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Export Competitiveness of major cereals in India

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Abstract

India is one of the third largest producer of cereals next to China and USA contributing to 11.38 per cent of global production. India is the world's second largest producer of Rice, Wheat and other cereals. Agriculture is the backbone of the Indian economy, contributing significantly to the nation's GDP and providing livelihoods for a substantial portion of the population. The present study aimed to examine the competitiveness of major cereals viz. basmati rice, non-basmati rice, wheat, maize and other cereals export from India. For the study purpose secondary data for last twenty years (2002-2022) obtained from the official website different agencies, including the Agricultural Processed Product Export Development Authority (APEDA), the Food and Agricultural Organization (FAO), the Agricultural Marketing Information Network (AGMARKNET) and India stat. To study the export competitiveness Nominal Protection Coefficient (NPC), Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA) were worked out. The NPC value showed that the basmati rice and maize were competitive in the global market whereas the non-basmati rice and wheat were non-competitive during the study period. The RCA and RSCA index showed that India had comparative advantage in the export of the basmati and non-basmati rice while it had comparative disadvantage in the export of wheat and maize.

Keywords: Competitiveness, NPC, RCA, RSCA, Cereals

Introduction

Indian economy is dependent on agriculture. Agriculture serves as a significant income generator for the society, providing numerous employment opportunities for both educated and uneducated individuals. According to The Economic Survey 2024 25 agriculture and allied sector contributes approximately 16 per cent of country's GDP during the year 2024-25. The agriculture sector still remains the leader in employment. Its share in employment was 44.1 per cent in 2017-18, which has increased to 46.1 per cent in 2023-24 (Anonymous, 2024). As a major producer of cereals, India not only meets domestic demands but also participates actively in the global market. With the increasing global population driving demand for cereals, understanding the dynamics of India's cereal exports is crucial for sustaining economic growth and ensuring food security. India is the leading exporter of the cereals to the global markets. Considering last three years scenario, during the year 2020-21 total export of cereals from India was 228.43 lakh MT, which rise up to 306.65 lakh MT. In terms of value the trade of cereals was accounted to Rs. 744.91 billion during the year 2020-21, which increased to Rs. 1110.62 billion during year 2022-23 (APEDA, 2024). Export is a vehicle of growth and development. They help not only in procuring the latest machinery, equipment and technology but also the goods and services, which are not available indigenously. Therefore, it occupies a very prominent place in the list of priorities of the economic set up of developing countries because they contribute largely to foreign exchange pool. In order to maintain healthy balance of trade and foreign exchange reserve, it is necessary to have a sustained and high rate of growth of export. Considering the above importance the present investigation undertaken aimed to examine the competitiveness of major cereals viz. basmati rice, non-basmati rice, wheat, maize and other cereals export from India.

Methodology

The study was based on secondary data pertaining to the export quantity and prices of selected cereals from India and the world, which was collected from the website of

Agricultural and Processed Food Products Export Development Authority (APEDA), the Food and Agricultural Organization (FAO), India stat, Ministry of Commerce, GoI and the different published reports of GoI. For Domestic prices of selected cereal crops were collected from AGMARKNET. As per the availability, the data was collected for the period of last twenty years *i.e.* from year 2002 to 2022. To study the decadal performance the entire study period was divided into two sub-period and overall period *viz.*, Period I: 2002-2011 Period II: 2012-2022 Overall Period: 2002-2022.

Nominal Protection Coefficient (NPC)

The Nominal Protection Coefficient was computed to determine extent of competitive advantage enjoyed by the commodity in the context of free trade. The coefficient shed light on whether a country has comparative advantage in the export of that commodity in the free trade scenario or not. NPC is defined as the ratio of the domestic price to the world reference price of the commodity under consideration. Symbolically,

$$NPC = \frac{P_d}{P_b}$$

Where, P_d = Domestic wholesale price of the commodity
 P_b = World reference price of the commodity
 if $NPC > 1$, the commodity is protected, compared to the situation that would prevail under free trade and
 if $NPC < 1$, the commodity is not protected (Tiwari *et al.*, 2023) ^[6].

Revealed Comparative Advantage Index (RCA)

To measure comparative advantage in export of specific commodity Revealed Comparative Advantage Index (RCA) formulated by Balassa (1965) was estimated. It is a ratio of traded products of the industry by a particular country to the world and total trade of that country to the world. The index for country i^{th} for commodity j^{th} is calculated as follows (Burange and Chaddha, 2008).

$$RCA_{ij} = \frac{X_{ij}/X_{it}}{X_{wj}/X_{wt}}$$

Where, RCA_{ij} = Revealed comparative advantage of i^{th} country for j^{th} product.

X_{ij} = j^{th} commodity export of i^{th} country

X_{it} = Total agriculture commodity export of i^{th} country

X_{wj} = World export of j^{th} commodity

X_{wt} = World export of total agriculture commodity

The calculated value of RCA lies between 0 and 1

If $RCA_{ij} > 1$, country 'i' have revealed comparative advantage in product 'j'

If $RCA_{ij} < 1$, country 'i' have comparative disadvantage capability in product 'j'

Revealed Symmetric Comparative Advantage (RSCA)

However, RCA having the limitation of asymmetry, therefore to make RCA symmetric another method was suggested by Dalum *et al.*, (1998) ^[4] called as Revealed Symmetric Comparative Advantage (RSCA) was used.

$$RSCA = \frac{RCA_{ij} - 1}{RCA_{ij} + 1}$$

The value of RSCA lies between +1 and -1.

If $RSCA_{ij} > 0$, $RSCA_{ij}$ represent the revealed symmetric comparative advantage of country i for product j and *vice versa* when $RSCA_{ij} < 0$.

Results and Discussion

Nominal Protection Coefficient (NPC)

Nominal Protection Coefficient (NPC) of basmati rice

The NPC values for basmati rice exports from India were 0.86, 0.90, and 0.89 for Period I, Period II and the overall period, respectively. These figures indicate that Indian basmati rice was moderately competitive in the global market throughout the study period. The domestic price of basmati rice remained lower than the international price, giving it a comparative advantage in export markets. The results were in line with the findings of Tiwari *et al.* (2023) ^[6] in which estimated value of NPC of basmati rice export was experienced moderately export competitiveness in international market.

Table 1: Nominal Protection Coefficient (NPC) of basmati rice export from India (Rs./qtl)

Period	Year	Domestic Price	International Price	NPC
Period I	2002-03	638.00	836.42	0.76
	2003-04	662.00	686.18	0.96
	2004-05	681.00	756.74	0.90
	2005-06	710.00	936.23	0.76
	2006-07	750.00	1070.07	0.70
	2007-08	837.00	1114.66	0.75
	2008-09	1061.25	1173.74	0.90
	2009-10	1382.50	1301.22	1.06
	2010-11	1271.25	1360.84	0.93
	2011-12	1185.00	1495.01	0.79
Average (Period I)		917.80	1073.11	0.86
Period II	2012-13	1807.50	1640.88	1.10
	2013-14	3818.50	1606.01	2.38
	2014-15	1850.00	1586.51	1.17
	2015-16	2964.00	1502.09	1.97
	2016-17	2478.00	3177.92	0.78
	2017-18	3270.00	2701.61	1.21
	2018-19	3342.00	2042.60	1.64
	2019-20	3254.00	5179.12	0.63
	2020-21	3158.00	5166.67	0.61
	2021-22	3799.50	5719.40	0.66
Average (Period II)		3058.86	3411.82	0.90
Overall period		1988.33	2242.47	0.89

Nominal Protection Coefficient (NPC) of non-basmati rice

During Period I, the NPC for non-basmati rice was 1.03, indicating non-competitive exports, with domestic prices exceeding global prices. The NPC slightly increased to 1.17 during Period II, with domestic prices consistently higher than international prices, putting Indian non-basmati rice at a comparative disadvantage. The overall period NPC was 1.12, suggesting that non-basmati rice exports were possibly protected and not competitive in the global market throughout the entire period.

Table 2: Nominal Protection Coefficient (NPC) of non-basmati rice export from India (Rs./qtl)

Period	Year	Domestic Price	International Price	NPC
Period I	2002-03	1285.50	882.20	1.46
	2003-04	1642.94	823.65	1.99
	2004-05	1129.82	1091.26	1.04
	2005-06	1253.87	1087.82	1.15
	2006-07	1273.59	1146.10	1.11
	2007-08	1389.15	1401.80	0.99
	2008-09	1643.73	1810.72	0.91
	2009-10	1959.41	2617.84	0.75
	2010-11	2110.91	2297.13	0.92
Average (Period I)		1582.10	1532.45	1.03
Period II	2012-13	2165.78	2160.41	1.00
	2013-14	2630.53	2488.36	1.06
	2014-15	2851.51	2468.99	1.15
	2015-16	2649.55	2395.12	1.11
	2016-17	3441.90	2500.42	1.38
	2017-18	2866.70	2500.42	1.15
	2018-19	3128.58	2787.66	1.12
	2019-20	3409.50	2849.73	1.20
	2020-21	3332.27	2709.15	1.23
	2021-22	3295.01	2644.64	1.25
	2022-23	3358.31	2872.40	1.17
Average (Period II)		3011.78	2579.75	1.17
Overall period		2296.94	2056.10	1.12

Nominal Protection Coefficient (NPC) of wheat

The NPC value for wheat exports was 1.06 during Period I, indicating non-competitive exports as domestic prices were consistently higher than international prices. Period II saw an NPC of 0.99, while the overall period NPC was 1.02, suggesting that Indian wheat was possibly protected

throughout the entire period and not competitive internationally. The result was in agreement with Agam (2022) who concluded that NPC value of wheat export was 1.05, which indicated that wheat was non-competitive in international market as domestic price was more than international price.

Table 3: Nominal Protection Coefficient (NPC) of wheat export from India (Rs./qtl)

Period	Year	Domestic Price	International Price	NPC
Period I	2002-03	743.66	479.36	1.55
	2003-04	850.72	584.19	1.46
	2004-05	875.49	726.52	1.21
	2005-06	828.87	747.18	1.11
	2006-07	1045.50	758.06	1.38
	2007-08	1156.91	1009.86	1.15
	2008-09	1147.51	1300.39	0.88
	2009-10	1217.53	1181.82	1.03
	2010-11	1338.23	1773.77	0.75
	2011-12	1339.07	1381.40	0.97
Average (Period I)		1054.35	994.26	1.06
Period II	2012-13	1462.39	1616.16	0.90
	2013-14	1691.74	1665.05	1.02
	2014-15	1724.73	1707.15	1.01
	2015-16	1685.45	1592.65	1.06
	2016-17	1779.19	1686.14	1.06
	2017-18	1843.52	1934.30	0.95
	2018-19	1925.45	1878.43	1.03
	2019-20	2090.21	2020.38	1.03
	2020-21	1983.70	1933.27	1.03
	2021-22	2011.74	2188.08	0.92
	2022-23	2374.60	2519.97	0.94
Average (Period II)		1870.25	1885.60	0.99
Overall period		1462.30	1439.93	1.02

Nominal Protection Coefficient (NPC) of maize

Maize exports showed moderate competitiveness, with NPC values of 0.80, 0.83 and 0.82 for Period I, Period II and the overall period, respectively. These figures suggest that Indian maize was relatively competitive in the global market, with domestic prices lower than global prices,

indicating an advantageous trade situation. The result was in line with the findings of Kolhe *et al.* (2021) ^[5] in which estimated value of NPC of maize export was 0.86 which implied that, maize experienced moderately export competitiveness in international market.

Table 4: Nominal Protection Coefficient (NPC) of maize export from India (Rs./qtl)

Period	Year	Domestic Price	International Price	NPC
Period I	2002-03	532.97	866.45	0.62
	2003-04	535.76	652.44	0.82
	2004-05	549.54	665.21	0.83
	2005-06	576.34	752.48	0.77
	2006-07	626.46	782.63	0.80
	2007-08	714.15	895.78	0.80
	2008-09	806.34	954.11	0.85
	2009-10	886.66	969.95	0.91
	2010-11	935.69	1115.94	0.84
	2011-12	1032.99	1337.63	0.77
Average (Period I)		719.69	899.26	0.80
Period II	2012-13	1145.26	1482.01	0.77
	2013-14	1314.44	1513.23	0.87
	2014-15	1283.14	1428.90	0.90
	2015-16	1377.58	1664.90	0.83
	2016-17	1474.78	1818.89	0.81
	2017-18	1531.83	1741.23	0.88
	2018-19	1550.42	1780.19	0.87
	2019-20	2098.07	2754.37	0.76
	2020-21	1494.17	1623.98	0.92
	2021-22	1591.99	2063.54	0.77
	2022-23	2109.39	2602.19	0.81
Average (Period II)		1542.83	1861.22	0.83
Overall period		2262.52	2760.48	0.82

Revealed Comparative Advantage Index (RCA)**RCA and RSCA of basmati rice**

RCA values for basmati rice were 26.72, 34.51 and 30.62 for period I, Period II and the overall period, whereas RSCA

values were 0.90, 0.93 and 0.92, respectively, implied that India had comparative advantage in basmati rice exports during the study period.

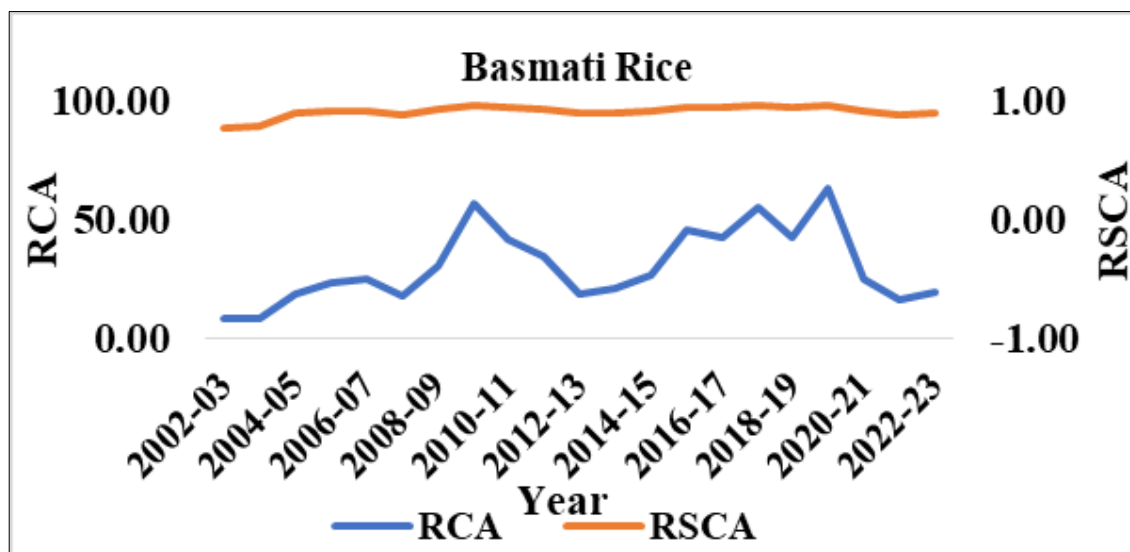
**Fig 1:** RCA and RSCA of Basmati rice

Table 5: RCA and RSCA of Basmati rice export from India

	Year	RCA	RSCA
Period I	2002-03	8.30	0.78
	2003-04	8.49	0.79
	2004-05	18.98	0.90
	2005-06	24.02	0.92
	2006-07	24.98	0.92
	2007-08	18.00	0.89
	2008-09	30.48	0.94
	2009-10	56.81	0.97
	2010-11	42.25	0.95
	2011-12	34.85	0.94
Average (Period I)		26.72	0.90
Period II	2012-13	18.79	0.90
	2013-14	21.67	0.91
	2014-15	26.62	0.93
	2015-16	45.97	0.96
	2016-17	42.61	0.95
	2017-18	55.57	0.96
	2018-19	43.19	0.95
	2019-20	63.63	0.97
	2020-21	25.63	0.92
	2021-22	16.23	0.88
Average (Period II)		34.51	0.93
Overall period		30.62	0.92

RCA and RSCA of non-basmati rice

During Period I, Period II and the overall period, the RCA values were 53.03, 94.05 and 73.54, whereas RSCA values were 0.90, 0.98 and 0.94, respectively, implied that India shows a comparative advantage in non-basmati rice exports

throughout the study period. The RCA and RSCA indices for Period II were greater than Period I, showing a higher comparative advantage in Period II in the export of non-basmati rice.

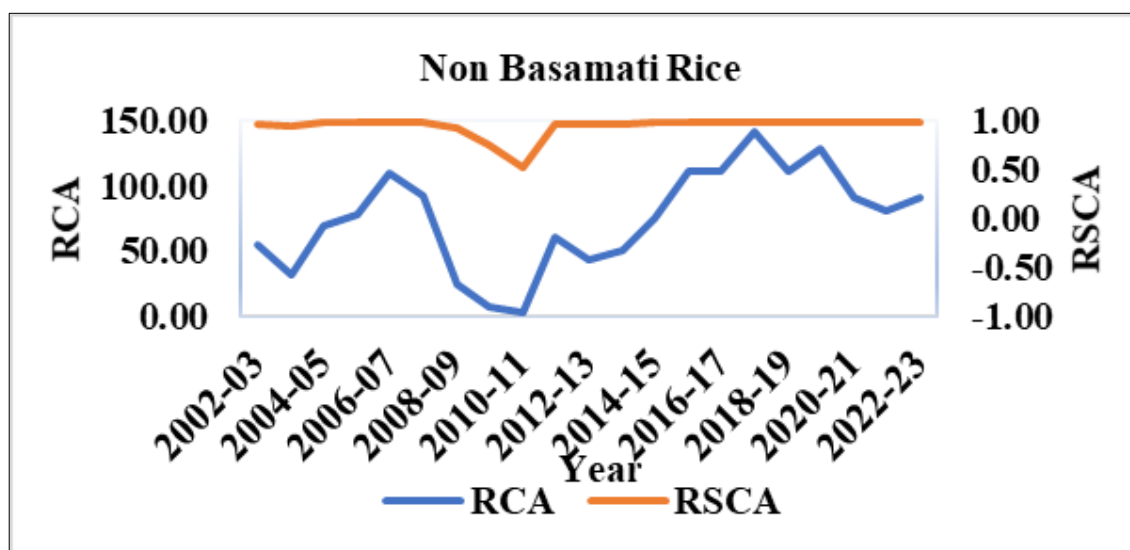
**Fig 2:** RCA and RSCA of non-basmati from India

Table 6: RCA and RSCA of non-basmati rice export from India

Period	Year	RCA	RSCA
Period I	2002-03	55.15	0.96
	2003-04	32.15	0.94
	2004-05	69.22	0.97
	2005-06	77.33	0.97
	2006-07	109.53	0.98
	2007-08	92.26	0.98
	2008-09	24.61	0.92
	2009-10	6.79	0.74
	2010-11	3.16	0.52
Average (Period I)		53.03	0.90
Period II	2012-13	43.31	0.95
	2013-14	50.42	0.96
	2014-15	75.18	0.97
	2015-16	111.42	0.98
	2016-17	110.33	0.98
	2017-18	141.00	0.99
	2018-19	111.32	0.98
	2019-20	128.98	0.98
	2020-21	91.05	0.98
Average (Period II)		94.05	0.98
Overall period		73.54	0.94

RCA and RSCA of wheat

India faces a comparative disadvantage in wheat export. The RCA values are 0.28, 0.29 and 0.29 for Period I, Period II and the overall period, respectively, which are less than one.

The RSCA values are -0.66, -0.60 and -0.63 for the same periods, which are negative. This indicates that Indian wheat was less competitive in the international market during the study period.

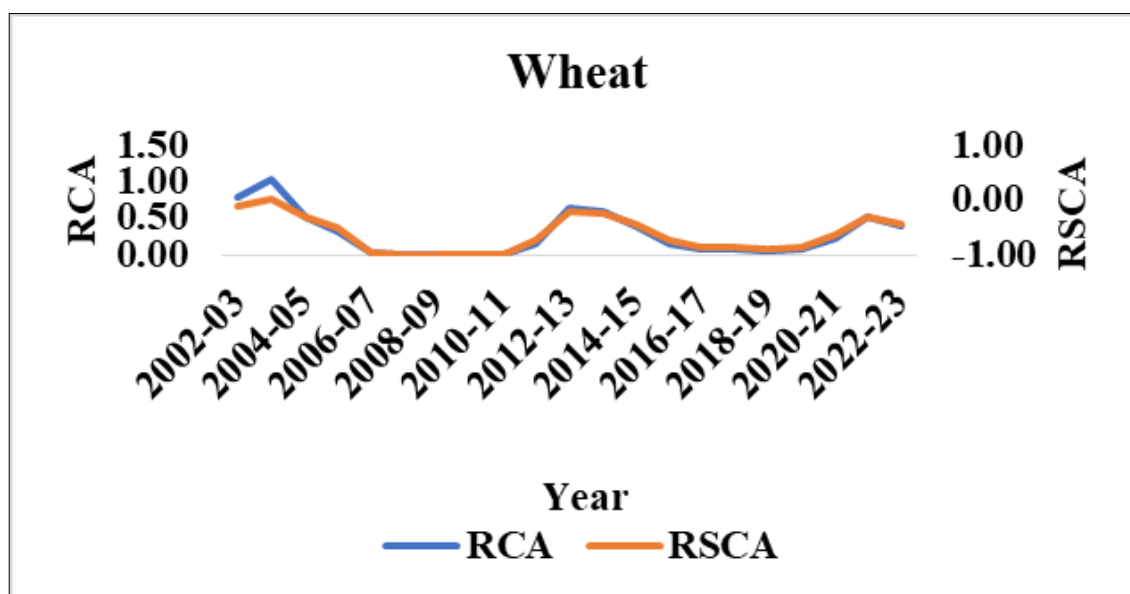
**Fig 3:** RCA and RSCA of wheat from India

Table 7: RCA and RSCA of wheat export from India

Period	Year	RCA	RSCA
Period I	2002-03	0.79	-0.12
	2003-04	1.04	0.02
	2004-05	0.51	-0.32
	2005-06	0.32	-0.51
	2006-07	0.02	-0.96
	2007-08	0.00	-1.00
	2008-09	0.00	-1.00
	2009-10	0.00	-1.00
	2010-11	0.00	-1.00
	2011-12	0.15	-0.74
Average (Period I)		0.28	-0.66
Period II	2012-13	0.63	-0.23
	2013-14	0.59	-0.25
	2014-15	0.38	-0.45
	2015-16	0.16	-0.72
	2016-17	0.06	-0.88
	2017-18	0.08	-0.86
	2018-19	0.05	-0.91
	2019-20	0.08	-0.85
	2020-21	0.23	-0.63
	2021-22	0.51	-0.32
	2022-23	0.38	-0.45
Average (Period II)		0.29	-0.60
Overall period		0.29	-0.63

RCA and RSCA of maize

India has a comparative disadvantage in maize export. The RCA values were 0.94, 0.31 and 0.63 during Period I, Period II and the overall period, respectively, with all values

less than one. The RSCA values were -0.22, -0.54 and -0.38 during Period I, Period II and the overall period, respectively, with negative values. This signifies that Indian maize was less competitive in the world market.

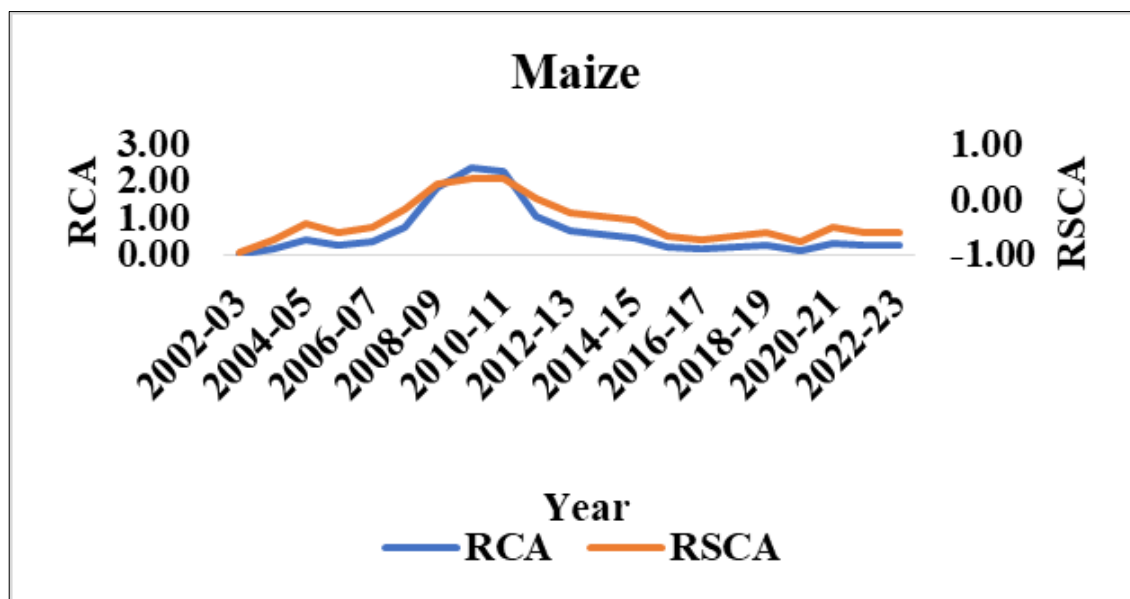
**Fig 4: RCA and RSCA of maize export from India**

Table 8: RCA and RSCA of maize export from India

Period	Year	RCA	RSCA
Period I	2002-03	0.02	-0.95
	2003-04	0.17	-0.71
	2004-05	0.40	-0.43
	2005-06	0.24	-0.61
	2006-07	0.34	-0.49
	2007-08	0.73	-0.16
	2008-09	1.82	0.29
	2009-10	2.36	0.40
	2010-11	2.29	0.39
	2011-12	1.06	0.03
Average (Period I)		0.94	-0.22
Period II	2012-13	0.64	-0.22
	2013-14	0.55	-0.29
	2014-15	0.45	-0.38
	2015-16	0.19	-0.68
	2016-17	0.17	-0.71
	2017-18	0.20	-0.66
	2018-19	0.25	-0.60
	2019-20	0.13	-0.77
	2020-21	0.33	-0.51
	2021-22	0.27	-0.58
	2022-23	0.26	-0.59
Average (Period II)		0.31	-0.54
Overall period		0.63	-0.38

Conclusion

The NPC value showed that the basmati rice and maize were competitive in the global market whereas the non-basmati rice and wheat were non-competitive during the study period. The RCA and RSCA index showed that India had comparative advantage in the export of the basmati and non-basmati rice while it had comparative disadvantage in the export of wheat and maize. As Indian basmati rice is highly competitive in global market there is a good opportunity to increase the export by standardizing the product and simplifying the export regulation. The initiative should be taken to increase the competitiveness of non-basmati rice and wheat by collaborating with various stakeholders of value chain. India could boost its export performance by taking new steps, such as developing drought-resistant varieties to protect domestic production and consequently exports.

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