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GROUNDNUT PRODUCTION DYNAMICS DURING PRE AND POST-LIBERALIZATION ERAS: A CASE OF GUJARAT

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Introduction:

Groundnut is called as the 'King' of oilseeds. It is one of the most important food and cash crops of our country. While being a valuable source of all the nutrients, it is a low-priced commodity as well. That is the reason for it being also touted as 'wonder nut' and 'poor man's cashew nut'. Besides, it is also known as peanuts, earthnuts and manila nuts. It is grown in tropical and subtropical areas and thrives between 25-28ºC temperature and under 500 mm rainfall in loamy and black soil. It originated in South America and was introduced into India in the first half of the 16th century (John *et al*., 1955). Around 1800, the crop was referred as being cultivated together with turmeric in Mysore. The South Arcot district (Madras) in 1850-51 was reported to cultivate 4,000 acres under groundnut, the largest area grown to the crop in any state in India at that time. Thereafter, the crop got popularity as a major oilseed crop in the country and spread from a mere 0.36 million hectare (mha) during 1909-10 (Seshadri, 1962) to 5.53 mha in 2013-14 (Anon., 2014) with various ups and downs over the period. Similarly, production also increased from 0.39 million tonnes (mt) to 9.67 mt during the same period.

Methodology:

The study will use secondary data to measure the trend and instability in groundnut in terms of area, production, productivity, and FHP in Gujarat for 46 years, from 1969-70 to 2014-15, which in turn shall be split in to two periods *viz.* Pre-Liberalization Era (1969-70 to 1991-1992) and Post-Liberalization Era (1992-93 to 2014-15). The data will be collected from the Cost of Cultivation of Principal Crops (CCPC) project of the Department of Agricultural Economics, Junagadh Agricultural University, Junagadh and the various reports and publications of the Commission for Agricultural Costs and Prices (CACP), Ministry of Agriculture (MoA) and Farmers Welfare, Government of India.

Linear growth rate:

The linear growth rate will be estimated using the following form,

$Y = a + bt + u$

Where,

Y = dependent variable (Area/ Production/ Productivity/ FHP);

t = time variable in years, 1, 2, 3 . . . n;

a = intercept;

b = regression coefficient to be obtained;

u = random error term.

The parameters of '*a*' and '*b*' will be determined through least squares method.

Compound growth rate:

The compound growth rate will be estimated as follows,

$$Y_t = Y_0 (1+r)^T e^u$$

Where,

Y_t = dependent variable (Area/ Production/ Productivity/ FHP);

Y_o = initial value;

T = time variable in years, 1, 2, 3 . . . n;

u = random error term.

For the purpose of estimation, the equation was expressed in logarithmic form,

$$\ln Y_t = \ln Y_0 + T \ln (1+r) + u$$

Which can be further expressed as,

$$Y_t = a + bT + u$$

Where,

Y_t = $\ln Y_t$

a = $\ln Y_0$

b = $\ln (1+r)$

It could be observed that the semi log function is linear in parameters. The compound growth rate (r) in percentage will be then computed using the relationship,

r = [(Anti ln of b)-1] X 100

Instability in production:

The magnitude of instability in growth dimensions of area, production, productivity of the groundnut crop will be measured by working out the coefficient of variation (CV) based on time series data for the study period. The data of growth dimension over the selected time period will be detrended using the linear equation. The detrended time series data (Z) for area and yield will be calculated as

$Z_t = a + bt + u_t$

Where,

Z_t = dependent variable (Area/ Production/ Productivity);
a = intercept;
b = parameter to be estimated;
t = time variable (in years);
u_t = error term with usual assumptions.

After detrending, the residuals (u_t) will be centered on the mean area, mean production and mean yield (Z).

Z = ut + Z

The time series data of detrended production will be calculated as the product of detrended area and yield. Finally, the coefficient of variation (CV) of groundnut production will be estimated from the detrended series for the study period. The variance of production will be decomposed into its constituent sources, *viz*., area variance, yield variance and area – yield co-variance to examine the source of instability.

$V(Q) = A^2 V(Y) + Y^2 V(A) + 2 A Y Cov(A,Y) – Cov(A,Y)^2 + R$

V (Q)	=	production variance;
A	=	mean area;
Y	=	mean yield;
V(Y)	=	yield variance;
V(A)	=	area variance;
Cov (A,Y)	=	Area – yield co–variance;
Cov (A, $Y)^2$	=	Higher order co-variance between area and yield;
R	=	Residual.

Where,

Profitability Analysis:

The profitability will be computed as the gross value of output (VOP) minus cost C_2 (i) and in the form of income measures (ii).

(i) Profitability = VOP - Cost C_2

(ii) The income measures: These will also be worked out to compute profitability;

1. Farm business income = Gross return - Cost A_1
2. Owned farm business income = Gross return - Cost A_2 3. Family labour income = Gross return - Cost B 4. Net income = Gross return - Cost C_2. 5. Intensive income=Net income + Rental value of owned land +Interest of fixed capital. 6. Farm investment income = Farm business income - Imputed value of family labour.

Resource use efficiency:

Cobb-Douglas production function will be used to estimate the effects of various inputs in the production of groundnut in consultation with the previous studies.

$$Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3}X_4^{b_4}X_5^{b_5}X_6^{b_6}X_7^{b_7}e^{u}$$

Where,

Y= groundnut yield (Rs. / ha);

X_1	=	family labour cost (Rs. / ha);
X_2	=	hired labour cost (Rs. / ha);
X_3	=	bullock labour (Rs./ ha);
X_4	=	chemical fertilizer cost (Rs./ ha);
X_5	=	manures cost (Rs./ha);
X_6	=	insecticides / pesticides cost (Rs. / ha);
X_7	=	irrigation cost (Rs./ ha);
$^{b}_{1}$ to $^{b}_{7}$	=	parameters to be estimated;
u	=	error term.

In order to test the efficiency, the ratio of Marginal Value Product (MVP) to the Marginal Factor Cost (MFC) for each input will be computed and tested for its equality to 1, MVP/MFC=1

Conclusion: The results showed that the growth rate, profitability and the resource use efficiency of groundnut crop was found to be significant in all periods. We can conclude that the crop showed significant results when the crop was cultivated from 1970s to 2015.The

change in growth, profitability and resource use efficiency will be noticed for different periods of groundnut crop cultivation i.e., due to decrease in area the growth rate will be declined.

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