
ORIGINAL ARTICLE

Temporal Study of Land utilization pattern and Crop
Diversification in India

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ABSTRACT

The total geographical area of India is 328.73 million hectares (mha) out of that 307.82 mha area reported for land utilization (2015). India is self-sufficient in food grain production and with about 284 million tones food grains stand second largest food grains producer in the world (2019). India already achieved food security but for the matter of nutritional security still far behind the target line. To achieve the nutritional security crop diversification plays an important role (Ebert). Incorporation of high valued crops in nutrition as well as remuneration to traditional crops. The data has been collected from various secondary sources. Five decadal data of land utilization and percentage area covered by different food and non-food crops have been taken for this research. To analyze the temporal change in crop diversification Herfindahl Index (HI) was used (Malik). During 1950-51 to 2014-15, the net area sown considerably increased. The area under sugarcane, total condiments and spices, total fruits and vegetables, total oilseeds, total fibers and fodder crops have been increased. Whereas, the area under total cereals & millets, total pulses, other food crops and other non-food crops have been decreased. The value of Herfindahl Index (HI) has been decreasing continuously. It shows the agriculture pattern changed from traditional to commercial in India.

Keywords: Herfindahl Index, land utilization, crop diversification

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INTRODUCTION

India is primarily an agrarian country. Agriculture contributes about 15% share in national GDP. Being a second largest populous country in the world the food requirements is so high. To feed the huge 1.35 billion people, requires more and more cultivable land. After independence the industrialization and developing infrastructure has been captured large arable land. As the roads, railways and other manufacturing industries has developed the arable area has been shrinking sharply. The total geographical area of India is 328,73 mha out of that 307.82 mha area reported for land utilization. India is self-sufficient in food grain production and with about 284 million tones food grains stand largest food grains producer in the world. India already achieved food security but for the matter of nutritional security still far behind the target line. To achieve the nutritional security crop diversification plays an important role. Incorporation of high valued crops in nutrition as well as remuneration to traditional crops [1-5]. Crop diversification ensures the nutritional security, minimizes the farm risks and increase sustainable income.

MATERIAL AND METHODS

The data has been collected from various secondary sources. Five decadal data of land utilization and percentage area covered by different food and non-food crops have been taken for this research. To

analyze the temporal change in crop diversification Herfindahl Index (HI) was used. The HI was used in the form of as follows;

$$HI = \sum p_i^2$$

$$p_i = a_i \div \sum a_i$$

Where,

p_i : the proportion of area covered by i_{th} crop

a_i : area covered by i_{th} crop

The value of HI ranges between 0 to 1. Zero indicates complete diversification and one indicates the complete specialization.

Land utilization pattern in India

The reporting area classified into broad categories viz., total cropped area, net area sown, forest, not available for cultivation, other uncultivated land and fallow lands (Gupta and Sharma). The perusal of table 1 indicates that reporting area for land utilization out of total geographical area continuously increases. The reporting area for land use was 284.32 mha in 1950-51 which was increased to 307.82 mha in 2014-15. The forest area has been increased more than 1.5 times from 40.48 mha in 1950-51 to 71.79 mha in 2014-15. The land not available for cultivation has decreased from 47.52 mha in 1950-51 to 43.88 mha in 2014-15. Area under non-agricultural uses increased almost thrice from 9.36 million hectare in 1950-51 to 26.88 mha in 2014-15. The barren and unculturable land sharply decreased from 38.16 mha in 1950-51 to 17 mha 2014-15. Other uncultivated land excluding fallow decreased by almost 100 % from 49.45 mha in 1950-51 to 25.83 mha in 2014-15. Permanent pasture & other grazing land considerably increased from 6.68 mha in 1950-51 to 10.26 mha in 2014-15. Land under miscellaneous tree crops & groves not included in net area sown decreased six times from 19.83 mha in 1950-51 to 3.1 mha in 2014-15. The area under culturable waste land decreased sharply from 22.94 mha in 1950-51 to 12.47 mha in 2014-15. Fallow lands almost remain constant from 28.12 mha in 1950-51 to 26.18 mha in 2014-15. The net area sown considerably increased from 118.75 mha in 1950-51 to 140.13 mha in 2014-15.

Table1: Agricultural Land by use in India (million hectare)

Classification	1950-51	1990-91	2000-01	2010-11	2014-15
Total Area	328.73	328.73	328.73	328.73	328.73
Reported Area for Land Utilization	284.32	304.86	305.19	307.48	307.82
(1 to 5)					
1. Forest	40.48	67.81	69.84	71.59	71.79
2. Not Cultivable Land Available (a+b)	47.52	40.48	41.23	43.58	43.88
(a) Non- Agricultural Land	9.36	21.09	23.75	26.4	26.88
(b) Barren and Un-cultivable Land	38.16	19.39	17.48	17.18	17
3. Other Uncultivable land except Fallow Land (a+b+c)	49.45	30.22	27.74	26.15	25.83
(a) Permanent Pasture and Grazing Land	6.68	11.4	10.66	10.3	10.26
(b) Land under Miscellaneous Tree Crops and Marine Groves excluded in Net Area Sown	19.83	3.82	3.44	3.2	3.1
(c) Culturable Waste Land	22.94	15	13.63	12.65	12.47
4. Fallow Lands (a+b)	28.12	23.37	25.04	24.6	26.18
(a) Fallow Lands except present Fallows	17.45	9.66	10.27	10.32	11.09
(b) Current Fallows	10.68	13.7	14.78	14.28	15.09
5. Net Area Sown (6+7)	118.75	143	141.34	141.56	140.13
6. Gross Cropped Area	131.89	185.74	185.34	197.68	198.36
7. Area Sown more than once	13.15	42.74	44	56.12	58.23
8. Cropping Intensity	111.07	129.89	131.13	139.64	141.55
Net Irrigated Area	20.85	48.02	55.2	63.67	68.38
Gross Irrigated Area	22.56	63.2	76.19	88.94	96.46

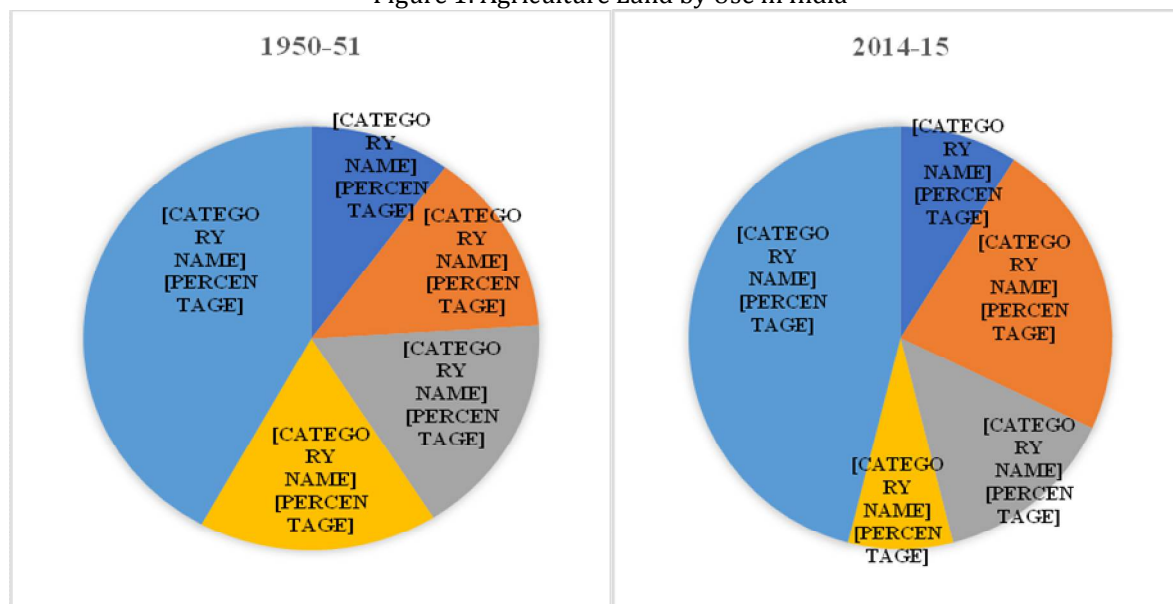
Source: Land Use Statistics 2014-15, Directorate of Economics & Statistics

As compare year 1950-51 to year 2014-15, the gross cropped area increased considerably from 131.89 mha to 198.36 mha. Area sown more than once increased more than 200% as 13.15 mha in 1950-51 to 58.23 mha 2014-15. Cropping intensity increased from 111.07 mha in 1950-51 to 141.55 mha in 2014-

15. Net irrigated area increased more than three times from 20.85 mha in 1950-51 to 68.38 mha in 2014-15. The gross irrigated area sharply increased more than four times from 22.56 mha in 1950-51 to 96.46 mha in 2014-15.

The figure 1. Depicts as compare 1950-51 to 2014-15, the net area sown and area under forest increased from 42% to 46% and 14% to 23% respectively. Similarly, for same temporal period the area under fallow land, not available for cultivation and other uncultivable land excluding fallow decreased from 10% to 9%, 17%to14% and 17% to 8% respectively.

Figure 1: Agriculture Land by Use in India



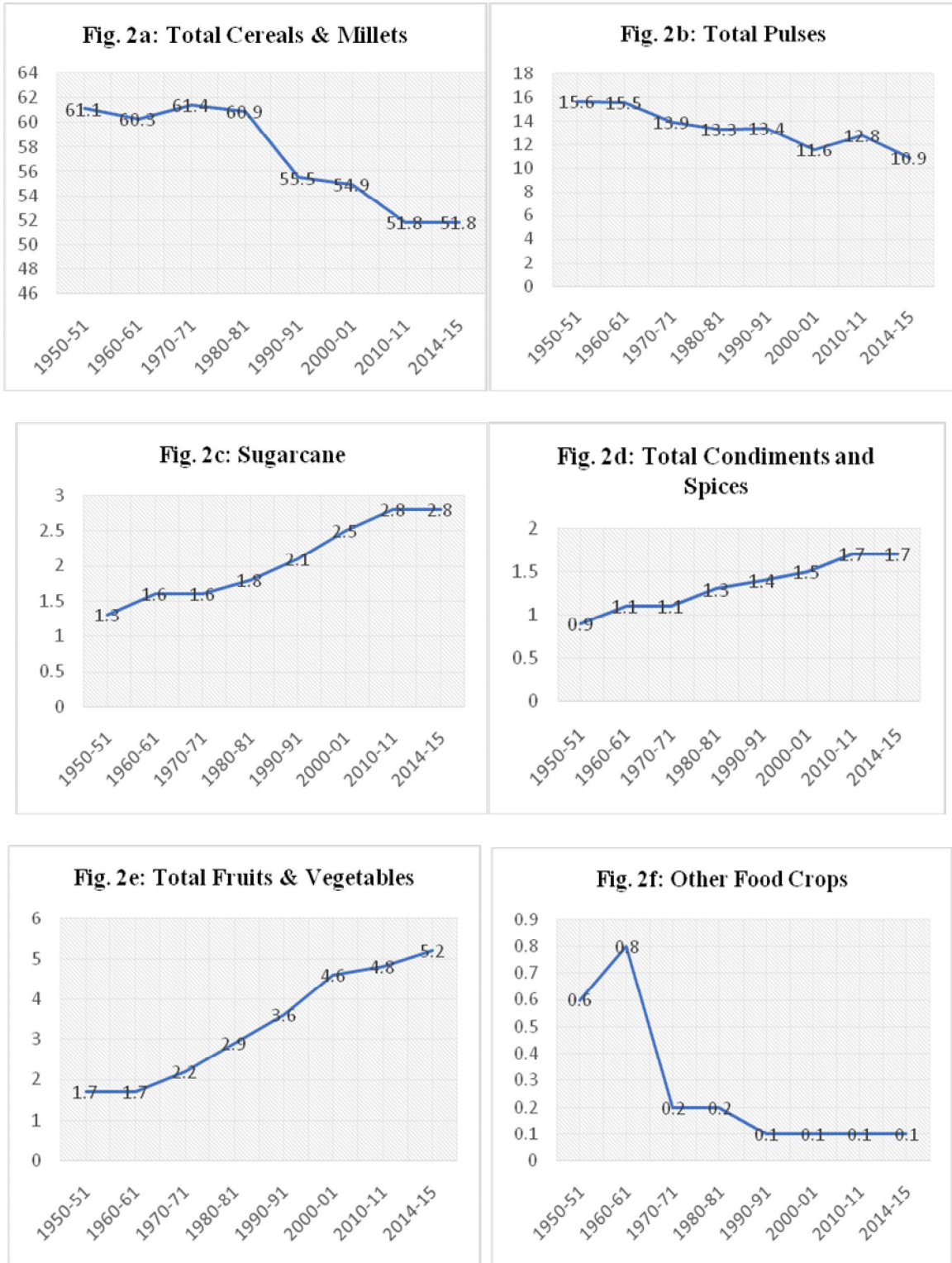
Trends of crop diversification

The proportion of area covered by different food crops and non-food crops depicts in table 2. For the temporal study of area shared by crops have been taken for the year of 1950-51, 1960-61, 1970-71, 1980-81, 1990-91, 2000-01, 2010-11 and 2014-15. The temporal data of last eight decades shows the clear trends of area covered by different crops.

Table 2. Per centage area share of different crops

Crops	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2014-15
Total Cereals & Millets	61.1	60.3	61.4	60.9	55.5	54.9	51.8	51.8
Total Pulses	15.6	15.5	13.9	13.3	13.4	11.6	12.8	10.9
Sugarcane	1.3	1.6	1.6	1.8	2.1	2.5	2.8	2.8
Total Condiments and Spices	0.9	1.1	1.1	1.3	1.4	1.5	1.7	1.7
Total Fruits & Vegetables	1.7	1.7	2.2	2.9	3.6	4.6	4.8	5.2
Other Food Crops	0.6	0.8	0.2	0.2	0.1	0.1	0.1	0.1
Total Oilseeds	8.3	8.4	8.9	9.1	13.6	13.3	14.6	14.5
Total Fibres	5.1	5.7	5.9	5.3	4.8	5.4	6.3	6.8
Fodder Crops	3.3	3.8	4.2	4.7	4.7	5	4.2	4.7
Other Non-Food Crops	2.1	1.1	0.6	0.5	0.8	1.1	0.9	1.5
HI	0.409	0.400	0.410	0.403	0.351	0.341	0.315	0.312

From table 2, fig. 2a and fig. 2b, observed that the area under total cereals & millets and total pulses decreased continuously in reported time zone from 1950-51 to 2014-15.



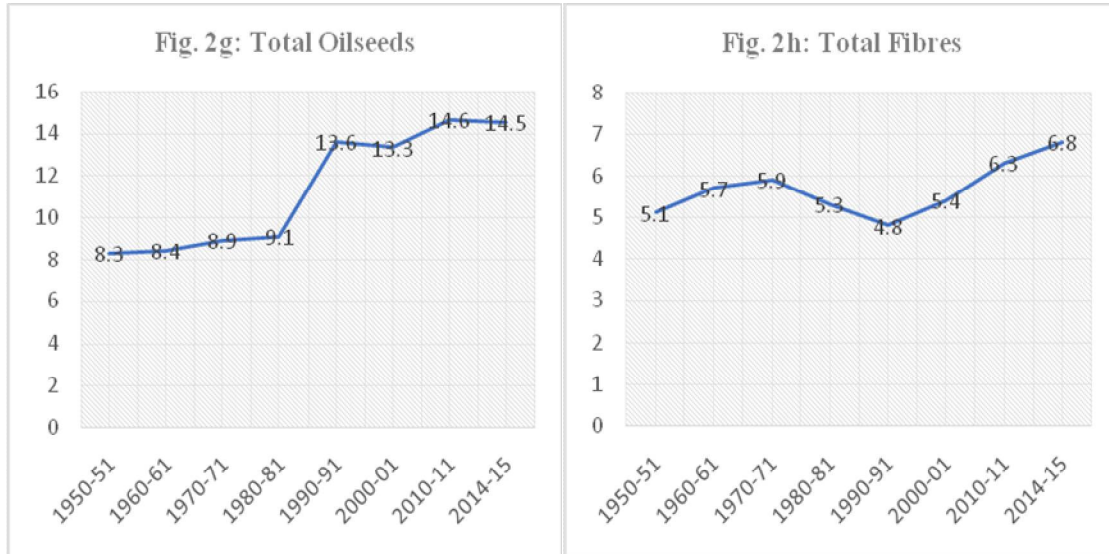
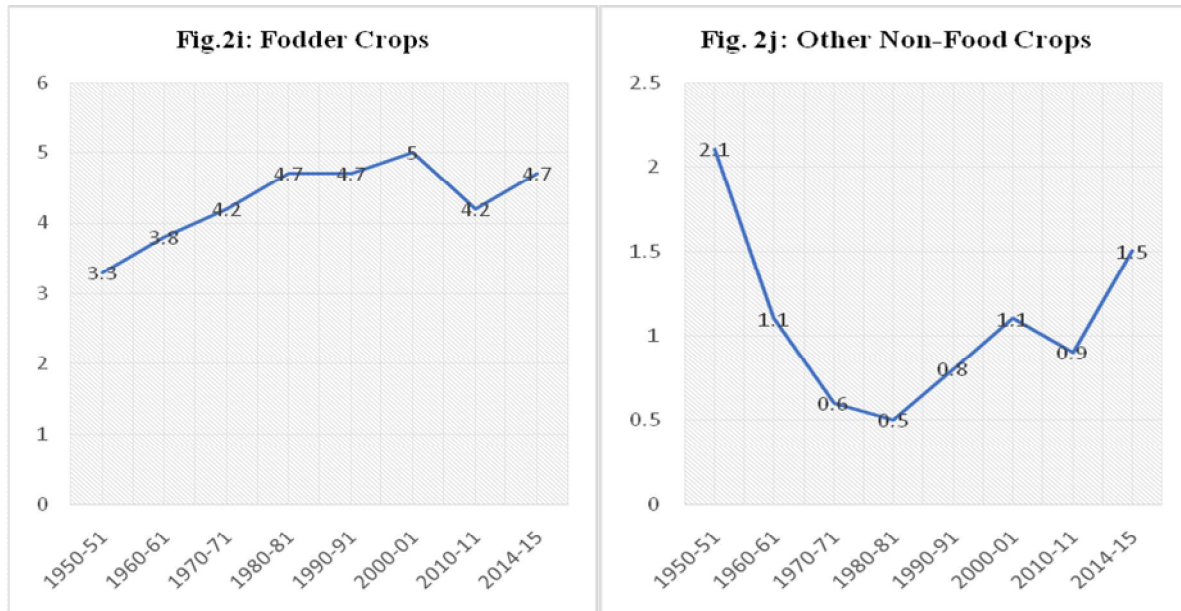


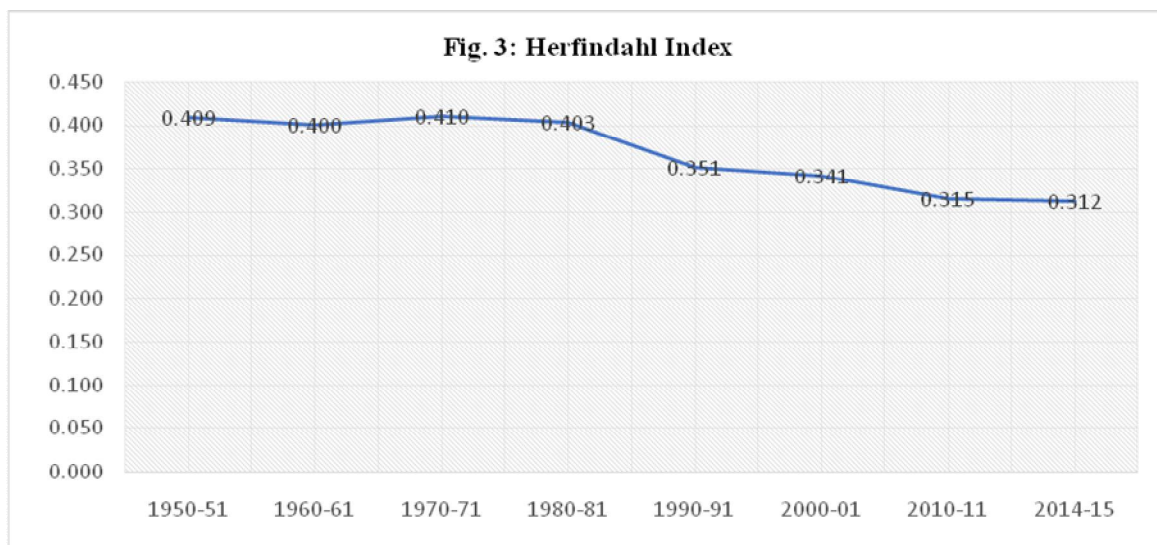
Fig. 2c and Fig. 2d clearly depicts that the area under sugarcane increased about twice from 1.3 mha to 2.8mha and total condiments and spices also increased about two times from 0.9 mha to 1.7 mha in sampled time zone.



From 1950-51 to 2014-15, the above figures indicate total fruits and vegetables increased from 1.7 mha to 5.2 mha, total oilseeds increased from 8.3 mha to 14.5 mha, total fibers increased from 5.1 mha to 6.8 mha and fodder crops increased from 3.3 mha to 4.7 mha. Whereas, other food crops and other nonfood crops reported decline from 0.6 mha to 0.1 mha and 2.1 mha to 1.5 mha, respectively [7-8].

Extent of Crop Diversification

The value of Herfindahl Index (HI) has been decreasing continuously. It reflects that extent of crop diversification has increased continuously as agriculture being commercialized the share of area decreased under cereals and increased under other food crops and other non-food crops. Table 1 and fig. 3 clearly indicate the HI decreased from 0.409 to 0.312 in 1950-51 to 2014-15 period. Noticeably, the maximum HI observed during 1970s because of Green Revolution in late 1960s therefore lowest crop diversification has been observed in this period. Due to green revolution specially the area under paddy and wheat increased sharply [4-6].



CONCLUSION

This temporal study is carried in the time period between 1950-51 to 2014-15. In this time period the reporting area for land use was increased. The forest area has been increased more than 1.5 times. The land not available for cultivation has decreased. Area under non-agricultural uses increased almost thrice. The barren and unculturable land sharply decreased. Other uncultivated land excluding fallow decreased by almost 100 %. Permanent pasture and other grazing land considerably increased. Land under miscellaneous tree crops and marine groves excluded in net area sown decreased. The area under culturable waste land decreased sharply. Fallow lands almost remain constant. Therefore, the net area sown considerably increased. The area under sugarcane, total condiments and spices, total fruits and vegetables, total oilseeds, total fibers and fodder crops have been increased. Whereas, the area under total cereals & millets, total pulses, other food crops and other non-food crops have been decreased. The value of Herfindahl Index (HI) has been decreasing continuously and conversely crop diversification has increased. It shows the agriculture pattern changed from traditional to commercial in India.

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