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Extent of crop diversification in selected tahsils of Nagpur division

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Abstract

Extent of crop diversification in the Nagpur division had been analyzed by collecting secondary data for time period from 2003-04 to 2015-16 for selected tahsils of Nagpur division by using Herfindahl index (HI). It was revealed from the study that the HI index of Wardha, Nagpur and Chandrapur districts were less than 0.40 shows diversification whereas HI index of Bhandara, Gondia and Gadchiroli districts above 0.50 which shows specialization in cropping pattern

Keywords: diversification, Herfindahl

Introduction

Agriculture is the backbone of Indian economy. It depends mostly on unpredictable behavior of monsoon. Indian farming is therefore not remunerative. India possesses 328 million hectares of land, out of which 141 million hectares is under cultivation and 142 million hectares under forest, pastures and waste land is uncultivable, fallows grooves etc. sixty-eight million hectares land has access to irrigation and over fifty-three percent area of the cultivable land is under rain fed cultivation.

Crop diversification is a strategy to maximize the use of land, water and other resources and for the overall agricultural development in the country. It provides the farmers with viable options to grow different crops on their land. The diversification in agriculture is also practiced with a view to avoid risk and uncertainty due to climatic and biological vagaries. It minimizes the adverse effects of the current system of crop specialization and monoculture for better resource use, nutrient recycling, reduction of risk and uncertainty and better soil conditions. It also provides better economic viability with value added products and improvement of ecology. Crop diversification in agriculture in India is taking place vertically or horizontally, mostly due to market forces and occasionally due to domestic needs.

Diversification is an integral part of the process of structural transformation of an economy, diversification in agriculture can mean any of the two situations. First situation says that a shift from less profitable crop or enterprise to more profitable crop or enterprise. Secondly crop diversification means using resources in diverse but complementary activities. The first type can be viewed as a farmer's response to relative price signals to adjust to the market conditions. The second type hints towards efficient allocation of resources.

Methodology

Selection of Area

The study has been confined to the Nagpur division of Vidarbha region of Maharashtra State. For this six districts of Nagpur division namely, Wardha, Nagpur, Bhandara, Gondia, Chandrapur and Gadchiroli were selected and from each district four tahsils were selected randomly.

Selection of Crops

For the present study, major crops of selected tahsils were selected. These crops occupied more than 90 per cent of the gross cropped area in the respective tahsils. Thus, study was confined to major crops with an assumption that excluded crops do not affect cropping pattern and in turn would not vitiate main conclusions of the study.

Table 1: Tahsil-wise selected crops of Nagpur division

Sr. No.	Selected Tahsils	Selected Crops
1	Arvi, Karanja, Ashti, Wardha	Kharif jowar, Tur, Cotton Soybean, Wheat, Gram.
2	Savner, Katol, Narkhed, Kalmeshwar	Kharif jowar, Tur, Cotton Soybean, Wheat, Gram.
3	Bhandara, Mohadi, Paoni, Lakhandur	Paddy, Tur, Mung, Soybean, Wheat, Gram, linseed.
4	Gondia, Deori, Amgaon, Sadak Ar.	Paddy, Tur, Mung, Kharif Sesamum, Wheat, Gram, linseed.
5	Bhadravati, Chimur, Rajura, Korpana	Paddy, Tur, Cotton, Soybean, Rabi jowar, Wheat, Gram, linseed.
6	Gadchiroli, Kurkheda, Armori, Charmoshi	Paddy, Tur, Kharif Sesamum, Soybean, Wheat, Gram, linseed.

Analytical tools and technique

The extent of crop diversification was studied by using Herfindahl index. This index was calculated for time period from 2003-04 to 2015-16 for selected tahsils of Nagpur division. The index is defined as below.

Herfindahl Index (HI)

Herfindahl index (HI) was computed by taking sum of squares of acreage proportion of each crop to the total cropped area.

$$HI = \frac{N}{\sum_{i=1}^N Pi^2}$$

Where,

N = The total number of crops

Pi = Proportion of acreage under ith crop to total cropped area

The value of HI is bounded by zero (perfect diversification) and one (complete specification). The value of HI approaches zero as 'N' becomes large and takes value one when only one crop is cultivated.

Results and discussion

The approach used in this study for crop diversification is to utilize a variety of measure of crop diversification, which connects the extent of dispersion and concentration of activities in a given time and space. The extent of crop diversification was studied by using Herfindahl index. This index was calculated for time period from 2003-04 to 2015-16 for each tahsil of Nagpur division.

1. Measurement of crop diversification in selected tahsil of Wardha district.

Measurement of crop diversification in selected tahsils of Wardha district were presented in Table 2

Table 2: Measurement of crop diversification in selected tahsil of Wardha district

Sr. No.	Year	Arvi	Karanja	Ashti	Wardha
1	2003-04	0.2687	0.3223	0.2678	0.2241
2	2007-08	0.3226	0.4090	0.3694	0.2816
3	2011-12	0.2982	0.3725	0.3005	0.3069
4	2015-16	0.2915	0.3517	0.2868	0.2981

The Table 2. shows that in all tahsils of Wardha district, the diversification index varied from 0.2241 (corresponding to Wardha tahsil during the year 2003-04) and 0.4090 (corresponding to Karanja during the year 2007-08). Which shows diversification took place in selected tahsils of Wardha district.

Results are in conformity with study made by Pattanayak and Nayak (2011) [3] regarding Koraput, Ganjam, Kalahandi, Dhenkanal were least specialized districts

2. Measurement of crop diversification in selected tahsil of Nagpur district.

Measurement of crop diversification in selected tahsils of Nagpur district were presented in Table 3.

Table 3: Measurement of crop diversification in selected tahsil of Nagpur district

Sr. No.	Year	Savner	Katol	Narkhed	Kalmeshwar
1	2003-04	0.2178	0.2995	0.2520	0.2647
2	2007-08	0.2409	0.3386	0.2844	0.2787
3	2011-12	0.2124	0.3128	0.2594	0.3227
4	2015-16	0.2219	0.3702	0.2584	0.3334

From the Table 3. it was revealed that in all selected tahsils of Nagpur district, the diversification index varied from 0.2124 (corresponding to Savner tahsil during the year 2011-12) and 0.3702 (corresponding to Katol during the year 2011-12). Which denotes diversification took place in selected tahsils of Nagpur district. Similar results were found by Bhattacharyya (2008) [1] studied that diversification was more prominent in rainfed areas than in irrigated zones.

3. Measurement of crop diversification in selected tahsil of Bhandara district.

Measurement of crop diversification in selected tahsils of Bhandara district were presented in Table 4.

Table 4: Measurement of crop diversification in selected tahsil of Bhandara district

Sr. No.	Year	Bhandara	Mohadi	Paoni	Lakhandur
1	2003-04	0.5699	0.7045	0.5861	0.8047
2	2007-08	0.5234	0.7166	0.5107	0.7495
3	2011-12	0.5490	0.7261	0.5304	0.6809
4	2015-16	0.4916	0.6878	0.4762	0.6249

From the Table 4 it was observed that in all selected tahsils of Bhandara district, the diversification index ranges from 0.4762 (corresponding to Paoni tahsil during the year 2015-16) and 0.8047 (corresponding to Lakhandur during the year 2003-04). Which denotes specialization took place in selected tahsils of Bhandara district. Similar results indicated by Yadav *et al.* (2010) [5] regarding diversification indices for all crops, oilseed and vegetables increased over the period in Konkan region.

4. Measurement of crop diversification in selected tahsil of Gondia district.

Measurement of crop diversification in selected tahsils of Gondia district were presented in Table 5

Table 5: Measurement of crop diversification in selected tahsil of Gondia district

Sr. No.	Year	Gondia	Deori	Amgaon	Sadak Ar.
1	2003-04	0.8468	0.8162	0.7483	0.8119
2	2007-08	0.8385	0.8046	0.7891	0.7302
3	2011-12	0.8496	0.7687	0.7643	0.7347
4	2015-16	0.8734	0.7567	0.7412	0.6818

In case of Gondia district from the Table 5 it was observed that in all selected, the diversification index ranges from 0.6818 (corresponding to Sadak Ar. tahsil during the year 2015-16) and 0.8734 (corresponding to Gondia tahsil during the year 2015-16). Which denotes high degree of specialization took place in selected tahsils of Gondia district. Nayak (2016) [2] found similar results in Odisha state. The

study revealed that most of the districts in Odisha are experiencing a lateral movement towards crop specialization.

5. Measurement of crop diversification in selected tahsil of Chandrapur district.

Measurement of crop diversification in selected tahsils of Chandrapur district were presented in Table 6

Table 6: Measurement of crop diversification in selected tahsil of Chandrapur district

Sr. No.	Year	Bhadravati	Chimur	Rajura	Korpana
1	2003-04	0.1973	0.2729	0.2207	0.2048
2	2007-08	0.2263	0.2551	0.2603	0.2666
3	2011-12	0.1960	0.2958	0.3142	0.3057
4	2015-16	0.1982	0.2458	0.3356	0.3052

In Chandrapur district Table 6 revealed that in all selected tahsil, the diversification index Varied from 0.1960 (corresponding to Bhadravati tahsil during the year 2011-12) and 0.3356 (corresponding to Rajura tahsil during the year 2015-16). Which denotes high degree of diversification took place in selected tahsils of Chandrapur district. Results are in conformity with study made by Shiyani and Pandya (1998) [4] studied the comparison of crop diversification by sub-zones

revealed that Sub-zones II and III ranked first and second respectively in higher level of crop diversification continuously after 1970-71.

6. Measurement of crop diversification in selected tahsil of Gadchiroli district.

Measurement of crop diversification in selected tahsils of Gadchiroli district were presented in Table 7.

Table 7: Measurement of crop diversification in selected tahsil of Chandrapur district

Sr. No.	Year	Gadchiroli	Kurkheda	Armori	Chamorshi
1	2003-04	0.8160	0.7978	0.8392	0.6215
2	2007-08	0.8215	0.7831	0.7881	0.6354
3	2011-12	0.7742	0.7486	0.8063	0.5265
4	2015-16	0.7801	0.7441	0.8066	0.5322

From the Table 7 it was observed that in all selected of Gadchiroli district, the diversification index Varied from 0.5265 (corresponding to Chamorshi tahsil during the year 2011-12) and 0.8392 (corresponding to Armori tahsil during the year 2003-04). Which shows Specialization took place in selected tahsils of Gadchiroli district. Similar results were found by Pattanayak and Nayak (2011) [3] regarding Balasore, Sambalpur were the highly specialized districts in Odisha state.

Conclusions

1. The result of herfindahl index denotes that Wardha, Nagpur and Chandrapur district shows diversification i.e. farmers of respective district utilized mix cropping for avoiding risk in agriculture production.
2. But Bhandara, Gondia and Gadchiroli district shows high degree specialization in cropping pattern which denote the farmers of respective district concentrate on sole crop i.e. paddy. So efforts may be made on cultivation of mixed cropping to minimize the risk in agriculture production over the period of time.

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