



THE TRENDS OF AGRICULTURE IN THE NASHIK DISTRICT

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Abstract

We see the changing nature of agriculture day by day. The main reason for this is human needs along with natural factors. Physiography, Climate, Soil, Water are major or essential factor on crops growing. Nashik District is one of the major and prime districts in the western Maharashtra. In this paper researcher is focus on pattern of agriculture. In the study area are growing various crops. All of them are twelve major crops taken by researcher. Which are crops has essential crops in this area out of them six crops are cash crops and six non cash crops. Millet, Rice, Groundnut, Wheat, Jawar, Maize, Onion, Sugarcane, Grapes, Tomato, Cotton, Peru are prime crops in this region. In this topic we will discuss cropping pattern and establish their relationship with various factors.

Key Words- Agriculture, Pattern, cash crop, food crop, trend etc.

Introduction -

You've probably seen that the land around you is put to various uses. Rivers run through portions of the area, trees grow in others, and roads and structures have been constructed in others. Different types of land are suitable for various purposes. As a result, humans use land as a resource for both production and dwelling and enjoyment. Thus, the constructions of your school, the roads you travel on, the parks where you play, the fields where crops are grown, and the pastures where animals graze indicate many uses of land.

In India, there is a great deal of diversity in the Climate, Physiography, Water, Sunlight, and Soil. As a result, from Jammu Kashmir to Kanyakumari and Gujarat to Arunachal Pradesh is having diversity in crops. There are many types of crops found in India. In our country Food crops and non-food crops are grown in different part of country depending upon the Physiography, Climate, Soil and pattern of cultivation practice. This crop can be classified on the basis of different criteria.

A. Based on Climate –

1. Crops in Tropical Climate
2. Crops in Non tropical Climate

B. Based on Growing Season

1. Kharif Crop (Rainy/Monsoon)
2. Rabbi Crop (Winter/Cold)
3. Zaid Crop (Summer)

C. Based on duration of Crops

1. Seasonal Crops – 3-4 Month
2. Two seasonal Crops – 6-8 Month

3. Annual Crops – 12 Month
4. Biennial Crops – Two Years
5. Perennial Crops – Mango, Guava etc.

D. Based on Water Availability

1. Rain Feed Crops
2. Irrigated Crops

E. Based on Type of Produce

1. Food Crops
2. Cash Crops
3. Plantation Crops
4. Horticulture Crops

All of them we are focus on following cropping pattern from 2001 to 2018.

India covers a total area of 328.7 million hectares, with roughly 42 percent of that being used for the cultivation of various food and non-food crops. This share is among the highest in the world, yet due to heavy population pressure, per capita arable land availability is significantly lower than the global average. Around 21% of the geographical area was occupied by forests in 2010-11, 8% was used for non-agricultural purposes, 5% was barren and unculturable, and 7.5 percent remained fallow.¹

Diverse crops dominated Maharashtra's land use pattern (57.34 percent), followed by forest and fallow land (7.67 percent). In terms of temporal variations in various land use categories, it was discovered that the proportionate area in each decade under various categories remained more or less the same, with only minor changes in each decade. In terms of rate of growth, positive and significant growth was observed in non-agricultural land (1.46 percent), miscellaneous tree crop land (1.65 percent), and both fallow (3.24 percent), while negative and significant growth was observed in forest land (-0.16 percent), barren and uncultivable land (-0.49 percent), and permanent pasture land (-0.49 percent) (-1.47 percent). According to the dynamics of land use change, roughly 5 million hectares were relocated from the ecological sector, with 76 percent going to non-agriculture and only 24 percent going to agriculture. Overall, the study found that the area under ecological sector in Maharashtra is rapidly shrinking, which is disrupting the ecological balance as well as land productivity.²

Objectives

The main objectives of the study are;

- 1 To study the existing land use pattern.
- 2 To analyze the changes of cropping pattern between the period 2001 to 2018.

Study Area

The Nashik District lies between 19° 35' and 20° 52' North Latitude and 73° 16' and 74° 56' east longitude, with an area of 15,582 sq km. (6,015 sq. miles). The Nashik district was formed in the year 1869 with the city of Nashik as it is district headquarter. It is surrounded by Dhule district in the North, Jalgaon and Aurangabad district in the East, Ahmednagar district in the South, Thane and Palghar district in the South-West and Gujarat state in the North-West. In Nashik district there are fifteen tahasil which are Nashik, Sinnar,

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

Igatpuri, Trimbak, Niphad, Yeola, Peth, Dindori, Chandwad, Nandgaon, Surgana, Kalwan, Deola, Baglan and Malegaon.

In this study area we are study crops mainly non cash crops and cash crops are as follows.

A. Non Cash Crops

1. Millet (बाजरी)

Millets are short-duration grain crops. It is grown in the Kharif season. It is used for both food and fodder. General high temperatures are required for the growth of millet, which is the range between 27⁰ C and 32⁰ C. As millet is a dry land crop, 50cm to 100cm of rainfall is generally best for this crop. It is grown in inferior alluvial or loamy soil.

Millet is an essential crop in the study area. In 2001, it covered 54.33 percent of the land area (336685 hectares). In the Nashik District, Malegaon Taluka had the highest millet crop area, which was 71308 hectares (21.17%), followed by Sinner Taluka at 60190 hectares (17.87%), Yeola Taluka was 48964 hectares (14.54%), Satana Taluka was 41154 hectares (12.22%), Chandwad Taluka was 35720 hectares (10.6%) and Nandgaon Taluka covered a 25000 hectare (7.42%) area in the year of 2001. This year, Surgana, Peth, and Trimbak Taluka received heavy rainfall; therefore, millet crops do not grow in this area. Igatpuri Taluka was occupied by a very small area of millet crops, which was 19 hectares (0.005%) of area. At Dindori Taluka, 708 hectares (0.21%), Nashik Taluka, 1289 hectares (0.38%), Kalwan Taluka was 9631 hectares (2.86%), and Deola Taluka was 20307 hectares (6.03%). area was under millet crop.

The area under millet crop in 2018 was 30.2 percent (130436 hectares). In the study area, Malegaon Taluka had the highest area under millet crop, which was 35970 hectares (37.57%), Satana Taluka was 31490 hectares (24.14%), Chandwad Taluka was 16078 hectares (12.36%), Yeola Taluka was 13677 hectares (10.49%), and Sinner Taluka was 13603 hectares (10.43%). This year, Peth, Igatpuri, and Trimbak Taluka have heavy rainfall; therefore, millet crops do not grow in this area. Surgana Taluka had a very small millet crop, covering only 2 hectares (0.0015%). Dindori Taluka had 101 hectares (0.08%), Nashik Taluka had 271 hectares (0.21%), and Niphad Taluka had 3147 hectares (2.41%) covered by millet crop in 2018.

A comparison of millet crop areas between 2001 and 2018 revealed a decrease of up to 24.13 percent. Malegaon Taluka increased millet crop area by up to 16.4% and Sinner Taluka decreased millet crop area by up to 7.44%.

2. Rice (तांदूळ)

Rice is the most important food crop in India. It is predominantly a Kharif, or summer, crop. Its crops require hot and humid climate conditions. It requires a 22⁰C to 32⁰C average temperature and 150cm to 140cm of rainfall to be suitable for its growth. Where rainfall is less than 150 cm, rice is cultivated with the help of irrigation. It is grown in deep clayey and loamy soils, which provide the ideal conditions for growing in the Plains area.

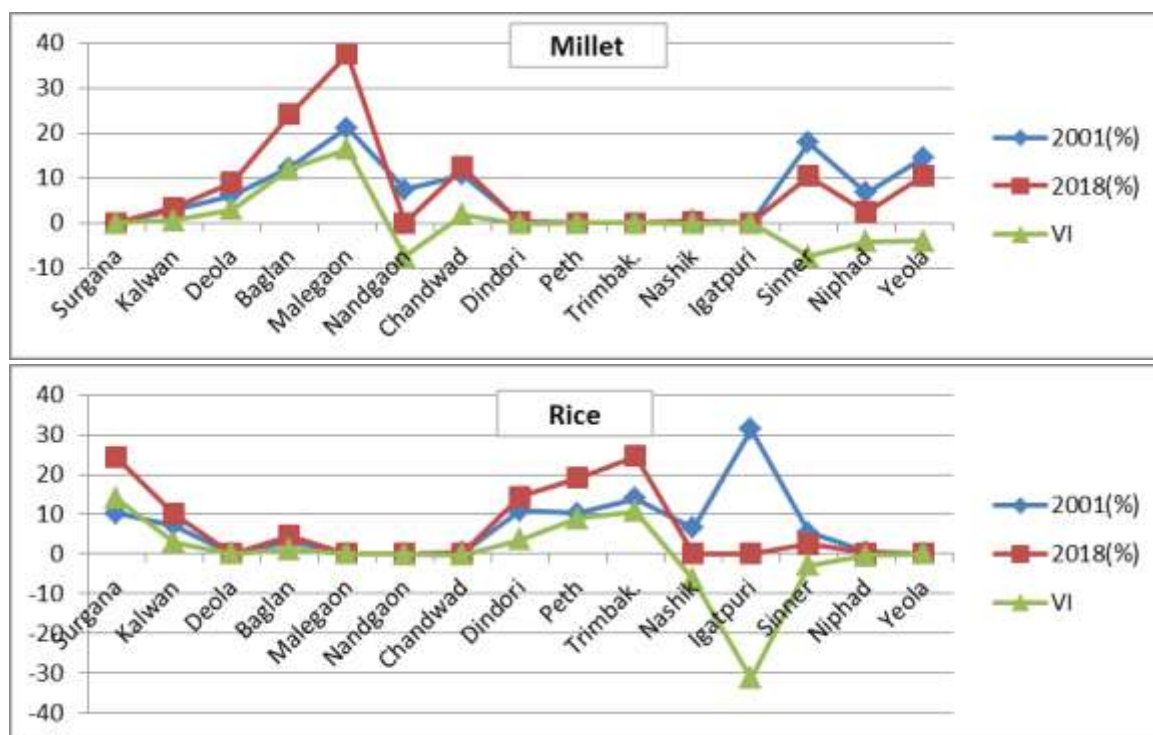
In 2001, rice was the second largest area covered in the Nashik District. It took up 8.93% (5.35 hectares) of the land. In the study area, Igatpuri Taluka had the maximum area under rice crop, which was 17340 hectares (31.32%). Rice crop covers 5700 hectares

(10.29%) of Surgana Taluka and 5644 hectares (10.19%) of Peth. Which areas have unsuitable conditions for growing rice crops? They covered very little area, such as Deola Taluka 11 hectares (0.01%), Malegaon Taluka 38 hectares (0.06%), Nandgaon Taluka 55 hectares (0.09%), and Chandwad Taluka 198 hectares (0.35%) of area were covered by rice crop in the year of 2001.

The rice crop covered 9.64 percent (41685 hectares) of the land area in 2018. Among them, Igatpuri, Trimbak, Surgana, and Peth Taluka are prime producers of rice. Trimbak Taluka was covered by 10251 hectares (24.59%), followed by Surgana Taluka at 10090 hectares (24.21%), Peth Taluka at 7968 hectares (19.12%) and Dindori Taluka at 6002 hectares (14.4%) of covered rice crop in the study area. Igatpuri and Nashik Taluka also have maximum production of rice. Due to the lack of water, Deola, Yeola, and Nandgaon Taluka were unable to grow rice crops. In 2018, Malegaon Taluka had the lowest rice crop area of 25 hectares (0.06%), Chandwad Taluka had 55 hectares (0.13%), Niphad Taluka had 85 hectares (0.20%), and Sinner Taluka had 1094 hectares (2.42%).

The Surgana Taluka increased under the area of the rice crop by 13.92 percent, and Sinner Taluka went down by 2.88 percent. Overall, the years 2001 and 2018 were compared and it was seen that the percentage of rice crop increased among the total main crops up to 0.71 percent in the year of 2018, but actually the area was decreased by up to 13670 hectares.

S. N.	Taluka	Millet					Rice				
		2001	%	2018	%	VI	2001	%	2018	%	VI
1	Surgana	0	0	2	0.0015	0.0015	5700	10.29	10090	24.21	13.92
2	Kalwan	9631	2.86	4393	3.37	0.51	3978	7.18	4222	10.13	2.95
3	Deola	20307	6.03	11704	8.97	2.94	11	0.01	0	0	-0.01
4	Satana	41154	12.22	31490	24.14	11.92	1827	3.3	1893	4.54	1.24
5	Malegaon	71308	21.17	35970	37.57	16.4	38	0.06	25	0.06	0
6	Nandgaon	25000	7.42	0	0	-7.42	55	0.09	0	0	-0.09
7	Chandwad	35720	10.6	16078	12.36	1.76	198	0.35	55	0.13	-0.22
8	Dindori	708	0.21	101	0.08	-0.13	6021	10.87	6002	14.4	3.53
9	Peth	0	0	0	0	0	5644	10.19	7968	19.12	8.93
10	Trimbak.	0	0	0	0	0	7692	13.89	10251	24.59	10.7
11	Nashik	1289	0.38	271	0.21	-0.17	3589	6.48	0	0	-6.48
12	Igatpuri	19	0.005	0	0	-0.005	17340	31.32	0	0	-31.32
13	Sinner	60190	17.87	13603	10.43	-7.44	2937	5.3	1094	2.42	-2.88
14	Niphad	22395	6.65	3147	2.41	-4.24	325	0.58	85	0.2	-0.38
15	Yeola	48964	14.54	13677	10.49	-4.05	0	0	0	0	0
District Total		336685	100	130436	100		55355	100	41685	100	



3. Groundnut

Groundnut is very important oilseed in India. It is grown in Kharif and Rabbi Season but mostly grown in Kharif season. It is required to 20⁰C to 30⁰C temperature, 15cm to 275cm rainfall and well drained light sandy loams. Red, Yellow and Black soils are the favorable for the growth of groundnut.

Groundnut is a prime oil seed crop. In the year of 2001 it was covered 5.85 percent (36293 hectare) area in the Nashik District. Highly area covered in the Malegaon Taluka was 6678 hectare (18.4%), followed by Dindori Taluka 4668 hectare (12.86%), Nandgaon Taluka 3380 hectare (9.31%) and Nashik Taluka 2736 hectare (7.53%). Lowest Groundnut crop area covered by Peth Taluka was 857 hectare (2.36%), Trimbak Taluka 891 hectare (2.45%), Deola Taluka 1070 hectare (2.94%), Surgana Taluka 1100 hectare (3.03%) and Sinner Taluka 1641 hectare (4.52%).

In 2018, land of under Groundnut crop was 5.53 percent (23919 hectare). Highest area seen in the Malegaon Taluka 4572 hectare (19.11%) followed by Dindori Taluka 3312 hectare (13.84%), Chandwad Taluka 2122 hectare (8.87%) and Sinner Taluka was covered 1675 hectare (7%). Lowest area under Groundnut Crop seen in the area of Nandgaon Taluka 159 hectare (0.66%), Surgana Taluka 685 hectare (2.86%), Deola Taluka 752 hectare (3.14%) and Peth Taluka 943 hectare (3.94%).

Variation Index shows that Nandgaon Taluka highly Decreases of area under Groundnut up to 8.65 percent. Trimbak Taluka was positively increased area under Groundnut crop up to 4.47 percent in the year of 2018. In short comparative study of the year of 2001 (5.85%) and 2018 (5.53%) shows that area of Groundnut crops decreases up to 0.32 percent.

4. Wheat (गहू)

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

In India which is a second important crop followed by rice. It is a Rabbi or winter crop. It is shown in the beginning of winter season (October-November) and harvested in the beginning of the summer season (March-April). Wheat crops require cool climate temperature is between 10°C to 15°C ideal at the time of showing at 21°C to 26°C at the time of harvesting. Wheat well thrives in areas annual rainfall of about 75cm 200cm. Which area is receiving less than 75cm rainfall, Wheat can also be grown by the irrigation method in plain areas. Well drained fertile loamy and clayey loamy soil is suitable for it. Now is wheat crops highly mechanized hence, requires less labour.

Wheat is main food grain in our society. In the study area land under wheat crop was 5.46 percent (33876 hectare) in the year of 2001. Dindori Taluka was highest wheat area covered by wheat crop which was 9410 hectare (27.78%), followed by Niphad Taluka 5392 hectare (15.92%), Nashik Taluka 3980 hectare (11.75%), Sinner Taluka 3175 hectare (9.37%) and Kalwan Taluka was 2665 hectare (7.87%) area occupied by wheat crop. Surgana, Peth and Trimbak Taluka were very negligible production of wheat. Lowest area under wheat crop was seen in the Nandgaon Taluka 470 hectare (1.39%), followed by Chandwad Taluka 853 hectare (2.52%), Deola Taluka 1092 hectare (3.22%) and Malegaon Taluka was 1470 hectare (4.33%) in the year of 2001.

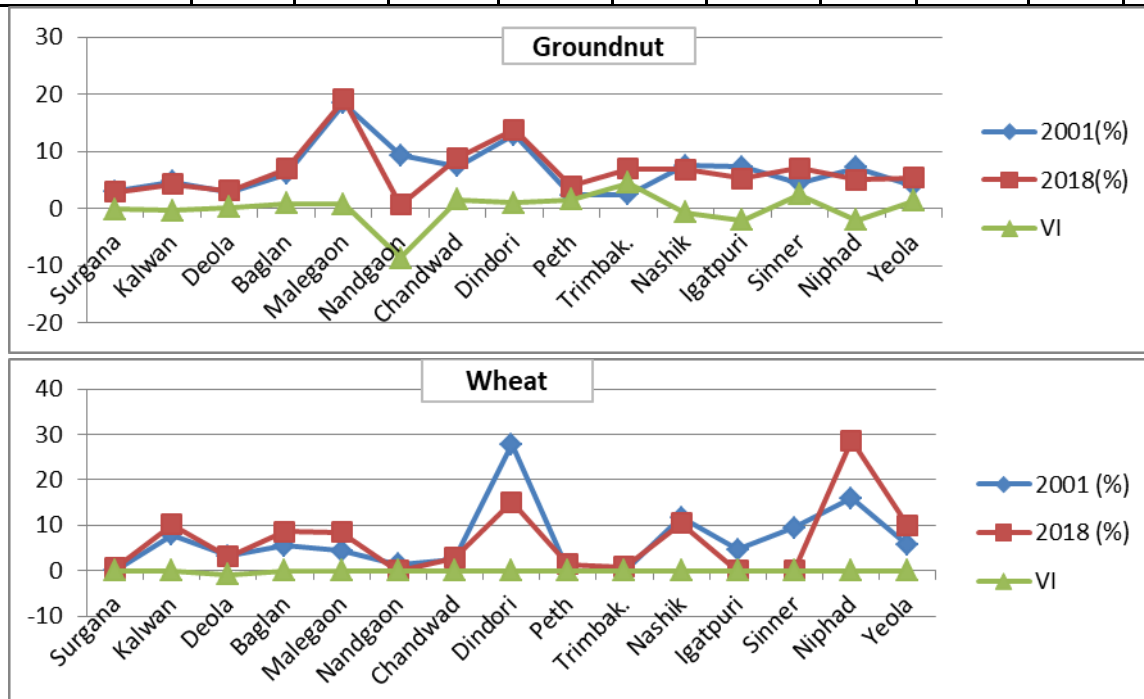
In the year of 2018 land under wheat crop was 7.86 percent (33954 hectare) in the Nashik District. Among them Niphad Taluka was highest area under in the wheat crop which was 9710 hectare (28.59%) followed by Dindori Taluka 5140 hectare (15.14%), Nashik Taluka 3559 hectare (10.48%), Kalwan Taluka 3453 hectare (10.17%) and Yeola Taluka was 3345 hectare (9.85%). In this year lowest area was under wheat crop in the Nandgaon, Igatpuri and Sinner Taluka, Followed by Surgana Taluka 170 hectare (0.5%), Trimbak Taluka 298 hectare (0.88%), Peth Taluka 474 hectare (1.4%) and Chandwad Taluka 961 hectare (2.83%).

Compare 2001 (5.46 percent - 33876 hectare) and 2018 (7.86 percent - 33954 hectare) year is conclude that area under wheat crop was increased up to 2.4 percent. Variation Index shows that Dindori Taluka was decreases area of wheat crop up to 12.64 percent and Niphad Taluka was increased up to 12.67 percent. Deola, Nandgaon, Nashik, Igatpuri and Sinner Taluka were also decreases area of wheat crop. Surgana, Kalwan, Satana, Malegaon, Chandwad, Peth, Trimbak and Yeola Taluka were slightly increased area under wheat crop in the year of 2018.

S. N.	Taluka	Groundnut					Wheat				
		2001	%	2018	%	VI	2001	%	2018	%	VI
1	Surgana	1100	3.03	685	2.86	-0.17	0	0	170	0.5	0.5
2	Kalwan	1703	4.69	1027	4.29	-0.4	2665	7.87	3453	10.17	2.3
3	Deola	1070	2.94	752	3.14	0.2	1092	3.22	1062	3.13	-0.88
4	Satana	2203	6.07	1657	6.92	0.85	1873	5.53	2897	8.53	3
5	Malegaon	6678	18.4	4572	19.11	0.71	1470	4.33	2885	8.5	4.17
6	Nandgaon	3380	9.31	159	0.66	-8.65	470	1.39	0	0	-1.39
7	Chandwad	2667	7.34	2122	8.87	1.53	853	2.52	961	2.83	0.31
8	Dindori	4668	12.86	3312	13.84	0.98	9410	27.78	5140	15.14	-12.64

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

9	Peth	857	2.36	943	3.94	1.58	0	0	474	1.4	1.4
10	Trimbak	891	2.45	1654	6.92	4.47	0	0	298	0.88	0.88
11	Nashik	2736	7.53	1628	6.81	-0.72	3980	11.75	3559	10.48	-1.27
12	Igatpuri	2637	7.26	1243	5.2	-2.06	1578	4.66	0	0	-4.66
13	Sinner	1641	4.52	1675	7	2.48	3175	9.37	0	0	-9.37
14	Niphad	2609	7.18	1216	5.08	-2.1	5392	15.92	9710	28.59	12.67
15	Yeola	1453	4	1273	5.32	1.32	1918	5.66	3345	9.85	4.19
District Total		36293	100	23919	100		33876	100	33954	100	



5. Jawar

Jawar crops are grown in Kharif and Rabbi Season. It is used for food and fodder. It requires temperature 26° to 33°C . Ideal climate of Jawar should be warm and arid. The average annual rainfall should be 45cm. It is grown in a variety of soil like loamy, Sandy, Clayey as well as in alluvial soil.

Maharashtra is a highest producer of Jawar. In the year of 2001, land under the Jawar crop was 4.46 percent (28814 hectare) in the study area. Dindori, Yeola, Chandwad, Malegaon and Kalwan Taluka were leading area under the Jawar crop. Dindori Taluka was 5610 hectare (19.46%), followed by Yeola Taluka 5108 hectare (17.72%), Chandwad Taluka 3120 hectare (10.82%), Malegaon Taluka 2832 hectare (9.82%) and Kalwan Taluka 2556 hectare (8.87%). Trimbak Taluka was very negligible area under Jawar crop. Peth Taluka was very lowest area under this crop which was 3 hectare (0.01%) only. Followed by Deola Taluka 63 hectare (0.21%), Nashik Taluka 340 hectare (1.17%) and Igatpuri Taluka was 725 hectare (2.51%) under Jawar Crop.

The area under Jawar crop in the year 2018 was 1.38 percent (5971 hectare). Malegaon Taluka was highest area under Jawar crop which was 2394 hectare (40.09%), followed by Sinner Taluka 1302 hectare (21.81%), Yeola Taluka 865 hectare (14.49%) and Dindori Taluka 391 hectare (6.55%). Peth, Trimbak and Nandgaon Taluka were not taking

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

Jawar production. Niphad Taluka was 32 hectare (0.53%), followed by Nashik Taluka 37 hectare (0.62%) and Chandwad Taluka 50 hectare (0.83%) area under Jawar crop.

A study of 2001 and 2018 years found that area under Jawar crop in the year 2018 has decreased by 3.08 percent as compared to 2001 year. Variation Index shows that Malegaon Taluka was leading positive changes up to 30.27%. But Dindori Taluka area under Jawar Crop was decreases up to 12.9 percent. All of indicators show that trend of Jawar farming was change in 2018 as compared 2001 year.

6. Maize

Maize is also known as corn in North America and Australia. It is grown in the Kharif and Rabbi season. It is used for food and fodder. It is required temperature between 21⁰C to 27⁰C, rainfall between 65cm to 125cm and grows well in old alive soil, deep heavy clay to light sandy loam soil. Today's production of maize is increase due to the model inputs such as HYV seeds, Fertilizers, mechanisation and irrigation facility. Maize is having highest genetic potential along the cereals therefore it is known as a 'Queen of Cereals'.

In the year of 2001, land under the Maize crop was 4.19 percent (26021 hectare). In the Satana Taluka was highest area under the Maize crop which was 7156 hectare (27.50%), followed by Kalwan Taluka 6963 hectare (26.75%), Deola Taluka 5111 hectare (19.64%), and Malegaon Taluka 4985 hectare (19.15%). Igatpuri, Peth, Surgana, Nashik and Trimbak Taluka are very negligible production of Maize. Nandgaon Taluka was 60 hectare (0.23%) area under Maize crop. Followed by Niphad Taluka 161 hectare (0.61%), Dindori 164 hectare (0.63%) and Yeola Taluka was 510 hectare (1.95%) area under a Maize Crop.

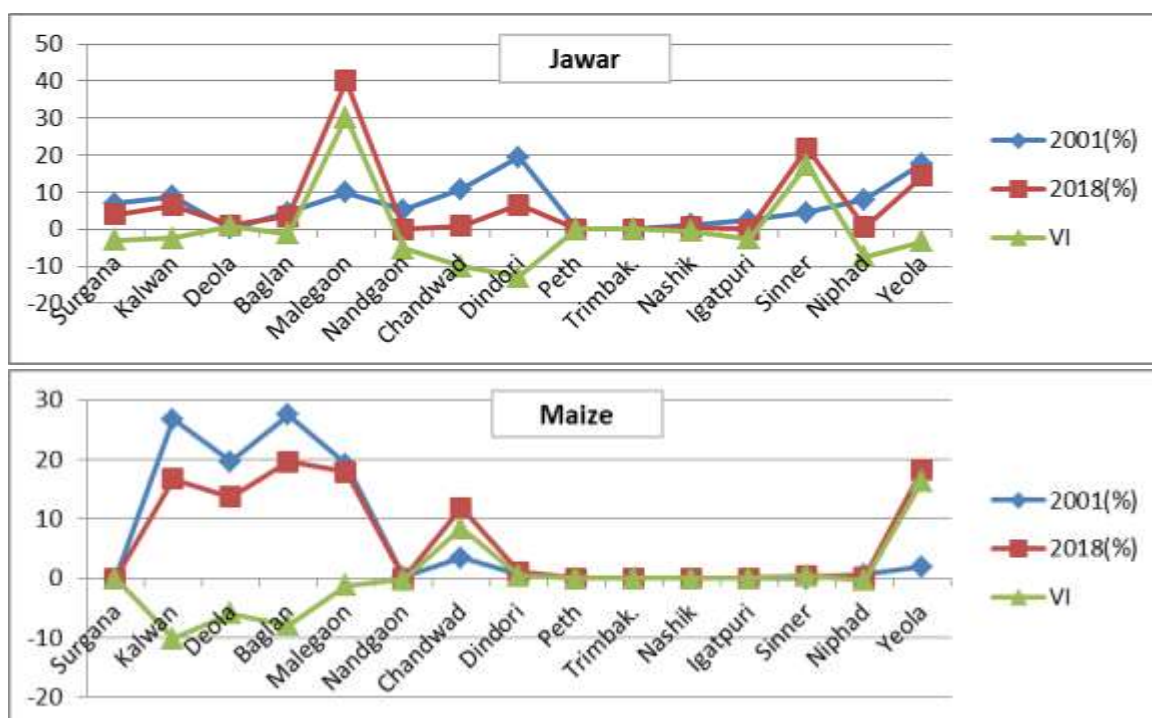
In 2018, land area under 6.03 percent (26021 hectare) was increased up to 1.84% compared as 2001 year. In the Nashik District was highest area under Maize crop in the Taluka of Satana which was 16160 hectare (19.6%), followed by Yeola Taluka 15118 hectare (18.30%), Malegaon Taluka 14784 hectare (17.9%), and Kalwan Taluka 13718 hectare (16.70%). In this Year Igatpuri, Peth, Surgana, Nashik, Nandgaon and Trimbak Taluka are very negligible production of Maize. Niphad Taluka had very low area under Maize crop which was 213 hectare (0.26%), followed by Sinner Taluka 397 hectare (0.48%), Dindori Taluka 911 hectare (1.1%), and Chandwad Taluka 9834 hectare (11.9%).

In 2018, land area under Maize Crop 6.03 percent (26021 hectare) was increased up to 1.84% compared as 2001 year. Variation Index shows that Yeola Taluka was increased area under Maize crop up to 16.39 percent and Satana Taluka was highest decreases area under Maize Crop Which was up to 7.89 percent.

S. N.	Taluka	Jawar					Maize				
		2001	%	2018	%	VI	2001	%	2018	%	VI
1	Surgana	2030	7.04	241	4.03	-3.01	0	0	0	0	0
2	Kalwan	2556	8.87	389	6.51	-2.36	6963	26.75	13718	16.7	-10.1
3	Deola	63	0.21	66	1.1	0.89	5111	19.64	11270	13.7	-5.96
4	Satana	1329	4.61	203	3.4	-1.21	7156	27.5	16160	19.6	-7.89
5	Malegaon	2832	9.82	2394	40.09	30.27	4985	19.15	14784	17.9	-1.21
6	Nandgaon	1500	5.2	0	0	-5.2	60	0.23	0	0	-0.23
7	Chandwad	3120	10.82	50	0.83	-9.99	911	3.5	9834	11.9	8.43
8	Dindori	5610	19.46	391	6.55	-12.9	164	0.63	911	1.1	0.47

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

9	Peth	3	0.01	0	0	-0.01	0	0	0	0	0
10	Trimbak.	0	0	0	0	0	0	0	0	0	0
11	Nashik	340	1.17	37	0.62	-0.55	0	0	0	0	0
12	Igatpuri	725	2.51	0	0	-2.51	0	0	0	0	0
13	Sinner	1293	4.48	1302	21.81	17.33	0	0	397	0.48	0.48
14	Niphad	2305	7.99	32	0.53	-7.46	161	0.61	213	0.26	-0.35
15	Yeola	5108	17.72	865	14.49	-3.23	510	1.95	15118	18.3	16.39
District Total		28814	100	5971	100		26021	100	26021	100	



B. Cash Crops

1. Onion

Onion is a temperate crop but can be grown in tropical and subtropical climate. In India Onion is growing in Kharif, Rabbi and Zaid season. If geographical condition good, it will be grow in whole year. It is having mild climate without extreme cold, hot and excessive rainfall. It is having to 13⁰C to 25⁰C temperature, 65cm to 75cm average annual rainfall. It is grown in all types of soil such as sandy loam, clay loam, silt loam and heavy soils.

In the Nashik District Lasalgaon Market is world prime Market for Onion.

In the year of 2001, land under the onion crop was 5.30 percent (32861 hectare) area. Chandwad, Niphad, Yeola Taluka were leading area under Onion Crop. Chandwad Taluka 8380 hectare (25.5%), followed by Niphad Taluka 5132 hectare (15.61%), Yeola Taluka 4806 hectare (14.62%), Sinner Taluka 3055 hectare (9.29%) and Deola Taluka 2775 hectare (8.44%). Dindori and Peth Taluka were not taken production of onion. Trimbak Taluka was lowest area under Onion Crop which was 5 hectare (0.001%), followed by Surgana Taluka 25 hectare (0.07%), Igatpuri Taluka 331 hectare (1%), Nashik Taluka 718 hectare (2.18%) and Nandgaon Taluka was 1400 hectare (4.26%) area under Onion Crop.

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

In the year of 2018, 15.78 percent (68188 hectares) land area covered by Onion Crop. Highest area covered in the Yeola Taluka was 12917 hectare (19.03%), followed by Chandwad Taluka 10505 hectare (15.41%), Malegaon Taluka 8314 hectare (12.19%), Nandgaon Taluka 7660 hectare (11.23%) and Niphad Taluka was 7170 hectare (10.52%) area under Onion Crop. In this year also Dindori and Peth Taluka were not taken production of onion. Trimbak Taluka was very low land under this crop which was 24 hectare (0.03%), followed by Surgana Taluka 30 hectare, Igatpuri Taluka 377 hectare (0.55%), Nashik Taluka 515 hectare (0.75%) and Sinner Taluka was 3566 hectare (5.29%) area under onion Crop.

According to the data area under Onion Crop was increased from 2001 to 2018 year up (7156 hectare (27.50%) to 15.78 percent (68188 hectares)) to 10.48 percent. Variation Index shows that highest positive changes in Nandgaon Taluka was up to 6.97 percent, followed by Yeola, Malegaon, Niphad, Kalwan and Deola Taluka. But some Taluka were decreases area under Onion Crop such as Chandwad, Niphad, Nashik, Sinner, Igatpuri and Surgana Taluka.

2. Sugarcane

We cannot think life without sugar. It is almost impossible to think sugar mainly made from sugarcane. It is grows well in hot and humid climates.

Sugarcane is herbaceous species belong to the perennial grass family of Poaceae (Gramineae). It is required 20⁰ to 30⁰ C. temperature, 80-85% humidity, 110cm to 150cm rainfall. It is also required to well-drained soil as like alluvial soil and black soil favourable of sugarcane with Ph range 6 to 7.7.

In the Nashik District Sugarcane was prime cash crop. Sugarcane is raw material for Sugar Industry. In 2001, land under Sugarcane 5.3 percent (32861 hectare). Among them highest area under Niphad Taluka 7000 hectare (22.37%), followed by Satana Taluka 3969 hectare (12.68%), Deola Taluka 3392 (10.83%), Kalwan Taluka 3350 hectare (10.71%) and Nashik Taluka was 3235 hectare (10.64%) area covered by Sugarcane Farming. In the Surgana Taluka wasn't take production of Sugarcane. Trimbak Taluka very low area under Sugarcane Crop which was 21 hectare (0.06%), followed by Peth Taluka 79 hectare (0.25%), Igatpuri Taluka 193 hectare (0.61%), Chandwad Taluka 253 hectare (0.8%), and Nandgaon Taluka 895 hectare (2.86%).

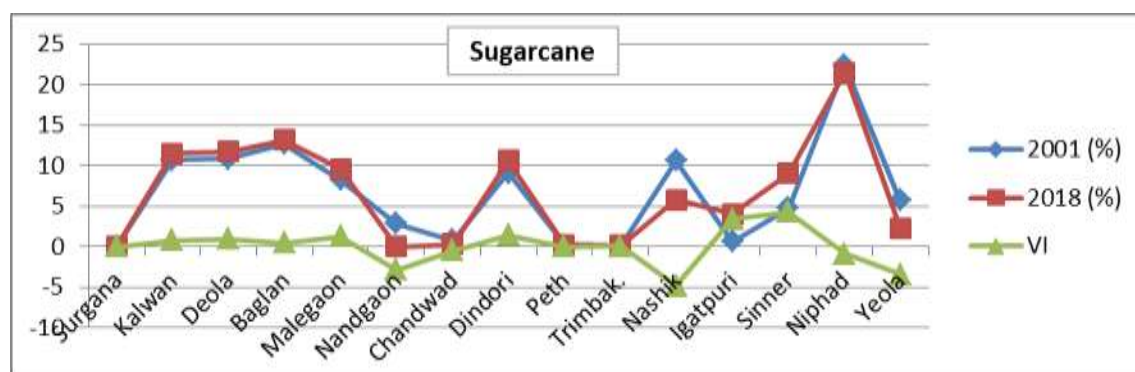
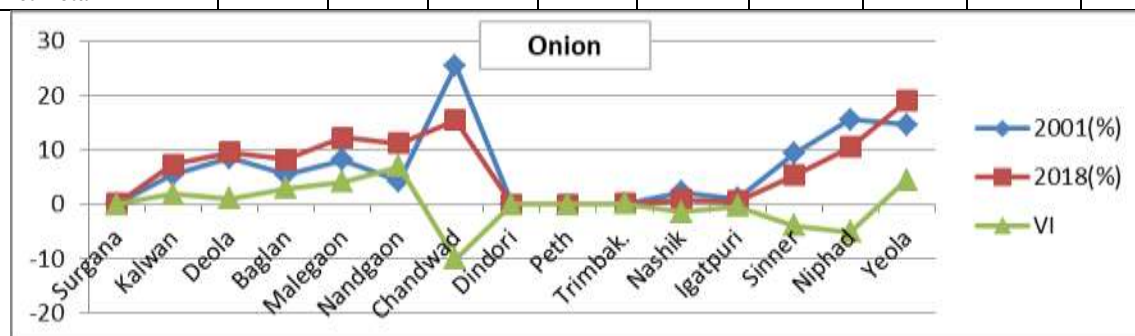
In 2018, 4.65 percent (20107 hectare) area was under the Sugarcane Crop. Highest area under Sugarcane Crop in the Niphad Taluka which as 4319 hectare (21.48%), followed by Satana Taluka 2644 hectare (13.14%), Deola Taluka 2367 hectare (11.77%), Kalwan Taluka 2311 hectare (11.49%) and Dindori Taluka 2132 hectare (10.6%). In this five Taluka was covered 13773 hectare area which was near about 68.48 percent area by Sugarcane Crop, remaining ten Taluka was covered only 31.52 percent area. in 2018 Nandgaon Taluka do not take production of Sugarcane due to the lack of water. Surgana Taluka was lowest 4 hectare (0.02%) area under Sugarcane Taluka. Followed by Peth Taluka 44 hectare (0.22%), Trimbak Taluka 51 hectare (0.16%), Chandwad Taluka 66 hectare (0.33%) and 459 hectare (2.28%) were land covered by Sugarcane Crop.

In 2001 Sugarcane Crop land was 5.3 percent (32861 hectare) and in 2018 Sugarcane Crop land was 4.65 percent (20107 hectare) area. Total area of Sugarcane crop was decrease up to 12754 hectare. Variation Index shows that Sinner (4.3%), Igatpuri (3.41%), Dindori

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

(1.46%), Malegaon (1.29%), Deola (0.94%), Kalwan (0.78%) and Satana (0.46%) were area increased from 2001 to 2018 year. But, Nashik (-4.86%), Yeola (-3.45%), Nandgaon (-2.86%), Niphad (-0.89%), Chandwad (-0.46%) and Peth (-0.03%) were area decreases from 2001 to 2018.

S. No.	Taluka	Onion					Sugarcane				
		2001	%	2018	%	VI	2001	%	2018	%	VI
1	Surgana	25	0.07	30	0.04	-0.03	0	0	4	0.02	0.02
2	Kalwan	1788	5.44	4945	7.27	1.83	3350	10.71	2311	11.49	0.78
3	Deola	2775	8.44	6460	9.47	1.03	3392	10.83	2367	11.77	0.94
4	Baglan	1780	5.41	5646	8.28	2.87	3969	12.68	2644	13.14	0.46
5	Malegaon	2666	8.11	8314	12.19	4.08	2592	8.28	1925	9.57	1.29
6	Nandgaon	1400	4.26	7660	11.23	6.97	895	2.86	0	0	-2.86
7	Chandwad	8380	25.5	10505	15.41	-10.09	253	0.8	66	0.33	-0.47
8	Dindori	0	0	0	0	0	2860	9.14	2132	10.6	1.46
9	Peth	0	0	0	0	0	79	0.25	44	0.22	-0.03
10	Trimbak.	5	0.015	24	0.03	0.015	21	0.06	51	0.16	0.1
11	Nashik	718	2.18	515	0.75	-1.43	3235	10.64	1163	5.78	-4.86
12	Igatpuri	331	1	377	0.55	-0.45	193	0.61	809	4.02	3.41
13	Sinner	3055	9.29	3566	5.29	-4	1485	4.74	1817	9.04	4.3
14	Niphad	5132	15.61	7170	10.52	-5.09	7000	22.37	4319	21.48	-0.89
15	Yeola	4806	14.62	12977	19.03	4.41	1667	5.73	459	2.28	-3.45
District Total		32861	100	68188	100		31291	100	20107	100	



3. Grapes

Grape is belonging to Vitaceae family. It is a prime commercial crop in the Nasik district, Maharashtra. The ideal climate is the Mediterranean climate for growing grape.

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

Generally required hot and dry climate for its growth and fruiting periods. Average temperature 15°C – 40°C suitable for its grow. It is grown in sub-tropical area in peninsular India. It is rich in sugar, calcium and phosphorus. It is well grown in well drained rich loamy soil with pH 6.5 to 7.0.

Nashik is a wine capital city in the India. In the year of 2001 Grapes Crop was covered 2.74 percent area (17027 hectare). Highest area under Grapes Crop in the Taluka of Niphad which was 8866 hectare (52.07%), followed by Nashik Taluka 3641 hectare (21.38%), Chandwad Taluka 1880 hectare (11.04%), and Satana Taluka was 611 hectare (3.58%) under the Grapes Crop. Surgana, Peth, Igatpuri Taluka were not take production of Grapes. Trimbak Taluka was very low area under Grapes crops, which as only 0.005 percent. Followed by Nandgaon Taluka 17 hectare (0.09%), Deola Taluka 84 hectare (0.49%), Malegaon Taluka 85 hectare (0.49%), Kalwan Taluka 158 hectare (1.16%) and Sinner Taluka 394 hectare (2.31%) were under Grapes Crop in the study area.

In the year of 2018, 6.83 percent (29498 hectare) area in the study area among them highest area under Grapes crop in the Niphad Taluka was 15582 hectare (52.82%), followed by Nashik Taluka 7154 hectare (24.25%), Chandwad Taluka 3205 hectare (10.87%), and Satana Taluka 1549 hectare (5.25%). Peth Taluka was very low area under Grapes Crop which was 7 hectare (0.02%), followed by Nandgaon Taluka 12 hectare (0.04%), Surgana Taluka 17 hectare (0.06%), Deola Taluka 53 hectare (0.18%), and Trimbak Taluka were lowest area under Grapes farming in the Nashik District.

According to this data in the year of 2018, area under Grapes Crops were increased up to 12471 hectare (4.9%). Especially in the Taluka of Niphad was increased area up to 6722 hectare from 2001 to 2018 year. Variation index shows that Nashik Taluka was highest positive changes up to 2.84 percent, followed by Satana (1.67%), Sinner (1.1%), Niphad Taluka (0.75%) and other hand Dindori Taluka goes in negative manner.

4. Tomatoes

Tomato is short period cash crop grown in Kharif, Rabbi and Zaid season. It is good growth and best fruit color in a 21° – 32°C temperature. It is cannot with stand frost and high humidity and less than 10°C temperature affect on tissues.

Tomato is cash crop grown in this study area. In the year 2001, 1.86 percent (11568 hectare) area was under Tomato Crop. Among them highest area seen in the Niphad Taluka which was 3047 hectare (26.33%), followed by Nashik Taluka 2571 hectare (22.22%), Dindori Taluka 1900 hectare (16.42%) and Chandwad Taluka 1465 hectare (12.66%). Surgana and Peth Taluka do not grow of Tomato. Trimbak Taluka was very low area under tomato crop which was 10 hectare (0.08%), followed by Malegaon Taluka 36 hectare (0.31%), Nandgaon Taluka 82 hectare (0.7%), Deola Taluka 101 hectare (0.87%) and Yeola Taluka was 197 hectare (1.7%) area cover by Tomato Crop.

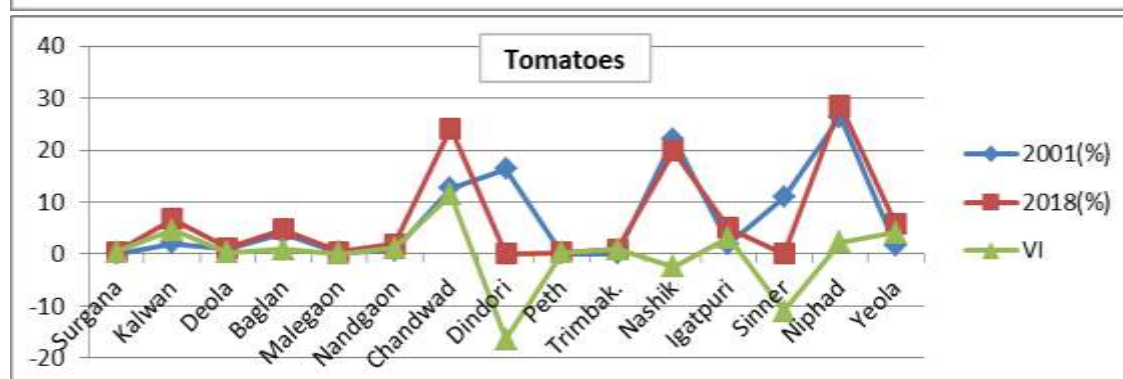
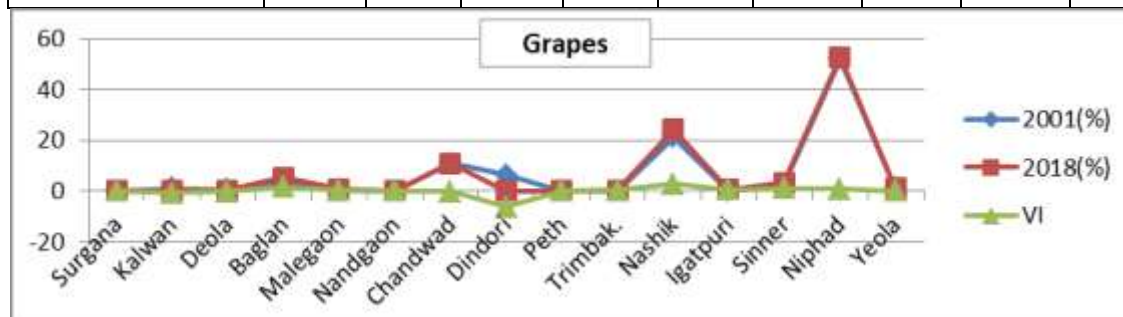
In the year of 2018, Tomato crop was 3.16 percent (13679 hectare) area under in the Nashik District. Niphad Taluka was highest area covered up to 3919 hectare (28.64%), followed by Chandwad Taluka 3300 hectare (24.12%), Nashik Taluka 2706 hectare (19.78%), Kalwan Taluka 916 hectare (6.7%), Yeola Taluka 802 hectare (5.86%), and Igatpuri Taluka 687 hectare (5.02%). Dindori and Sinner Taluka was very lowest area covered. Followed by Peth Taluka 37 hectare (0.27%), Malegaon Taluka 56 hectare (0.41%),

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

Surgana 60 hectare (0.44%), Trimbak Taluka 134 hectare (0.98%), and Deola Taluka was 161 hectare (1.18%) area under Tomato Crop.

From 2001 to 2018 land cover area was increased up to 1.3 percent by Tomato Crop. Variation index shows that Chandwad Taluka was highest area increased last eighteen year up to 11.46 percent. Followed by Kalwan Taluka 4.69 percent, Yeola Taluka 4.16 percent, Igatpuri Taluka 3.12 percent etc. Dindori Taluka decreased area up to 16.42 percent followed by Sinner Taluka 10.9 percent, and Nashik Taluka 2.44 percent.

S. N.	Taluka	Grapes					Tomatoes				
		2001	%	2018	%	VI	2001	%	2018	%	VI
1	Surgana	0	0	17	0.06	0.06	0	0	60	0.44	0.44
2	Kalwan	198	1.16	102	0.35	-0.81	233	2.01	916	6.7	4.69
3	Deola	84	0.49	53	0.18	-0.31	101	0.87	161	1.18	0.31
4	Satana	611	3.58	1549	5.25	1.67	444	3.83	643	4.7	0.87
5	Malegaon	85	0.49	230	0.78	0.29	36	0.31	56	0.41	0.1
6	Nandgaon	17	0.09	12	0.04	-0.05	82	0.7	258	1.89	1.19
7	Chandwad	1880	11.04	3205	10.87	-0.17	1465	12.66	3300	24.12	11.46
8	Dindori	1074	6.3	0	0	-6.3	1900	16.42	0	0	-16.42
9	Peth	0	0	7	0.02	0.02	0	0	37	0.27	0.27
10	Trimbak.	1	0.005	90	0.3	0.295	10	0.08	134	0.98	0.9
11	Nashik	3641	21.38	7154	24.25	2.87	2571	22.22	2706	19.78	-2.44
12	Igatpuri	0	0	176	0.59	0.59	220	1.9	687	5.02	3.12
13	Sinner	394	2.31	1008	3.41	1.1	1262	10.9	0	0	-10.9
14	Niphad	8866	52.07	15582	52.82	0.75	3047	26.33	3919	28.64	2.31
15	Yeola	176	1.03	313	1.06	0.03	197	1.7	802	5.86	4.16
District Total		17027	100	29498	100		11568	100	13679	100	



5. Cotton

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

Cotton is a Kharif crop which is mainly grown in tropical and non tropical area. It is very important fibre crops in India. It is not only used in the Cotton Textile Industry but also used in Vanaspati Oil Industry. Cotton seeds are also used as a part of a fodder for milch cattle for better milk production. It requires a temperature of 20°C to 30°C and it is grown in the areas having at least 210 frost free day in a year. It requires 50cm 100cm rainfall. It is also grown in less 50cm rainfall areas successful with irrigation facility available. It is grown very well in black soil therefore called 'Black Cotton Soil' due to its characteristics. Up to days cotton picking has not been mechanized therefore a lot of labour is required. In Indian Deccan Plateau the prime area of production of cotton.

Cotton one of the cash crop which was covered 1.39 percent (8655 hectare). Among them Malegaon Taluka was highest area under Cotton Crop which was 3994 hectare (46.14%), followed by Nandgaon Taluka 2600 hectare (30.04%), Yeola Taluka 1430 hectare (16.52%) and 1 hectare (0.01%). In the year 2018, 8.41 percent (36361 hectare) area was under Cotton Crop. Yeola Taluka was 17065 hectare (46.93%), followed by Malegaon Taluka was 15478 hectare (42.56%), Sinner Taluka 300 hectare (0.82%), Satana Taluka 75 hectare (0.2%) and 3 hectare (0.003%).

Last eighteen year Cotton Crops area increased up to 27706 hectare / 7.02 percent. Overall data shows that in the Nashik District was only five to six Taluka was produced Cotton Crop.

6. Peru / Guava / Guajava

Guava is most common fruit in India. It is good source of C vitamin, calcium and Phosphorus. It is well grown in tropical and sub-tropical climates. Average rainfall 100cm is suitable for its good quality production. It is deep friable and well drained soils are the best with pH 4.5 to 8.5.

In the year 2001, Peru was covered 0.2 percent (1230 hectare) area. Among them Dindori Taluka was highest area under Peru crop which was 628 hectare (51.05%), followed by Nashik Taluka 288 hectare (23.41%) and Niphad Taluka 132 hectare (10.73%). Surgana, Igatpuri, Peth, Trimbak and Sinner Taluka were not growing Peru. Deola Taluka was very lowest land which was only one hectare area (0.08%), followed by Kalwan Taluka 4 hectare (0.32%), Satana Taluka 16 hectare (1.3%), Malegaon Taluka 20 hectare (1.62%), and Nandgaon Taluka 20 hectare (1.62%).

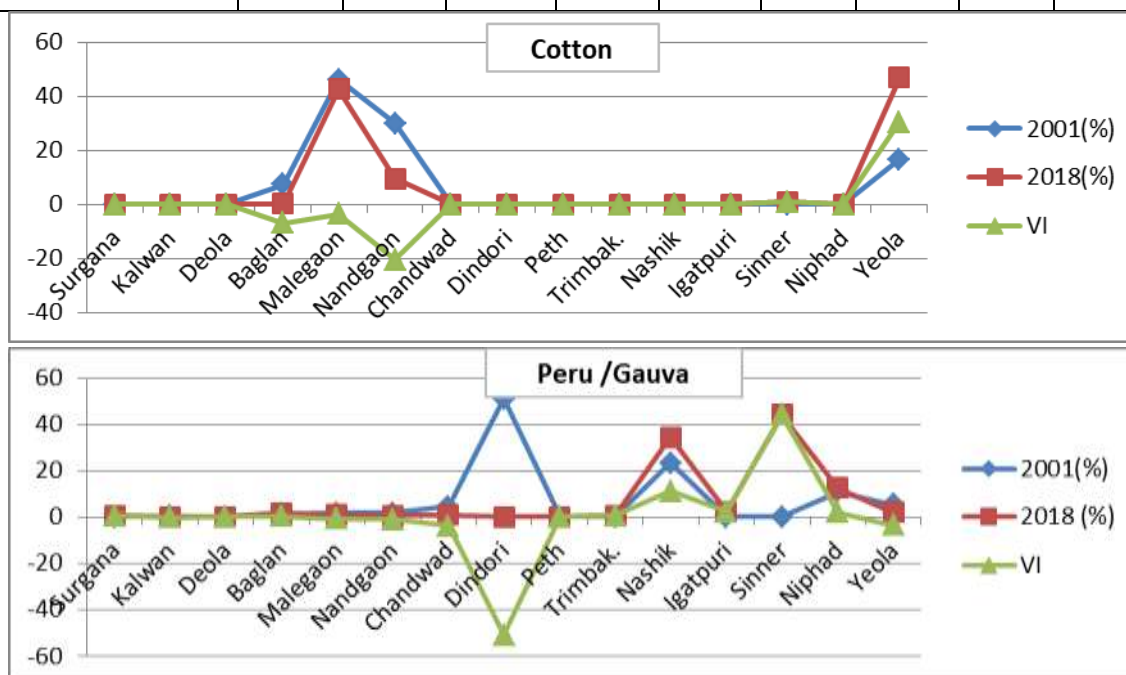
In the year 2018, 0.5 percent (2153) area was under Peru crop. Among them Sinner Taluka was having maximum area under Peru Crop which was 950 hectare (44.12%) and Nashik Taluka was 743 hectare (34.51%). In 2018, Surgana and Kalwan Taluka decreased area under Peru. Nandgaon Taluka lowest area under Peru which was 10 hectare (0.46%), followed by Trimbak Taluka 11 hectare (0.51%) and Chandwad Taluka was 15 hectare (0.7%).

From 2001 to 2018 area under Peru Crop was increased up to 923 hectare (0.3%).

S. N.	Taluka	Cotton					Peru / Gauva				
		2001	%	2018	%	VI	2001	%	2018	%	VI
1	Surgana	0	0	0	0	0	0	0	15	0.69	0.69
2	Kalwan	0	0	0	0	0	4	0.32	0	0	-0.32
3	Deola	1	0.01	3	0.008	-0	1	0.08	0	0	-0.08

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

4	Satana	630	7.27	75	0.2	-7.07	16	1.3	34	1.58	0.28
5	Malegaon	3994	46.14	15478	42.56	-3.58	20	1.62	16	0.74	-0.88
6	Nandgaon	2600	30.04	3440	9.46	-20.6	20	1.62	10	0.46	-1.16
7	Chandwad	0	0	0	0	0	55	4.47	15	0.7	-3.77
8	Dindori	0	0	0	0	0	628	51.05	0	0	-51.05
9	Peth	0	0	0	0	0	0	0	0	0	0
10	Trimbak.	0	0	0	0	0	0	0	11	0.51	0.51
11	Nashik	0	0	0	0	0	288	23.41	743	34.51	11.1
12	Igatpuri	0	0	0	0	0	0	0	48	2.23	2.23
13	Sinner	0	0	300	0.82	0.82	0	0	950	44.12	44.12
14	Niphad	0	0	0	0	0	132	10.73	270	12.54	1.81
15	Yeola	1430	16.52	17065	46.93	30.41	66	5.36	40	1.86	-3.5
District Total		8655	100	36361	100		1230	100	2153	100	



Conclusion

Millet, Rice, Groundnut, Wheat, Jawar, Maize are main food crops in the Nashik District. This all crops needful of the farmer for complete their primary needs. Onion, Sugarcane, Grapes, Tomato, Cotton and Guava are prime cash crops in this area. Other some cash crops also important grown in 'Kasmde' Belt such as Pomegranate. Some food grains also take crop for market purpose as like Maize and Groundnut. In 2001, 83.4 percent food crops are grown and 16.6 percent cash crops grown. In 2018 change this cropping pattern with 60.6 percent food crops grown and 39.4 percent cash crops taken by farmer. In short we are seen that, 2018 cash crops percentage are increased while food grains are decreases due to the market and profit purpose.

Crop	2001	%	2018	%	V.I.
Millet	336685	54.33	130436	30.2	-24.13
Rice	55355	8.93	41685	9.64	0.71
Groundnut	36293	5.85	23919	5.53	-0.32

Mr. Anil. C. Gaikwad, Prin. Dr. S. N. Nikam

Wheat	33876	5.46	33954	7.86	2.4
Jawar	28814	4.64	5971	1.38	-3.36
Maize	26021	4.19	26021	6.03	1.84
Onion	32861	5.3	68188	15.78	10.48
Sugarcane	31291	5.05	20107	4.65	-0.4
Grapes	17027	2.74	29498	6.83	4.09
Tomato	11568	1.86	13679	3.16	1.3
Cotton	8655	1.39	36361	8.41	7.02
Guava/Peru	1230	0.2	2153	0.5	0.3
Total	619676	100	431972	100	

In 2001, Nashik District was covered 619676 hector area by main crops; of these Millet crops was covered 54.33 percent area. It is highest in this year followed by Rice (8.93%), Groundnut (5.85%), Wheat (5.46%) and Sugarcane (5.05%). Peru having very lowest area covered 0.2 percent followed by Cotton (1.39%), Tomato (1.86), Grapes (2.74%) and Maize (4.19%).

In 2018, Nashik District was covered 431972 hector area by prime crops; of these Millet was covered highest area of 30.2 percent. Followed by Onion (15.78%), Cotton (8.41%), Rice (9.64%), Wheat (7.86%), and Grapes (6.83%) are main crops. Others crops are covered very low area in this District. Guava was covered 0.5 percent followed by Jawar (1.38%), Tomato (3.16%), Sugarcane (4.65%) and groundnut (5.53%).

Variation index shows that area of Millet crops was decreases up to -24.13 percent. Followed by, Jawar (-3.36%), Sugarcane (0.40%) and Groundnut (-0.32%). Some cropping area are increased which are Onion have 10.48 percent followed by Cotton (7.02%), Grapes (4.09%), wheat (2.4%) and Maize (1.84%). In short in this eighteen year's period are cropping pattern change to food grains to cash crops.

Due to the Globalization, modernization, Information Technology, development of fertilizers, Pesticides, a change the attitudes towards the agriculture in this study area change the trend of agriculture.

Extending agriculture land, increasing land productivity, soil conservation, improved seeds, pesticides, plant protection, and better agriculture tools, as well as changes in crop distribution and agro-based enterprises in the study region, all contribute to agriculture land use planning issues.

My findings suggest a small increase in cultivable area at the expense of an undesirable ecological sector. Land for non-agricultural uses has been steadily expanding, with much of it diverted from the ecological sector.

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