



Export of agricultural commodities from India: Performance and prospects

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ABSTRACT

Indian agricultural export has undergone significant changes during recent times. In this context, the present study has analysed the trend in exports of agricultural commodities from India, the changes in the comparative advantage, the Indian agricultural export scenario has witnessed during the past decade and the prospects for further boosting the agricultural export. There was significant rate of growth of export during the past decade; with wide difference across various commodity groups. The growth was 41.5% in case of guar gum and other resins; 27% in meat and offals; 26.6% in case of meat and meat products; 24–25% in case of sugar and spices and 16.4% in case of cereals. The rate of growth was low in case of fish and marine products, tea and coffee. The differential trend growths have resulted in the changes in the composition of export. The study finds a significant increase in the share of export of cereals from (3.3 to 6.9%), guar gum and other resins (1.0 to 7.5%), cotton (14.1 to 17.3%), spices (2.3 to 3.3%), and sugar (3.9 to 4.3%). On the other hand, the share has declined in some commodities- the notable one being fish and marine products (14.0 to 7.6%), fruits and nuts (6.1 to 3.5%) and coffee and tea (5.4 to 3.5%). The study has also analysed the comparative advantage of India's exports, through revealed comparative advantage (RCA). The RCA was improving in case of cotton, maize, and certain fruits and vegetables over time, but declining in case of some spices, rice and wheat. In case of plantation based spices and other commodities, India is gradually losing its comparative edge, mainly to Asian countries. The study has so identified yield improvement through growth in total factor productivity (TFP) as a potential factor that would result in generation of exportable surpluses and boosting India's export.

Key words: Agricultural export, Comparative advantage, Competitiveness, Growth, India, Trend

Performance of agricultural export has always attracted policy makers' attention, as it is an important source of foreign exchange earnings, driver of crop diversification and farm income improvements. The coming into force of the World Trade Organisation (WTO) has brought a qualitative change in the deliberations on the topic. The domestic preparedness to deal with a globalised and interconnected world, with increased concern on intellectual properties, food safety and quality aspects and international movements of finances and services on the one hand, and domestic livelihood and food security concerns on the other hand, has generated substantial debate. One concern that ran through all the arguments was the ability of the domestic agriculture to cope up with demands of the new paradigm of international monitoring and regulations. Two decades have passed since the WTO came into existence. During this span of time, some of the initial apprehensions have dissipated. However, a different set of problems, notably faster transmission of international price volatility to domestic markets, higher rates of rejection

on account of sanitary and phyto-sanitary (SPS) measures, and restriction in providing subsidy supports have emerged. During the past two decades, the domestic agricultural sector has also witnessed several changes, including the composition of public and private investments in agricultural research with greater participation of private sector, emergence of new institutional innovations like contract farming and farmer producer companies, change in the composition of the demand for agricultural commodities in the domestic market, and diversification towards high value crops which has led to differential growth experience for different commodity groups. Accordingly, the focus of agricultural output is also undergoing a paradigm shift.

The competition that a country offers in the international markets for its export depends on a number of factors. A country whose domestic consumption is low and volume of exports is high in terms of share in world exports would be able to provide stiff competition in international markets (Bhattacharya 2002). One major factor that affects the export prospects is the ability of the country to generate exportable surpluses (Singh and Sain 2003) which is dynamic during a period of time and bound to undergo shifts, depending on the macro-economic changes

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and the shift in the production environment especially for an economy of India’s size and diversity. In this context, the present paper analyses the trend in export of agricultural commodities from India; changes in the export competitiveness and prospects of boosting it.

MATERIALS AND METHODS

The present study has analysed the export performance of a large number of commodity and commodity groups based on their contribution to the total agricultural export. As a first step, the relative shares of various commodities in agricultural exports were estimated. Except for studying the compositional changes, the study was focused on commodities of crop origin. The major crop groups considered under study are cereals, spices, fruits and nuts, vegetables, cotton, sugar, and resin and gums. In the next step, the respective crops under each commodity groups were identified. The study uses data from various published sources. The data on export of the selected commodities were extracted from the export-import data bank maintained by Ministry of Commerce (www.commercemintistry.nic.in). The data on agricultural exports of other countries and other related global statistics were extracted from Trade Yearbook of Food and Agricultural Organisation (FAOSTAT). Publication of Directorate of Economics and Statistics, Ministry of Agriculture, Government of India was the major source for the data of area, production and yield (DES 2014).

The data was analyzed by using major analytical techniques like growth rates, indices of instability and Revealed Comparative Advantage (RCA). The growth rates were estimated by using semi-log growth model while indices of instability were measured by using Cuddy Della-Valle index (CDVI).

Semi-log growth model used the OLS regression of the form $Ln Y_t = a + bt$ where, Y is the variable under consideration and t is the time in years. The growth rate was arrived at using the formular $r = (exp(b)-1)*100$. We have selected the semi-log growth mode based on the best fit and interpretational easiness.

$CDVI = CV*(1-R^2)^{0.5}$, where, CV = Simple coefficient of variation and R^2 = Coefficient of determination from time trend regression adjusted for degrees of freedom.

The literature provides a number of measures to analyse the competitiveness of agricultural exports. One crude method is to compare the producer prices in major exporting countries, expressed in common currency. An analysis of the competitiveness was undertaken by examining the producer prices in various competing countries. However, these figures may not represent the competitiveness fully due to the presence of large extent of costs on account of transportation. In this context, a widely used concept of competitiveness is the Revealed Comparative Advantage (RCA) (Balassa 1965), constructed based on the tenets of David Ricardo’s theory of comparative advantage. The idea behind the usage of RCA is that it is possible to evaluate comparative advantage on

the basis of a country’s specialization in exports of a commodity with reference to some group of countries or the global trade. The index is based on the premise that countries specialize and export those agricultural commodities which they can produce at lower relative cost. Put in different way, if a country is able to produce a commodity at a lower relative cost compared to other countries then with trade, that country should divert more of its scarce resources to the production of that particular good (Serin and Civan 2008). The lower cost of production is largely a function of comparative advantage in physical and capital endowments. Given a trade policy, the changes in the quality and composition of the human and capital endowments would bring forth shifts in the trade pattern (Balassa 1986). The estimate of RCA was computed by the following formula:

$$RCA_{ij} = \frac{\left(\frac{X_{ij}}{X_w}\right)}{\left(\frac{X_i}{X_w}\right)} \dots(1)$$

where, RCA_{ij} = Revealed comparative advantage of the i^{th} country’s j^{th} commodity, x_{ij} = Exports of the j^{th} commodity by the i^{th} country, X_i = Total merchandise exports of the i^{th} commodity, X_{wj} = World export of j^{th} commodity, X_w = Total world merchandise exports.

A movement of the index towards the higher side indicates an improvement in the relative advantage and vice versa.

RESULTS AND DISCUSSION

As on 2011, India’s agricultural exports have reached US \$ 22 billion, growing through an annual rate of 16.2% since 2000 (Table 1). All the value are based on the triennial ending averages, in order to minimize the influence of variations. It constitutes less than 10% of India’s total merchandise export. Further, the declining trend in share of agricultural exports to total merchandised exports was observed over the years (Fig 1). The annual growth rate of agricultural export (16%) was less than the growth experienced in case of total merchandise export (19.0%). However, increasing trend in share of agricultural exports to agricultural GDP witnessed from a figure of 7.1% in 2000 to 14% during 2011 that indicates that Indian agriculture is getting more and more integrated with the external economy.

Table 1 Growth and instability in India’s agricultural exports vis-a-vis total merchandise exports, 2000-2011

Item	2000 (billion US \$)	2011 (billion US \$)	Growth (%)	Instability (%)
Agricultural export	4.9	22.0	16.2	8.8
Total merchandise export	38.7	231.3	19.0	5.4

Source: Computed by the authors using data from FAOSTAT.

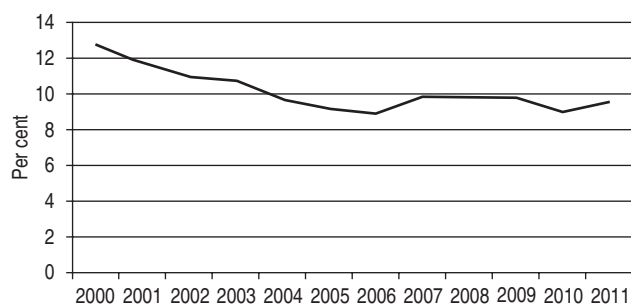


Fig 1 Share of agricultural trade in total merchandise trade, 2000-2011.

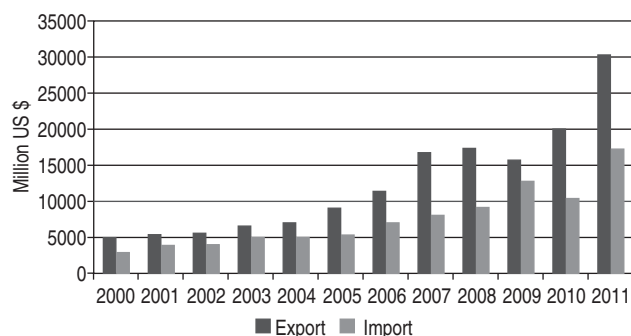


Fig 2 Trend in export and import of agricultural commodities in India (million US \$).

This could probably be due to the diversification of Indian agriculture and the increased propensity to capitalise on newer opportunities.

During the period under consideration, the exports were more than imports, both at levels and in terms of growth rates (Fig 2). The share of India in global agricultural trade has registered an improvement over years. However, as of 2011, Indian agricultural trade accounts for only about 1.6% of global agricultural trade.

Change in composition of India's agricultural export

During the period under analysis, the exports of all commodity groups have registered an increase in value terms. However, there was a change in the composition of export characterised by an increase in the share of meat (and meat products), cereals, spices, sugar, oilseeds, cotton and guar gum and a decline in the share of the fish (and fish products), vegetables, fruits and some traditional export commodities like tea and coffee (Table 2).

In the total export of US\$ 30 billion in 2012-13, the major items of export were cotton (17.3%), cereals (16.4%), fish and marine products (7.6%) and meat (6.9%). Notwithstanding the decline in share of some commodities, all the commodity groups have registered significant positive growth rates. One notable commodity has been meat and meat products which have registered a growth rate of 27.6% with a low instability at 4.8%. This was mainly due to the growth in export of buffalo meat which account for close to 80% of total meat exported. Another significant sector is marine fish and fish products which has registered a growth rate of 8%/year. The marine products' export is facing a slowdown in recent periods, mainly on account of reduced demand in European and United States market. Further, there has been stagnation in marine fish production in recent years. Other significant commodity groups in terms of growth performance are spices and cereals. Among non-food crops, cotton and natural gums/resins have registered significant export growth. Cotton has traditionally contributed to Indian foreign exchange earning through textile export. Such a raise in export contributed by productivity improvement through research and development activities (Rajendran *et al.* 2005). In case of cotton, the production advantage brought about by Bt cotton technology helped India to achieve higher export levels. The highest export growth is in guar gum, mainly on

Table 2 Compositional changes in India's agricultural exports, 2003-04 to 2012-13(TE average)

Item	Value (US \$ million)		Share (%)		Growth (%)	Instability(%)
	2003-2004	2012-2013	2003-2004	2012-2013		
Meat and offals	299.1	2720.4	3.3	6.9	27.6	4.8
Fish and marine products	1283.8	2976.7	14.0	7.6	8.7	10.8
Vegetables and tubers	272.7	981.1	3.0	2.5	15.2	6.7
Fruits and nuts	554.6	1355.4	6.1	3.5	10.0	3.1
Coffee	151.5	593.8	1.7	1.5	15.8	10.0
Tea	337.2	782.6	3.7	2.0	10.3	3.9
Cereals	1361.1	6424.8	14.9	16.4	16.7	14.9
Spices	211.1	1286.1	2.3	3.3	24.1	10.1
Rice	930.3	4567.0	10.2	11.6	17.4	12.6
Oilseeds	325.4	1660.3	3.6	4.2	20.3	9.3
Guar gum and other resins	90.5	2951.5	1.0	7.5	41.5	34.6
Sugar	354.7	1698.0	3.9	4.3	24.6	44.7
Raw hides and skins	510.1	990.0	5.6	2.5	6.4	6.4
Natural rubber	29.5	114.7	0.32	0.29	12.5	19.9
Cotton (raw and yarn)	1293.5	6798.2	14.1	17.3	20.2	13.0
Total	6834.2	29932.7	74.7	76.3	17.0	6.9

Source: Computed by the authors using data from Ministry of Commerce, Government of India.

account of sudden rise in its demand for industrial uses. The high level of instability points to the vulnerability part of the demand. This is quite noticeable in case of sugar, in which case the export has expanded at the rate of close to 25%/year, but with a high instability of 45%. This is mainly owing to the policy shifts in case of sugar, which includes restriction on its exports at times when domestic prices rise.

Commodity growth trends

The commodity wise export performance for major commodity groups, viz. cereals, vegetables, fruits and nuts, and spices in the past decade has been analyzed in detail to draw the inferences which are as under:

Cereals

The exports of cereals accounted for more than US\$ 6.4 billion during 2012-13 (Table 3). Rice and maize were the major cereals exported accounting for 71% and 16%, respectively. Amongst the three broad categories of rice exported, viz. basmati, parboiled and non-basmati non-parboiled, two-thirds of export alone accounts for basmati rice, followed by non-basmati parboiled rice (21%). The trade volume of basmati rice has increased from US \$ 0.4 to 3.1 billion at an annual growth rate of 27.7%. India has the advantage of niche markets in case of basmati rice, notably in west and middle Asian countries. Unlike basmati rice, the share of other rice commodities like non-parboiled and non-basmati rice varieties have declined from 32% to 7%, and have registered a negative growth in value terms (-0.8%). The export of parboiled rice has increased, but with high instability. The sharp rise in export of maize is quite noteworthy. The export value of maize increased from US\$ 36.8 million to US\$ 1035 million during last eleven years, at a whopping annual average growth rate of 44.6% especially due to productivity increase in states like Andhra Pradesh, Bihar and Karnataka. India's exports of wheat however, have not registered significant growth over the

Table 3 Trend in export of cereals, 2002-03 to 2012-13 (TE average)

Items	Export (US \$)		Share (%)		Growth (%) / year
	2002-03	2012-13	2002-03	2012-13	
Wheat and meslin	387.6	712.2	28.5	11.1	-34.4
Maize (corn)	36.8	1034.8	2.7	16.1	44.6
Rice	930.3	4567.0	68.4	71.1	17.4
Grain sorghum	1.03	41.4	0.08	0.6	46.0
Total cereals	1361.1	6424.8	100.0	100.0	16.7
Composition of rice export, share as a per cent of total rice export					
Parboiled rice	206.4	947.7	22.2	20.8	4.5
Basmati rice	415.4	3091.6	44.7	67.7	27.6
Non-parboiled non-basmati rice	299.4	321.1	32.2	7.0	-8.0

Source: Computed by the authors using data from Ministry of Commerce, Government of India.

Table 4 Trend in exports of vegetables, 2003-04 to 2012-13 (TE average)

Items/ commodities	Value (Million US \$)		Share (%)		Growth (%) / year
	2003-04	2012-13	2003-04	2012-13	
Potatoes	3.6	31.2	1.3	3.2	26.1
Tomatoes	1.46	72.5	0.52	7.4	60.7
Onions	100.5	381.8	36.9	38.9	18.5
Cole crops	0.06	1.7	0.02	0.17	40.9
Legume vegetables	74.6	218.6	27.4	22.3	7.05
Total vegetables	272.7	981.1	100	100	15.2

Potatoes and tomatoes includes both fresh and chilled; onions includes fresh and chilled forms of shallots, garlic, leeks and other alliaceous vegetables; Cole crops includes cabbages, cauliflowers, kohlrabi, kale and similar edible brassicas. Source: Computed by the authors using data from Ministry of Commerce, Government of India.

years and the growth rate was at the expense of high instability, as well.

Vegetables

The exports of vegetables from India is dominated by onions (accounting for 39%), followed by dried leguminous vegetables (Table 4). As on 2012-13 (TE) the onions and dried legumes accounted for US \$ 382 and US\$ 218 million, respectively. The highest growth was recorded by tomato at 61%/year, mostly exported in the processed form. Among other vegetables cole crops (41%), potato (26%) and onion (19%) recorded high growth rate. Vanitha *et al.* (2014) has observed that India has a competitive advantage in exporting onion and peas compared to other vegetables. India's onion exports are largely concentrating on neighbouring countries, and suffers from large instability as well (Panwar *et al.* 2009). One of the major factors that negate India's export potential in case of vegetables is the high level of post-harvest losses, sometimes accounting for 25% of total production (Sharma and Singh 2011). Expansion of infrastructure in the form of cold storage facilities, packaging centres, machineries for sorting and grading and development of the food processing industry needs increased attention to overcome the problem.

Fruits and nuts

The export of fruits and nuts is dominated by cashew (56%), mango (14%) and grapes (11%) (Table 5). Cashew is one of the traditional export crop of India. Despite an increase in value of cashew export from US \$ 390 million in 2003-04 to US \$ 761 million in 2012-13, the share of cashew in total export has declined over the years. Mango, exported mostly as pulp, continues to be the largest exported fruit of India. It has increased in value, but its export shares have declined. Grapes is another crop that exhibits promising export potential. One factor that might have contributed to the high level of export of grapes in recent period has been the establishment of testing facilities for pesticide residues, which has been a major hindrance for export markets.

Table 5 Trend in exports of fruits and nuts, 2003-04 to 2012-13 (TE average)

Items/ commodities	Value (Million US \$)		Share (%)		Growth (%)/year
	2003-04	2012-13	2003-04	2012-13	
Cashew	389.72	760.48	70.27	56.11	6.54
Banana and plantain	2.83	21.84	0.51	1.61	32.52
Citrus fruits	10.05	20.00	1.81	1.48	7.28
Grapes	19.52	150.55	3.52	11.11	24.80
Apples	2.98	13.94	0.54	1.03	16.93
Pomegranate	1.53	29.71	0.28	2.19	32.89
Mango	79.93	187.09	14.41	13.80	12.34
Total fruits and nuts	508.7	1228.9	91.7	90.7	9.99

Source: Estimated by the authors basic data from Ministry of Commerce, Government of India.

Further, India has diversified the export destinations with the inclusion of China and Russia. In case of pomegranate though, increase in area and productivity has been noted for major producer states. However, India still imports pomegranate to the tune of US \$ 1.5 million.

Table 6 Trend in the exports of spices, 2003-04 TO 2012-13

Items/ commodities	Value (US \$ million)		Share (%)		Growth Rate (%)
	2003-04	2012-13	2003-04	2012-13	
Pepper	34.32	141.03	16.27	10.97	20.27
Chilli	58.90	449.33	27.91	34.94	26.56
Nutmeg	4.57	29.13	2.17	2.27	22.98
Cardamom	10.55	63.47	5.00	4.93	26.20
Coriander	10.10	34.33	4.79	2.67	16.90
Cumin	15.33	162.00	7.27	12.60	35.96
Ginger	4.49	42.60	2.13	3.31	23.74
Turmeric	22.23	100.53	10.53	7.82	17.25
Total Spices	211.00	1286.06	100.00	100.00	24.15

Source: Estimated by the authors using data from Ministry of Commerce, Government of India.

Table 7 Price competitiveness of exports of wheat, rice, maize and potato exported from India

Wheat		Rice		Maize		Potato	
Country	Ratio	Country	Ratio	Country	Ratio	Country	Ratio
Argentina	0.77	Bangladesh	0.91	Argentina	0.73	Belgium	1.47
Australia	1.32	Brazil	1.09	Brazil	1.12	China	1.15
Canada	1.10	China	1.63	India	1.00	Egypt	1.14
Chile	1.75	India	1.00	Ukraine	0.71	France	2.16
China	0.96	Indonesia	1.07	USA	0.83	Germany	2.30
France	0.86	Pakistan	1.12			India	1.00
Germany	1.10	Philippines	1.39			Israel	3.10
India	1.00	Thailand	0.89			Netherlands	1.50
Pakistan	0.65	Bangladesh	0.91			Pakistan	1.38
Russia	0.83						

The ratio of producer prices with respect to that of India in the latest available years. Source: Computed by the authors using data from FAO.

Spices

The growth in the spice export is quite noteworthy which doubles almost every four years. The export value has increased from US\$ 211 million in 2003-04 to 1 286 million in 2012-13 at a growth rate of 24.2 %/year. However, spices as a group have undergone sharp change in commodity composition of exports over time. The share of perennial spices like pepper and cardamom has declined over years; whereas, that of annual crops like chilli and cumin has increased (Table 6). As of 2012-13, chilli constituted more than one-third of total spices exports, up from close to 28% in 2003-04. High growth in production of chillies in Andhra Pradesh and cumin in Rajasthan has contributed to their increased export share.

Competitiveness of Indian exports

The export competitiveness was analyzed by comparing the producer prices of various countries and by estimating the RCA. The analysis of producer prices indicated that even after liberalisation, India continues to be a low cost producer of many commodities (Table 7, 8).

The RCA is influenced by the individual countries' internal and external trade policies like government interventions, import restrictions, subsidies and high tariffs, etc. Thus, a disadvantage may not be a true picture of the comparative status, but it may indicate that the trade policies are not in favour of the exports of the produce. The trend in the RCA of major export commodities are provided in Table 9 for the year 2001 and 2011. It indicated that as on 2011, India has comparative advantage in case of cashew, coconut, coffee, cotton, maize, mango, ginger, onion, pepper, rice, sugar and tea. Compared to 2011 India's comparative advantage improved in case of cotton, maize, mangoes, grapes, banana, onion and potato. On the otherhand, weakening of comparative advantage was noted in case of cashewnut, coffee, ginger, pepper, wheat, sugar, tea, and rice. This trend clearly indicates a pattern in exports. While gains in comparative advantage was noted in case of fruits and vegetables (along with cotton and maize), erosion of comparative advantage is noted in case of plantation crops

Table 8 Price competitiveness of exports of agricultural commodities from India

Tea	Sugar		Natural rubber		Onion		
	Country	Ratio	Country	Ratio	Country	Ratio	
China	4.79	Brazil	0.93	Malaysia	0.75	Brazil	2.41
India	1.00	India	1.00	India	1.00	China	2.81
Sri Lanka	1.03	Thailand	0.93			India	1.00
						Indonesia	5.81

Note: As under Table 7.

where total production has stagnated. One notable feature is that Asian countries are gradually emerging as the major competitors for Indian exports, notably in case of plantation crops. For example, in terms of producer prices, Sri Lanka is a competitor of India in case of tea; Thailand in case of sugarcane; Malaysia, Sri Lanka and Thailand in case of natural rubber and Vietnam in case of black pepper. This is on account of stagnation in productivity of the crops. Another contributing factor might be the lack of private capital formation in plantation sector. Agricultural price movements in India are mainly influenced by international prices rather than output fluctuations (Sekhar 2003). Many commodities produced in tropical regions have low demand-supply elasticities. Therefore, even small changes in prices may lead to volatility in prices (Kuruville *et al.* 2012). There seems to be a high level of instability in prices of plantation crops. The instability of prices dissuades farmers from undertaking long term investments in agriculture, compromising long-term sustainability.

Prospects of boosting export performance

In the long run, India's export prospects will be determined by the technological advantage, as expressed through yield improvement. In this context, the growth in the area, production and yield of major crops in India was estimated for the past decade (Table 10). Among the cereals, the highest growth rate in production was noted in case of maize, close to 6%/year. This growth in maize emanated from both area expansion and productivity improvement

Table 9 Trend in revealed comparative advantage of India's agricultural exports

Crop	Year		Crop	Year	
	2001	2011		2001	2011
Cashew nuts	76.51	18.85	Onions	10.37	11.52
Coconuts	0.62	7.93	Oranges	0.50	0.10
Coffee	3.64	1.44	Papayas	4.33	1.44
Cotton	0.24	13.43	Pepper	14.30	4.94
Eggs	1.89	0.91	Potatoes	0.26	0.48
Bananas	0.12	0.19	Rice	14.09	9.24
Maize	0.14	1.85	Sugar	2.85	2.50
Mangoes	6.56	12.71	Tea	20.38	7.81
Ginger	6.78	3.48	Rubber	0.09	0.19
Grapes	0.88	0.99	Wheat	1.24	0.06

Source: Computed by the authors using data from FAOSTAT.

(at the rate of 3.0%/year in case of area and 3.06 % in case of productivity). The production of rice and wheat also expanded at an annual rate of 2.0 and 2.7%, respectively. The growth in production in rice has entirely been contributed by yield expansion whereas that in case of wheat was contributed by both area and yield improvement. In case of rice, large scale transition of area from non-basmati to basmati is noticed in Haryana and Punjab. However, the domestic price of basmati rice is highly dependent on international prices. The ban on the exports of non-basmati rice while permitting the export of basmati rice in the recent past might also have contributed to expansion of area under basmati rice. Deceleration of TFP might have contributed to the stagnation of yield growth in case of wheat (Bhushan 2005), while in case of rice it might be due to the reduced input intensification despite a catching up of the TFP by low productivity states in recent periods (Suresh 2013).

India imports close to 14% of the total requirement of pulses. Chickpea and pigeonpea are the major pulses consumed in India. There is a glaring difference in the growth performance of these crops. The growth in production of chickpea has been at the rate of 5.9%/year-contributed by 4% growth in the area and rest by yield. Pigeon pea expanded its production at the rate of 1.9% contributed largely by the expansion of area (at the rate of 0.7%/year). Chand *et al.* (2011) has noted, contrasting performance of TFP growth in case of both chickpea and pigeonpea, during the period of 1970-2005, characterised by an improvement in the case of former and a moderation in case of the latter.

India meets close to half of the domestic requirement of oilseeds through imports. In 2012, India imported vegetable oils worth US \$97.9 million. Of India's production of 29.8 million tonnes of edible oil in 2012, more than 80 % of production is contributed by three crops, viz. soybean (40.8%), groundnut (23.4%) and rapeseed/mustard (22.1%) (DES 2014). During the past decade, yield of oilseeds have depicted positive trends, ranging from 0.46% in sunflower and 9.08% in soybean. Oilseeds in general have experienced a stagnation/deceleration of TFP growth for a long period of time (Chandel 2007, Chand *et al.* 2011). It is forecasted that given high income elasticity of demand, and improvement of the per capita income, the total demand for edible oils by 2030 would be to the tune of 25 million tonnes. There were some concerted efforts to improve the domestic oilseeds production, with the initiative of Technology Mission on Oilseeds and later with the inclusion of oil palm under the ambit of the programme. However, at current level of yield growth and area expansion, India will not be able to meet the domestic requirement without imports.

The major spices exported from India are chillies, coriander, pepper and cardamom. There was a clear difference in the trends in productivity of these crops. Chillies and coriander have depicted positive growth, while cardamom and pepper show negative growth. However,

Table 10 Trend growth in area, production and yield of major crops in India, 2003-2013 (% per year)

Crop	Area	Production	Yield
Rice	0.03	1.99+	1.82+
Wheat	1.07+	2.69+	1.28+
Maize	2.95+	5.99+	3.06+
Chick pea	3.99+	5.87+	1.79+
Pegion pea	0.74+	1.93+	0.70
Groundnut	-0.84*	1.58@	2.62+
Rapeseed/mustard	3.02*	4.42*	2.10+
Soybean	5.59	9.08+	3.17+
Sunflower	3.03	0.46	2.84+
Coconut	0.03	1.02	3.57+
Cashew nut	2.63+	4.09+	-0.22
Chillies	0.27	1.86+	1.53@
Coriander	3.37*	5.56*	2.20@
Cardamom	-0.71*	-0.32	0.38
Pepper	-2.99+	-5.95+	-4.27+
Banana	6.19+	9.26+	2.90+
Apple	4.72+	5.92+	1.06@
Citrus	5.00+	5.90+	0.74@
Grapes	9.56+	1.73	-6.92+
Mango	3.58+	3.84+	0.18
Potato	4.82+	5.44+	0.58
Tomato	4.35+	6.61+	2.12+
Cauliflower	3.46+	3.92+	0.61+
Onion	8.79+	14.44+	5.38+
Pea	1.82*	3.08@	0.86

+, * and @ indicates statistical significance at 1, 5 and 10 %levels, respectively.

positive growth trend in area was noted only in case of coriander. In view of the stagnation of yields and the high level of competition from other countries, notably Vietnam, India is likely to see a weakening of export prospects in future too.

Fruits in general have exhibited an improvement in production with some exceptions. Amongst five fruits under consideration, only banana has shown robust growth rates in yield, while all others exhibited positive trend growth in area under cultivation. In case of grapes the statistically significant negative yield growth would be a limiting factor in boosting its exports. Another crop of high level of export prospects is pomegranate but its share in the total export is very low. The development of superior quality of pomegranate varieties and package of practices has helped to boost its production, notably from rainfed regions. This would, in future, contribute to boosting the export. Going by export shares, the most important fruits exported from India is mango. The area under mango has depicted significant growth in the past decade. However, slow growth in productivity is a concern for the crop. Among the nuts, cashew is the most important one, exported from India. However, India's export of cashew kernel is dependent on the large scale import of raw cashew nuts (in shell) imported, mainly from African countries. Productivity

stagnation at national level continues to be an impediment in its export performance.

All the vegetable crops considered have registered significant growth in production, however productivity has been growing significantly only in case of onion, tomato and cauliflower. The onion production has grown at the rate of about 14.4%/year, triggered by expansion of both area and productivity improvement. The production growth of about 5.4% in potato was contributed mainly by area expansion (4.8%), with no prominent impacts of productivity growth. There are improved varieties suitable for processing and export. However, India's ability to improve production of quality potatoes depend on improving the value chain in terms of higher share of benefits to the farmers and development of institutional initiatives like contract farming.

Conclusion and implications

The present study has analyzed the trend in exports of agricultural commodities from India during the past decade and examined the prospects of boosting it. The study finds that there was significant improvement in the export of agricultural commodities, but this was characterised by a shift in commodity composition. This would have implications on area allocation for crops, crop diversification and farm income. Significant increase in the share in total export has been noted in case of cereals, guar gum, cotton, spices, and sugar. On the other hand, the share has declined in some commodities, fish and marine products, fruits and nuts and coffee and tea. Among the major commodity groups high growth rates were registered by basmati rice and maize in case of cereals, chillies and coriander among spices, mango and grapes among fruits, and onion and potato among vegetables. Consistent growth with low instability was noted in case of meat and meat products and spices. Some commodities with high growths are depicting high instability as well, as seen in guar gum and other resins, sugar and cotton. The high instability carries a risk of falling market prices, and is a concern for assuring farm income to the cultivators and for linking them with markets.

The comparative advantage improved in case of cotton, maize, and certain fruits and vegetables over time, but declined in case of some plantation crops, rice and wheat. In case of plantation based spices and other commodities, India is gradually losing its comparative edge, mainly to Asian countries. Improving the comparative advantage in export warrants generation of exportable surplus and internationally competent prices. There was wide variation in the growth in yield of various crops and crop groups. Yield improvements through changes in TFP would be a potential factor that would determine India's ability to generate exportable surplus, comparative advantage and export growth.

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