

Study on the trends in area, production and productivity of mustard in India

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ABSTRACT

The growth rates in area and production of mustard have been highly significant indicating the popularity of the crop in India and ever growing demand from the industry prices multiple uses in the economy and diversified utility of mustard in the agricultural economy of India. The productivity figures indicates insignificant growth rate mainly attributed to the high sensitivity of the mustard used in production of mustard seed due to problems like shattering and storability. Growth rates in area, production and productivity of mustard have been highly significant which is the indication of the major crop in Rajasthan in winter season. The contribution of Rajasthan in area was 20% of total mustard seed cultivation in India during earlier years but it has increased up to 40% in recent three years while in case of production the contribution of Rajasthan was 21% of total production in India during earlier years but it has increased up to 50% in recent three years. The increased in the area of mustard may be due to increased demand for mustard in North India or may be due to shift in acreage in favour of mustard due to its higher profitability. This eventually caused the shift in acreage under this crop from other *Rabi* season crops. Increased in productivity might be attributed to technology break-through in mustard with the release of high yielding varieties, utilization of proper combination of inputs and better field management practices. Production was increased both due to significant increase in area and productivity.

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Key words : Compound growth rate, Area, Production, Productivity

INTRODUCTION

India occupies a significant place among major cereal and oilseed producing countries in the world, next only to China and USA in cereals production and next to USA, China, Argentina and Brazil in case of oilseeds.

India holds a premier position in the world not only in terms of rich diversity of oilseed crops but also in terms of area as well. Oilseeds occupy an important position in the Indian economy as they account for 13.6 per cent of the gross cropped area, contributing more than 5 per cent to the gross national product (GNP) (Bhore *et al.*, 2008). In the domestic agriculture sector, oilseeds occupy a distinct position after food grains, contributing 14 per cent of the country's gross cropped area. Although, India has the largest cultivated area under oilseeds in the world, the current consumption level of crucial nutrients such as oils and fats are below the minimum nutritional requirements. The present per capita consumption level of oils and fats in India at around 7.5 kg per annum is quite below the world average of 15.0 kg per annum (Anonymous, 2008). This situation has forced the government to resort to large-scale import of edible oils to bridge the gap. Considering the sizeable drain on foreign exchange caused by edible oil imports to meet domestic requirement, the efforts towards achieving self-sufficiency assumes great significance. To achieve self-

sufficiency in oilseeds and to reduce the deficiency on balance of payments, Government of India appointed a Technology Mission on Oilseeds (TMO) in May 1986. This mission has implemented an integrated policy on oilseeds with a three pronged strategies to improve oilseed crop technology, to improve post-harvest technology, to strengthen services to farmers. As a result, there has been a phenomenal increase in the oilseeds production during the past few years. However, a high percentage of oilseeds cultivated in the country still depend on rainfall, and hence, the oilseeds production fluctuates from year to year.

Brassica (Mustard) is the second most important edible oilseed crop in India after groundnut and accounts for nearly 30% of the total oilseeds produced in the country. When compared to other edible oils, mustard oil has the lowest amount of harmful saturated fatty acids. It also contains adequate amounts of the two essential fatty acids, linoleic and linolenic, which are not present in many of the other edible oils.

MATERIALS AND METHODS

Nature and sources of data:

The nature of data used for the study is entirely based on secondary source of data. The data on area, production and productivity was compiled from various published journals, periodicals and websites from year

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1986-2009.

Analytical tools and techniques used:

Compound growth rate analysis:

To compute average compound growth rates of area, production and productivity, the following form of regression equation was used.

$$Y_t = Ab^t V_t \quad \dots\dots\dots (3.1)$$

where, Y_t = data on area, production and productivity in the year 't'.

A = intercept indicating Y in the base period (t-0).

t = time period

V_t = error term

$b = (1+g)$

g = average compound growth rate to be estimated.

Equation 3.1 was converted into logarithmic form in order to facilitate the use of linear regression.

Taking logarithms on both sides of the equation (3.1)

$$\ln Y = \ln A + t (\ln b) + \ln V_t$$

This can be written in the following form

$$Q_t = a + bt + V_t \quad \dots\dots\dots (3.2)$$

where, $Q_t = \ln Y_t$

$a = \ln A$

$b = \ln B$

$V_t = \ln V_t$

The values of 'a' and 'b' were estimated by using ordinary least squares estimation technique.

Later, the original 'A' and 'B' parameters in equation (3.1) were obtained by taking anti-logarithms of 'a' and 'b' value as

$A = \text{anti } \ln a$

$B = \text{anti } \ln b$

Average annual compound growth rate was calculated as

$g = (B-1) 100$

The significance of the regression coefficient was tested using student's 't' test.

RESULTS AND DISCUSSION

The growth rate analysis of any variable provides an intuition and behaviour to analyse the various variables for a long term and would provide performance of the variable. Table 1 represents the trends in area, production, and productivity of mustard in India.

Table 1 : Area, production and productivity of mustard in India

Year	Area (000 ha)	Production (000 Mt)	Productivity (kg/ha)
1986	3720	2600	699
1987	4620	3450	747
1988	4830	4380	907
1989	4970	4130	831
1990	5780	5230	905
1991	6550	5860	895
1992	6190	4800	775
1993	6290	5330	847
1994	6010	5760	958
1995	6550	6000	916
1996	6550	6660	1017
1997	7040	4700	668
1998	6510	5660	869
1999	6030	5790	960
2000	4480	4190	935
2001	5070	5080	1002
2002	4520	3920	867
2003	5420	6290	1161
2004	7310	7590	1038
2005	7270	8130	1118
2006	6790	7440	1096
2007	6450	7220	1120
2008	6640	6200	900
2009	6430	5920	920
CGR	14.20**	27.85**	11.71**
R ²	0.38	0.58	0.41
CV (%)	16.62	24.67	14.01

** indicates significance of value at P=0.01

The time series data of mustard for 24 years was subjected to growth rate analysis of area, production and productivity.

The area under mustard registered nearly 14.20 per cent growth rate while production represented annual growth rate of 27.85 per cent for mustard seed whereas the productivity showed annual growth rate 11.71 per cent. The results showed significant annual growth rate in area, followed by production and productivity in India. The R square values were found to be 0.38, 0.58 and 0.41 for area, production and productivity, respectively, as viewed from Table 1 and Fig. 1. Since the compound growth rate is positive and statistically significant, the null-hypothesis that 'There is positive growth in area, production and productivity of mustard in India' is accepted.

In Rajasthan, the area under mustard registered nearly 46.80 per cent annual growth rate while production recorded an annual growth rate of 73.45 per cent whereas the productivity showed an annual growth rate of 17.92

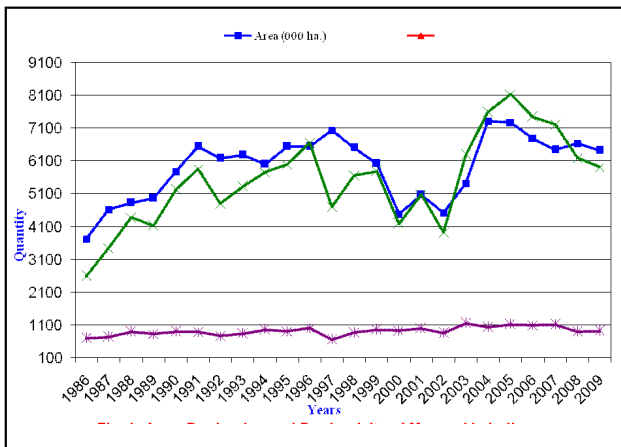


Fig. 1 : Area, production and productivity of mustard in India

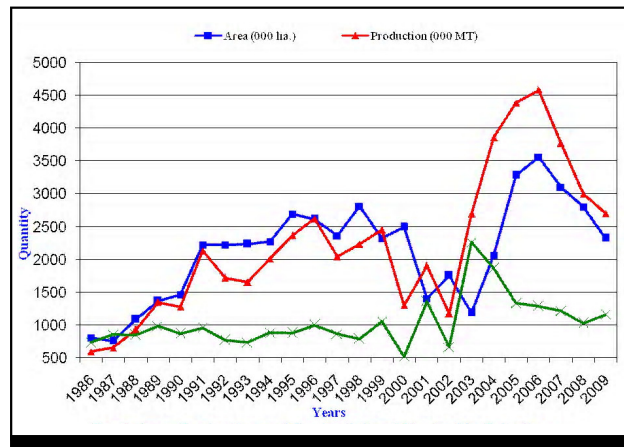


Fig. 2 : Area, production and productivity of mustard in Rajasthan

per cent. The results showed significant growth rate in area followed by production and productivity. The R square values were found to be 0.57, 0.70 and 0.18 for area, production and productivity, respectively, as viewed

from Table 2 and Fig. 2.

Table 2 : Area, production and productivity of mustard in Rajasthan

Year	Area (000 ha)	Production (000 Mt)	Productivity (kg/ha)
1986	808	595	736
1987	763	655	858
1988	1092	932	853
1989	1369	1349	985
1990	1464	1278	873
1991	2223	2132	959
1992	2221	1720	774
1993	2236	1652	739
1994	2271	2015	887
1995	2691	2368	880
1996	2616	2622	1002
1997	2360	2041	865
1998	2812	2233	794
1999	2320	2450	1056
2000	2495	1302	522
2001	1403	1908	1360
2002	1760	1178	669
2003	1191	2694	2262
2004	2062	3857	1871
2005	3286	4385	1334
2006	3558	4583	1288
2007	3100	3767	1215
2008	2803	3000	1030
2009	2325	2700	1161
CGR	46.80**	73.45**	17.92**
R ²	0.57	0.70	0.18
CV (%)	35.71	49.32	36.88

** indicates significance of value at P=0.01

In Uttar Pradesh, The area under mustard registered nearly 35.17 per cent growth rate per year while production represented growth rate of 39.52 per cent per annum whereas the productivity showed the growth rate of 2.4 per cent per annum. The results showed significant growth rate in area, followed by production and productivity. The R square values were found to be 0.52, 0.57 and 0.21 for area, production and productivity, respectively, as viewed from Table 3 and Fig. 3.

The results presented in Table 1 clearly reveals that the growth rates in area and production of mustard have been highly significant indicating the popularity of the crop in India and ever growing demand from the industry prices multiple uses in the economy and diversified utility of mustard in the agricultural economy of India.

The productivity figures indicates insignificant growth rate mainly attributed to the high sensitivity of the mustard used in production of mustard seed due to problems like

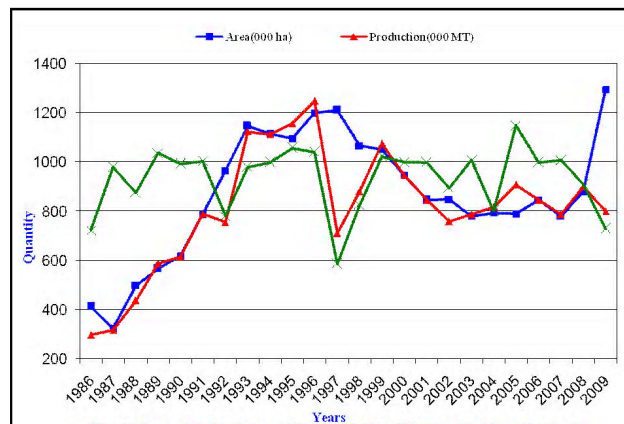


Fig. 3 : Area, production and productivity of mustard in Uttar Pradesh

Table 3 : Area, production and productivity of mustard in Uttar Pradesh

Year	Area (000 ha)	Production (000 Mt)	Productivity (kg/ha)
1986	413	298	723
1987	324	317	980
1988	499	437	876
1989	567	588	1037
1990	619	615	993
1991	787	790	1004
1992	965	755	782
1993	1147	1124	980
1994	1116	1113	998
1995	1095	1157	1057
1996	1199	1248	1041
1997	1211	710	586
1998	1066	880	826
1999	1052	1076	1023
2000	946	946	1000
2001	847	845	998
2002	848	759	895
2003	781	787	1008
2004	793	818	801.4
2005	790	908	1149
2006	846	845	998
2007	780	787	1008
2008	880	900	910
2009	1295	800	730
CGR	35.17**	39.52**	2.40**
R ²	0.52	0.57	0.21
CV (%)	29.53	29.99	14.07

** indicates significance of value at P=0.01

shattering and storability.

The germination percentage is very low which calls for high seed rate of mustard seed used in production. This calls for more research in production of good quality mustard seeds used for futures production which can enhance the yield levels of mustard.

Table 2 depicts that the growth rates in area, production and productivity of mustard have been highly significant which is the indication of the major crop in Rajasthan in winter season. The contribution of Rajasthan in area was 20% of total mustard seed cultivation in India during earlier years but it has increased up to 40% in recent three years while in case of production the contribution of Rajasthan was 21% of total production in India during earlier years but it has increased up to 50% in recent three years. The increased in the area of mustard may be due to increased demand for mustard in North India or may be due to shift in acreage in favour of mustard due to its higher profitability. Relatively more

increase in prices of mustard and increased irrigation facilities on the fields of farmer made the cultivation of this crop more profitable. This eventually caused the shift in acreage under this crop from other *Rabi* season crops.

Increased in productivity might be attributed to technology break-through in mustard with the release of high yielding varieties, utilization of proper combination of inputs and better field management practices.

Production was increased both due to significant increase in area and productivity. In addition, the production was led by growth in area to a greater extent coupled with productivity growth. Since the crop was profit oriented as a result many of the farmers increased their area under this crop at the cost of other crops and followed the improved package of practices to get higher yield and also due to positive impact of technology Mission on Oilseeds.

In Uttar-Pradesh, the area, production and productivity had depicted in Table 3. The area and production of mustard had significant growth rate but there was very low productivity. The contribution of Uttar-Pradesh in area was 9% of total mustard seed cultivation in India during earlier years but it has increased up to 15% in recent three years while in case of production the contribution of Uttar-Pradesh was 9% of total production in India during earlier years but it has increased up to 12% in recent three years. This is mainly due to minimum use of high yielding varieties, proper inputs and better field management practices.

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