Economic Affairs, Vol. 67, No. 01(Spl.), pp. 31-34, February 2022
DOI: 10.46852/0424-2513.1.2022.6

AESSRA

Research Paper

Dynamics of Food Grains Production in Vidisha District of Madhya Pradesh

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Received: 20-09-2021 **Revised:** 27-01-2022 **Accepted:** 02-02-2022

ABSTRACT

The examined the relative change in area, production and productivity of major foodgrain crops (paddy, sorghum, maize, pigeonpea, black gram, green gram, wheat, chickpea, peas and lentil) in Vidisha district of Madhya Pradesh. The relative change in area of green gram was noticed highest and wheat was observed lowest, although sorghum, maize, lentil and chickpea were observed negative. The relative change in production of paddy was highest as compared to other food grains, although sorghum and maize were found negative. The variability in area, production and productivity of paddy was highest as compared to other food grains. The growth rates in area of paddy, green gram, black gram, pigeonpea, wheat were observed positive and highly significant. The growth rates in area of sorghum, maize, lentil were noticed negative and highly significant. The growth rate in production of wheat, pigeonpea, black gram, and green gram were positive and highly significant while growth rate in production of sorghum was found negative and highly significant. The growth rate in productivity of paddy, wheat, black gram and lentil were found positive and highly significant.

HIGHLIGHTS

- The relative change in area of green gram was noticed highest and that of wheat was lowest, although sorghum, maize, lentil and chickpea were observed negative.
- The growth rate in productivity of paddy, wheat, black gram and lentil were found positively significant.

Keywords: Coefficient of variation, relative change, linear growth rate, area, production, productivity

The foodgrains production was increased from 192.26 million tonnes to 285.01 million tonnes during 1997-98 to 2017-18 in India. The major food grains producing state are Uttar Pradesh (51.37 Million tonnes) followed by Madhya Pradesh (33.45 Million tonnes), Punjab (31.69 Million tonnes), Rajasthan (19.96 Million tonnes) and West Bengal (16.88 Million tonnes) which consisted 53.8 percent to the total food grains production in India (2017-18). The major foodgrain crops such as paddy, wheat, sorghum, maize, chickpea, pigeonpea and lentil contributed 90.46 percent of total food-grains in Madhya Pradesh. The area, production and productivity of foodgrains in Madhya Pradesh were 17.04 million hectare, 33.45 million tonnes and 1963 Kg/ha respectively which is about 13.36 per cent area and 11.74 percent production of the country(2017-18). Therefore, keeping in view the importance of food grain crops, the present study was undertaken to work out the relative change, variability and growth rate in area, production and

How to cite this article: Verma, A.K., Ahirwar, R.F., Sharma, S.K. and Khedkar, N.S. (2022). Dynamics of Food grains Production in Vidisha District of Madhya Pradesh. *Economic Affairs*, **67**(01 Spl.): 31-34.

Source of Support: None; **Conflict of Interest:** None

productivity of different food grains in Vidisha district of Madhya Pradesh.

MATERIALS AND METHODS

This study confined to Vidisha district of Madhya Pradesh is based on time series secondary data on area, production and productivity of different foodgrain crops (paddy, sorghum, maize, pigeonpea, black gram, green gram, wheat, chickpea, peas and lentil)collected foom the period 1998-99 to 2017-18 from website of Department of Farmer Welfare and Agriculture Development, Madhya Pradesh, Bhopal. The average of first three years was taken as base year and last average of three years were taken as current year for the analysis in view of economics accuracy. The statistical tools were used for estimation of relative change, mean, coefficient of variation and linear growth rate.

Arithmetic mean

$$\text{Arithmetic mean} = \sum x/N$$

Where:

$\sum x$ = Total value of area/production/productivity

N = Number of years

The Relative Change

Relative change (%) = $(Pn - Po/Po) \times 100$

Whereas %

Pn = Current year

Po = Base year

Base year = Triennium average (1998-99 to 2001-02) in area, production and productivity of different crops

Current year = Triennium average (2015-16 to 2017-18) in area, production and productivity.

The Coefficient of Variation

The Coefficient of variation in area, production and productivity in different food grain crops were estimated by using following formula:

$$\text{C.V. (\%)} = (\text{S.D./Mean}) \times 100$$

Whereas

C.V. = Coefficient of variation in area, production and productivity

S.D. = Standard deviation in area, production and productivity

Mean = Average in area, production and productivity

The Linear Growth Rate

The linear growth rate in area, production and productivity were worked out by using following formula

$$\text{LGR}(\%) = \frac{b}{\bar{y}} \times 100$$

Whereas

b = Regression coefficient

y = Average

RESULTS AND DISCUSSION

The relative change in area of food grains presented in table 1, revealed that the highest relative change was recorded of green gram (764%) followed by paddy (613.64%), black gram (580.13%), pegeonpea (453.33%), peas (32.35%) and wheat (26.72%) in Vidisha district of Madhya Pradesh while, relative change of sorghum, maize lentil and chickpea was noticed negative during entire period of study.

Table 1: Relative change in area, production and productivity of foodgrain crops

Crops	Area	Production	Productivity
Paddy	613.64	3245.09	309.06
Sorghum	-72.90	-47.73	12.01
Maize	-12.79	-9.80	3.43
Wheat	26.72	158.87	107.45
Pigeonpea	453.33	591.40	21.93
Black gram	580.19	1579.07	129.64
Green gram	764.00	387.33	-42.72
Peas	32.35	73.82	54.09
Lentil	-39.84	36.03	126.69
Chickpea	-0.25	23.36	21.53

The relative change in production of paddy (3245.09%) was observed highest and remarkable change in this crop followed by black gram (1579.07%), pigeonpea (591.40%), green gram (387.33%), wheat (158.87%), peas (73.82%),lentil (36.03%) and chickpea (23.36%) while,relative change in production of sorghum and maize were found negative. The relative change in productivity of paddy (309.06%) was found highest followed

by black gram (129.64%), lentil (126.69%), wheat (107.45%), peas (54.09%), pigeonpea (21.93%), chickpea (21.53%), sorghum (12.01%) and maize (3.43%) but green gram showed negative relative change in Vidisha district under the entire period.

Variability

The variability in area, production and productivity of paddy, sorghum, maize, wheat, pigeonpea, black gram, green gram, peas, lentil and chickpea are presented in table 2, revealed that the highest variability in area of paddy (148.36%) was recorded highest followed by green gram (116.20%), pigeonpea (94.74%), sorghum (88.43%), black gram (81.90%), peas (38.81%), lentil (26.16%), maize (19.95%), wheat (15.48%) and chickpea (9.20).

Table 2: Variation in area, production and productivity of foodgrain crops

Crops	Area	Production	Productivity
Paddy	148.36	266.47	77.91
Sorghum	88.43	80.38	36.87
Maize	19.95	30.73	23.87
Wheat	15.48	49.69	35.70
Pigeonpea	94.74	102.83	38.99
Black gram	81.90	147.35	43.28
Green gram	116.20	79.45	21.29
Peas	38.81	70.83	41.93
Lentil	26.16	26.20	39.43
Chickpea	9.20	23.25	21.60

The variability in case of production of paddy (266.47%) was recorded highest followed by black gram (147.35%), pigeonpea (102.83%), sorghum (80.38%), green gram (79.45%), peas (70.83%), wheat (49.69%), maize (30.73%), lentil (26.20%) and chickpea (23.25%). The variability in productivity of paddy (77.91%) was recorded highest as comparison to other crops such as black gram (43.28%), peas (41.93%), lentil (39.43%), pigeonpea (38.99%), sorghum (36.87%), wheat (35.70%), maize (23.87%), chickpea (21.60%), and green gram (21.29%) in the entire period.

Growth Rate

The linear growth rate in area, production and productivity of paddy, sorghum, maize, wheat, pigeonpea, black gram, green gram, peas, lentil and chickpea are presented in table 3, revealed that the highest positive and highly significant growth rate in area of paddy (14.21%) followed by green gram (13.49%), black gram (11.20%), pigeonpea (10.71%) whereas peas showed positive and significant growth rate in area while, area of sorghum, maize, and lentil showed negative and highly significant growth rate but area under chickpea was recorded negative and non-significant growth rate.

Table 3: Linear Growth Rate in area, production and productivity of foodgrain crops

Crops	Area	Production	Productivity
Paddy	14.21**	22.76*	8.81**
Sorghum	-11.38**	-8.22**	1.68
Maize	-2.05**	-2.24	-0.10
Wheat	1.57**	6.55**	4.70**
Pigeonpea	10.71**	12.91**	2.03
Black gram	11.20**	17.09**	5.37**
Green gram	13.49**	9.54**	-1.69*
Peas	3.33*	6.27*	3.57*
Lentil	-2.97**	0.19	4.07**
Chickpea	-0.39	1.08	1.36

*** Significant at 1% level of probability, * at 5% level of probability.*

The highest positive and highly significant growth rate in production of black gram (17.09%) was recorded followed by pigeonpea (12.91%), green gram (9.54%) and wheat (6.55%) whereas paddy and peas showed positive and significant growth rate in production while, sorghum was negative but highly significant growth rate in production. The maize showed negative and non significant in case of production whereas, lentil and chickpea both crop showed positive but non-significant growth rate in production during entire period. The growth rate in productivity of paddy (8.81%) was recorded highest positive and significant followed by black gram (5.37%), wheat (4.70%) and lentil (4.07%). The positive and significant growth rate in productivity of peas (1.36%) whereas chickpea, pigeonpea and sorghum showed positive but non-significant growth rate in productivity as well as green gram showed negative and significant growth rate in productivity. The negative and non significant growth rate in productivity of maize was observed during entire period of study.

It is concluded that the relative change in area of green gram was recorded highest as comparison to other food grains. The area of sorghum, maize, lentil

and chickpea was decreased during entire period. The relative change in production and productivity of paddy was highest as comparison to other food grains. The variability in area, production and productivity of paddy was highest as compared to sorghum, maize, wheat, pigeonpea, black gram, green gram, peas, lentil and chickpea. The growth rates in area of paddy, green gram, black gram, pigeonpea, wheat were positive and highly significant. The growth rates in area of sorghum, maize, lentil were negative and highly significant. The growth rate in production of wheat, pigeonpea, black gram, and green gram were positive and highly significant while growth rate in production of sorghum was negative and highly significant. The growth rate in productivity of paddy, wheat, black gram and lentil were positive and highly significant during entire period.

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