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RESEARCH PAPER

Growth dynamics of area, production and productivity of soybean in Belagavi district of Karnataka

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Abstract: Soybean (*Glycine max*) holds immense global economic significance. Its cultivation spans 121.20, 3.17, 0.86 lakh hectares, yielding 128.97, 3.76, 0.87 lakh tonnes, and achieving productivities of 1064, 1212, 1033 kilograms/hectare in India, Karnataka and Belagavi district respectively. Lever aging growth analysis for innovative marketing strategies, the Compound Annual Growth Rate (CAGR) emerges as a pivotal tool. Meanwhile, regression models find application in control strategies. Collating secondary data from sources such as DSO, Belagavi and DGCIS over a decade, a comprehensive view was obtained. In Karnataka, area of soybean burgeoned from 1.90 lakh hectares in 2011-12 to 3.17 lakh hectares in 2020-21, boasting a robust CAGR of 6.71 per cent. Similarly, production escalated from 1.92 lakh tonnes to 3.76 lakh tonnes during the same period, at a CAGR of 8.87 per cent. Correspondingly, productivity of soybean improved from 1.01 tonnes/hectare to 1.21 tonnes/hectare, with a CAGR of 2.11 per cent. Within Belagavi district, the soybean landscape witnessed growth from 0.77 lakh hectares in 2011-12 to 0.86 lakh hectares in 2020-21, demonstrating a CAGR of 2.32 per cent. Production figures mirrored this trend, ascending from 0.78 lakh tonnes to 0.87 lakh tonnes, reflecting a CAGR of 7.09 per cent. Notably, productivity of soybean progressed moderately, advancing from 1.01 tonnes/hectare to 1.03 tonnes/ hectare at a CAGR of 4.77 per cent. Karnataka experienced a substantial and significant surge in soybean cultivation, attributed to escalating demand and advancements in scientific techniques. Meanwhile, Belagavi district exhibited a positive growth trajectory, partially attributable to similar factors. Although soybean productivity witnessed an uptick, the pace was relatively modest in both Karnataka and Belagavi district. Suitable measures have to be taken up by the government and by the farmers like introducing and using seeds of HYVs to boost the productivity of soybean.

Key words: Area, Growth rate, Production, Productivity of soybean, Regression

Introduction

Agriculture stands as the cornerstone of India's economy, employing more than half of its workforce and contributing approximately 17 per cent to the GDP. The soybean plant (*Glycine max*), also known as soya bean or soja bean, represents an edible seed of global economic significance. It plays a pivotal role in providing vegetable protein to millions and acting as a vital raw material for a multitude of chemical products. Functioning as a leguminous crop, soybean's suitability as an oilseed is counter balanced by challenges in terms of cookability and digestibility, primarily stemming from the presence of trypsin inhibitor. Its growing popularity can be attributed to its adaptable nature across diverse agro-climatic conditions.

Earning the title of a "wonder crop", soybean exhibits exceptional versatility and unparalleled nutritional advantages. Its utility spans various domains, with the production of vegetable oil and margarine constituting significant applications. Soybean oil finds use both in its pure form for salad dressings and in the creation of mayonnaise. This agricultural pursuit is estimated to employ around 6 million individuals within India. As of September 2021, the prospects for soybean cultivation within India displayed encouraging growth and expansion. The nation boasts a noteworthy standing as a key global producer and consumer of soybeans. This crop's cultivation has maintained a steady upward trajectory.

Agricultural marketing plays a multifaceted role extending beyond mere enhancement of productivity and consumption; it serves as an impetus for economic advancement. Its dynamic functions hold pivotal importance in stimulating economic development, thereby earning recognition as a potent driver of agricultural progress. Against this backdrop, endeavors have been undertaken to dissect the growth dynamics concerning area, production, and productivity of soybean in both Belagavi district and Karnataka. Such growth analysis assumes significance as it aids in devising novel marketing strategies, thereby fostering innovation in the sector.

To analyze the growth in area, production and productivity of soybean in Belagavi district and Karnataka.

Material and methods

The secondary data was collected through reviewing publications and reports of various sources like, District Statistical Office, Belagavi, Directorate of Economics and statistics, Karnataka, Government of Karnataka and from the dac.net website, pertaining to last 15 years data on area, production and productivity of soybean in Belagavi district and Karnataka.

Compound Annual Growth Rate (CAGR) is the analytical tool used. Regression model is used for control purposes. Exponential growth model was selected for the analysis and the model is of the following form.

$y=ab^t$

where,

y = Dependent variable for which growth rate is to be estimated

a = Intercept and b = Regression co-efficient

t = Time – variable

CAGR was obtained by the logarithmic form of the equation, $y = ab^t$ and calculated using the formula,

CAGR(%) = (Antilog b – 1) * 100

Cuddy Della Valle Instability index is measured which depicts the per cent instability in the given time series data. The ranges of CDVI are as follows.

Low stability: 0 per cent to 15 per cent

Medium stability: 15 per cent to 30 per cent

High instability: More than 30 per cent

CDVI is calculated using the following formula.

$$CDVI\,(\%) = CV * \sqrt{1-dR^2}$$

where,

C V = Coefficient of Variation

dR^2 = Adjusted R^2 value

Results and discussion

In the context of soybean cultivation in Karnataka spanning from 2006-07 to 2020-21, Table 1 represents the growth rates pertaining to the cultivated area, production output, and productivity. Upon initial examination, it becomes evident that soybean cultivation area in Karnataka has undergone a notable expansion over the course of fifteen years. This expansion is quantified by a CAGR of 7.65 per cent, a statistically significant figure attested at the 1 per cent level of probability. Concurrently, soybean production has also exhibited a robust increase, characterized by a CAGR of 11.49 per cent at a statistically

Table 1. Growth in area, production and productivity of soybean in Karnataka

Years	Area (Hectares)	Production (Tonnes)	Productivity (Tonnes /Hectare)
2006-07	1,31,139	97,209	0.74
2007-08	1,13,190	92,249	0.81
2008-09	1,34,183	92,556	0.69
2009-10	1,83,688	82,396	0.45
2010-11	1,68,075	1,47,777	0.88
2011-12	1,90,973	1,92,764	1.01
2012-13	1,69,509	1,77,805	1.05
2013-14	2,18,908	2,70,157	1.23
2014-15	2,55,538	1,89,081	0.74
2015-16	2,57,971	1,39,890	0.54
2016-17	3,17,870	2,37,281	0.75
2017-18	2,76,536	4,23,142	1.53
2018-19	2,61,855	2,57,221	0.98
2019-20	3,36,850	3,78,700	1.12
2020-21	3,17,287	3,76,746	1.21
CAGR(%)	7.65***	11.49***	3.62*
CDVI(%)	10.45	26.73	26.56

Note: *** represents 1 per cent and * represents 10 per cent level of significance

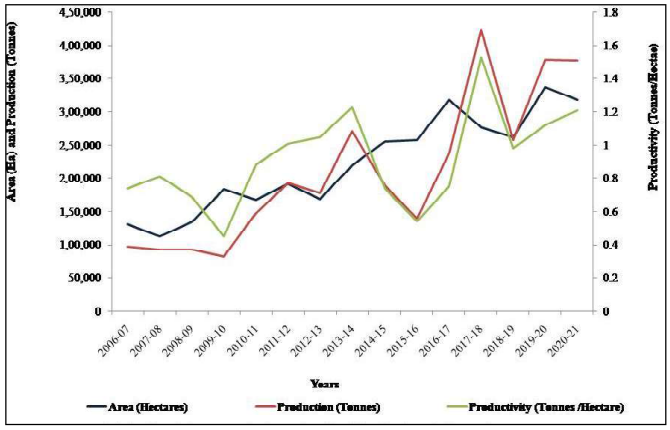

Fig.1 Growth in area, production and productivity of soybean in Karnataka

significant level of 1 per cent probability. These observations are graphically depicted in Figure 1. Moreover, the analysis of the soybean cultivation data reveals a positive trajectory in terms of productivity enhancement. The productivity growth, represented by a CAGR of 3.62 per cent, demonstrates a discernible improvement over the studied period. While statistically significant at the 10 per cent probability level, this productivity trend, when combined with the area and production dynamics, underscores the crop's rising prominence within the region's agricultural landscape. This burgeoning trend signals a notable shift as soybean progressively establishes itself as a pivotal crop in Karnataka, prompting farmers to actively expand its cultivation footprint.

The instability in the dimensions of area, production, and productivity are evident through their corresponding CDVI values, standing at 10.45 per cent, 26.73 per cent, and 26.56 per cent, respectively. These variances can be attributed to a range of factors including evolving weather patterns, shifts in market

Table 2. Growth in area, production and productivity of soybean in Belagavi district

Years	Area (Hectares)	Production (Tonnes)	Productivity (Tonnes /Hectare)
2006-07	76,927	58,976	0.77
2007-08	64,422	55,387	0.86
2008-09	70,104	47,152	0.67
2009-10	97,400	49,318	0.51
2010-11	78,662	64,715	0.82
2011-12	77,257	78,385	1.01
2012-13	60,203	40,378	0.67
2013-14	66,769	49,159	0.74
2014-15	74,314	67,986	0.91
2015-16	90,450	30,762	0.34
2016-17	93,873	1,00,862	1.07
2017-18	76,747	94,491	1.23
2018-19	72,014	90,853	1.26
2019-20	83,238	83,425	1.00
2020-21	86,481	87,458	1.03
CAGR (%)	0.93	4.04*	3.09
CDVI(%)	13.21	26.01	25.41

Note: *represents 10 per cent level of significance

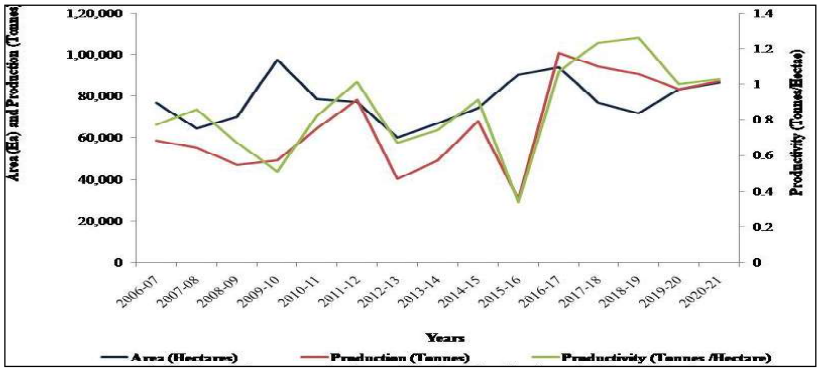

Fig.2 Growth in area, production and productivity of soybean in Belagavi district

demands, and the adaptive practices of farmers. In particular, the production and productivity of soybean within Karnataka exhibit a moderate degree of instability. This alignment with the findings of Kumar *et al.* (2019) , which assessed the growth and volatility of area, production, and productivity of soybean on a national scale, reaffirms the presence of similar patterns.

Table 2 elucidates the growth dynamics encompassing the area, production, and productivity of soybean within the confines of Belagavi district, spanning the temporal range of 2006-07 to 2020-21. An overview of this tabulated data reveals a discernible upswing in the expanse allocated to soybean cultivation in Belagavi district over a span of fifteen years. This expansion is quantified by a CAGR of 0.93 per cent. In parallel, soybean production has exhibited a positive trajectory, marked by a CAGR of 4.04 per cent, which achieves statistical significance at a confidence level of 10 per cent. This growth trend, substantiated by data, is further complemented by the enhancement in soybean cultivation's productivity, with a CAGR of 3.09 per cent. These trends are visually represented in Fig. 2, a graphical embodiment of soybean's growing significance driven by increasing demand and utilization.

The instability within the dimensions of area, production, and productivity becomes apparent when evaluating their respective CDVI values, standing at 13.21 per cent, 26.01 per cent, and 25.41 per cent correspondingly. These variances can be attributed to evolving market demands, dynamic changes, and the adaptive strategies employed by farmers. Notably, the patterns of instability align with the trends witnessed in the context of area, production, and productivity of soybean cultivation across Karnataka. These observations resonate with the findings of Pusadekar *et al.* (2020) study focused on groundnut trends within Gujarat.

Conclusion

The identified growth patterns and stability nuances hold implications for future agricultural strategies and policies within the region.Soybean being the "wonder crop" due to its remarkable versatility and incredible nutritional benefits, area and production of soybean is significantly increasing in Karnataka and positively increasing in Belagavi district. Productivity of soybean is increasing but not at significant rate in both Karnataka and Belagavi district. Suitable measures have to be adopted by the government and by the farmers like, introducing and using seeds of HYVs, enhancing the effectiveness of research and development with respect to production technologies, which are suitable to Indian situations to boost the productivity of soybean.

References

Anonymous, 2022, Area, production and productivity, www.belagavi.nic.in

Anonymous, 2022, Area, production and productivity of soybean. www.eands.dacnet.nic.in

Kumar S, Singh P K, Rathi D, Nahatkar S B, Choudhary V K and Parey S K, 2019, Growth and instability in area, production and productivity of Soybean in India. *International Journal of Science, Environment and Technology,* 8(2): 278-288.

Pusadekar N N, Dangore U T, Baviskar P P, Gaware U P and Pusadekar M G, 2020, Trend and decomposition analysis of groundnut in Gujarat. *Journal of Pharmacognosy and Phytochemistry*, 9(5): 145-147.