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SB Ingole
PG Student, College of
Horticulture, Department of
Agricultural Economics and
Statistics, Post Graduate
Institute, Akola, Maharashtra,
India

VK Khobarkar
Assistant Professor, College of
Horticulture, Department of
Agricultural Economics and
Statistics, Post Graduate
Institute, Akola, Maharashtra,
India

YR Nikam
PG Student, College of
Horticulture, Department of
Agricultural Economics and
Statistics, Post Graduate
Institute, Akola, Maharashtra,
India

Anuj Raut
Assistant Professor, College of
Horticulture, Department of
Agricultural Economics and
Statistics, Post Graduate
Institute, Akola, Maharashtra,
India

Correspondence
SB Ingole
PG Student, College of
Horticulture, Department of
Agricultural Economics and
Statistics, Post Graduate
Institute, Akola, Maharashtra,
India

Study of growth and instability in selected tahsils of Amravati district micro level analysis

SB Ingole, VK Khobarkar, YR Nikam and Anuj Raut

Abstract

The present study has examined the growth rates of area of major crops, Growth and instability in selected tahsils of Amravati district. In order to work out Growth and instability, compound growth rates of area of major crops were estimated from 2003-04 to 2015-16. Coefficient of variation was used for analytical tools. The compound growth rates of area of major crops i.e. Soybean were significantly positive in selected tahsils. In case of Tur compound growth rates of area were significantly positive in Dharni, Bhatkuli and Nandgaon. The area of Cotton in Dharni and Bhatkuli tahsil was significantly positive. In Dharni tahsil, the most stable crop was Soybean followed by Cotton and Tur. In Chikhaldara tahsil, most stable crop was *Kharif* jowar followed by soybean. In Bhatkuli tahsil, most stable crop is Soybean followed by other crop and Tur. In Nandgaon tahsil, Soybean was most stable crop followed by Cotton and *Kharif* jowar and in Tiwasa tahsil Soybean was most stable crop followed by Cotton and Black gram. The area of Cotton shows increasing trend of land concentration ratios from year 2003-04 to 2015-16.

Keywords: growth rate, growth and instability, compound growth rate, Amravati, coefficient of variation

Introduction

Cropping pattern is defined as a combination of agricultural crops that are grown in a particular geographical area. It can be viewed either in terms of the area allocated for each crop or by the production composition in value terms for any specific area. Therefore, 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 is evident in the case of agriculture in India. Sustainable growth of the agriculture depends considerably on the process of agricultural transformation, which in turn is well connected with shifts in production patterns i.e., on the extent of crop diversification. The importance of crop diversification becomes more pertinent particularly as a strategy to reduce inconsistency in agricultural production and yield. In essence, crop diversification helps the farmers in reducing variability in income, sustaining a reasonable income level and mitigating drought and enhancing water use efficiency. It is a well noted fact that, the growth of agricultural production depends on both acreage and productivity growth. Productivity growth can be further decomposed into two parts. One is the yield growth and other is the cropping pattern change. The farmers measures the impact of changes in output per unit of area, while, the latter captures the shift of acreage from crops with relatively low values of output per unit of area to higher value crops.

Methodology

Growth and Instability

For examining performance of different crops growth rates of area was be estimated using exponential model

$$Y = ab^t$$

Where,

Y = Area of selected crops

a & b = are the parameters to be estimated from exponential model

$$\text{Compound growth rate (r)} = [(\text{Antilog of } (\log b)) - 1] \times 100$$

Coefficient of variation and Coppock's instability index

To measure the degree of instability in area of different crops coefficient of variation and coefficient of instability was computed with the help of following formula.

$$CV (\%) = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

Coppock's instability index

To measure the coefficient of instability Coppock's instability index were estimated as below.

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

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

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

Where,

Xt = Production of crop year t

N = number of year minus 1

Arithmetic means of difference between the log of X1 and Xt-2 etc.

Log V = Log arithmetic variation of the series

Result and Discussion

Growth and Instability analysis

Growth rate of area

Performance of important crops of selected tahsils of Amaravati district can be ascertained through studying the growth in area of major crops. Compound growth rate of area of major crops were worked out for different selected tahsils of Amaravati district i.e. Dharni, Chikhaldara, Bhatkuli, Nandgaon and Tiwasa. The growth rates were worked out for overall periods i.e. 2003-04 to 2015-16. The results obtained are presented and in Table 1.

Table 1: Compound growth rates of area of major crops in selected tahsils of Amaravati district (Per cent per annum)

Sr. No	Crops	Dharni	Chikhaldara	Bhatkuli	Nandgaon	Tiwasa
1	Kh. Jowar	-9.63***	-16.97***	-14.02***	-2.10***	-14.76***
2	Tur	8.95***	-9.37***	7.12***	3.06***	-8.41***
3	Green gram	-11.22***	-11.05***	-10.40***	-11.74***	-15.97***
4	Black gram	-8.51***	-11.73***	-11.88***	-11.53***	-12.37***
5	Soybean	19.51***	7.97***	4.16***	20.53***	5.71**
6	Cotton	1.50**	0.19	7.41***	1.38*	-1.65

(Note: ***, **, * significant at 1, 5 and 10 Per cent level respectively)

1. Dharni tahsils

The compound growth rates of area of major crops in Dharni tahsil of Amaravati district for Period 2003-04 to 2015-16 are presented in Table 1. It is revealed that the area under growth of Soybean was positively significant indicated that increasing area under Soybean by 19.51 per cent, Tur 8.95 per cent, Cotton 1.5 per cent respectively. It is also observed from the table area under *Kharif* Jowar, Green gram, and Black gram are negatively significant. The area under *Kharif* Jowar -9.63 per cent, Green gram -11.22 per cent, and Black gram -8.51 per cent respectively.

2. Chikhaldara tahsil

The compound growth rates of area of major crops in Chikhaldara tahsil of Amaravati district for period 2003-04 to 2015-16 are presented in Table 1. It is revealed that the area under growth of Soybean, was positively significant indicated that increasing area under Soybean 7.97 per cent. It is also observed from the table area under *Kharif* Jowar, Tur, Green gram, and Black gram are negatively significant. Area under *Kharif* Jowar -16.97 per cent, Tur-9.37 per cent, Green gram -11.05 per cent, Cotton 0.19 per cent, and Black gram -11.73 per cent.

3. Bhatkuli tahsil

The compound growth rates of area of major crops in Bhatkuli tahsil of Amaravati district for period 2003-04 to 2015-16 are presented in Table 1. It is revealed that the area under growth of Soybean, Tur and Cotton was positively significant indicated that increasing area under Soybean 4.16 per cent, Tur 7.12 per cent, Cotton 7.41 per cent respectively. It is also observed from the table area under *Kharif* Jowar, Green gram, and Black gram are negatively significant. Area

under *Kharif* Jowar -14.02 per cent, Green gram -10.40 per cent, Black gram -11.88 per cent.

4. Nandgaon tahsil

The compound growth rates of area of major crops in Nandgaon tahsil of Amaravati district for period 2003-04 to 2015-16 are presented in Table 1. It is revealed that the area under growth of Tur and Soybean was positively significant indicated that area under Tur 3.06 per cent, and Soybean 20.53 per cent respectively. It is also observed from the table area under *Kharif* Jowar, Green gram, and Black gram are negatively significant. Area under *Kharif* Jowar -2.10 per cent, Green gram -11.74 per cent, and Black gram -11.53 per cent.

5. Tiwasa tahsil

The compound growth rates of area of major crops in Tiwasa tahsil of Amaravati district for period 2003-04 to 2015-16 are presented in Table 1. It is revealed that the area under growth of Soybean was positively significant indicated that area under Soybean 5.71 per cent. It is also observed from the table area under *Kharif* Jowar, Tur, Green gram, and Black gram are negatively significant. Area under *Kharif* Jowar -14.76 per cent, Tur-8.41 per cent, cotton-1.65 per cent, Green gram -15.97 per cent, and Black gram -12.37 per cent respectively.

5.1 Coefficient of variation (C.V.) and Coppock's instability index (CII)

In order to examine the extend instability in area of major crops of selected tahsils of Amaravati district were worked out by using coefficient of variation and Coppock's variability index.

Table 2: Coefficient of variation (C.V.) and Coppock's instability index (CII) of area of major crops in selected tahsils of Amaravati district (In per cent)

Tahsils	Dharni		Chikhaldara		Bhatkuli		Nandgaon		Tiwasa	
	CV	CII	CV	CII	CV	CII	CV	CII	CV	CII
Crop										
<i>Kh.</i> Jowar	41.18	16.48	72.49	24.39	48.57	37.7	10.72	8.5	39.92	13.61
Tur	33.75	17.38	36.45	17.95	28.52	27.77	14.38	12.12	18.66	16.9
Green gram	44.45	25.77	53.00	33.55	44.14	19.47	40.98	27.14	41.62	23.64
Black gram	33.68	17.67	53.80	38.74	46.87	21.9	39.13	33.64	32.36	13.87
Soybean	70.75	44.14	28.24	25.66	19.01	15.79	67.49	52.66	47.29	44.26
Cotton	8.85	6.78	11.24	10.49	34.31	17.5	11.15	8.37	12.57	8.99

Note: Coefficient of variation and Coppock's instability index of major crops

1. Dharni tahsil

As seen from table 2. That the coefficient of variation of area for overall period was highest in Soybean i.e. 70.75 per cent followed by Green gram 44.45 per cent and *Kharif* jowar 41.18 per cent. The coefficient of variation of area for overall period was lowest in Cotton i.e. 8.85 per cent. The Coppock's instability index indicated that 44.14 per cent and variation Soybean crop whereas 6.78 per cent lowest variation observe in Cotton crop in Dharni tahsil.

2. Chikhaldara tahsil

As seen from table 2. That the coefficient of variation of area for overall period was highest in *Kharif* jowar i.e. 72.49 per cent and Black gram 53.80 per cent. The coefficient of variation of area for overall period was lowest in Cotton i.e. 11.24 per cent. In Chikhaldara tahsil The Coppock's instability index show 38.74 per cent variation in Black gram and lowest variation observe in Cotton crop i.e.10.49.

3. Bhatkuli tahsil

As seen from table 2. That the coefficient of variation of area for overall period was highest in *Kharif* jowar 48.57 per cent and Black gram 46.87 per cent. The coefficient of variation of area for overall period was lowest in Soybean i.e. 19.01 per cent. The Coppocks instability index indicated that 37.7 per cent variation Jowar crop where as 15.79 per cent lowest variation in Soyabean crop in Bhatkuli tahsils.

4. Nandgaon tahsil

As seen from table 2. That the coefficient of variation of area for overall period was highest in Soybean i.e. 67.49 per cent followed by Green gram 40.98 Per cent. The coefficient of variation of area for overall period was lowest in *Kharif* jowar i.e. 10.72 per cent. In Nandgaon tahsil the Coppock's instability index show 52.66 per cent variation in Soybean and lowest variation observe in jowar crop i.e.8.5

5. Tiwasa tahsil

As seen from table 2. That the coefficient of variation of area for overall period was highest in Soybean i.e. 47.29 per cent followed by Green gram 41.62 per cent and *Kharif* Jowar 39.92 per cent. The coefficient of variation of area for overall period was lowest in Cotton i.e.12.57 per cent. The Coppock's instability index indicated that 44.26 per cent variation in Soybean crops where 8.99 per cent lowest variation in cotton crops in Tiwasa tahsil.

Conclusion

1. The growth rates of *Kharif* Jowar were significantly negative in all the selected tahsils of Amaravati district.
2. The growth rates for area under Cotton were significantly positive i.e. 1.5 per cent for Dharni and 7.41 per cent for

Bhatkuli tahsil on the other hand the area growth rates for Cotton in Chikhaldara and Tiwasa tahsils were stagnant.

3. The growth rates of area for Soybean crop were significantly positive in all the selected tahsils.
4. The growth rates for area under Tur were significantly positive ie. 8.95 per cent, 7.12 per cent and 3.06 per cent in Dharni, Bhatkuli and Nandgaon tahsil.
5. The area growth rates for Green gram and Black gram were significantly negative for all the tahsils of Amaravati district.

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