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Performance of Area, Production and Productivity of Soya-bean Crop in the State of Madhya Pradesh (2000-01 to 2015-16)

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Abstract:

An attempt was made to examine the Absolute and Relative change and trend Analysis of APY of soya-bean in Madhya Pradesh. In this paper Compound growth and variability of Area ,Production and Productivity of Soyabean Crop is also pointed out in the state of Madhya Pradesh. Madhya Pradesh is one of the forerunner states in soya-bean production. Contribution of Madhya Pradesh was more than fifty percent in the total area and production of soya-bean. The study measured the Trend Analysis, Absolute and Relative change in area, production and productivity of soya-bean crop in Madhya Pradesh based on secondary data during 2001-02 to 2015-16. The area, production and productivity of soya-bean registered positive and significant growth trend during the study period. It is observed from the paper that the absolute and relative change of area under soya-bean is positive during all the three phases. It is revealed from the data that change in Production and Productivity is negative during phase II due to erratic rainfall during sowing season and lower price realization from last kharif harvest discouraged farmers during the year 2015-16,the production may be also declined by diverted soyabean area to other crops such as Urad, maize, Moong etc.

Key words: ***Soya-bean, Trend Analysis, Absolute and Relative change, Compound Growth Rate.***

Introduction:

Soya-bean (*Glycine max L*) is rightly termed as miracle crop because of its unique qualities and giving higher returns to develop farmers' economy. In India soya-bean is mainly grown as a rainfed crop covering states of Madhya Pradesh, Maharashtra and Rajasthan. Madhya Pradesh covered 24.7 per cent of total oilseed area in India, contributed 22 per cent of production share and 89 per cent of productivity share of total oil seed of India. Soya-bean, rapeseed, mustard, sesamum and groundnut all together contributed 96.75 per cent of total oilseed area of the state. The remaining 3.25 per cent of oilseeds in the state was contributed by other oilseeds like linseed etc.

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Madhya Pradesh is the largest soya-bean growing state in India and it alone contributes about 72 per cent and 65 per cent of the total area and production of soya-bean in the country. Despite this, the area of cultivation in India and Madhya Pradesh continues to increase at a faster rate, which needs the assessment of the absolute and Relative change and Trend analysis in the area, production and productivity during the period when this crop has been made their own importance in cropping system of farmers' field.

Research Methodology:

Objective of study:

- To study the trend in Growth of Area, Production and Productivity of Soyabean crop in the state of Madhya Pradesh.
- To analyze Variability In growth of Soyabean crop in the state of Madhya Pradesh.

Source of data and Period of study:

In order show change and trend in area, production and productivity of soya-bean, time series secondary data for the period of 15 years i.e. (2000-001 to 2015-2016) was collected. The source of the data was secondary in nature and mainly collected from Agriculture Statistics of Madhya Pradesh (from the Directorate of Agriculture, Bhopal), www.mpkrishi .net and from other published and unpublished records.

Analytical procedure:

Absolute and Relative change:

Absolute change as well as relative change was included in the present study.

Absolute change = Yn-Yo

Where,

Yn = Mean value (area production and productivity) for the last triennium ending

Yo = Mean value (area production and productivity) for the first (base) triennium ending

Relative change = $\frac{Yn-Y0}{Y0} * 100$

Where,

Yn = Mean value (area, production and productivity) for the last triennium ending

Y0 = Mean value (area, production and productivity) for the first (base) triennium ending

Trend equation:

Y=a +bx.

Where,

Y is independent variable (Area, Production and Productivity), a- intercept, b- coefficient.

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The compound growth rate were worked out by the following formula:

Compound growth rate (%) = [Antilog (B)-1] ×100.

To examine the variability with respect to area, production and productivity of the paddy and wheat mean, standard deviation and coefficient of variation were pointed out for the three different phases.

Coefficient of variation = $\sigma / \bar{x} * 100$

Where, σ = Standard deviation

$\bar{X}$ = Mean of the Sample data

Standard deviation [σ] = $\sqrt{\sum X^2/n-1}$

Where, $X = [x^i — \bar{x}]$

N = Number of observation

Results and Discussion.

Absolute and Relative Change:

The absolute and relative changes in area, production and productivity of soya-bean in the state of Madhya Pradesh have been worked out in this paper. The change in area, production and yield under soya crop in the state of Madhya Pradesh is depicted by absolute and relative change over a whole reference period. To show the absolute and relative changes in APY of soya crop in Madhya Pradesh, the analysis was done in three phases i.e. Phase I from 2000-01 to 2007-08, phase II from 2009-06 to 2015-16, phase III from 2000-01 to 2015-16 which is of sixteen years from 2000-01 to 2015-16.

Table 1: Absolute and Relative Change in Area, Production and Yield of Soya-bean crop in M.P.

	2001-02 to 2007-08		2008-09 to 2015-16		2001-02 to 2015-16	
	Absolute change	Relative change	Absolute change	Relative change	Absolute change	Relative change
Area(000ha)	727	16.24	611.9	11.55	1431.9	31.9
Production(000MT)	1937	56.45	-1475.9	-24.91	1017.1	29.64
Productivity(ton/ha)	0.26	3.19	-0.36	-24.6	-0.013	-1.78

Source: Agricultural Economic Survey 2016, WWW.mpkrishi.net

Absolute Change:

Table: 1- depicts that the Absolute change in area of soya-bean in Madhya Pradesh had increased by 1431.9 thousand hectares during the whole reference period. While as in

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phase I and II the area under soyabean has increased by 727 (000ha) and 611.9 (000ha) respectively. As regards absolute change in production of soya-bean in the state is found to increase by 1017.1 thousand metric tons during current year over to base year. In phase I the production has raised by 1937(000ha) while as in phase II the production has declined by 1475.9. As regards yield Table 1 also depicts the absolute change in productivity of soya-bean in Madhya Pradesh has declined by 0.013 tonne /ha mainly due to erratic rainfall during sowing season in 2015-16.

Relative Change:

Table 1also revealed relative change in Area, Production and Productivity of soya crop during phase I, II and III in the state of Madhya Pradesh. Relative change in area of soya-bean in Madhya Pradesh found to increase by 16.24%, 11.55% and 31.99% per cent during phase I, II and III respectively. As regards relative change in production of soya-bean in the state of Madhya Pradesh the production of soya-bean was observed to increase by 56.45%, 29.64% during phase I and III respectively. While as in phase II the production of Soybean has declined by -24.91% due to drastic decline in rainfall during sowing season. Table 1 also depicts the relative change in productivity of soya-bean in Madhya Pradesh and found to increase by 3.19% during phase I and declined by -24.69% and -1.78% during phase II and III respectively.

Compound growth rate of Area, Production and Productivity:

Table 2: Compound growth rate of Area, Production and Productivity of soyabean in the state of Madhya Pradesh during three phases.

Phases	Compound Growth Rate		
	Area	Production	Yield
2000-01 to 2007-08	2.035%	7.31%	5.17%
2013-14 to 2015-16	1.655%	-2.53%	-4.12%
2000-01 to 2015-16	2.658%	4.55%	1.85%

Source: Agricultural Economic Survey 2016, WWW.mpkrishi.net

The compound growth rate of area under soybean crop in the state is 2.65% for the entire reference time period of 16 years while as the CGR of area is 2.03% and 1.65 % during phase I and II respectively. The CGR of production of soyabean is observed to be positive which is 7.3% and 4.5% during Phase I and III respectively, further it is depicted that CGR of production is negative i.e. -2.53% during phase II which covers period from 2008-09 to 2015-16.The table 2 also pointed out the CGR of Productivity it is observed during phase II CGR of yield is negative i.e. -4.11 due to erratic rainfall during the year 2015-16.While as it is pointed out from the table 2 that CGR of yield is noted to be 5.17% and 1.84% during phase I

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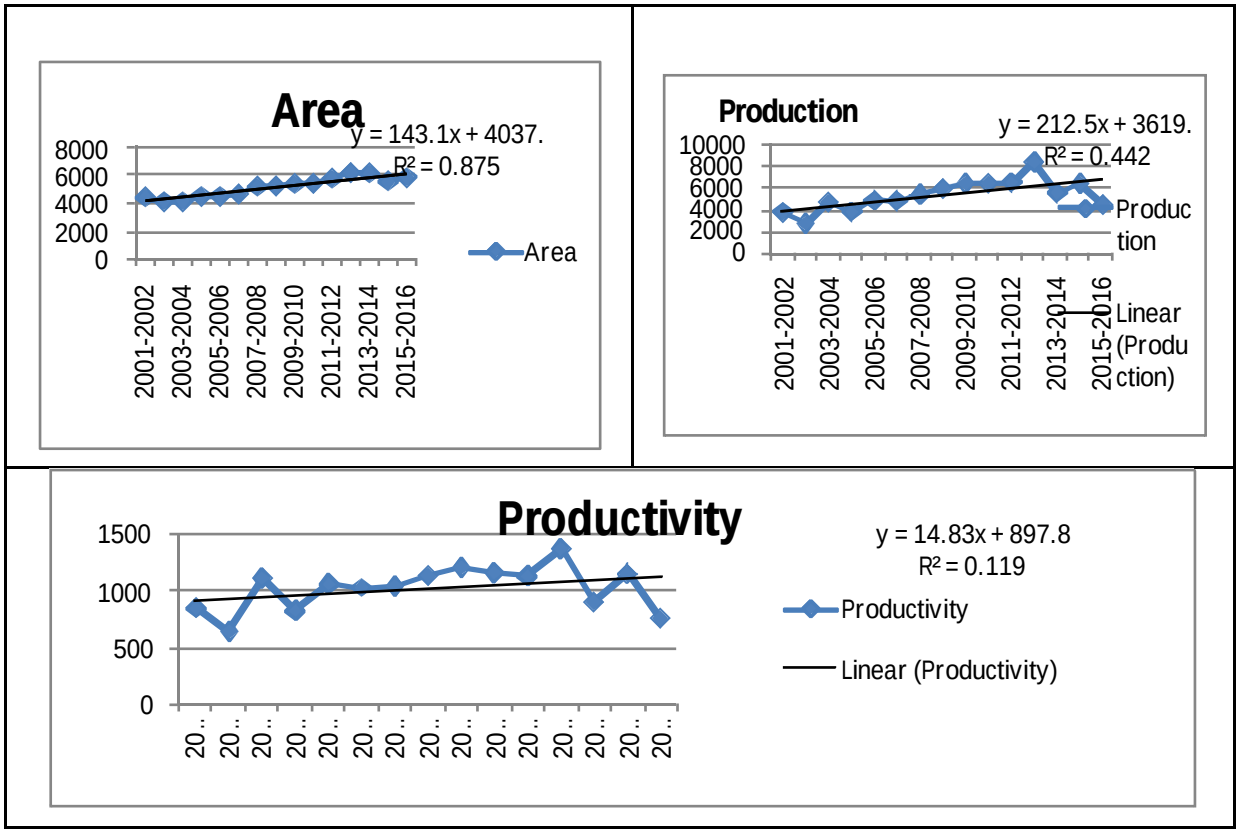
and III respectively. It is observed from the table that CGR of soyabean crop is much better in the first Eight years phase as compared to the second eight years phase.

Trend and growth in acreage, production and productivity of soya-bean:

Trend Analysis:

Trend analysis provides the rate of change of particular variables during the period of reference and the direction of change, but it fails to provide the rate of change per annum. This section provides growth trends in linear forms. Status of soya-bean trends in area, production and productivity have been fitted on the time series data. The trend value presented in table 2 assumed straight line tendencies of soya-bean area, production and productivity. The slope of the line is given by the value associated with year (x).

Figure 2: Trend in Area, Production and Productivity of soya-bean during 2000-01 to 2015-16.



Source: www.mpkrishi.com

The trend in area, production and productivity of soya-bean in Madhya Pradesh were positive during the period of study. As regard the trend in area of soya-bean, the positive slope (b= 143.1) was observed. The trend in production of soya-bean (b= 212.5) was also positive. The trend in productivity of soya-bean (b=14.83) was also found positive. This indicated that during 2001-02 to 2015-16, cultivated area under soya-bean was expanding

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positively with increasing production and productivity. The area and production expansion under soya-bean is found to be nominal but increase in productivity of soya-bean was not satisfactory.

Variability:

An analysis of variability in the area under soyabean crop is presented in table no.3. The two statistical techniques used are the standard deviation which gives an absolute measure of variability and coefficient of variation, which reveals the relative change in variability. The entire span of study was split into three phases: Phase I (2001-02 to2017-2008), Phase II (2008-09 to2015-16) and Phase III (2001-02 to2015-16).

Table 3: Standard Deviation and Coefficient of Variation of Area, Production and Productivity.

Phases	Area		Production		Productivity	
	S.D	C.V	S.D	C.V	S.D	C.V
Phase I	318.79	7.00	894.87	21.55	0.17	18.21
Phase II	340.70	5.95	1113.77	17.87	0.19	17.07
Phase III	686.90	13.36	1451.59	23.29	0.19	19.44

Source: Agricultural Economic Survey 2016, WWW.mpkrishi.net.

The table 3 reveals that in terms of percentage, the Variability of area under soyabean is observed to be 7.00%, 5.95% and13.36% in phase I, phase II and phase III respectively. The Variability of Production under soyabean crop noted to be 21.55%, 17.87% and 23.29% in phase I, phase II and phase III respectively. As regards yield the variation revealed to be 18.21%, 17.07% and 19.44% accordingly in three phases. While as in absolute terms the variability is shown by standard deviation it is observed from the table 3 that standard deviation of area under soyabean is noted to be 318.79, 340 and 686.9 in the phase I, II and III respectively. The standard deviation of production under soyabean is observed to be 894.87, 1113.7 and 1451.5 in the phase I, II and III respectively. The standard deviation of yield under soyabean is worked to be 0.17, 0.19 and 0.19 in the phase I, II and III respectively.

Conclusion:

It is to be concluded that Soya-bean (*Glycine max L*) is rightly termed as miracle crop because of its unique qualities and giving higher returns to develop farmers' economy. It is observed from the results that the Absolute and Relative change in the Acreage, are positive in all the Phases, While as the Absolute and Relative change in Production and productivity is observed to be positive in Phase I and negative in Phase II . It is also found that the trend line

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of APY has positive slope. It is observed from the study that CGR of soyabean crop is much better in the first Eight years phase as compared to the second eight years phase. the Variability of area under soyabean is observed to be 7.00%, 5.95% and13.36% in phase I, phase II and phase III respectively. The Variability of Production under soyabean crop noted to be 21.55%, 17.87% and 23.29% in phase I, phase II and phase III respectively. As regards yield the variation revealed to be 18.21%, 17.07% and 19.44% accordingly in three phases. It is revealed from the data thatt change in Production and Productivity is negative during phase II due to erratic rainfall during sowing season and lower price realization from last kharif harvest discouraged farmers during the year 2015-16.the production is also declined by diverted soyabean area to other crops such as Urad, maize, Moong etc.

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