Growth of Oil Industries in Bharatpur, Rajasthan: A Geographical Study

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ABSTRACT

Rajasthan is the second-largest producer of oilseeds in the India, behind the Gujarat. Around 35% of the India's oilseed output has come from India. From 1980–1981 to 2008–2009, Bharatpur saw the greatest growth rates for rapeseed and mustard, respectively, of 6.17 and 7.96% per year, which had an influence on the district's oilseed output as well as its economic development. There is a lot of potential for the production of oilseeds since this state is the biggest in terms of area in India. The district's time series data over the last five decades reveals a long-term, bidirectional association between economic expansion and oilseed output. Data research shows that Bharatpur's oilseed output has seen major changes during the last five decades.

KEYWORDS: Growth, stationary, long-term, and oilseed

INTRODUCTION

Due to the nation's expanding population and economic success, the demand for edible oil has been increasing more quickly year after year. It was reportedly 5 Mt in 2000-2001 and 14 Mt in 2006–2007. Consumption of all edible oils per month grew in both rural and urban India from 0.37 kg and 0.56 kg, respectively, in 2007–2008 to 0.64 kg and 0.82 kg in 2013–2014. This amounts to an increase in rural and urban families of 72% and 46%, respectively. According to estimates, the nation will need 16.34 Mt of edible oils in 2016–17 and 20.36 Mt in 2020–21. In 2018–19, there would be a shortfall of 5.79 Mt due to the predicted demand of 16.34 Mt, which must be filled by imports (Jha et al., 2019). Any additional increase in crop growth will lessen reliance on imports. Between 1980 and 2009, rapeseed-mustard output increased with compound annual growth rates of 1.88 percent, 4.18 percent, and 2.26 percent, respectively.

Although its percentage has decreased recently, Bharatpur is still the district that produces the most rapeseed-mustard. Between 1985 and 1995, there was a considerable rise in rapeseed-mustard seed production, area, and yield, mostly as a result of the expansion of irrigated land and the accessibility of high-yielding seeds in the nation. Due to sporadic famine circumstances in some of the key rapeseed-mustard producing districts, including Bharatpur, this tendency was partially reversed.

Hedge (2019) calculated that 17.84 Mt of vegetable oils will be needed to fulfil the country's anticipated 2050 fat dietary needs of 1685 million people. This translates to around 59.41 Mt of oilseeds. By 2050, the nation only needs to produce 44.56 Mt of oilseeds to fulfil the anticipated population's dietary demands for fat, assuming that 25% of vegetable oils come from sources other than annual oilseed crops. This amount of output might be readily attained by fully using the oilseed technologies that are already available.

India harvests roughly 25 million tonnes of oilseeds annually, ranking fourth in the world after only the United Districts, China, and Brazil. The globe produces 250 million tonnes of oilseeds annually. Since 1995, India has contributed almost 10% of the total global oilseed output. Despite being a large producer of oilseeds, India's per capita oil consumption is just 10.6 kg per year, which is low compared to China's 12.5 kg, Japan's 20.8 kg, Brazil's 21.3 kg, and the United States' 48.0 kg. (Report on the GPDP Project in the Indian Edible Oil Industry)

Agriculture contributes significantly to the district's economy, amounting to 18.63% of the district's GDP (2009–10). Geographically speaking, Bharatpur is the biggest district in India, with 10.4% of total land area, of which 61.0% is desert, 16.0% is semi-arid, 15.0% is sub-humid, and 8.0% is humid. In 2008–09, the district had 10 agroclimatic zones and 32 administrative districts. In the district, eleven different desert districts make up about 60% of the territory that is farmed and over 65% of the area that is rainfed. Barmer, Bikaner, Churu, Sri Ganganagar, Jaisalmer, and Jodhpur are six of the eleven desert districts that are entirely in the dry zone2. According to Kar et al. (2009), the remaining five districts3—Nagaur (96%), Jalore (88%), Jhunjhunu (69%), Sikar (65%), and Pali (48%)—are partially desert. Approximately 70% of the district's 3.42 million square km total arable land is solely reliant on the monsoon.

In the district of Bharatpur, Dhaka and Verma (1989) calculated the growth rates of area, production, and productivity for oilseed crops as well as for some of the important individual crops, including bajra, guar, wheat, gramme, and rapeseed and mustard. The study covered the period 1956 to 1988 with two subperiods 1956 to 1966 and 1966 to 1988. For the purpose of computing growth rates, the exponential function method was used. The results showed that the productivity in oilseeds was negative during the pre-green revolution and the entire period of study in the district. The study was conducted over the entire district and the two most productive agroclimatic zones, namely I (b) (Irrigated North Western Plain) and III (a) (Semi-arid Eastern Plain). This demonstrated how high yielding varieties developed using contemporary technologies have aided in quickening the increase of oilseed output and productivity. Rapeseed mustard was also shown to have greatly grown post-green revolution compared to pre-green revolution throughout the district and in both zones, according to research.

In order to examine the yield instability of the crops, Panda (1991)'s linear growth model was fitted to the data and the coefficient of variation was also calculated. At the district level, the area planted with oilseeds increased favourably. Oilseed production increased favourably. At the district level, oilseed productivity has also outperformed that of grains and pulses. During the research period, it was discovered that in practically all locations, crop-wise instability was most pronounced with oilseeds and least pronounced with pulses. In the case of oilseeds, the research showed a correlation between greater production increase and larger volatility.

According to Jha et al. (2012) analysis, the three main districts that produce oilseeds Bharatpur, showed strong growth rates in terms of area, output, and productivity between 1980 and 2009. With a yield of 10.31 Mt and a productivity of 1098 kg/ha, the area planted with soybeans has quickly expanded from 0.03 M ha in 1970 to 2.6 M ha in 1990 and to 9.39 M ha in 2009–2010. At the national level, the rate of production growth was projected to be approximately 12%. Between 1981 and 1990, there was a large increase in area (16.71%), which contributed significantly to production growth. Madhya Pradesh had significant increase, accounting for 55.80% of the area planted to soybeans.

Objectives of the study

To calculate the long-term link between oil seed output and economic development.

To determine the association between economic development and output of oilseeds

Methodology

This analysis is based on time series data for the Bharatpur from 2012–2013 to 2021–2022. The secondary data were gathered from the Directorate of Economics and Statistics (DES), Bharatpur's sixty-year publication of Agricultural Statistics of Bharatpur. The unit root of the chosen variables was first calculated using the analysis. For unit root testing, the Augmented Dickey-Fuller (ADF) has been used. The VEC model within the context of the Johansen cointegration test is used to analyse the long-run dynamics and the direction of causation between oilseed production and NSDP. If a linear combination of a group of non-stationary series is stationary, the group is said to be cointegrated. The cointegrating equation, which represents a stable long-run equilibrium connection between the variables, is a linear combination of these series. Additionally, the log transformation of each variable has been used to smooth the data. to verify the stationarity of each series, including the log of NSDP and the log of oilseed production.

Co-integration has grown in significance in analysis that aims to represent equilibrium or long-run connections. When model variables are co-integrated, an equilibrium connection is present. However, exhibiting comparable statistical features in the data series for each included variable, i.e., being integrated to the same order with evidence of some linear combination of the integrated series, is a prerequisite for integration. For instance, the mean, variance, and auto-correlation of a stationary series Xt remain constant across time. However, non-stationarity is a common trait of most economic series.

Unit Root Augmented Dickey–Fuller Test

Model I Pure Random Walk $\Delta Y_t = \eth Y_{t-1} + u_t \ldots \ldots \ldots (1)$

Model II Random Walk with drift $\Delta Y_t = Q_1 + \eth Y_{t-1} + u_t \ldots \ldots \ldots (2)$

Model III RW with drift and Trends $\Delta Y_t = Q_1 + Qt + \eth Y_{t-1} + u_t \ldots \ldots \ldots (3)$

ADF Test

$$\Delta Y_t = Q_1 + Qt + \eth Y_{t-1} + \sum_{i=1}^{m} a_i \Delta Y_{t-i} + u_t$$

H_0: Series is non Stationry

In a simple Granger-causality test there are two variables and their lags and the equation are below

$$(EcoGro)_t = a + \sum_{i=1}^{m} Q_i (Oilpro)_{t-j} + \sum_{i=1}^{n} r_j (EcoGro)_{t-j} \pm \mu_t \quad \ldots \ldots (4)$$

$$(Oilpro)_t = a + \sum_{i=1}^{p} Q_i (Oilpro)_{t-i} + \sum_{j=1}^{q} r_j (EcoGro)_{t-j} + \mu_t \quad \ldots \ldots (5)$$

Where Oilpro = Oilseeds Production, EcoGro = Net district domestic product

Analysis

Table 1 Unit Root Test of NSDP and Oilseeds Production (2012-2022)

		Level			First Difference		
		None	Constant	Constant with	None	Constant	Constant
NSDP	NSDP	NA	6.27	2.94	-0.21	-1.92	-1.92***
	LnNSDP	NA	-0.07	-0.07	-0.88	-0.88***	
	DLNSDP	-0.88	-8.90***				
Oilseed	Oilseed	NA	-0.94	-3.19*	-7.89***		
	LnOilseed	NA	-0.77	-4.02***			
	DLOilseed	-9.16***					

From Table 1, it is obvious that the production of oilseeds and net district domestic product are stationary at the first difference and that the natural log of NSDP and oilseed production are stationary but at separate levels. Oilseed production and the NSDP's natural log difference are stagnant at the same level.

Result 1.1

Cointegration between NSDP and Oilseed Production

Dependent Variable: L_NSDP

Method: Fully Modified Least Squares (FMOLS)

Sample (adjusted): 1962 2010

Included observations: 49 after adjustments

Cointegrating equation deterministics: C

Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth

= 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
L_OILSEED	1.472222	0.077204	19.06935	0.0000
C	3.789902	0.543196	6.977043	0.0000

R-squared	0.923111	Mean dependent var	13.96526
Adjusted R-squared	0.921475	S.D. dependent var	1.665652
S.E. of regression	0.466753	Sum squared resid	10.23936
Durbin-Watson stat	1.083239	Long-run variance	0.373298

The data's result, defined as result 1.2, indicates that there is a long-term association between NSDP and oilseed output. The coefficient of oilseed, which is 1.47, is statistically significant at the 1% level of significance, and the coefficient of determination, which is 0.92.

Result 1.2 Cointregation Residuals unit root
Null Hypothesis: RESID01 has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.300616	0.0001
Test critical values:	1% level	-2.614029	
	5% level	-1.947816	
	10% level	-1.612492	

There is a long-term link between the NSDP and oilseed output in the district, as shown by the residual of co-integration being stationary at the 1% level of significance.

Result 1.3 Vector Error Correction Estimates

2012 as a sample (adjusted) 2022 Observations included: 47 after corrections t- statistics and standard errors in

Error Correction:	D(L_NSDP)	D(L_OILSEED)
CointEq1	-0.029285 (0.04052) [-0.72264]	0.421893 (0.14246) [2.96154]
D(L_NSDP(-1))	-0.027519 (0.19359) [-0.14215]	1.346168 (0.68054) [1.97810]
D(L_NSDP(-2))	-0.149425 (0.18136) [-0.82390]	-0.145053 (0.63755) [-0.22752]
D(L_OILSEED(-1))	-0.141919 (0.05443) [-2.60717]	-0.254990 (0.19135) [-1.33257]
D(L_OILSEED(-2))	-0.009461 (0.05573) [-0.16975]	0.083014 (0.19592) [0.42371]
C	0.138771 (0.03251) [4.26895]	-0.066593 (0.11427) [-0.58276]
R-squared	0.253360	0.372509
Adj. R-squared	0.162306	0.295985
Sum sq. resids	0.317553	3.924113
S.E. equation	0.088007	0.309370
F-statistic	2.782535	4.867911
Log likelihood	50.74545	-8.339440
Akaike AIC	-1.904062	0.610189
Schwarz SC	-1.667872	0.846378
Mean dependent	0.109741	0.053261
S.D. dependent	0.096155	0.368713

Residuals of Lnnsdp and Lnoilseed

The coefficient of error correction term indicates that if the difference between NSDP and Oilseed production is positive in one period, then NSDP or Oilseed production will fall to restore equilibrium, but result 1.3 it is not significant so there is no short run equilibrium. The vector error correction estimates result is shown in result 1.3, which districts that the co integration equation 1 value is negative (-0.03).

Result 1.4 Granger Causality of Oilseed production and NSDP

Null Hypothesis:	F-Statistics	Prob.
L_OILSEED does not Granger Cause L_NSDP	4.89817	0.0121
L_NSDP does not Granger Cause L_OILSEED	7.08844	0.0022

Oilseed production has an influence on district economic growth, and district economic development has an impact on oilseed production, as shown in result 1.4.

Conclusion

The production of oilseeds and economic expansion are long-term partners. The bidirectional relationship between economic growth and oilseed production was assessed using the Granger causality, demonstrating how they have influenced one another. The district has to concentrate on oilseed production since economic expansion depends on it. Oilseed output and district domestic product are in balance over a long period of time, but this research also came to the conclusion that there is no link between them in the short term.

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