



# Use of Statistical Techniques in Managing Cash Crop Production in Indian Economy

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## Abstract

Agriculture plays a vital role in India's economy. Agriculture, with its allied sectors, is the largest livelihood provider in India. The sugarcane and potato are the main cash crops and providing huge employment opportunities in rural and urban areas. Potato is the world's fourth important crop. India ranks 2<sup>nd</sup> largest country in the world in production of potato after China. In the present paper, an attempt has been made to study the production trend and growth rate for Potato by using statistical techniques. It is observed that there is an increasing trend in cultivation area sown. The growth rate has been highest at the level of 6.43 % per annum during 1955-56 to 1965-66 and lowest 2.28% during 1995-96 to 2005-06. The production of potato has been constantly increased from the level of 1.78 thousands tones in 1955-56 to 46.68 thousands tones during 2015-16. The productivity level has shown positive growth rates per annum during all the periods except 1995-96 to 2005-06. The state-wise analysis for potato has also been carried out. A Least Square Model has been developed using data from 1995 to 2020. The projected cultivated area, production and yield for potato has been worked for 2025-26 and 2030-31. Authors have also suggested the strategies for enhancing the returns of the potato crop and its products through appropriate marketing strategy and trade liberalization.

Keywords : Area Sown, Growth Rate, Least Square Technique, Productivity, Production

## Introduction

Agriculture in India is one of the most prominent sectors to its economy. Agriculture and allied sectors continue to play a critical role in economic growth and development of the country. Developments in the sector are of interest to whole spectrum of people across the world, including policy makers, researchers,

academicians, agri-business community, International organizations etc. The sugarcane and potato are the main cash crops and providing huge employment opportunities in rural and urban areas. These crops need to develop in the pattern of agri-business to achieve maximum returns and employment. Potato is the world's fourth important food crop after rice, wheat and maize and contributes to the energy and nutritional needs of more than a billion people worldwide. India is the 2<sup>nd</sup> largest country in the world in production of potato after China. Potato is grown almost in all the States of India, However, Uttar Pradesh, West Bengal and Bihar together contributes about 80% of India's production.

### **Methodology**

The following formulae were used:

#### Three Year Moving Average

$$Y_{t+1} = \frac{Y_t + Y_{t+1} + Y_{t+2}}{3}$$

Where  $Y_t$  is variable ( area sown, production or productivity )

And  $t$  is period, say,  $t = 0, 1, 2, \dots$

#### Growth Rate

The moving averages have been used to estimate growth rates.

$$R_t = \frac{Y_1 - Y_0}{Y_0} * 100$$

Where  $R_t$  is the simple growth rate during two periods

$Y_t$  -> Value of the variable of the time  $t$ .

$Y_0$  -> Value of the variable of the initial period

#### Projection

Least Square Technique has been applied for the following linear model:

$$Y = a + b X$$

Where  $Y$  is number of operational holding and area

$a$  is constant

$b$  is regression of  $Y$  on  $X$ ,

$X$  is year ( $X=1$  for 1995

$=2$  for 2000 & so on)

### **Result and Discussion**

The potato crop is highly labour intensive. Production of potato crop generates a large scale of employment in performing various activities. The potato can be used for preparing various marketable products like potato chips, paper, fruit chat and mixing the potato in various vegetables for higher return.

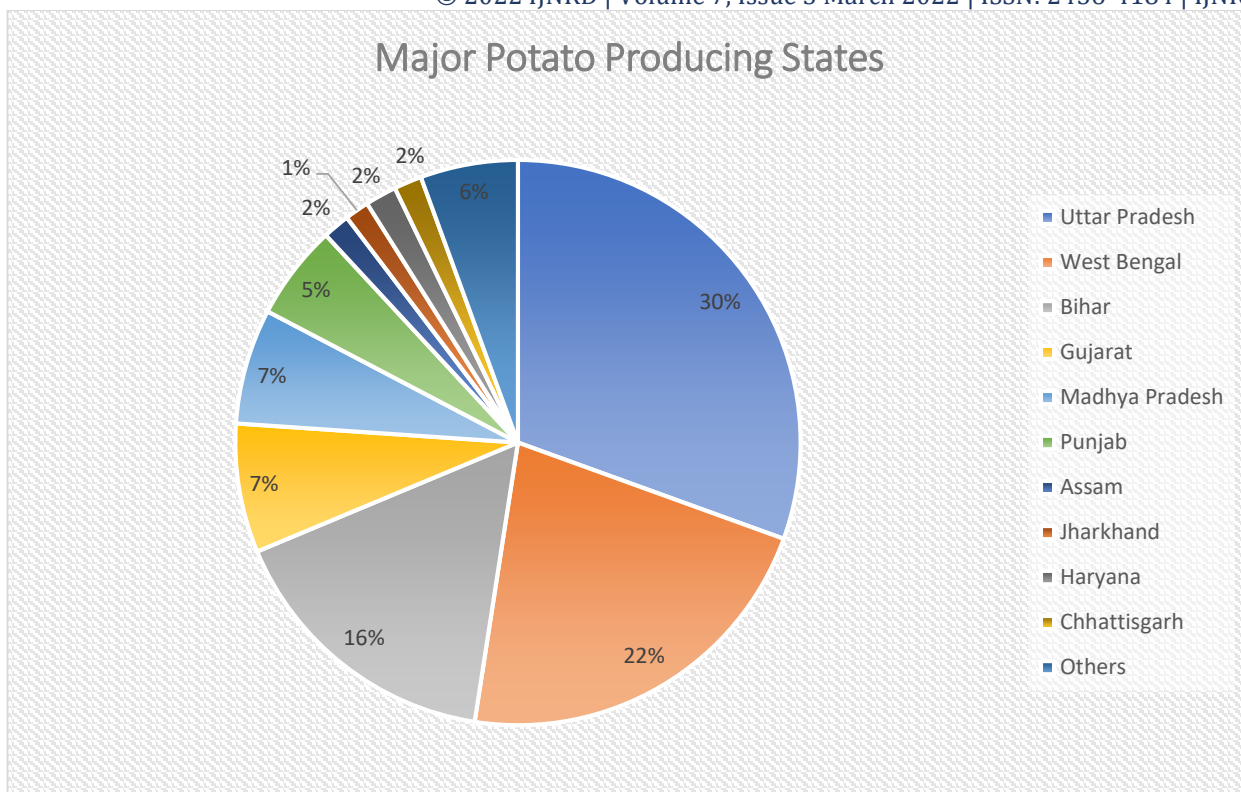
**Table -1\_Three years moving average of area, production and yield of the Potato**

Year.	Area sown 000 Hect	Growth rate per annum	Production 000 Tones	Growth rate per annum	Yield Kg/Hect	Growth rate per annum
1955-56	0.28		1.78		6633	
1965-66	0.46	6.43	3.74	11.01	8116	2.24
1975-76	0.61	3.26	6.90	8.45	11303	3.93
1985-86	0.84	3.77	11.91	7.26	14164	2.53
1995-96	1.14	3.57	20.15	6.92	17537	2.38
2005-06	1.40	2.28	22.91	1.37	16641	-0.51
2015-16	2.13	5.21	46.68	10.38	21979	3.21

**Table -2\_Area, Production and Yield of Potato (2018 – 2019)**

	Area 000 Hect	%age of Total Area	Production 000 Tones	%age of Total Production	Yield Kg/ Hect
Uttar Pradesh	610.50	28.09	15323.55	30.53	25100
West Bengal	436.04	20.07	11000.00	21.92	25227
Bihar	321.90	14.81	8153.91	16.25	25332
Gujarat	124.65	5.74	3706.00	7.38	29732
Madhya Pradesh	145.00	6.67	3315.00	6.60	22862
Punjab	103.07	4.74	2724.44	5.43	26434
Assam	103.21	4.75	773.48	1.54	7495
Jharkhand	49.03	2.26	695.46	1.39	14186
Haryana	34.74	1.60	897.85	1.79	25846
Chhattisgarh	49.94	2.30	797.42	1.59	15967
Others	194.95	9.28	2802.43	5.58	14375
All India	2172.99	100	50189.52	100	23096

Table-1 presents the three yearly moving averages of area sown and production for Potato crop. Yield rates have been estimated using three year moving averages of area sown and production. It is observed that there is an increasing trend in cultivation area sown. This has been increased from the level of 0.28 thousand hect in 1955-56 to 2.13 thousand hect in 2015-16. The growth rate has been highest at the level of 6.43 % per annum during 1955-56 to 1965-66 and lowest 2.28% during 1995-96 to 2005-06. The production of potato has been constantly increased from the level of 1.78 thousand tones in 1955-56 to 46.68 thousand tones during 2015-16. The growth rate has been highest at the level of 11.01 % per annum during 1955-56 to 1965-66 and lowest 1.37% during 1995-96 to 2005-06. The productivity level has been 6633 Kg/hect during 1955-56 which has gone up to 21979 Kg/hect during 2015-16. The productivity level has shown positive growth rates per annum during all the periods except 1995-96 to 2005-06. The highest growth rate was observed during 1965-66 to 1975-76 (i.e. 3.93%) and lowest during 1995-96 to 2005-06. The state-wise analysis for potato is presented in Table-2. It is seen that the major states producing about 85% of the total potato are Uttar Pradesh (30.53%), West Bengal (21.92%), Bihar (16.25%), Gujarat (7.38%) and Madhya Pradesh (6.60%). The productivity per hectare is highest of the order of 29732 Kg/hect in Gujarat.



The following Table presents the projected area sown, production and yield for Potato crop for 2025-26 and 2030-31. The least square model has been used for projection. It is seen that the estimated area will be 2.39 thousand hect in 2025-26 and 2.61 thousand hect in 2030-31. The production has been estimated of the order of 57.08 thousand tones and 63.91 thousand tones in 2025-26 and 2030-31 respectively. The yield will be 25208 Kg/hect in 2025-26 and 26725 in 2030-31.

**Table –3 Projected Area, Production and Yield**

	2025-26	2030-31
Area 000 Hect	2.39	2.61
Production 000 Tones	57.08	63.91
Yield Kg/ hect.	25208	26725

### Suggestions

To achieve the projected targets, the following strategies are suggested:

- Development of improved high yielding varieties
- Crop Insurance
- Identification of best-fit cropping system with optimized packages of practices
- Development of potato by-product small scale industries
- Reasonable Minimum Support Price
- Strengthening the Ware Housing facilities in the rural areas
- Farmer's participation
- Adoption of IT-based tools for processing and marketing

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