



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(8): 502-504
© 2021 TPI
www.thepharmajournal.com
Received: 03-06-2021
Accepted: 12-07-2021

Om Prakash Verma
Assistant Professor, Department
of Economics, S.N. Sinha
College, Jahanabad, Bihar, India

OP Maurya
Assistant Professor, Department
of Agricultural Economics,
R.S.M. College Dhampur, Uttar
Pradesh, India

Hemant Kumar
Scientist, Department of
Agricultural Statistics, I.C.A.R.
I.I.P.R. Kanpur, Uttar Pradesh,
India

Growth and decomposition analysis of potato production in India

Om Prakash Verma, OP Maurya and Hemant Kumar

Abstract

Rural population in India is largely engaged in vegetable cultivation apart from traditional agricultural practices. Vegetable cultivation has gained impetus in a few decades due to increasing health awareness, population growth, urbanization and better marketing facilities. Potato cultivation in India plays a vital role towards socio-economic development in the rural areas by mobilizing rural resources and generating higher income and employment opportunities. The potato production in the country has gone up from 1.66 to 51.31 million tons between 1950-51 and 2017-18, registering a modest growth. During the period of study the area has increased from 0.24 to 2.14 million ha, while the yield has steadily increased from 6917 kg/ha to 23967 kg/ha. In the present study data were broadly partitioned into seven decades in order to demonstrate the trend of potato production in a more convincing way and simple manner. The compound growth rates of area, production and yield of potato was found positive for almost all the decades of the study period. Overall there was positive growth rate of area, production and yield. The area effect has a greater say in potato each decade except seventies. The area and yield instability were of medium order and production instability is of high order. Overall the change in production is due to area and interaction of area and yield effect.

Keywords: potato, instability, growth rate, coefficient of variation, decomposition analysis

Introduction

There are a number of crops grown by farmers. These include different food and vegetable crops, commercial crops, oil seeds crops etc. Potato is one of the main commercial crops in India and rural population in India is largely engaged in vegetable cultivation apart from traditional agricultural practices. Vegetable cultivation has gained impetus in a few decades due to increasing health awareness, population growth, urbanization and better marketing facilities. Earlier, small land holders used to grow vegetables but now with increasing demand and higher remunerations large land holders have also shifted towards vegetable cultivation. Potato is widely used due to its low cost, easy handling and transportation and its higher shelf life as compare to other vegetables. Most part in India Potato is grown on the plains under irrigation during the winter. The Indian states Uttar Pradesh, West Bengal, Bihar, Punjab and Haryana where potato is grown on a large extent of area and production. There are a number of varieties that are grown in India depending on the suitability of the soil. The area, production and yield and potato cultivation is subjected to fluctuate in response to policies of the government and also conditions of cultivation.

The potato production in the country has gone up from 1.66 to 51.31 million tons between 1950-51 and 2017-18, registering a modest growth. During the period of study the area has increased from 0.24 to 2.14 million ha, while the yield has steadily increased from 6917 kg/ha to 23967 kg/ha.

In this article an attempt has been made to assess the growth of potato in India and study the contribution of area, yield and interaction of yield and area to the total production during the last 67 years (i.e. 1950-51 to 2017-18).

Data and Methodology

The time series secondary data on area, production and yield of potato during the period 1950-51 to 2017-18 were collected from "Agricultural Statistics at a Glance", a publication of the government of India. The present data were broadly partitioned into six decades in order to demonstrate the trend of potato production in more convincing and simple manner. The partition of the data in decade's terms could clearly show the potato production status and growth pattern in the country.

Corresponding Author
Om Prakash Verma
Assistant Professor, Department
of Economics, S.N. Sinha
College, Jahanabad, Bihar, India

The compound growth rate has been determined by using the following exponential function adopted by Maurya (2016) [2]

$$Y = ab^t$$

Where

Y = the variable for which growth rate is calculated

t= time variable

b= the regression coefficient

a= intercept

The log form of the above exponential equation is expressed as

$$\text{Log}(Y) = \text{Log}(a) + t \text{Log}(b)$$

The compound growth rate percentage (r %) can be expressed as

$$r \% = (\text{Antilog}(\text{Log}(b)) - 1) \times 100$$

The coefficients of variation in percent (CV %) were computed using the formula

$$CV \% = (\text{Standard deviation} / \text{Mean}) \times 100 \text{ (Moorti, 1991 and Devraj, 2019) [4, 1].}$$

To study the contribution of area, yield and the interaction of area and yield towards increasing the potato production in India, a decomposition analysis has been performed and is expressed as

Production in the base year is given by

$$P_o = A_o \times Y_o$$

Similarly, the production in the nth year is given by

$$P_n = A_n \times Y_n$$

Also $P_n = P_o + \Delta P$, $A_n = A_o + \Delta A$ and $Y_n = Y_o + \Delta Y$

Therefore, $P_n = A_n \times Y_n$

$$= (A_o + \Delta A)(Y_o + \Delta Y)$$

$$= A_o Y_o + A_o \Delta Y + \Delta A Y_o + \Delta A \Delta Y$$

$$= P_o + A_o \Delta Y + \Delta A Y_o + \Delta A \Delta Y$$

$$\text{or } \Delta P = P_n - P_o = A_o \Delta Y + Y_o \Delta A + \Delta A \Delta Y$$

The first term on the right hand side can be considered as the yield effect, the second term as the area effect and the third term as the interaction effect.

Where,

A_o = area in the base year

A_n = area in nth year

P_o = yield in base year

P_n = yield in nth year

Y_o = yield in base year

Y_n = yield in nth year

ΔA = Change in area ($A_n - A_o$)

ΔP = Change in production ($P_n - P_o$)

ΔY = Change in yield ($Y_n - Y_o$)

Results and Discussions

Decade wise area, production and yield of potato has been given in table 1. The area under potato in 1950-51 was 0.24 million ha which showed an increasing trend and recorded acreage of 2.14 million ha in 2017-18. The production and yield of the crop also witnessed an increasing trend during the period under study. The production of potato was 51.31 million tons in 2017-18 and its production was 1.66 million tons in the base year 1950-51. The yield of potato has an increasing trend and recorded 23967 kg/ha in 2017-18 as against 6917 kg/ha in 1950-51. The farmer could achieve this increasing trend in production and yield mainly due to introduction of resistant varieties against different diseases and insects and pests, better management and matching

improved production and protection technologies.

Table 1: Area, production and yield of potato during 1950-51 to 2017-18

Year	Area (m.ha.)	Production (m.tons)	Yield (kg/ha)
1950-51	0.24	1.66	6917
1960-61	0.38	2.72	7251
1970-71	0.48	4.81	9976
1980-81	0.73	9.67	13258
1990-91	0.94	15.21	16254
2000-01	1.22	22.49	18404
2010-11	1.86	42.34	22724
2017-18	2.14	51.31	23957

Table 2 presents the percentage contribution of area, yield and their interaction in changing (increase or decrease) of the production of potato for each decades from 1950-51 to 2017-18 and the overall period. Response to change in production was due to acreage affect during all the decades. The yield effect in eighties and nineties are more compared to remaining decades of the study periods. The interaction of area and yield is not much as compared to yield and area effect. Overall the production is increased due to area and interaction of area and yield effect.

Table 2: Percentage contribution of yield, area and their interaction in production of potato

Period	Yield	Area	Interaction
1950-51 to 1959-60	15	78	7
1960-61 to 1969-70	20	73	7
1970-71 to 1979-80	29	59	12
1980-81 to 1989-90	35	55	10
1990-91 to 99-2000	35.1	59.5	5.4
99-2000 to 2009-10	13	81	6
1950-51 to 2017-18	8	27	65

Table 3: Coefficient of variation (CV %) and compound growth rate (r %) of potato in different decades

Period	Area		Production		yield	
	CV (%)	r (%)	CV (%)	r (%)	CV (%)	r (%)
1950-51 to 1959-60	13.32	4.46	16.06	3.95	8.03	-0.56
1960-61 to 1969-70	11.24	3.88	20.31	6.28	10.65	2.17
1970-71 to 1979-80	16.29	5.35	27.32	9.17	12.19	3.71
1980-81 to 1989-90	8.59	2.92	15.94	5.17	8.74	2.19
1990-91 to 99-2000	11.24	3.83	18.43	5.44	8.93	1.53
2001-02 to 2009-10	15.00	4.81	18.91	4.86	7.58	0.04
1950-51 to 2017-18	59.77	3.27	89.17	5.13	38.33	2.05

The compound growth rate and coefficient of variation in area, production and yield of potato in different decades and for the whole period are given in table 3. It indicates that the compound growth rates of area and production of potato were found positive in each decade of the study period. However, the growth rate in potato yield was estimated negative (-0.56%) in fifties. Critical perusal of Table 3 indicated that the potato registered highest growth rate in area (5.35%), production (9.17%) and yield (3.71%) during seventies. Overall there were positive growth rate of area, production and yield. The coefficient of variation of the detraind data was used as a measure of instability in the area, production and yield of potato in the country. The instability of area, production and yield for each decade are of low order. The area instability ranges 8.59% to 16.29%, production and yield instability ranges 16.06% to 27.32% and 7.58 to 12.19% respectively. The yield stability is less as compared to area

and production instability. Table 3 revealed that for the overall period 1950-51 to 2017-18 the instability were of high order for all three component area, production and yield.

References

1. Devraj Kumar H, Bhatt S, Kumar R. Pulses production in India during last three plan periods- A growth analysis. *Journal of Food Legumes* 2019;32(4):261-263.
2. Om Prakash Maurya A, Amarender Reddy, Hemant Kumar. Growth and decomposition analysis of pigeonpea in India. *International Journal of Agriculture and Statistical Science* 2016;12(1):189-191.
3. Hemant Kumar, Devraj. Growth rates of field pea in India-A decomposition analysis. *Agricultural situation in India* 2010;67(3):127-129.
4. Moorti TV, Sharma KD, Thakur DR. Trends in the production of Pulses and Oilseeds in Himachal Pradesh. *Agricultural Situation in India* 1991, 303-308.