taluka where it is 340 and 337 ha successively comprising 1.16 and 1.18% of the cropped area. The least share is in Goregaon taluka where 109 ha (0.41%) area is under the crop.

Table & Fig no 5.2.2.8 Area under Oilseed and Irrigation

SN	Taluka	Area under Oilseed	%	Irrigated Oilseed area	%
1	Tirora	192	0.54	0	0
2	Goregaon	109	0.41	0	0
3	Gondia	261	0.62	0	0
4	Amgaon	149	0.55	12	8.05
5	Salekasa	146	0.62	0	0
6	Sadak Arjuni	199	0.81	3	1.51
7	M. Arjuni	340	1.16	0	0
8	Deori	337	1.18	0	0
	District	**1733**	**0.73**	**15**	**0.87**

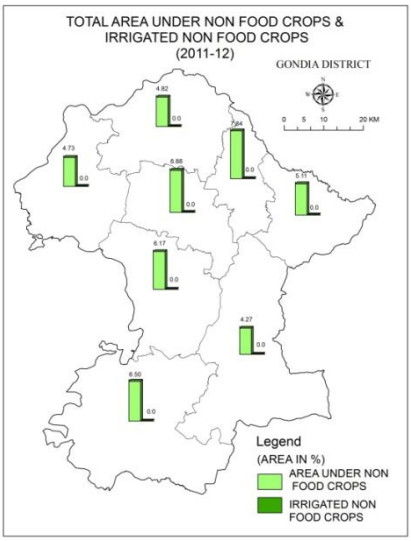


5.2.2.9 Non food crops and irrigation

Total area under nonfood crops in the district in 2011 was 13419 ha.area of the gross cropped area. Maximum area under the crops in the district is in Amgaon 2107 followed by 2029 in Gondia taluka. The minimum area in the district is in Salekasa taluka where 1194 ha area is under their crops.

Table & Fig no 5.2.2.9 Area under non food crops and Irrigation

SN	Taluka	Area under non food crops	%	Irrigated area	%
1	Tirora	1640	4.73	0	0
2	Goregaon	1790	6.88	0	0
3	Gondia	2029	4.82	0	0
4	Amgaon	2107	7.84	12	0
5	Salekasa	1194	5.11	0	0
6	Sadak Arjuni	1513	6.17	0	0
7	M.Arjuni	1902	6.50	5	0
8	Deori	1244	4.27	0	0
	District	**13419**	**5.67**	**17**	



Conclusion

The above analysis reveals some important feature of agriculture in the district

- Throughout the region an agriculture rhythm is found in which the crop are determined by the incidence of rainfall.
- There are two broad crops season in the region they are kharif or Summer/rainy season during which crops needing more water for grown.
- Kharif crop require much water and long lot weather for their growth and are therefore grown as soon as the south west monsoon commences. The principal kharif crops in the region are rice, jawar, sugarcane, moong, urid, tur etc.

The crop rose during winter i.e. rabi crops in the district are those need relatively cool climate. The winter is usually a rainless period and in absence of artificial irrigation the crop moisture. In the moisture left in the soil by monsoon, the dews of winter and any occasional rainfall that the cultivators good luck may bring, Wheat , gram, beans, peas, reddish, carrot, cabbage, are grown.

- Percentage area under food crops is higher under the crop sharing that of nonfood crops and cash rented crops.
- The subsistence economy is predominant in the region as more than 90 % of the gross cropped area occupied by rice.
- Irrigation is available in the district basically for kharif crop as the source of irrigation in the district is basically surface i.e. by tanks where water gathered in the ponds S.W. monsoon rainfall.

Area sown more than once that is in rabi season is very less in the district the season for this low ratio is that the water of the tanks are not sufficient to fetch the crop second time and the role of various irrigation project is limited to the near vicinity of the project. Therefore, there is a need to make the proper way of various irrigation projects. So that the agricultural scenario of the district can be changed and the proper utilization of irrigated can be possible

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