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Pre- and Post-WTO Changes in Oilseed Economy of Karnataka: A Case of Groundnut

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Abstract

The growth in exports, economics of production and global competitiveness of groundnut has been reported over the period of 20 years (1984-85 to 2004-05) in Karnataka by collecting data from various published sources. Techniques used for the analysis are growth functions, tabular function, nominal protection coefficient and domestic resource cost. The analysis of export trends of groundnut from 1985-86 to 2004-05 has shown that quantity of groundnut export has grown annually at a compound growth rate of 9.52 per cent, whereas the value of groundnut exported has grown at a much higher rate of 13.13 per cent. Structural changes in costs are due to changes in quantity and quality of inputs associated with the technological process and also due to their prices. Groundnut has shown competitive disadvantage during the pre-WTO period, as values of NPC and DRC are more than one. But, during the post-WTO period, the competitiveness has increased as is evident from the NPC and DRC values which turned out to be less than one. The study has suggested to exploit the competitiveness of Karnataka in groundnut and other oilseed crops.

Introduction

Oilseeds constitute one of the important groups of cash crops in Indian agriculture. They are the most important sources of supply of edible oils in the country. Indian vegetable oil economy is the fourth largest in the world, next only to that of USA, China and Brazil, accounting for about 14 per cent of world oilseed area and 7 per cent of global production. However, the

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productivity in India is low, only 986 kg/ha (2003) as compared to the world average of 1777 kg/ha (2003). The oilseed sector has been playing a major role in reducing the gap in domestic demand and supply, and is also earning valuable foreign exchange from its byproducts (Virupakshappa and Kiresur, 1998). The oilseed scenario in the country has undergone a sea change during the past twenty years. India emerged as a net exporter of edible oil in 1990s from a net importer during the early 1980s. However, it has again become a net importer, accounting for more than 40 per cent of annual edible oil needs.

India has a comparative advantage in agriculture, and there is a considerable potential in raising farm income and employment by stepping up agro-based exports. Economic integration and trade liberalization will have a great impact on the national economy in general, and on the agricultural sector in particular. It will be a good opportunity to expand markets and acquire advanced technologies from the developed countries.

Production of Groundnut in India

India has been producing groundnut since its introduction in Asia in the 16th century. The weather in the Indian subcontinent suits well to the crop. The country ranked 2nd in the world groundnut production, with an annual groundnut seed production of 5.9 million tonnes and annual groundnut oil production of 1.5 million tonnes in 2005. Also, India has maximum area under groundnut cultivation. The major groundnut producing states in India are: Gujarat (2.5 Mt), Tamil Nadu (1 Mt), Andhra Pradesh (1 Mt), Karnataka (0.5 Mt), Maharashtra (0.5 Mt), Madhya Pradesh, Orissa and Rajasthan. The Indian groundnut production and coverage are largely concentrated in these states. Today, groundnut has a share of approximately 25 per cent in the total Indian oilseed production. But, this share is constantly reducing since India became independent; it was around 70 per cent in the 1950s. Karnataka was one of the major oilseeds-producing states in the country, accounting for 9.72 per cent of the total area under oilseeds and 7.03 per cent of the national production in the year 2003-04.

Significance of Study

Implications of WTO and globalization have provided enormous opportunities for the agricultural exports. To step up the rate of growth in agri-exports, the Government of India has embarked upon a major programme of macro economic stabilization and structural adjustments through new trade and industrial policies. In this context, it is important to understand the global competitiveness of groundnut in the state of Karnataka.

The present study has analyzed global competitiveness in groundnut and economics of its production over a period of time in Karnataka, along with estimation of Nominal Protection Coefficient (NPC) and Domestic Resource (DRC) values. The specific objectives of the study were to find (i) growth in the export of groundnut during pre- and post-WTO periods, (ii) changes in economics of groundnut cultivation in Karnataka during pre- and post-WTO periods, and (iii) trade competitiveness of India in groundnut.

Methodology

The study was conducted in the state of Karnataka as it is a major producer of groundnut in the country. The methods and tools of analysis employed in the present study were: Growth functions, Tabular analysis, Nominal Protection Coefficient (NPC) and Domestic Resource Cost (DRC)

(i) Growth Model

The growth in area, production, productivity, quantity exported and export value were analyzed using Equation (1):

$$Y = a b^t e \quad \dots(1)$$

where,

Y = Dependent variable for which growth rate is estimated

a = Intercept

b = Regression coefficient

t = Time variable, and

e = Error-term

The compound growth rate was obtained from the logarithmic form as Equation (2):

$$\ln y = \ln a + t \ln b \quad \dots(2)$$

The per cent compound growth rate (g) was derived using the relationship (3):

$$g = (\text{Anti ln of } b - 1) \times 100 \quad \dots(3)$$

(ii) Tabular Analysis

The cost of cultivation data on the *kharif* groundnut crop was collected for 20 years, which was divided into two sub-periods, viz., Pre-WTO (1984-85 to 1994-95) and Post-WTO (1995-96 to 2004-05) and the average cost and returns were worked out for the two sub-periods separately and have been compared.

(iii) Nominal Protection Coefficient

The nominal protection coefficient (NPC) is a straightforward measure of competitiveness. It is calculated as the ratio between the domestic price (PD) to the international price (PR) of a comparable grade of commodity, adjusted for all transfer costs such as freight, insurance, handling costs, margins, losses, etc. Symbolically, it is given by Equation (4):

$$\text{NPC} = \frac{\text{PD}}{\text{PR}} \quad \dots(4)$$

If NPC is less than one, then the commodity is competitive (a good import substitute or worth exporting). If NPC is greater than one, the commodity is not competitive. The NPC of tradable outputs (A) and tradable inputs (B) was estimated as per Equation (5):

$$\text{NPC of tradable goods} = A/B. \quad \dots(5)$$

(iv) Domestic Resource Coefficient (DRC)

The DRC ratio measures the relative efficiency of domestic production in terms of its international cost competitiveness. The DRC coefficient compares the opportunity costs of using domestic primary resource — land, labour and capital and traded inputs in domestic production, to the value added by that production at border price.

$$\text{DRC} = a_{ij}v_j / (P_i^b - a_{ij}P_i^b) \quad \dots(6)$$

where, a_{ij} ($j = k+1$ to n) is the technical coefficient (input-use per unit of output) for domestic resource (non-tradable intermediary input) in the production output v_{ij} , and I is the shadow price of such an input. When DRC ratio is lower than one, domestic production is efficient and internationally competitive because the opportunity cost of the spent domestic resource is smaller than the net foreign exchange gained in exports or saved by substituting for imports. A DRC ratio of less than one is thus taken as an indicator of long-run comparative advantage. The opposite is true when DRC ratio is more than 1.

Results and Discussion**Growth in Exports of Groundnut**

The principal demand factors influencing exports are the magnitude of economic activity in the rest of the world and the international prices (unit values). Exports are also influenced by the competitiveness of goods in the world market. Growth of exports over the years has been discussed below for the selected crop.

During pre-WTO period, groundnut exports were impressive (Table 1). Exports increased mainly due to increased production (impact of Technology Mission on Oilseeds and market intervention operations of NDDB) and rise in the world market prices of groundnut. India's major export destinations are: Indonesia, Malaysia, Philippines and UK. However, India's destination-wise exports have been found decelerating over the years. It could be due to stagnation in the domestic production in recent years, which in turn might be due to increased import of edible oil and stagnant real prices of groundnut. The accelerated export of castor oil has been reported slowly replacing the groundnut area (Chand *et al.*, 2004). To gain from the market access, India should strive to export value-added products.

Table 1. Growth in export of groundnut from India to different countries

Description	Quantity (tonnes)		Value (million Rs)		Price (Rs/q)	
	Coefficient	Growth rate (percentage)	Coefficient	Growth rate (percentage)	Coefficient	Growth rate (percentage)
Pre-WTO period (1984-85 to 1994-95)						
Indonesia	0.4505* (0.1587)	56.90	0.2638* (0.0853)	30.19	0.0048* (0.0052)	0.49
Malaysia	0.3190* (0.1157)	37.58	0.1562* (0.0509)	16.91	0.0041* (0.0006)	0.41
UK	0.2399 (0.1757)	27.11	0.2238** (0.1038)	25.09	0.0045* (0.0007)	0.45
Philippines	0.2657** (0.1395)	30.43	0.1375* (0.0552)	14.74	0.00008 (0.00008)	0.008
Srilanka	0.1360* (0.0506)	14.57	-0.0422 (0.0192)	-4.13	0.0054* (0.0008)	0.54
Others	0.1454 (0.2004)	15.65	0.1223 (0.1113)	13.00	0.0052* (0.0006)	0.52
Total	0.1028*** (0.0882)	10.82	0.1513*** (0.0871)	16.34	0.0071* (0.0007)	0.71
Post-WTO period (1995-96 to 2004-05)						
Indonesia	0.0069 (0.0268)	0.69	0.0179 (0.0257)	1.81	0.0027* (0.0008)	0.27
Malaysia	0.0918* (0.0281)	9.60	0.1073* (0.0199)	11.33	0.0023 (0.0009)*	0.23
UK	-0.0499 (0.0366)	-4.87	-0.0441 (0.0345)	-4.31	0.0022** (0.0012)	0.22
Philippines	0.0341 (0.0716)	3.47	0.0198 (0.0397)	2.00	0.0023** (0.0009)	0.23
Srilanka	0.0412*** (0.0230)	4.20	0.0438*** (0.0272)	4.48	0.0025** (0.0011)	0.252

Contd

Table 1. Growth in export of groundnut from India to different countries — Contd

Description	Quantity (tonnes)		Value (million Rs)		Price (Rs/q)	
	Coefficient	Growth rate (percentage)	Coefficient	Growth rate (percentage)	Coefficient	Growth rate (percentage)
Others	-0.0142 (0.0325)	-1.40	2.8413 (0.0023)	0.23	0.0027* (0.0009)	0.275
Total	0.0075 (0.0230)	0.75	3.3580 (0.0191)	1.93	0.0042* (0.0011)	0.421
Overall period (1984-85 to 2004-05)						
Indonesia	0.3017* (0.0469)	35.21	0.2134* (0.0273)	23.79	0.0095 (0.0027)*	0.96
Malaysia	0.2841* (0.0328)	32.86	0.1988* (0.0160)	21.99	0.0015 (0.0014)	0.159
UK	0.1397* (0.0458)	14.99	0.1404* (0.0309)	15.07	0.0012 (0.0022)	0.122
Philippines	0.2459* (0.0413)	27.87	0.1593* (0.0205)	17.27	0.0023 (0.00005)	-0.00
Srilanka	0.2489* (0.0259)	28.26	0.1217* (0.0188)	12.95	0.0021 (0.0042)	0.22
Others	0.1011** (0.0488)	10.64	0.0929* (0.0287)	9.73	0.0044* (0.0016)	0.44
Total	0.0909* (0.0226)	9.52	0.1234* (0.0232)	13.13	0.0074* (0.0025)	0.74

Note: Figures within the parentheses indicate standard errors.

*, **, *** denote significance at 1, 5 and 10 per cent levels, respectively.

Changes in Economics of Groundnut Production

The comparative advantages of the *kharif* oilseed crops in terms of cost of cultivation, cost structure and changes in cost over time for groundnut were analyzed for the pre-WTO and post-WTO periods. It has been found that cost has increased on all major inputs like, human labour, bullock labour, seeds, fertilizers and manures (Table 2). The positive change in human labour was mainly due to the increase in wage rates over time, which was supported by the results of Kiresur *et al.* (1994). The positive increase in cost of groundnut seeds over the years was mainly due to rise in prices of seeds and a substantial increase in physical quantity of seeds being used for groundnut cultivation. The gross return from groundnut has recorded an increase of 107.82 per cent during the post-WTO over pre-WTO period. The increase in gross return from groundnut could be attributed to rise in production and also prices of groundnut.

Table 2. Changes in economics of groundnut cultivation in Karnataka during pre- and post-WTO periods

Particulars	Pre-WTO period	Post-WTO period	Percentage change from pre-WTO period to post-WTO period
Quantity of Inputs			
Seed (kg/ha)	57.9	90.6	56.5
Fertilizers (kg/ha)	49.0	44.8	-8.6
Manures (tonnes/ha)	1.8	2.4	33.3
Human labour (human days)	67.4	68.3	1.33
Bullock labour (pair days)	12.9	15.5	20.1
Pesticides			
Dust (kg/ha)	3.1	17.9	477.4
Liquid (L/ha)	0.7	0.1	-85.7
Prices of inputs			
Seed (Rs/kg)	12.8	22.6	76.6
Fertilizers (Rs/kg)	4.45	16.4	268.5
Manure (Rs/t)	98.93	296.0	199.2
Human labour (Rs/human day)	13.81	34.3	148.3
Bullock labour (Rs/pair day)	33.23	102.2	207.6
P.P. Dust (Rs/kg)	33.45	3.1	-90.7
Yield (q/ha)			
Main product	6.1	7.2	18.0
By-product	7.3	10.8	48.0
Market prices of output (Rs/q)			
Prices of main product	917.5	1568.4	70.9
Prices of by-product	39.79	87.3	119.4
Gross return	957.29	1655.7	72.95
Cost of production	619.0	1406.2	127.2
B:C ratio (per quintal)	1.54	1.17	
Value of output (Rs/ha)			
Value of main product	5596.75	11292.48	101.76
Value of by-product	290.47	942.84	224.59
Gross return	5887.22	12235.32	107.82
B:C ratio (per ha)	1.59	1.18	

Trade Competitiveness of Groundnut

The trade competitiveness was evaluated on the basis of nominal protection coefficient (NPC) and domestic resource cost (DRC). The calculations of NPC have been shown in Annexures I and II for pre-WTO and post-WTO periods, respectively. It has been observed that groundnut

Table 3. Trade competitiveness of groundnut under exportable hypothesis

Year	NPC	DRC
1985-86	1.46	1.09
1986-87	1.58	0.97
1987-88	1.44	1.31
1988-89	1.80	1.01
1989-90	1.76	1.05
1990-91	1.76	1.24
1991-92	1.56	1.23
1992-93	1.26	0.80
1993-94	1.22	1.15
1994-95	1.15	0.79
Average of 1985-86 to 1994-95	1.50	1.06
1995-96	0.97	0.72
1996-97	1.04	0.60
1997-98	0.76	0.42
1998-99	0.73	0.51
1999-00	0.63	0.49
2000-01	0.67	0.56
2001-02	0.46	0.42
2002-03	0.60	0.24
2003-04	0.49	0.27
2004-05	0.47	0.40
Average of 1995-96 to 2004-05	0.68	0.46
Overall average	1.09	0.76

had a competitive disadvantage in the pre-WTO period because the values of NPC and DRC have been found more than one (Table 3). More than unity value of NPC in the pre-WTO period revealed that the domestic price of groundnut was more than the import price, which signified that groundnut received protection from the state. The level of DRCs showed that costs involved in import of groundnut were lower than the value of domestic resources used in producing groundnut in one-hectare area. These results receive support from the findings of Ravi and Reddy (1998) and Reddy *et al.* (1998).

During the post-WTO period, the competitiveness of groundnut improved significantly as supported by the estimates of NPC and DRC, which turned out to be less than one (Table 3). However, these results are in contradiction with those of Reddy *et al.* (1998), Ravi and Reddy (1998) and Gulati (2002). Under the exportable hypothesis it was assumed that Indian groundnut would

compete with US groundnut in the Europe (Rotterdam). The NPCs were above unity during the pre-WTO period which means that groundnut was not an export-efficient crop. But, during the post-WTO period, fertilizer subsidy by the state helped in bringing down the value of NPCs below unity. The decontrolling of phosphatic fertilizers and almost constant prices of groundnut during this period were the factors that might have rendered groundnut competitive internationally during the post-WTO period.

Conclusions

The study conducted for a twenty-year period (1984-85 to 2004-05) has revealed that growth of groundnut export from India has been impressive during the pre-WTO period. But, it declined substantially during the post-WTO period. Indonesia, Malaysia, Srilanka and Philippines have been the major destinations for Indian groundnut. The structural changes in costs have been due to changes in quantity and quality of inputs associated with the technological process and their prices. The total cost of cultivation of groundnut has gone up from Rs 3690/ha during pre-WTO period to Rs 10330/ha in post-WTO period — an increase of 2.8-times. The increase has occurred in all the major cost components like human labour, bullock labour, seeds, fertilizers and manures. The cost on human labour has shown maximum increase. The rise in gross return from groundnut has been attributed to the increase in the prices of main and by-products of groundnut over the years. Groundnut has shown competitive disadvantage during the pre-WTO period as values of NPC and DRC are more than one. But, during the post-WTO period, there has been an increase in the competitiveness as is evident from less than unity values of NPC and DRC. Under the importable hypothesis also similar results have been found. Since the state of Karnataka enjoys export competitiveness in groundnut, all efforts should be made to increase the production and productivity of groundnut and other oilseed crops. State should encourage enhancing the export of groundnut.

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Annexure 1
Calculation of nominal protection coefficients (NPC) for groundnut under exportable hypothesis during pre-WTO period
 (Rs/q)

Particulars	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Wholesale price in Karnataka	550	568	620	634	720	890	1010	1250	1480	1450
Transport cost to Chennai	27.75	29	29	29.65	29.8	30	31.6	31.75	32	32
Marketing margin at 5%	27.50	28.41	31.00	37.71	36.01	44.53	50.50	62.53	74.03	72.54
C&F handling charges	14.00	14.20	14.50	15.60	16.00	17.20	18.00	21.00	22.75	23.80
Wharfage charges	3.15	3.5	3.60	4.00	4.00	5.00	5.45	5.80	6.00	6.10
Service charges	2	2	2.3	2.45	2.5	2.7	2.9	3	3	3.25
Service tax	0.16	0.16	0.18	0.2	0.2	0.22	0.23	0.24	0.24	0.26
Equals FOB price at Chennai	624	645	700	717	808	990	1118	1374	1618	1588
Plus freight from India to Rotterdam	24.04	21.47	23.64	32.96	41.04	59.11	54.54	66.24	86.59	88.77
Plus insurance at 1% of the price	6.25	6.46	7.01	7.18	8.09	9.90	11.19	13.75	16.19	15.89
Equals landed price	654	673	731	757	857	1059	1184	1454	1721	1693
FOB price at Rotterdam	37.80	34.80	39.78	32.39	33.6	36.1	42.2	47.06	48.77	47.1
Exchange rate (Rs/\$)	11.89	12.24	12.78	12.97	14.48	16.65	17.94	24.47	28.96	31.4
FOB price at Rotterdam	449	425	508	420	486	601	757	1151	1412	1478
NPC	1.46	1.58	1.44	1.80	1.76	1.76	1.56	1.26	1.22	1.15
NPC aggregate during pre-WTO period					1.5					

Note: C & F charges include empty container lift on charges, container yard to CFS, container transportation, cargo container stuffing charges, customs and port sundries, documentation charges.
 Wharfage charges - Ship landing charges.

Annexure 2

Calculation of nominal protection coefficients (NPC) for groundnut under exportable hypothesis during post-WTO period
(Rs/q)

Particulars	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
Wholesale price in Karnataka	1354	1441	1649	1546	1375	1342	1499	1756	1820	1900
Transport cost to Chennai	33.20	33.65	33.75	34	34	34.50	35	34.40	35.50	36.5
Marketing margin at 5%.	67.70	72.08	82.48	77.31	68.77	67.12	74.00	87.80	91.00	95.00
C&F handling charges	25	27	27.5	28	30	30	31	32	29	31.50
Wharfage charges	6.25	6.4	7	7	7.25	7.25	7.50	7.25	6.50	7.50
Service charges	3.45	3.65	3.80	3.90	4	4	3.90	4.50	4.20	4.10
Service tax	0.28	0.29	0.30	0.31	0.32	0.32	0.28	0.32	0.30	0.33
Equals FOB price at Chennai	1489	1584	1804	1696	1519	1485	1651	1922	1986	2074
Plus freight from India to Rotterdam	60.11	72.65	66.08	45.84	49.28	40.83	49.64	57.40	55.2	62.06
Plus insurance at 1% of the price	14.9	15.85	18.05	16.97	15.20	14.86	16.52	19.22	19.87	20.75
Equals landed price	1564	1673	1888	1759	1584	1541	1717	1998	2061	2157
FOB price at Rotterdam	51.35	48.02	69.74	64.51	59.45	53.32	78.78	67.22	88.48	101.53
Exchange rate	31.39	33.4	35.47	37.12	42.08	43.28	47.76	49.38	47.45	45.56
FOB price at Rotterdam	16110	16030	24730	2394	2501	2307	3762	3319	4198	4625
NPC	0.97	1.04	0.76	0.73	0.63	0.67	0.46	0.60	0.49	0.47
NPC aggregate during post-WTO period	0.68									

Note: C & F charges include empty container lift on charges, container yard to CFS, container transportation, cargo container stuffing charges, Customs and port sundries, documentation charges
Wharfage charges - Ship landing charges