



“Geographical Study of Crop Diversification pattern in Ahmednagar District 2000-01 to 2015-16 (M.S)”

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Abstract

Varieties of crops are grown in the world where agriculture is traditionally practiced and most people work in the same business year after year. If the area of □□cultivable land is limited, the tendency of the farmers is to take various crops. There is competition of each crop for the area. 'The sharper the competition, the higher is the number of crops. On the contrary, there is no competition which means that there is a tendency towards Monoculture or Specialization' (Husain M. 1979). Supporters of the Green Revolution believe that, the contribution of inputs of irrigation, fertilizers, pesticides, improved seed and biotechnology contributes to crop diversity. However, in traditional farming, it is found that the farmers adopt crop diversification through their self-sufficiency mind-set even in adverse conditions like rain, drought and hail.

Therefore, the study of cropping diversification pattern is necessary for agricultural development and planning. The cropping pattern defines as the proportion of area under different crops at a point of time, whereas change in cropping pattern refers to change in area under different crops at two different points of time. The technique of crop diversification is a one of tools for understand cropping pattern in present study. Jasbir Singh's crop diversification method (1976) is applied to identify spatio-temporal changes in cropping pattern. Periodic maps showing crop diversity and special crops guide planners for agricultural development.

The main objective of present study is to identify crop diversification pattern in Ahmednagar district during 2000-01 and 2015-16. Tehsil is taken as basic unit of investigation. The study is based on secondary sources of data which is collected from socio-economics review and statistical abstracts of Ahmednagar district.

Key Words: Agriculture, Cropping Pattern, Crop Diversification.

Introduction:

Land is the most important natural resource of a country and it is base for agricultural production. Cropping pattern means the proportion of area under various crops at a point of time. Cropping pattern is a dynamic concept as it changes over space and time. The cropping patterns of a region are closely influenced by the geoclimatic, sociocultural, economic, historical and political factors (Husain M. 1996).

Crop diversification means rising of a variety of crops involving intensity of competition amongst field crops for cultivable land. “Keener the competition, higher the magnitude of the crop diversification and lesser the competition the greater will the trend towards specialization of monoculture farming where emphasis is on one or two crops” (Singh 1976). Crop diversification is a concept which is opposite to crop specialization. The farmers all over the world, especially in the developing country, try to grow several crops in their holdings in an agricultural year. “The combination of natural and economic factors also helps Crop diversity. Agriculture is believed to be stable due to Crop diversity. If a farmer plants more than one crop in a season in one region, one crop is not very profitable or damaged due to weather adversity, but the other crop does not cause complete loss to the farmer. Crop diversity is one way to reduce the risk of farm business (Salunke, 2015). The level of crop diversification depends on the geo-climatic, socioeconomic conditions and technological development in a region. In general, higher is the level of agricultural technology, lesser is the degree of diversification. Moreover, the rich farmers prefer to specialize in agricultural enterprise while the

poor and subsistent farmers are generally more interested in diversification of crops. The diversification in agriculture is also practiced with a view to avoid risk and uncertainty due to climate change (Husain M. 1996).

Agricultural development is depends on crop diversification pattern. The study of crop diversification pattern is important for agricultural planning. Changing pattern of crop diversification is a reliable index to understand agricultural development in study region. It will help in identifying weaker areas for agricultural planning.

Objectives:

1. To define regions of crop diversification in Ahmednagar district.
2. To identify spatio-temporal changes in crop diversification in Ahmednagar district.

Study area:

Geographically Ahmednagar district is the largest district in the state of Maharashtra. The total geographical area of the district is 17048 Sq. Km, which is 5.66 % of states land. It is divided into 14 tehsil with a total of 1585 villages. The total population of the district is 4543159, out of which 80 % is in rural areas. The district is situated in the central part of the state; the Geographical location of the district is 18021N to 19091N latitude and 730.9 E to 750.5 E longitudes. The district lies on the elevated table land of the Deccan trap, which has a general slope from west to east. The western sub-division of Akola is the highest part of the district. The district receives an average annual rainfall of 566 mm. The minimum and maximum temperature ranges between 140C to 440 C. (Figure No. 1)

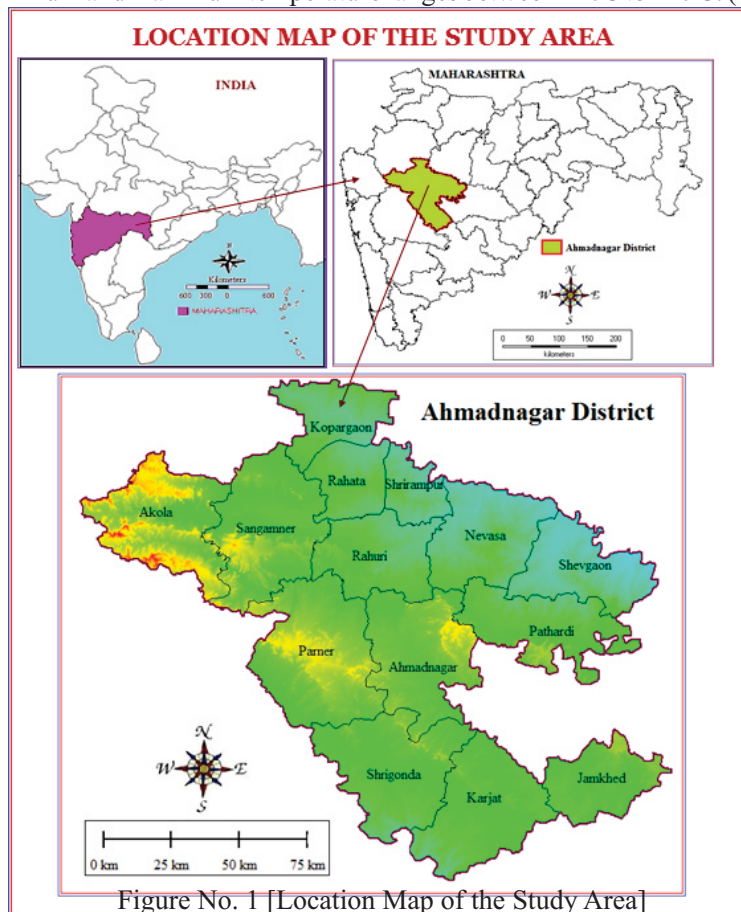


Figure No. 1 [Location Map of the Study Area]

Database and Methodology:

To fulfil the objectives, data has been collected from secondary sources i.e. socio-economic abstract of Ahmednagar district. The statistical data extracted on the basis of the sources referred of Ahmednagar district, during 2000-01 and 2015-16. Tehsil is taken as basic unit of investigation.

In the present study the main aim is to identify spatio-temporal change in cropping pattern of Ahmednagar District. For this, Jasbir Singh's (1976) crop diversification technique is used. The crops having more than 5% area are considered for calculation of crop diversification index.

Formula of crop diversification index (CDI) is as follows,

$$CDI = \frac{\text{Percentage of total harvested area under 'X' crop}}{\text{Number of 'X' crop}}$$

Whereas, 'X' crops are those which individually have occupied 5% or more area of the total harvested area.

Result and Discussion:

The percentage wise variations in spatial area under various crops are presented in the Annexure 1 (Year 2000-01) and Annexure 2 (Year 2015-16). The table (Table No.1) shows the crop diversification regions which have been identified according to range of crop diversification index (CDI).

1. Area of high crop diversification (below 15)
2. Area of medium crop diversification (15 to 20)
3. Area of low crop diversification (20 to 25)
4. Area of very low crop diversification (above 25)

Table No. 1 Crop Diversification Pattern (2000-01 and 2015-16)

Sr. No.	Crop Diversification Class	CDI Value	Name of the Tehsil : 2000-01	%	Name of the Tehsil : 2015-16	%
1	High	Below 15	-	0.00	Akola, Sangamner, Kopargaon, Rahta, Shrirampur, Newasa, Rahuri	50.00
2	Medium	15-20	Kopargaon, Rahta, Shrirampur, Newasa, Shevgaon, Nagar	42.86	Shevgaon, Pathardi, Shrigonda	21.42
3	Low	20-25	Akola, Sangamner, Rahuri, Shrigonda	28.57	Nagar, Parner	14.29
4	Very low	Above 25	Pathardi, Parner, Karjat, Jamkhed	28.57	Karjat, Jamkhed	14.29

Source - Compiled by Researcher

The table (Table No. 2) presents the pattern of crop diversification in the year 2000-01.

Table No. 2 Pattern of Crop Diversification in Year 2000-01

Sr. No.	Name of the Tehsil	Index of Crop diversification(CDI)	Crops in Competition for Diversification	Area in hectares	Area in %
1	Akola	21.83	Ri+Bj+Oc+Fd	79694	87.30
2	Sangamner	22.96	Wh+Jr+Bj+Su	101521	91.85
3	Kopargaon	15.12	Wh+Jr+Bj+Pu+Su+Fr&vg	59816	90.71
4	Rahta	15.80	Wh+Jr+Bj+Pu+Su+Fd	51237	94.83
5	Shrirampur	16.85	Wh+Jr+Bj+Pu+Su	40709	84.26
6	Newasa	18.35	Wh+Jr+Bj+Pu+Su	101346	91.78
7	Shevgaon	15.50	Jr+Bj+Pu+Su+Co+Os	83862	92.98
8	Pathardi	30.16	Jr+Bj+Pu	88011	90.48
9	Nagar	18.57	Jr+Bj+Oc+Pu+Os	111531	92.87
10	Rahuri	20.72	Wh+Jr+Bj+Su	58158	82.86
11	Parner	28.21	Jr+Bj+Pu	121568	84.64
12	Shrigonda	21.81	Wh+Jr+Pu+Su	98530	87.23
13	Karjat	29.04	Jr+Bj+Pu	97367	87.12
14	Jamkhed	30.66	Jr+Bj+Os	69067	91.99
	District	17.07	Wh+Jr+Bj+Pu+Su	1110682	85.33

(Source: Compiled by Researcher)

It is observed from the table (Table No. 2) that in year 2000-01 various crops are involved in the competition for the diversification. More the number of crops present per tehsil, more was the crop diversification can be observed in the respective tehsil. It can also be observed from the crop diversification index value. For example, in Kopargaon tehsil the six crops namely wheat, jowar, bajara, pulses, sugarcane, fruits and vegetables were in competition for diversification. Therefore, it is observed that the Kopargaon tehsil had more crop diversification as compared to other tehsils in the district. It is observed from the CDI value (i.e. 15.12). Similarly, the farmers of Rahata, Shrirampur, Newasa, Shevgaon and Nagar had more tendencies towards crop diversification rather than monoculture or specialisation. It is noticed that the CDI value for the overall district was 17.07. It represents that in year 2000-01, the Ahmednagar district shows medium crop diversification pattern.

The table (Table No. 3) presents the pattern of crop diversification in the year 2015-16.

Table No. 3 Pattern of Crop Diversification in Year 2015-16

Sr. No.	Name of the Tehsil	Index of Crop diversification(CDI)	Crops in Competition for Diversification	Area in hectares	Area in %
1	Akola	11.88	Ri+Wh+Bj+Oc+Pu+Su+Fr&vg+Os	40551	95.07
2	Sangamner	12.81	Wh+Jr+Bj+Pu+Su+Fr+vg+Fd	91034	89.68
3	Kopargaon	12.50	Wh+Bj+Oc+Pu+Su+Co+Os	66134	87.51
4	Rahta	13.17	Wh+Jr+Bj+Oc+Pu+Su+Os	51318	92.14
5	Shrirampur	14.13	Wh+Jr+Oc+Pu+Su+Os	45237	84.77
6	Newasa	14.27	Wh+Jr+Pu+Su+Co+Fd	84731	85.57
7	Shevgaon	18.18	Jr+Bj+Pu+Su+Co	65823	90.91
8	Pathardi	15.59	Wh+Jr+Bj+Pu+Su+Co	81685	93.55
9	Nagar	22.56	Wh+Jr+Pu+Fr&vg	114471	90.26
10	Rahuri	11.86	Wh+Jr+Bj+Pu+Su+Fr&vg+Co+Fd	53930	94.87
11	Parner	23.59	Wh+Jr+Pu+Fr&vg	93570	94.34
12	Shrigonda	18.49	Wh+Jr+Pu+Su+Fr&vg	98014	92.45
13	Karjat	26.33	Wh+Jr+Su	81865	78.97
14	Jamkhed	29.66	Jr+Pu+Co	85019	88.99
District		12.57	Wh+Jr+Bj+Pu+Su+Fr&vg+Co	1037207	87.97

(Source: Compiled by Researcher)

[Note: Ri: Rice, Wh: Wheat, Bj: Bajara., Oc: Other cereals, Pu: Pulses, Su: Sugarcane, Fr&vg: Fruits and vegetables, Os: Oil seeds, Fd: Fodder, Co: Cotton]

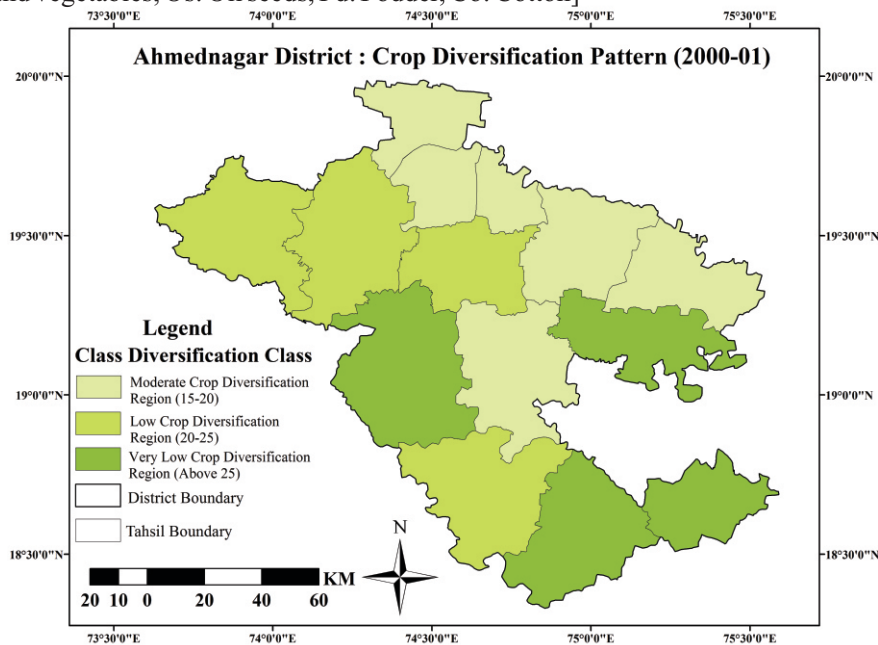


Fig. 2 Crop Diversification Pattern (2000-01)

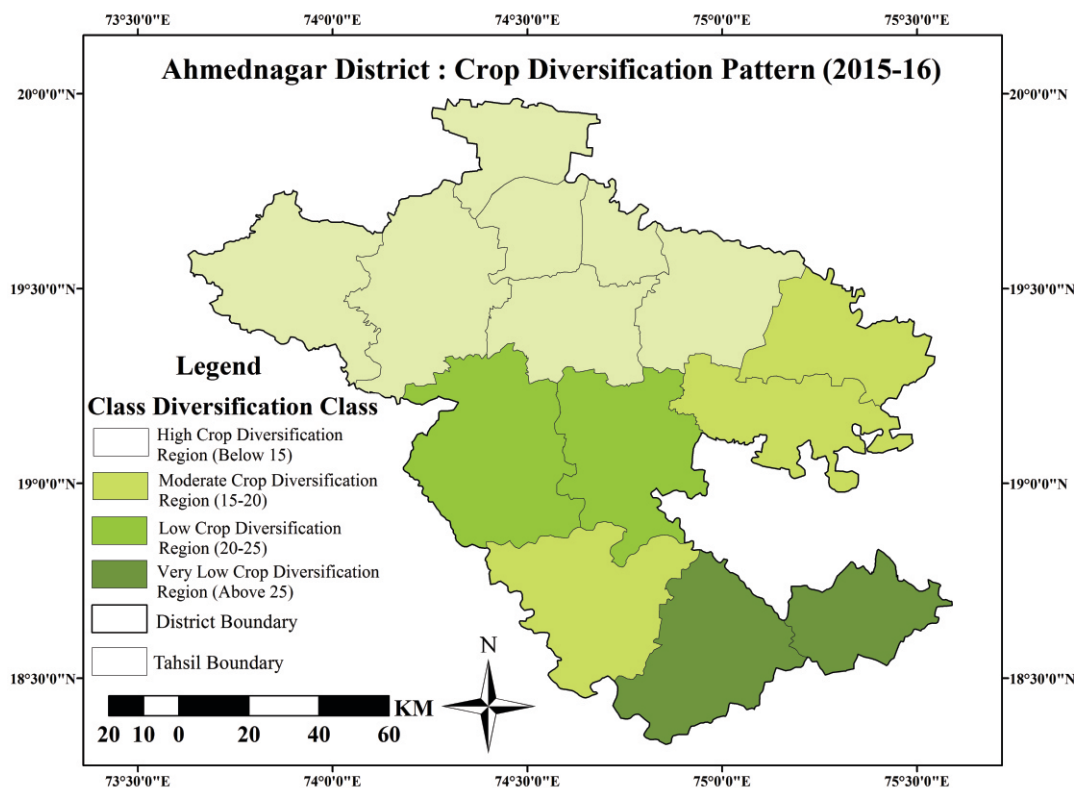


Fig. 3 Crop Diversification Pattern (2015-16)

It is observed from the table (Table No. 3) that, variety of crops has been grown in the district in year 2015-16 as compared to 2000-01. The tehsils Akola and Rahuri have highest number (8) of crops in competition namely rice, wheat, bajara, other cereals, pulses, sugarcane, fruits and vegetables, cotton, fodder and oilseeds. The newly introduced crops in the year 2015-16 are Fruits and vegetables and cotton in the district. It can be seen from the above table that, the overall CDI value of the district is decreased in year 2015-16, as compared to year 2000-01. It represents that the Ahmednagar district is under high crop diversification pattern in year 2015-16.

Crop Diversification Analysis:

The crop diversification means growing of multiple crops from the same land. For this use the formulas of Jasbir Singh (1976), crop diversification index values worked out and shown in the table (Table No. 1) and the figure (Figure No. 2) and also figure (Figure No. 3) for the year 2000-01 and 2015-16 respectively. The crop diversification regions in the district has been designated and interpreted as below.

High Crop Diversification Region (CDI below 15): In year 2000-01, it is observed that none of the tehsils have noticed high diversification of crops in district. However, in year 2015-16, seven tehsils (50%) has been observed under high diversification region viz, Akola, Sangamner, Kopargaon, Rahta, Shrirampur, Newasa and Rahuri. The main crops cultivated in the tehsils were wheat, bajara, other

cereals, pulses, sugarcane, fruits and vegetables, cotton, fodder and oilseeds. The rice crop is cultivated only in the Akola tehsil. It is observed that, these tehsils have high degree of diversification due to inputs to irrigation, fertilizers, pesticides, improved seed and biotechnology etc. This diversification is mostly due to the extension of canal irrigation. So the farmers of these tehsils have changed their attention from food grains to cash crops such as sugarcane, fruits and vegetables, cotton and oilseeds.

Moderate Crop Diversification Region (CDI 15 to 20): In the year 2000-01, six tehsils viz, Kopergaon, Rahta, Shrirampur, Newasa, Shevgaon and Nagar were belongs to moderate diversification region occupying 42.86% tehsils in the district. The major crops cultivated were wheat, bajara, other cereals, pulses, sugarcane, fruits and vegetables, cotton, fodder and oilseeds. However, in the year 2015-16 three tehsils viz, Shevgaon, Pathardi are Shrigonda are observed in moderate diversification category occupying 21.42% tehsils of the district. Due to the growth of area under irrigation, the area under cash crops has increased in these tehsils.

Low Crop Diversification Region (CDI 20 to 25): In the year 2000-01 four tehsils viz, Akola, Sangamner, Rahuri and Shrigonda comprising 28.57% tehsils are observed under low crop diversification region. However, in the year 2015-16, only two tehsils viz, Nagar and Parner are observed under this category which contributes 14.29% tehsils of the district.

Very Low Crop Diversification Region (CDI above 25): In the year 2000-01, four tehsils viz, Pathardi, Parner, Karjat and Jamkhed occupying 28.57% tehsils are observed in very low crop diversification region. However, in year 2015-16, only two tehsils viz, Karjat and Jamkhed are observed under this region which contributes 14.29% tehsils of the district. The main reason behind the low and very low crop diversification is the limited irrigation facilities, very scanty rainfall and poor soil quality. Therefore, mainly food grain crops are grown in these tehsils like wheat, jowar, pulses etc.

Conclusion:

The spatio-temporal changes in crop diversification of Ahmednagar district is drawn by using Jasbir Singh's crop diversification method. The results of crop diversification index shows that the tehsils are shifting towards diversification rather than specialisation due to development in agricultural technologies. The highest diversification is found in Akola, Sangamner, Kopergaon, Rahta, Shrirampur, Newasa and Rahuri tehsil in 2015-16 whereas lowest diversification was observed in Parner, Karjat and Jamkhed tehsil. The newly introduced crops in the year 2015-16 are Fruits and vegetables and cotton in the district. The considerable change in diversification is observed in the tehsil Akola, Sangamner and Rahuri as they shifted from low to high level of diversification. It is interesting to note that Pathardi tehsil is shifted from very low to moderate level of crop diversification. The Crop Diversity Index is helps in understanding the relationship between the number of crops and their relative importance. Periodic maps showing crop diversity and special crops guide planners for agricultural development.

This study is important for planners and researchers for sustainable agricultural development.

**Annexure No. 1
Tehsil wise index of crop diversification in Ahmednagar district (2000-01)**

Name of Tehsil	Area under different crop (Area in %) 2000-01											CDI Index	
	Rice	Wheat	Jowar	Bajara	Other cereals	Pulses	Sugarcane	Fruits & Vegetables	Cotton/Fibre	Oilseed	Fodder		spices
Akola	10.35	1.61	0.05	26.48	6.09	3.24	2.86	3.61	0.00	1.31	44.38	0.02	21.83
Sangmner	0.00	5.54	9.64	68.30	0.42	3.49	8.37	2.55	0.39	0.18	0.94	0.18	22.96
Kopargaon	0.04	8.90	19.37	41.25	0.97	7.93	8.05	5.21	0.87	2.60	4.51	0.30	15.12
Rahta	0.02	11.38	22.91	40.75	0.99	6.00	8.53	3.12	0.71	0.07	5.25	0.27	15.80
Shrirampur	0.04	16.55	24.39	19.22	1.07	7.95	16.13	4.11	1.88	4.44	3.84	0.38	16.85
Newasa	0.00	10.09	24.96	30.24	2.65	7.90	18.58	1.96	0.80	1.42	0.81	0.59	18.35
Shevgaon	0.00	4.77	30.26	37.53	0.29	7.80	6.82	0.85	5.05	5.52	0.88	0.23	15.50
Pathardi	0.00	1.50	32.97	52.43	1.15	5.08	2.79	1.59	0.13	1.71	0.43	0.22	30.16
Nagar	0.17	3.68	50.91	15.26	8.73	11.50	0.39	1.02	0.04	6.47	1.65	0.18	18.57
Rahuri	0.00	19.85	16.90	23.88	1.55	4.54	22.23	4.58	0.43	0.99	4.81	0.24	20.72
Parner	0.06	3.19	51.47	23.98	0.55	9.18	1.13	4.68	0.03	3.15	2.27	0.31	28.21
Shrigonda	0.00	10.84	63.54	3.44	0.49	6.26	6.59	4.33	0.02	3.08	1.10	0.31	21.81
Karjat	0.00	2.62	70.30	7.99	0.23	8.82	2.32	1.38	0.04	4.45	1.55	0.30	29.04
Jamkhed	0.00	1.76	60.52	19.49	0.85	2.82	0.39	0.42	0.00	11.98	0.67	1.10	30.66
Total	0.75	6.45	36.67	28.69	1.98	6.84	6.68	2.74	0.64	3.37	4.87	0.32	17.07

(Source: Computed by researcher)

**Annexure No. 2
Tehsil wise index of crop diversification in Ahmednagar district (2015-16)**

Name of Tehsil	Area under different crop (Area in %) 2015-16											CDI Index	
	Rice	Wheat	Jowar	Bajara	Other cereals	Pulses	Sugarcane	Fruits & Vegetables	Cotton/Fibre	Oilseed	Fodder		Spices
Akola	25.62	8.88	0.92	7.87	5.44	12.54	12.56	9.59	0.00	12.56	4.02	0.00	11.88
Sangmer	00.00	12.30	14.51	32.83	4.84	9.62	8.06	5.44	1.64	3.84	6.92	0.00	12.81
Kopargaon	00.00	11.17	4.64	5.91	11.67	8.83	23.61	3.97	5.07	21.25	3.88	0.00	12.50
Rahta	00.00	12.28	8.89	8.24	6.91	10.26	27.63	1.36	1.75	17.95	4.73	0.00	13.17
Shrirampur	00.00	15.80	14.88	2.83	6.71	13.57	18.02	4.75	3.49	15.79	4.16	0.00	14.13
Newasa	00.00	13.75	9.83	3.92	2.52	13.00	28.45	4.85	13.41	3.12	7.15	0.00	14.27
Sheygaon	00.00	3.11	29.71	7.45	0.34	7.78	15.98	3.37	30.00	0.28	1.98	0.00	18.18
Pathardi	00.00	7.11	33.29	11.86	00.00	9.56	7.09	4.06	24.65	1.60	0.78	0.00	15.59
Nagar	00.00	6.69	67.02	3.06	1.04	9.98	1.52	6.56	0.96	1.73	1.44	0.00	22.56
Rahuri	00.00	18.99	26.52	6.82	2.21	17.81	6.35	7.38	5.21	2.93	5.78	0.00	11.86
Parner	00.00	8.26	68.49	2.86	0.07	9.70	00.00	7.89	0.00	0.76	1.97	0.00	23.59
Shrigonda	00.00	8.60	54.57	1.80	2.19	6.98	12.75	9.54	1.15	0.04	2.38	0.00	18.49
Karjat	00.00	6.55	65.79	4.27	4.67	4.99	6.64	3.44	2.14	0.13	1.38	0.00	26.33
Jamkhed	00.00	3.11	60.58	1.96	0.85	10.51	0.87	0.42	17.89	2.47	1.34	0.00	29.66
Total	0.93	9.22	37.75	7.29	3.13	9.92	10.98	5.20	7.62	4.73	3.23	0.00	12.57

(Source: Computed by researcher)

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