



Comparative Study on Crop Diversification in Tribal and Non-tribal Area of Chhattisgarh, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This paper aims to measure crop diversification for a uniform data set of 21 year in tribal and non-tribal area which includes eight districts of Chhattisgarh state of India namely Bastar, Kondagaon, Balrampur and Surguja (In tribal region) and Raipur, Rajnandgaon, Durg and Dhamtari (in Non-tribal region). At the same time it focuses on status and changing pattern of crop diversification in the districts with a comparative outlook of both. Data used for the study were collected from year 2001 to 2022 and whole study was divided in to seven periods and separate analysis was done for all period. Simpson index were used to measure the crop diversification in the districts for comparative study. Results of the study shows complete diversification was found in the tribal area in all period through all index and likewise in Surguja and Balrampur district crop specialization was found more than Durg and Raipur districts of non-tribal area. During the study I was found that higher indices observed in the tribal area than non-tribal area. The results have revealed that in almost all crops group very low diversification indices were observed. The study has suggested that despite plenty of natural resources available in the state, the economic improvement of farmers is in

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infancy. Pre-requisite infrastructural facilities like cheap sources of irrigation water (assured irrigation as the monsoon in the present decade had been erratic and scanty rainfall) and extension of technological know-how (quality seeds and fertilizers), may acts as catalyst in diversification of agriculture towards high-valued crops. These developmental efforts may be helpful in fetching good incomes by the cultivators.

Keywords: Diversification; diversification indices; simpson index.

1. INTRODUCTION

“Crop diversification has remained widely discussed issue for a long period of time and the researchers have been trying to relate diversification with developmental prospect” [1]. “Many studies have advocated various methods of diversification of land use and other resources for a sustainable agricultural growth and rural livelihood. Crop diversification is one of the means to minimize the risk due to climatic change and maximize the use of land and is measured by proportion of area under various crops [2-4]. The diversification in agriculture is also adopted for avoiding or minimizing the adverse effects of current system of crop specialization and monoculture for better use of resources, recycling of nutrient, regaining soil fertility [5,6]. It also provides better economic viability with value added products and improvement of ecology” [7].

“Changing climatic conditions like erratic and scanty rainfall, depletion of water resources, decline in net sown area, the existing cropping pattern is becoming less productive. Cultivators are moving towards crop intensification through mix cropping and including high value crops such as horticultural crops as well as medicinal and aromatic plants as a climatic change adaptation strategy” [7].

“In general, diversification is governed by market forces, advancement in technology (access to inputs and implements), agro-climatic condition, development of infrastructure (communication, marketing and storage facilities) and institutional factors like government’s policy, protection and risk” [1].

“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 practised 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 risks and uncertainty and better soil conditions. It also provides better economic viability with value-added products and improvement of ecology” [8-10]. The specific objectives of this paper were: to comparative analyze of the nature and extent of crop diversification in tribal and non-tribal area of Chhattisgarh [7].

2. MATERIALS AND METHODS

The simpson Diversification Index has been constructed for state, district and farm household level, for districts, divisions and state, Diversity Index is constructed for twenty years i.e. from 2001-02 to 2021-22. For farm household level, memory recall method was used to find out the change in area, crops, crop groups and their varieties in the selected districts i.e. Raipur, Durg, Dhamtari and Rajnandgaon (Non-tribal area) and Bastar, Kondagaon, Balrampur and Surguja districts (Tribal area). To examine the nature of crop diversification within different crop groups and within all crops taken together, the Simpson Diversity Index has been worked out for different crop such as overall crops, annual and Seasonal crops, foodgrains crops, cereal crops, pulses crops, oilseed crops. Growth rates were also worked out for the diversification index over the study period (2001-02 to 2021-22). The index ranges between 0 and 1. If there exists complete specialization, then index moves towards 0. The index is easy to compute and interpret, as follows:

$$D = 1 - (\sum n(n-1) / N(N-1))$$

Where:

n = number of individuals of each crops

N = Total number of Crops

3. RESULTS AND DISCUSSION

For analyses of Simpson Index (SI), the whole study period (2001-02 to 2021-22) has been

classified into 7 sub-periods, considering a periodicity of 3 years, namely, Period 1: 2001-03; Period 2: 2004-06; Period 3: 2007-09; Period 4: 2010-12; Period 5: 2013-15; Period 6: 2016-18 and Period 7: 2019-22. So in this section an attempt is made to analyze the nature and extent of crop diversification at districts and state level. At districts and state level index for different crop groups viz. overall crops (kharif and rabi crops), paddy, pigeonpea, maize, green gram, sesame, minor millets, soybean, black gram, mustard and rapeseed, linseed, wheat, chickpea and lathyrus are measured and quantified using Simpson Diversification Index at secondary data from 2001-02 to 2021-22.

In order to present area allocation among various crops cropping pattern changes has also been analysed for the two periods i.e.2001-02 and 2021-22.

The results of Simpson Diversification index for every crop group at districts and state level are presented in two categories: (1) first give the changes in diversification index over the period of 11 years and in second one (2) a summary of diversification index, growth rate of

diversification index along with coefficient of variation.

3.1 Crop Diversification Index of kharif Crops in Tribal Area and Non-tribal Area

SI indices were obtained annually and periodically for the eight crops including paddy, pigeonpea, maize, green gram, sesame, minor millets,soybean and black gram,. To compare the crop diversification indices in tribal and non-tribal area Table 1 and Fig. 1 has been studied. The table depicts that tribal area is more diversified than the non-tribal area.

3.2 Crop Diversification index of Rabi Crops in Tribal Area and non-tribal area

SI indices were obtained annually and periodically for the five crops namely mustard and rapeseed, linseed, wheat, chickpea and lathyrus. To compare the crop diversification indices in tribal and non-tribal area Table 2 and Fig. 2 has been studied. The table depicts that tribal area is more diversified than the non-tribal area.

Table 1. Crop diversification in overall area during Kharif season

Area	Districts	Simpson diversification index
Tribal area	Bastar	0.858
	Sarguja	0.972
	Balrampur	0.867
	Kondagaon	0.751
Non-tribal area	Raipur	0.223
	Rajnandgaon	0.407
	Durg	0.123
	Dhamtari	0.286

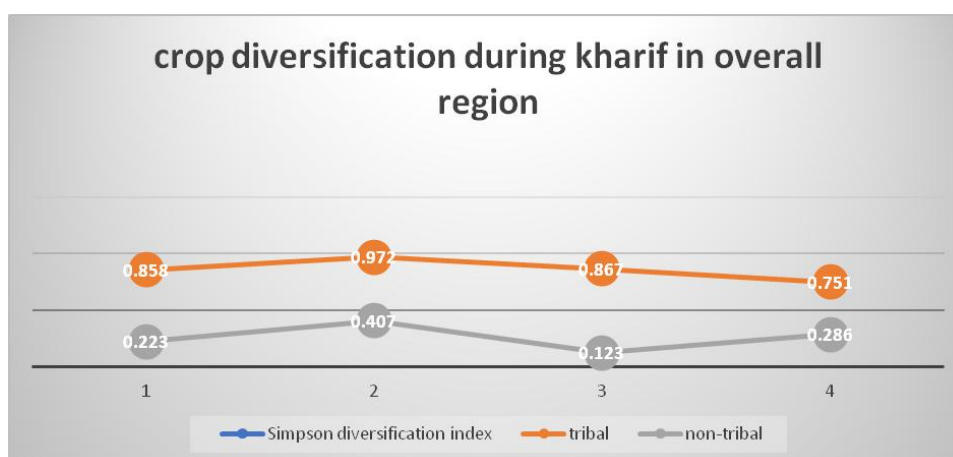


Fig. 1. Crop diversification in overall area during kharif season

Table 2. Crop diversification in overall area during Rabi season

Area	Districts	Simpson diversification index
Tribal area	Bastar	0.599
	Sarguja	0.712
	Balrampur	0.664
	Kondagaon	0.679
Non-tribal area	Raipur	0.538
	Rajnandgaon	0.286
	Durg	0.522
	Dhamtari	0.599

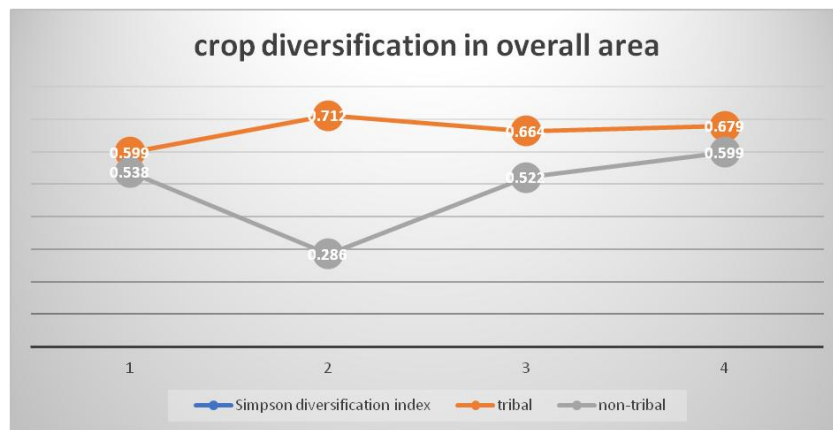


Fig. 2. Crop diversification in overall area during Rabi season

4. CONCLUSION

On the basis value of Simpson index maximum proportion we can concludes that Surguja and Balrampur district from tribal area shows higher diversification than Raipur and Durg district of non-tribal area from 2001 to 2022. It might be due presence of less cultivated area, no adequate facilities of irrigation, low marketing and infrastructural facilities and lack of awareness of government policy and programs in non-tribal area. That's why still they were in crop specialization mainly base on livestock's and its products. From the above results we can say that simpson index were found higher in tribal area than non-tribal area. Geographical location of both the regions was totally different and results also vary in both. On the basis of this we can also concludes that the degree of diversification is not evenly distributed over the districts in the state. While some of the districts are picking up diversification quite rapidly others are lagging behind (supported by Bhattacharyya 2008). This might be because of the fact that even though the state or district has achieved self-sufficiency in staple food the emphasis is still focused towards increasing production of rice.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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