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Growth performance of selected oilseed commodities in Maharashtra

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Abstract

Oilseed crops are the second most important determinant of agricultural economy, next only to cereals within the segment of field crops. India is one of the major oilseeds grower and importer of edible oils. The data pertaining to the area, production and productivity of selected oilseed crops viz, groundnut and soybean for thirty years (1983-84 to 2013-2014) in Maharashtra were taken from the authentic published source *viz:* Epitome of Agriculture in Maharashtra published by the Department of Agriculture Maharashtra State and from various Government publications. Therefore, attempt has been made to study the performance of selected oilseed commodities viz, groundnut and soybean by compound growth rate in Maharashtra. The growth rates for area, production and productivity of groundnut found stagnant during all three decadal studies. The variation in area of groundnut was highest followed by production and productivity respectively. Instability studies in groundnut indicates that productivity under groundnut exhibited highest variation as compared to area. The growth rates for area and production of soybean found significant during all three periods. The productivity of Soybean was stagnant during period II and period III and I period productivity was significant. The coefficient of variation during overall period of soybean was highest in area, production and productivity. Cuddy and Della instability index on soybean in Maharashtra state showed the highest instability on production followed by productivity and area with 32.45 per cent, 24.72 per cent and 22.64 per cent respectively.

Keywords: Oilseed commodities viz, groundnut and soybean, CGR, CV, Cuddy and Della instability index

Introduction

Oilseed crops are the second most important determinant of agricultural economy, next only to cereals within the segment of field crops. India is one of the major oilseeds grower and importer of edible oils. In India, annual oilseeds are cultivated over 26.67 million hectares of area producing 30.06 million tonnes annually (2016-17). Majority of the oilseeds are cultivated under rainfed ecosystem (70%). The area under oilseeds has experienced a deceleration in general, and this is due to their relative lower profitability against competing crops like maize, cotton, chickpea etc., under the prevailing crop growing and marketing situations. The demand-supply gap in the edible oils has necessitated huge imports accounting for 60 per cent of the country's requirement (2016-17: import 14.01 million tonnes; cost Rs. 73,048 crore). Despite commendable performance of domestic oilseeds production of the nine annual crops (Compound Annual Growth Rate of 3.89%), it could not match with the galloping rate of per capita demand (6%) due to enhanced per capita consumption (18 kg oil per annum) driven by increase in population and enhanced per capita income. Therefore, attempt has been made to study the performance of selected oilseed commodities viz, groundnut and soybean in Maharashtra.

Methodology

Maharashtra is the state well known for its diversified climate and crop production activities and greater productivities of oilseeds. The data pertaining to the area, production and productivity of selected oilseed crops viz, groundnut and soybean for thirty years (1983-84 to 2013-2014) in Maharashtra were taken from the authentic published source *viz:* Epitome of Agriculture in Maharashtra published by the Department of Agriculture Maharashtra State and from various Government publications.

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Compound growth rate

The compound growth rate in annual area, production and productivity were worked out by fitting an exponential function as well as separate growth rate for ten years each and overall thirty years were calculated form gathered data as given below.

$Y = ab^t$

Where,

Y = Annual area, production and productivity of selected oilseeds viz, groundnut and soybean

a = Intercept

b = Regression co-efficient

t = Time period (years)

From the coefficient values, the rates of compound growths were worked out by using the formula.

CGR = [Antilog (log b)-1] x 100

Where,

r = compound growth rate in per cent.

The 't' test was used to test the significance.

Estimation of variability in area, production and productivity of selected oilseed crops (Period (I)1983-84 to 1992-93, Period (II) 1993-94 to 2002-03, Period (III) 2003-04 to 2013-14 and Overall (1983-84 to 2013-14).

Cuddy and Della Instability Index

The Instability Index developed by Cuddy and Della were used for estimating instability index. Yield instability were measured in relative terms by the Cuddy and Della Valle index, which is commonly used as measures of instability in time-series data (Singh and Byerlee, 1990 and Deb *et. al* 1999). Since the simple coefficient of variation over-estimates

the level of instability in time-series data characterized by long-term trends, the Cuddy and Della Valle index corrects the coefficient of variation as follows.

$CV = (CV^*) (1 - R^2)^{1/2}$

Where,

CV = Cuddy and Della Valle index of instability

CV* = Coefficient of variation without trend-adjusted data

R^2 = Coefficient of multiple determination from a time trend regression adjusted by the number of degrees of freedom

Cvt = Net measure –index of instability = $Cv \sqrt{1- R^2}$

1. Fit y = a+ bt,
2. Trend were significant Cv multiple by Sq. root of unexplained variable and it gives index of instability.

Result Discussion

The present study was undertaken with a view to workout CGR, CV and Cuddy and Della Instability Index of area, production, and productivity of oilseeds viz, groundnut and soybean.

Performance of selected oilseed commodities in Maharashtra

The performance of selected oilseed crops viz, groundnut and soybean in Maharashtra is ascertained by studying the compound growth rate, coefficient of variation and cuddy – della instability index of area, production, and productivity are presented in Table 1 to 2

Table 1: Growth rate, coefficient of variation and Cuddy and Della instability index of area, production and productivity of groundnut in Maharashtra.

Particulars		Period I (1983-84 to 1992-93)	Period II (1993-94 to 2002-03)	Period III (2003-04 to 2013-14)	Overall (1983-84 to 2013-14)
Area	CGR	0.39	-4.10	-4.78	-3.58
Production		2.47	-4.95	-2.91	-2.68
Productivity		2.06	-0.88	1.29	0.81***
Area	CV (%)	13.56	13.94	19.93	34.27
Production		29.24	18.32	15.73	34.19
Productivity		12.45	11.94	10.35	14.55
Area	CDII (%)	13.51	6.13	12.54	12.64
Production		28.39	9.99	12.66	22.40
Productivity		18.94	8.33	9.53	22.49

Note: ***, **, * denotes level of significance at 1%, 5% and 10%, respectively

It is observed from the table that the groundnut showed stagnant growth in terms of area, production and productivity during all three decade. The compound growth of Groundnut during the overall period was stagnant in terms of area and production. Productivity showed positive and significant growth of 0.81 per cent during the overall period.

During the overall period, the variation in area of Groundnut was highest with 34.27 per cent followed by production and

productivity with 34.19 per cent and 14.55 per cent respectively.

The instability for area of Groundnut was observed to be 12.64 per cent. Production and productivity showed the instability indices of 22.40 per cent and 22.49 per cent respectively.

Table 2: Growth rate, coefficient of variation and Cuddy and Della instability index of area, production and productivity of soybean in Maharashtra.

Particulars		Period I (1983-84 to 1992-93)	Period II (1993-94 to 2002-03)	Period III (2003-04 to 2013-14)	Overall (1983-84 to 2013-14)
Area	CGR	22.03***	11.35***	6.29***	16.09***
Production		36.73***	12.67***	8.51***	20.45***
Productivity		12.05***	1.18	2.09	3.75***
Area	CV (%)	76.31	31.44	20.30	90.02
Production		109.14	37.47	32.41	97.78

Productivity		41.27	13.32	23.15	36.42
Area		32.07	8.90	8.51	22.64
Production	CDII (%)	45.62	16.86	18.38	32.45
Productivity		22.99	12.88	22.61	24.72

Note: ***, **, * denotes level of significance at 1%, 5% and 10%, respectively

It is seen from the table that the soybean revealed positive and significant growth in area during period I, Period II and period III with 22.03 percent, 11.35 per cent and 6.29 per cent respectively at 1 per cent level of significance. The production also valued increasing growth of 36.73 per cent, 12.69 per cent 8.53 per cent at l per cent level of significance during the respective periods. The increase in production might be due to increase in area under cultivation in the state. Productivity showed positive and significant growth of 12.05 per cent during 1983-84 to 1992-93 at 1 per cent level of significance. The productivity of Soybean was stagnant during period II and period III. During the overall period of study, increasing growth was observed in terms of area, production and productivity with 16.09 per cent, 20.45 per cent and 3.75 percent respectively.

Highest coefficient of variation during the overall period of 30 years was ascertained in production of soybean with 97.78 per cent followed by area with 90.02 per cent and productivity with 36.42 per cent.

Cuddy and Della instability index on Soybean in Maharashtra state showed the highest instability on production followed by productivity and area with 32.45 per cent, 24.72 per cent and 22.64 per cent respectively.

Conclusions

The growth rates for area, production and productivity of groundnut found stagnant during all three decadal studies. The variation in area of groundnut was highest followed by production and productivity respectively. Instability studies in groundnut indicates that productivity under groundnut exhibited highest variation as compared to area. The growth rates for area and production of soybean found significant during all three periods. The productivity of Soybean was stagnant during period II and period III and I period productivity was significant. The coefficient of variation during overall period of soybean was highest in area, production and productivity. Cuddy and Della instability index on Soybean in Maharashtra state showed the highest instability on production followed by productivity and area with 32.45 per cent, 24.72 per cent and 22.64 per cent respectively.

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