

GROWTH AND INSTABILITY OF MAJOR AGRICULTURAL CROPS

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Abstract

The present investigation was undertaken to study the growth and instability of major agricultural crops in selected tahsils of Nagpur district. The study was based on secondary data for the period of 10 years from 2005-06 to 2014-15 for Kamptee, Hingna, Parseoni and Narkhed tahsils of Nagpur district. Compound growth rates of major crops were computed to study their growth in selected tahsils. Coefficient of variation and Coppocks instability index were calculated to analyzed instability of major crops. Growth rates of kharif jowar, tur, mung declined significantly and that of cotton, wheat increased significantly. Kharif jowar, soybean, cotton and wheat showed high instability while gram showed stagnancy in all the selected tahsils of Nagpur district. Over a period of study cropping pattern has changed in selected tahsils of Nagpur district.

Key words: Growth rate, instability, coefficient of variation, coppocks instability index, cropping pattern

Introduction

Cropping pattern is defined as a combination of agricultural crops that are grown in a particular geographical area. Changes in cropping pattern can be seen as the changes in proportion of acreage or the value of production under different crops to total agricultural area or production. The cropping pattern usually changes over time with the development of agriculture, as evident in the case of agriculture in India. Changes in cropping pattern in terms of acreage allocation among different crops have been the integral part of agricultural development of a region, which further depends on the money invested, production, available time, etc. It is a well noted fact that the growth of agricultural production depends on both acreage and productivity growth. So the present study was under taken to study growth and instability of major agricultural crops and changes in cropping pattern in selected tahsils of Nagpur district with following objectives.

Objectives

To study growth and instability of major crops and To worked out the changes in cropping pattern in selected tahsils of Nagpur district

Materials and Methods

For the present study four tahsils of Nagpur district viz., Kamptee, Hingna, Parseoni and Narkhed were selected purposively. The study was based on secondary data collected from various Government publications for a period of 10 years i.e. from 2005-06 to 2014-15. Crops viz., kharif jowar, mung, tur, cotton, soybean, wheat, gram and other crops were selected for present study.

1 Analysis of growth and instability of major crops

a) Exponential model

For examining the performance of different crops growth rates of area of major crops were estimated using exponential model.

$$Y = ab^t$$

Where,

Y = area under particular crop

a & b = parameters to be estimated from exponential model

$$CGR = [Antilog(\log b) - 1] \times 100$$

b) Coefficient of variation (C.V)

Coefficient of variation of area were calculated by using the following formula

$$C. v. = \frac{S.D.}{Mean} \times 100$$

c) Coppocks Instability Index

To measure the coefficient of instability, Coppocks Instability index were estimated as below

$$m = \frac{\sum [\log(X_{i+1}) - \log(X_i)]}{(N - 1)}$$

$$V \text{ Log} = \frac{\sum \{[\log(X_{i+1}) - \log(X_i)] - m\}}{(N - 1)}$$

Where-

$$\text{Coppocks Index} = [Anti \log(\sqrt{V \text{ Log}}) - 1] * 100$$

X_t = area of crop year 't'

N = number of year minus 1

M = The arithmetic mean of the difference between the log of X₁ and x_{t-2} etc.

V log = Log arithmetic variances of the series

2 Analysis of changes in cropping pattern

Cropping pattern of selected tahsils of Wardha district were studied by simple tabular analysis for major crops. Cropping pattern in terms of percentage share of individual crops in gross cropped area were work out at different points of time.

Results and Discussion

1. Growth rates of area of major crops .

The compound growth rates of area of major crops for Kamptee, Hingna, Parseoni and Narkhed tahsils of Nagpur district are presented in Table 1.

Table 1 Compound growth rates of area of major crops in selected tahsils of Nagpur district

Sr. No.	Crops	Tahsils			
		Kamptee	Hingna	Parseoni	Narkhed
1	Kharif jowar	-39.78***	-38.81***	-13.33***	-19.55***
2	Tur	-10.31***	-6.83**	-1.15**	-2.70***
3	Mung	-9.88**	-24.94***	-16.31***	25.49***
4	Soybean	1.67***	-3.32*	-5.70***	-3.07**
5	Cotton	-4.25	5.19**	15.75***	13.88***
6	Wheat	-1.48	7.69**	5.07*	8.22**

7	Gram	1.37	-2.57	-4.55*	-0.36
8	Other crops	18.83***	-10.91**	8.12***	-3.83

***, **, * denotes statistical significance at 1, 5 and 10 per cent level respectively.

The compound growth rates of area of major crops are calculated for the period of 2005-06 to 2014-15. In case of Kamptee tahsil, the growth rates of area of Soybean was increased significantly by 1.67 per cent and for Kharif jowar it was declined significantly by 39.78 per cent. The growth rates of Tur and Mung showed negatively significant during the study period. The growth rates of cotton showed stagnancy. The growth rate of Other crops showed increased significantly by 18.83 per cent. The growth rates of area under Wheat and Gram showed stagnancy.

In case of Hingna tahsil, the growth rates of area of Kharif jowar declined significantly by 38.81 per cent. The stagnant growth rate was observed in case of Gram. The growth rates of Wheat and Cotton showed increased significantly during study period. Tur and Mung were negatively significant. Growth rates of Soybean and Other crops declined significantly by 3.32 per cent and by 10.91 per cent respectively.

In case of Parseoni tahsil, the growth rates of area of Tur and Mung declined significantly Tur by 1.15 per cent and Mung by 16.31 per cent. Growth rate of Cotton, Wheat and Other crops showed increased significantly Cotton by 15.75 per cent, Wheat by 5.07 per cent and Other crops by 8.12 per cent. The growth rate of Kharif jowar, Soybean and Gram showed declined significantly Kharif jowar by 13.33 percent, Soybean by 5.70 per cent and Gram by 4.55 per

Table 2 Coefficient of variation and Coppocks instability index of area of major crops in selected tahsils of Nagpur district.

Sr. No.	Crops	Kamptee		Hingna		Parseoni		Narkhed	
		CV	CII	CV	CII	CV	CII	CV	CII
1	Kharif jowar	123.40	69.30	95.94	96.14	81.18	38.82	77.09	30.06
2	Tur	32.77	19.80	34.48	26.19	5.50	7.13	10.87	10.50
3	Mung	44.38	58.71	63.11	103.42	72.35	75.62	75.93	76.00
4	Soybean	6.82	6.17	21.10	18.95	19.33	13.49	13.94	10.33
5	Cotton	46.97	57.93	21.28	19.22	43.34	28.33	42.79	27.61
6	Wheat	26.48	46.69	32.17	46.45	26.19	50.69	27.97	41.04
7	Gram	22.06	31.57	26.80	34.91	31.59	28.48	23.46	23.38
8	Other crops	49.15	17.53	40.19	38.78	27.30	13.76	47.55	127.78

Note: Coefficient of variation and Coppocks instability index of major

From Table 2 it was observed that in Hingna Tahsil, Kharif jowar, Mung, Wheat and Gram shows high Coppocks instability index with low coefficient of variation. This indicates least consistency in area of these crops in Hingna tahsil with stagnation in area expansion. Tur, Soybean, Cotton and Other crops shows high coefficient of variation value of 34.48 per cent, 21.10 per cent, 21.28 per cent and 40.19 per cent respectively coupled with low Coppocks instability index of 26.19 per cent, 18.95 per cent, 19.22 per cent and 38.78 per cent which indicates high area instability of this crop in tahsil.

In Parseoni tahsil, Coppocks instability index for Tur, Mung and Wheat was 7.13 per cent, 75.62 per cent and 50.69 per cent respectively with low coefficient of variation value of 5.50 per cent, 72.35 and 26.19 for Tur, Mung and Wheat. This shows stagnation in area of these crops. Kharif jowar, Soybean, Cotton, Gram and Other crops experienced high coefficient of variation value of 81.18 per cent, 19.33 per cent, 43.34 per cent, 31.59 per cent and 27.30 per cent respectively with low coppocks instability index value of 38.82 per cent, 13.49 per cent, 28.33 per cent, 28.48 per cent and 13.76 per cent for Kharif jowar, Soybean, Cotton, Gram, and Other crops. This

cent. In case of Narkhed tahsil, the growth rates of Cotton increased significantly by 13.88 per cent and it was stagnant in case of Gram and Other crops. The growth rate of Kharif jowar, Tur and Soybean declined significantly Kharif jowar by 19.55 per cent, Tur by 2.70 per cent and Soybean by 3.07 Per cent.

2 Coefficient of variation and Coppocks instability index

Coefficient of variation and Coppocks instability index of area of crops in Kamptee, Hingna, Parseoni and Narkhed tahsil of Nagpur were presented in Table 2.

In Kamptee tahsil, kharif jowar showed high coefficient of variation value of 123.40 per cent than Coppocks instability index 69.30 per cent. This indicates that there was acceleration in area expansion with high instability. For Tur Coppocks instability index value 19.80 per cent coupled with high coefficient of variation value 32.77 per cent indicated that there was high instability. For Mung, Cotton, Wheat and Gram coefficient of variation is less than the Coppocks instability index which indicated least consistency in area and stagnation in area expansion. Coefficient of variation for Soybean and Other crops is 6.82 per cent and 49.15 per cent respectively coupled with low Coppocks instability index of 6.17 per cent and 17.53 per cent for soybean and Other crops. This shows high instability of soybean and other crops.

crops are calculated for the period of 2005-06 to 2014-15.

indicated that there was acceleration in area expansion of these crops with high instability.

In Narkhed tahsil, coefficient of variation value for Kharif jowar, Soybean and Cotton was 77.09 per cent, 13.94 per cent, 42.79 per cent, with low Coppocks instability index value of 30.06 per cent, 10.33 per cent and 27.61 per cent for Kharif jowar, Soybean and Cotton. This shows high instability of these crops in Narkhed tahsil. Coefficient of variation value 10.87 per cent and 23.46 per cent for Tur and Gram with Coppocks instability index value of 10.50 per cent and 23.38 for Tur and Gram. This indicated less instability. Mung and Wheat shows low coefficient of variation value with high Coppocks instability index value. This shows least consistency in area of these crops and stagnation in area expansion.

3 Changes in cropping pattern

1.Changes in cropping pattern in Kamptee tahsil of Nagpur district

The changes in cropping pattern in Kamptee tahsil of Nagpur district during 2005-06 to 2014-15 are presented in Table 3.

Table 3 Changes in cropping pattern in Kampteei tahsil of Nagpur district

(Area in hectare)

Crops	Years										Percentage change over base period 2005-06
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	
Kharif Jowar	568 (2.11)	568 (1.93)	300 (0.97)	223 (0.87)	46 (0.17)	43 (0.13)	43 (0.14)	14 (0.04)	12 (0.04)	10 (0.03)	-98.24
Tur	1717 (6.38)	1653 (5.61)	1544 (4.97)	1475 (5.73)	1413 (5.13)	1069 (3.33)	1032 (3.33)	638 (2.03)	752 (2.29)	819 (2.53)	-52.30
Mung	17 (0.06)	17 (0.06)	17 (0.05)	21 (0.08)	21 (0.08)	17 (0.05)	31 (0.10)	10 (0.03)	9 (0.03)	5 (0.02)	-70.59
Soybean	12597 (46.81)	12993 (44.13)	13369 (43.02)	14042 (54.57)	14042 (50.96)	14108 (43.97)	14114 (45.50)	15181 (48.28)	15800 (48.20)	13629 (42.06)	8.19
Cotton	876 (3.25)	503 (1.71)	787 (2.53)	283 (1.10)	285 (1.03)	303 (0.94)	305 (0.98)	355 (1.13)	410 (1.25)	698 (2.15)	-20.32
Wheat	6561 (24.38)	8012 (27.21)	8066 (25.95)	3085 (11.99)	3911 (14.19)	6457 (20.13)	6517 (21.01)	6088 (19.36)	6402 (19.53)	5126 (15.82)	-21.87
Gram	2962 (11.01)	4091 (13.90)	4364 (14.04)	3645 (14.17)	4124 (14.97)	6367 (19.85)	3779 (12.18)	3913 (12.44)	3426 (10.45)	4364 (13.47)	47.33
Other crops	1615 (6.00)	1604 (5.45)	2632 (8.47)	2958 (11.50)	3711 (13.47)	3718 (11.59)	5201 (16.77)	5246 (16.68)	5967 (18.20)	7754 (23.93)	380.12
Gross cropped area	26913 (100)	29441 (100)	31079 (100)	25732 (100)	27553 (100)	32082 (100)	31022 (100)	31445 (100)	32778 (100)	32405 (100)	20.41

(Figures in the parenthesis indicates the percentage over gross cropped area)

Figures shown in 2005-06 revealed that Soybean and Wheat contributed 46.81 and 24.38 per cent of gross cropped area. The proportion of Wheat was 24.38 per cent in the year 2005-06 and it has reduced to 15.82 per cent in 2014-15. The constant proportion of area under Gram over gross cropped was highest in 2010-11 i.e. 19.85 per cent. Increasing proportion of area were observed in respect of Other crops. Proportion of area under Other crops over gross cropped area has increased from 6.00 per cent in 2005-06 to 23.93 per cent in 2014-15. The proportion of area under Tur and Cotton were constant for the entire period. Kharif jowar and Mung contributed very negligible proportion of area over gross cropped area. Percentage change over base period of Gram is 47.33 per cent which indicates increase of acreage under the crop. The area of Kharif jowar, Tur, Mung, Cotton and Wheat have been shifted to Gram. There is positive change in Soybean by 8.19 per cent, Other crops by 380.12 per cent next to Gram over base period. The gross cropped area has increased by 20.14 per cent over base period.

2.Changes in cropping pattern in Hingna tahsil of Nagpur district

Table 4 Changes in cropping pattern in Hingna tahsil of Nagpur district

(Area in hectare)

Crops	Years										Percentage change over base period 2005-06
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	
Kharif jowar	7985 (15.75)	5985 (12.73)	3205 (6.15)	2806 (6.14)	1925 (4.63)	3738 (7.87)	1025 (2.29)	492 (1.10)	88 (0.20)	96 (0.23)	-98.80
Tur	9280 (18.30)	9455 (20.11)	8317 (15.95)	7614 (16.65)	4090 (9.84)	4040 (8.50)	4094 (9.16)	4434 (9.89)	5753 (13.24)	6515 (15.46)	-29.80

The changes in cropping pattern in Hingna tahsil of Nagpur district during 2005-06 to 2014-15 are presented in Table 4.

Table 4 revealed that Cotton and Soybean were observed as major crops of the tahsil during 2005-06. In the span of 10 year cropping pattern has changed substantially. The proportion of Cotton was 27.49 per cent in the year 2005-06 it has increased to 40.01 per cent in 2014-15. In case of Soybean, its share over gross cropped area has reduced to 24.73 per cent in 2014-15 which still emerged as the major crop in the tahsil. The proportion of area under Tur and Gram was constant for entire period. Mung and Other crops contributed very negligible proportion of area over gross cropped area. The proportion of area under Kharif jowar decrease drastically after 2010-11. Percentage change over base period of Wheat is 87.96 per cent which indicates increase of acreage under this crop. The area of Kharif jowar, Tur, Mung, Soybean and Other crops have been shifted to Wheat.

There is positive change in Cotton by 21.00 per cent, Gram by 6.28 per cent next to wheat over base period. The gross cropped area has decreased by 16.87 per cent over base period.

Mung	26 (0.05)	26 (0.06)	30 (0.06)	30 (0.07)	40 (0.10)	35 (0.07)	21 (0.05)	3 (0.01)	5 (0.01)	2 (0.00)	-92.31
Soybean	13923 (27.46)	12425 (26.43)	19099 (36.64)	20137 (44.03)	17615 (42.40)	15575 (32.78)	14556 (32.58)	13781 (30.74)	12023 (27.67)	10422 (24.73)	-25.15
Cotton	13937 (27.49)	11521 (24.50)	13396 (25.70)	9983 (21.83)	11347 (27.31)	14347 (30.19)	18369 (41.11)	18487 (41.24)	17583 (40.46)	16864 (40.01)	21.00
Wheat	2923 (5.77)	3785 (8.05)	3922 (7.52)	1680 (3.67)	2325 (5.60)	4388 (9.23)	3960 (8.86)	4805 (10.72)	5273 (12.13)	5494 (13.04)	87.96
Gram	2580 (5.09)	3797 (8.08)	4131 (7.92)	3447 (7.54)	4161 (10.02)	5361 (11.28)	2620 (5.86)	2808 (6.26)	2718 (6.25)	2742 (6.51)	6.28
Other crops	44 (0.09)	25 (0.05)	28 (0.05)	35 (0.08)	41 (0.10)	34 (0.07)	38 (0.09)	18 (0.04)	15 (0.03)	10 (0.02)	-77.27
Gross cropped area	50698 (100)	47019 (100)	52128 (100)	45732 (100)	41544 (100)	47518 (100)	44683 (100)	44828 (100)	43458 (100)	42145 (100)	-16.87

(Figures in the parenthesis indicates the percentage over gross cropped area)

3 Changes in cropping pattern in Parseoni tahsil of Nagpur district

The changes in cropping pattern in Parseonii tahsil of Nagpur district during 2005-06 to 2014-15 are presented in Table 5.

In the span of 10 years cropping pattern has changed substantially. The proportion of area under kharif jowar by 1.21 per cent and Soybean by 18.01 per cent has been reduced while Cotton by 32.42 per cent, Other crops by 17.48 per cent have been increased by the end of the year 2014-15. In case of Soybean its share over gross cropped area has reduced to 18.01 per cent in 2014-15 from 36.80 per

cent in 2005-06 which is still emerged as major crop in the tahsil. The proportion of area under Tur and Gram constant for the entire period. Mung contributed very negligible proportion of area over gross cropped area. The percentage change over base period of Cotton is 150.55 per cent which indicates increase of acreage under this crop. The area of kharif jowar, Tur, Mung, Soybean and Gram have been shifted to Cotton. There is positive change in Wheat by 69.95 per cent and other crops by 87.94 per cent next to Cotton over base period. The gross cropped area has increased by 13.60 per cent over base period.

Table 5 Changes in cropping pattern in Parseoni tahsil of Nagpur district

(Area in hectare)

Crops	Years										Percentage change over base period 2005-06
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	
Kharif jowar	2432 (6.26)	1570 (4.31)	640 (1.62)	640 (1.73)	445 (1.15)	445 (1.05)	415 (0.96)	446 (1.00)	587 (1.34)	536 (1.21)	-77.96
Tur	4411 (11.36)	4421 (12.13)	3985 (10.06)	4420 (11.96)	4285 (11.05)	4508 (10.69)	3969 (9.16)	4101 (9.24)	3939 (8.96)	3957 (8.97)	-10.29
Mung	172 (0.44)	206 (0.57)	320 (0.81)	320 (0.87)	64 (0.17)	90 (0.21)	81 (0.19)	75 (0.17)	65 (0.15)	55 (0.12)	-68.02
Soybean	14293 (36.80)	12058 (33.10)	13176 (33.27)	13675 (36.99)	10625 (27.40)	10786 (25.57)	9245 (21.33)	9078 (20.45)	9905 (22.54)	7946 (18.01)	-44.41
Cotton	5709 (14.70)	4015 (11.02)	5006 (12.64)	4718 (12.76)	9030 (23.28)	10088 (23.91)	12120 (27.96)	12574 (28.33)	13185 (30.01)	14304 (32.42)	150.55
Wheat	4366 (11.24)	5975 (16.40)	6397 (16.15)	2385 (6.45)	4280 (11.04)	5862 (13.89)	5930 (13.68)	6279 (14.15)	6363 (14.48)	7420 (16.82)	69.95
Gram	3349 (8.62)	4013 (11.01)	5620 (14.19)	6520 (17.64)	5750 (14.83)	6062 (14.37)	4961 (11.45)	4879 (10.99)	2854 (6.49)	2188 (4.96)	-34.67
Other crops	4104 (10.57)	4175 (11.46)	4454 (11.25)	4291 (11.61)	4305 (11.10)	4348 (10.31)	6623 (15.28)	6954 (15.67)	7044 (16.03)	7713 (17.48)	87.94
Gross cropped area	38836 (100)	36433 (100)	39598 (100)	36969 (100)	38784 (100)	42189 (100)	43344 (100)	44386 (100)	43942 (100)	44119 (100)	13.60

(Figures in the parenthesis indicates the percentage over gross cropped area)

4 Changes in cropping pattern in Narkhed tahsil of Nagpur district

The changes in cropping pattern in Narkhed tahsil of Nagpur district during 2005-06 to 2014-15 are presented in Table 6.

Figures shown in 2005-06 revealed that Soybean contributed 44.47 per cent of gross cropped area. In the span of 10 years cropping pattern changed substantially. The proportion of area under Cotton by 31.83 per cent have been increased at the end of the year 2014-15. The proportion of area under Tur and Other crops was constant for the entire period. Mung contributed very negligible proportion of area

over gross cropped area. The proportion of area under Kharif jowar decrease from 11.98 per cent in 2005-06 to 2.32 per cent in 2014-15. The percentage change over base period of Mung is 721.88 per cent which indicates increase of acreage under this crop. The area of Kharif jowar, Tur, Soybean and Other crops have been shifted to Mung. There is positive change in Cotton by 154.64 per cent, Wheat by 69.70 per cent and Gram by 24.83 per cent next to Mung over base period. The gross cropped area has decreased by 1.12 per cent over base period.

Table 6 Changes in cropping pattern in Narkhed tahsil of Nagpur district

(Area in hectare)

Crops	Years										Percentage change over base period
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	
Kharif jowar	6867 (11.98)	6857 (12.15)	4455 (7.12)	2192 (3.82)	2084 (3.53)	1930 (3.20)	1637 (2.73)	1148 (1.99)	1026 (1.80)	1316 (2.32)	-80.84
Tur	6911 (12.06)	6911 (12.24)	6911 (11.04)	6127 (10.69)	6327 (10.72)	7028 (11.65)	6780 (11.29)	5300 (9.20)	5300 (9.28)	5700 (10.06)	-17.52
Mung	32 (0.06)	90 (0.16)	104 (0.17)	115 (0.20)	119 (0.20)	135 (0.22)	540 (0.90)	304 (0.53)	298 (0.52)	263 (0.46)	721.88
Soybean	25490 (44.47)	27011 (47.85)	30562 (48.82)	32957 (57.50)	28268 (47.88)	25123 (41.65)	24927 (41.52)	24620 (42.73)	23740 (41.57)	19940 (35.18)	-21.77
Cotton	7084 (12.36)	6813 (12.07)	6947 (11.10)	4790 (8.36)	8425 (14.27)	10443 (17.31)	14300 (23.82)	14961 (25.96)	15386 (26.94)	18039 (31.83)	154.64
Wheat	3069 (5.35)	3069 (5.44)	3474 (5.55)	1890 (3.30)	4330 (7.33)	4991 (8.27)	4981 (8.30)	4915 (8.53)	5050 (8.84)	5208 (9.19)	69.70
Gram	3685 (6.43)	5148 (9.12)	6243 (9.97)	6017 (10.50)	6905 (11.70)	8009 (13.28)	5100 (8.49)	4675 (8.11)	4596 (8.05)	4600 (8.12)	24.83
Other crops	4184 (7.30)	545 (0.97)	3906 (6.24)	3225 (5.63)	2583 (4.37)	2666 (4.42)	1775 (2.96)	1700 (2.95)	1718 (3.01)	1615 (2.85)	-61.40
Gross cropped area	57322 (100)	56444 (100)	62602 (100)	57313 (100)	59041 (100)	60325 (100)	60040 (100)	57623 (100)	57114 (100)	56681 (100)	-1.12

(Figures in the parenthesis indicates the percentage over gross cropped area)

Conclusions

Growth rates of kharif jowar, tur, mung declined significantly and that of cotton, wheat increased significantly. Kharif jowar, soybean, cotton and wheat showed high instability while gram, tur and mung showed stagnancy in all the selected tahsils of Nagpur district. Area growth rates of cotton were positively significant in Kamptee, Hingna, Parseoni and Narkhed tahsils of Nagpur district at 1% level of significance. Over a period of study cropping pattern has changed in selected tahsils of Nagpur district. Cotton is one of the major crops of all the selected tahsils of Nagpur district. Tahsil wise proportions of area under cotton in 2014-15 were Kamptee (2.15 per cent), Hingna (40.01 per cent), Parseoni (32.42 per cent) and Narkhed (31.83 per cent). The area under kharif jowar, tur, mung and soybean are found to be decreasing in selected tahsils (i.e. study area) .

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