Current Journal of Applied Science and Technology

39(33): 86-94, 2020; Article no.CJAST.62363
ISSN: 2457-1024
(Past name: British Journal of Applied Science & Technology, Past ISSN: 2231-0843, NLM ID: 101664541)

Growth Performance of Organic Agriculture in India

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Authors' contributions

This work was carried out in collaboration between both authors. Author DC designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. While author SKS managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i3331022
Editor(s):
(1) Dr. Orlando Manuel da Costa Gomes, Lisbon Accounting and Business School (ISCAL), Lisbon Polytechnic Institute, Portugal.
Reviewers:
(1) Tahereh Sharghi, Payame Noor University, Iran.
(2) Shadrack Jacob Mbapila, Tanzania Agricultural Research Institute (TARI), Tanzania.
Complete Peer review History: http://www.sdiarticle4.com/review-history/62363

Original Research Article

Received 10 August 2020
Accepted 16 October 2020
Published 02 November 2020

ABSTRACT

Organic agriculture is growing rapidly as an alternative strategy to modern farming methods. At present, only 1.5 per cent of the world's agricultural land is organic. However, it has encountered a phenomenal rise over the past fourteen years (2005 to 2018) growing annually at a compound growth rate of 7.05 per cent; with 71.5 million hectares global organic land in 2018. However, India has witnessed a remarkable growth of 10.62 per cent during the ibid period and stood at ninth rank among other countries in terms of organic agricultural land (2018-19). The present study attempts to examine the trend and variability in growth of organic agricultural land (including both the cultivated and wild) from 2005 to 2018 at both the national and global level. Further, it explores the marketing patterns for organic food products and unveils those areas where more emphasis is needed and which issues are to be further investigated, addressed and improvised.

Keywords: Organic; agriculture; growth; cultivated; wild.

1. INTRODUCTION

Organic agriculture is not a new concept for India. It has its roots in indigenous agricultural practices that have been followed since decades among the farming communities residing in countless villages of India. Modern organic farming is, however, an advanced version of the

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traditional practice of agriculture which maintains food quality while enhancing the richness of soil [1]. Organic farming strives for human well-being without damaging the environment and follows the principles of health, ecology, fairness and care for all including soil. Organic agriculture is defined as a system of production which sustains the health of soils, ecosystems, and people. It depends on ecological processes, biodiversity and cycles adapted to local conditions, rather than using the inputs with adverse consequences. In recent years, organic farming as a cultivation process is gaining increasing popularity [2]. Organic agriculture brings tradition, innovation, and science together to benefit the shared environment and foster fair relationships and good quality of life for all concerned [3]. The holistic principles of organic agriculture have attracted farmers all over the world. India has witnessed a phenomenal growth in organic agriculture and has emerged as the single largest country having the highest number of organic producers in the world [4]. Further, the crowning of Sikkim as the first 'fully organic' state in India by the Honorable Prime Minister in 2016 has set a success story for the rest of the nation and the world.

Many states and private agencies are currently engaged in promoting organic farming in India, including several ministries and government departments both at the central and state levels. National Program for Organic Production (NPOP) was implemented at the central level by Agricultural and Processed Food Products Export Development Authority (APEDA) in 2001 following the standards of IFOAM (International Federation of Organic Agriculture Movements). The programme includes the promotion of organic farming, its marketing, accreditation of certification bodies, organic production standards etc. European Commission and Switzerland have recognized the production and accreditation standards of unprocessed plant products of NPOP as equivalent to their country standards. Likewise, NPOP conformity assessment procedures of accreditation have been recognized by USDA as equivalent to that of NOP of the US. Due to these recognitions, importing countries are accepting the Indian organic products duly certified by the accredited certification bodies of India. And presently, APEDA is in the process of getting bilateral equivalence with South Korea, Taiwan, Canada, Japan etc [5].

India has a huge potential in this sector due to the presence of varied agro-climatic conditions. Further, the inherited tradition of organic farming is an added advantage in many parts of the country. Moreover, growing health awareness and rising environmental concerns have dramatically enhanced consumer's interest in food safety and quality. It is assumed that organically produced food products can effectively meet these demands [6]. Currently, there are three types of organic farmers in India. Firstly, those who are traditionally committed to it, having low inputs and lack resources to adopt non-organic farming. The second category includes the farmers who moved to it after suffering from the ill-effects of high-input conventional farming. In the third category lie the farmers who are drawn to it in light of the emerging market opportunities and are involved in it at a commercial scale [7].

The rising demand due to growing health consciousness and emerging market opportunities highlights the immense scope of organic agriculture throughout the world. The temporal growth of area under organic agriculture assumes great significance while formulating any strategy for the development of organic sector. Further, the variability in the growth will help in analysing the loopholes in the path. Thus, an attempt has been made in the present study to evaluate the growth and performance of various aspects related to organic agriculture and also to bring together various issues in the light of recent developments at the global, national and state levels.

2. MATERIALS AND METHODS

The present study is primarily based on secondary data collected on various aspects of organic agriculture (area, production and exports) at both the country and world level. Also, information on various aspects of organic farming have been collected from various sources like published reports and official websites of Research Institute of Organic Agriculture (FiBL), Agricultural and Processed Food Products Export Development Authority (APEDA), International Federation of Organic Farming Movements (IFOAM), International Trade Centre (ITC), National Programme for Organic Production (NPOP), National Centre of Organic Farming (NCOF), journals, periodicals and newspapers etc.

Compound annual growth rate (CAGR) has been used to estimate the trend in area, production, exports and number of producers by employing the following exponential regression model as follows:

$$Y_t = Y_0 (1+r)^t \quad (1)$$

Where,

Y_t = Dependent variable for which growth rate id estimated in t^{th} year
Y_0 = Dependent variable in initial year
r = Compound growth rate
t = 1, 2, 3……..years.

The log transformation of above equation becomes

$$\text{Log } Y_t = \text{Log } Y_0 + t \text{ Log } (1+r) \quad (2)$$

Assuming Log Y_0 = Log a and Log (1+r) = b, the same expression could be put as:

$$\text{Log } Y_t = \text{Log } a + bt \quad (3)$$

This is same as the log-linear form of the exponential function. From this log-linear form, CAGR is worked out as follows by differentiating it with reference to 't'

$$d (\text{Log } Y_t) / dt = b$$

But the estimate of 'b' in the log-linear function is in semi-log term. Therefore, to convert it into original form of Y_t following transformation is done:

Since, b = log (1+r)
Antilog (b) = 1 + r
r = (antilog b) – 1
CAGR in percentage = [(antilog b) – 1] X 100

And the variability in the above-mentioned variables have been computed by employing the Coefficient of Variation as follows:

$$\text{C.V.} = \frac{SD}{AM} \text{ X } 100 \quad (4)$$

Where;

C.V. = Coefficient of Variation
SD = Standard deviation of the variable under study
AM = Arithmetic mean of the variable under study

Also, percentage share has been calculated to examine the individual shares of different years or states in the total value of the above-mentioned variables.

3. RESULTS AND DISCUSSION

Sustainable development is becoming increasingly important in the world. There has been significant sensitization of the world community towards environmental safety and assurance of food quality. Organic agriculture is one among the several approaches that promote sustainable agriculture by prohibiting the use of almost all synthetic inputs with special emphasis on the protection of soil quality.

3.1 Growth of Organic Agricultural Land

With the increasing popularity, the share of organic agricultural land and farms is growing rapidly and now it is being practised in almost all the countries of the world. The present study examines the growth of organic agricultural land (cultivated and wild) over the past fourteen years, i.e. from the year 2005 to 2018.

3.2 World Scenario

Organic agriculture has gained momentum all over the world and today almost 186 countries report commercial organic activities. Out of these, 103 countries are reported to have organic regulations. Currently, 1.5 per cent of the world's agricultural land is organic. From Table 1, it can be realized that global organic agricultural land has registered a dramatic growth over the past years. It has encountered a phenomenal rise from 29.24 million hectares in 2005 to 71.5 million hectares in 2018 growing annually at a compound growth rate of 7.05 per cent. On the other hand, the coefficient of variation was found to be quite high as 32.07 per cent. Apart from the agricultural land, 65.7 million hectares of the organic area have been reported under wild cultivation.

As per the latest reports of FiBL and IFOAM, Oceania has recorded the largest area under organic agriculture (36 million hectares, which is around half of the global organic agricultural land) followed by Europe (15.6 million hectares, 22 per cent) and Latin America (8 million hectares, 11 per cent). Rest of the regions includes Asia having 6.5 million hectares accounting to 9 per cent of the global area followed by North America (3.3 million hectares,

5 per cent) and Africa (2 million hectares, 3 per cent). Among the various countries engaged in organic agriculture, Australia has recorded the largest area (35.7 million hectares) followed by Argentina (3.6 million hectares) and China (3.1 million hectares). According to the recent survey, around 2.8 million producers are engaged in organic agriculture (2018); highest of which have been recorded in Asia (47 per cent) followed by Africa (28 per cent), Europe (15 per cent) and Latin America (8 per cent). India has the largest number of organic producers in the world (2018) followed by Uganda and Mexico [4].

3.3 Organic Agriculture in India

The rising demand for organic food products worldwide has increased the pace of organic farming in India. Organic production and trade have evolved as an attractive sector in India and other parts of the developing world. Moreover, most of the farmers in India are adopting this practice motivated by attractive markets and price margins. Presently, India ranks ninth in terms of area under organic agricultural land (2018-19) as per the FiBL Survey, 2020. According to Agricultural and Processed Food Product Export Development Authority (APEDA), the total area under organic cultivation is 3.42 million hectares which include both the cultivated area (1.93 million hectares) and area under wild harvest collection (1.49 million hectares) during the year 2018-19.

Table 1 indicates the growth of organic area (cultivated and wild) and share of this area in total farmland of India for over a period of past fourteen years. The organic area in India has witnessed a remarkable growth of 10.62 per cent. It has increased from 0.186 million hectares in 2005 to 1.93 million hectares in 2018 with a very high coefficient of variation; as 51.83 per cent during the period. On the other hand, an area under wild cultivation has declined from 2.38 million hectares in 2005 to 1.49 million hectares in 2018 showing a compound annual growth rate of just 0.55 per cent. This wild area is mainly the organic forest area from where minor forest produce is collected. Wild harvested products shall only be labelled as certified organic; if they are derived from a balanced and sustainable growth environment and the harvesting shall not exceed the sustainable yield of the ecosystem and does not threaten the survival of plant or animal species.

Table 1. Growth of organic area

						Area (hectares)
India						**World**
Year	**Cultivated organic area**	**Wild collection**	**Total organic area**	**Share of the organic area in total farmland [%]**	**Number of organic producers**	**The total organic cultivated area**
2005	185937	2385963	2571900	0.1	48846	29248420.33
2006	432259	2385963	2818222	0.24	141904	30173401.52
2007	1030311	1769689	2800000	0.57	195761	31509670.58
2008	1018469	2781530	3799530	0.57	340000	34472530.4
2009	1180000	3360000	4540000	0.66	677257	36271079.68
2010	780000	3650000	4430000	0.43	400551	35713927.04
2011	1084266	4477526	5561792	0.6	547591	36676917.84
2012	500000	4700000	5200000	0.28	600000	36839284.75
2013	510000	5180000	5690000	0.28	650000	43074263.08
2014	720000	3990000	4710000	0.4	650000	48700984.25
2015	1180000	3710000	4890000	0.66	585200	50360386.24
2016	1490000	4220000	5710000	0.83	835000	58175562.17
2017	1786494	1780044	3566538	0.99	1093288	69492495.31
2018	1938221	1490418	3428639	1.08	1149371	71494738.75
CAGR (%)	10.62	0.55	3.44			7.05
CV (%)	51.83	36.25	25.90			32.07

(Source: Compiled from APEDA website and FiBL Survey Reports, 2005-2020)

The collection area should not be exposed to prohibited substances and should be at a safe distance from conventional farming, human habitation, and places of pollution and contamination. The declining trend in the growth of the wild organic area and a high coefficient of variation (36.25 per cent) is mainly attributed to the increasing rate of urbanization and industrialization in the country. However, the total organic area has increased sufficiently from 2.57 million hectares in 2005 to 3.42 million hectares in 2018 registering an annual growth rate of 3.44 per cent with the coefficient of variation of 25.90 per cent. It is quite evident that the growth of the cultivated organic area is higher than the wild and total organic area. But the share of the organic area in total cultivated farmland of India is still quite low. In 2018, it accounts for only 1.08 per cent of the total farmland. Whereas in terms of a number of producers engaged in organic farming, India ranks first among all the countries. It has around 2.8 million producers contributing to 40 per cent of the total organic producers in the world.

Table 2 reveals the state-wise area and production of organic agriculture in India. Madhya Pradesh covers the largest area under organic certification. It accounts for 34.78 per cent of the total certified organic area in India for the year 2018-19. It is followed by Maharashtra (12.95 per cent) and Rajasthan (11.56 per cent). This includes both the certified area and in-conversion area (an area which is still under the process of conversion to the organic area). In terms of certified organic production, Maharashtra ranks first with a share of 33.02 per cent followed by Madhya Pradesh (28.34 per cent) and Karnataka (14.21 per cent). The maximum organic wild area has been found in Rajasthan (27.42 per cent) followed by Madhya Pradesh (16.39 per cent) and Himachal Pradesh (12.80 per cent). The wild harvest collection from this area was found highest in Madhya Pradesh (34.78 per cent) followed by Odisha (16.06 per cent) and Chattisgarh (16 per cent).

Madhya Pradesh was the first state to encourage organic agricultural practices in 1998. For this purpose, the concept of Bio farming was introduced by the state government through biovillages (Jaivik Kehti Gaon). Bio-farming was implemented in 1565 villages selected from 313 blocks of 48 districts in the state by the concerned state government [8]. Among the other states practising organic agriculture, Sikkim has become India's first fully organic state by implementing organic practices on around 75,000 hectares of agricultural land. Although its share in India's total organic farmland and organic production is quite low (3.91 per cent) and (0.2 per cent) respectively. But the entire farmland of the state is certified organic. It took a long journey of around 12 years to achieve the target, starting with the political commitment to support organic farming in 2003 to the launching of Sikkim Organic Mission in 2010, and ultimately declaring the state as "fully organic" in 2016. For this, the state's Policy on Organic Farming (2004) and Sikkim Organic Mission (2010) was recognized with the Future Policy Gold Award 2018, awarded by the World Future Council in collaboration with the FAO and IFOAM – Organics International. Besides Sikkim, there are other states like Madhya Pradesh, Himachal Pradesh, Rajasthan, Uttarakhand, Kerala etc. that are making commendable efforts in this direction.

India produced around 2.65 million MT (2018-19) of certified organic products which includes all varieties of food products namely oil seeds, sugar cane, vegetables, cereals & millets, dry fruits, cotton, fruits, pulses, spices, aromatic & medicinal plants, tea, coffee, processed foods etc. The production not only constitutes the edible sector but organic cotton fibre, functional food products etc. are also produced. The total organic production constitutes both the certified (2599 thousand MT) and in-conversion production (8.2 thousand MT), in addition to the wild harvest production (37.9 thousand MT).

Fig. 1 depicts the share of major categories of organic products in India's total organic certified production during the year 2018-19. Among the major categories, sugar crops (sugarcane and sugarbeet) occupies the largest share of 38 per cent (991.6 thousand MT) followed by oilseeds with a share of 28 per cent (727.1 thousand MT) and fibre crops having a share of 12 per cent (313.8 thousand MT).

3.4 The Market for Organic Products

Organic agriculture offers immense trading opportunities to the producers in both the developing and developed countries. The expanding organic market makes it possible for the farmers to reap the benefits of organic trade with relatively high price premiums. According to FiBL report 2020, the global organic market is estimated at around 95 billion euros in 2018-19.

Table 2. State-wise area and production of organic farming in India (2018-19)

State Name	Total area under Certification process (ha)	Per cent share	Production (MT)	Per cent share	Wild area (ha)	Per cent share	Production (MT)	Per cent share
Madhya Pradesh	674051.85	34.78	738885.70	28.34	244251.23	16.39	9394.55	24.77
Maharashtra	250934.33	12.95	860976.01	33.02	10637.41	0.71	20.98	0.06
Rajasthan	223991.47	11.56	134612.73	5.16	408709.76	27.42	2601.9	6.86
Odisha	95739.70	4.94	88948.61	3.41	32112.07	2.15	6090.52	16.06
Gujarat	93841.28	4.84	66106.20	2.54	867.41	0.06	NA	NA
Karnataka	83098.78	4.29	370576.98	14.21	21863.59	1.47	930.67	2.45
Sikkim	75798.92	3.91	423.81	0.02	NA	NA	NA	NA
Uttar Pradesh	62838.14	3.24	142511.57	5.47	143142.68	9.60	433.12	1.14
Meghalaya	48409.74	2.50	699.34	0.03	NA	NA	NA	NA
Kerala	38404.24	1.98	25434.58	0.98	2507.00	0.17	NA	NA
Uttarakhand	36658.55	1.89	29601.81	1.14	4751.00	0.32	50.8	0.13
Andhra Pradesh	32510.72	1.68	11503.33	0.44	4899.00	0.33	54.063	0.14
Assam	28174.67	1.45	38475.60	1.48	60.00	0.00	NA	NA
Jammu & Kashmir	25002.89	1.29	33878.95	1.30	162000.00	10.87	4883.06	12.87
Tamil Nadu	22459.55	1.16	15739.58	0.60	4087.28	0.27	362.35	0.96
Chhattisgarh	21225.71	1.10	14364.67	0.55	184955.00	12.41	6070.78	16.00
Goa	13308.82	0.69	2454.55	0.09	7655.98	0.51	5684.8	14.99
Himachal Pradesh	13065.03	0.67	6958.21	0.27	190782.47	12.80	132.43	0.35
Punjab	8908.59	0.46	744.27	0.03	16616.00	1.11	958.3	2.53
Others	89797.83	4.63	24488.39	0.94	50520.10	3.39	260.3	0.69
Total	1938220.79	100	2607384.91	100	1490417.98	100	37930.67	100

(Source: APEDA, 2018-19)

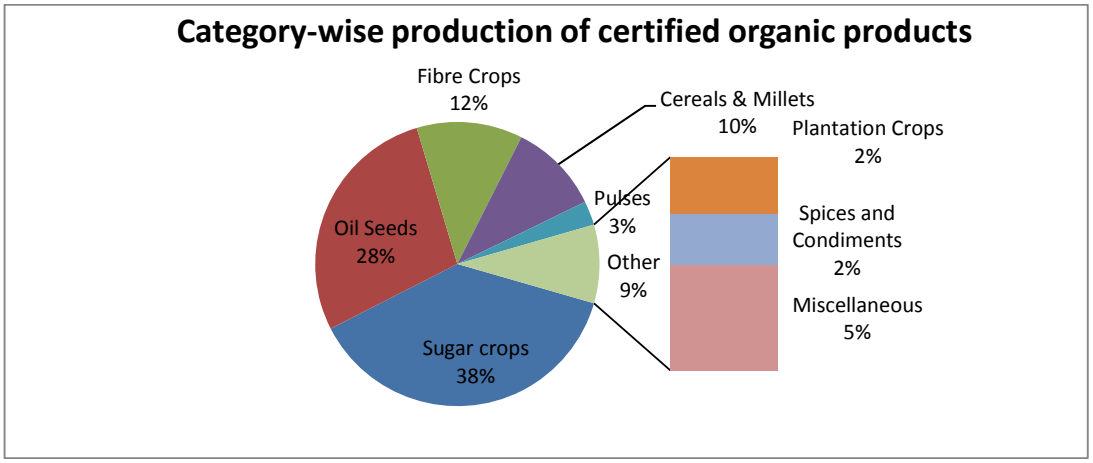

Fig. 1. Category-wise production of certified organic products

Table 3. Organic exports from India

Year	Export volume (MT)	percent change	Export Value (Rs crore)	percent change
2007	37533	----------	498	----------
2008	44476	18.5	537	7.8
2009	58408	31.3	526	-2.0
2010	69837	19.6	699	32.9
2011	147800	111.6	1866.33	167.0
2012	165262.1	11.8	2106.81	12.9
2013	194088	17.4	2563.08	21.7
2014	285663	47.2	2099	-18.1
2015	263687	-7.7	1975	-5.9
2016	309767	17.5	2478	25.5
2017	458339	48.0	3453	39.3
2018	614089	34.0	5150	49.1
CAGR	28.71	---------	22.92	----------

[10]

Table 4. Category-wise exports of organic products from India (2018-19)

Item/Commodity	The quantity exported (MT)	Value of Export (crores)	Value of export (US $ million)	% in Quantity terms	% in Value terms
Cereals & Millets	61184.79	38833.38	57.11	9.96	7.54
Coffee	2918.96	6651.68	9.78	0.48	1.29
Dry Fruits	3804.77	27481.19	40.41	0.62	5.34
Oil Seeds	176112.8	91293.43	134.26	28.68	17.72
Processed Food	299406.32	234979.55	345.56	48.76	45.62
Pulses	5180.23	5919.78	8.71	0.84	1.15
Spices & Condiments	6756.16	29253.95	43.02	1.10	5.68
Sugar	41119.63	20234.67	29.76	6.70	3.93
Tea	5807.3	33157.26	48.76	0.95	6.44
Others	11795.47	27271.57	40.12	1.92	5.29
Total	614086.43	515076.46	757.49	100	100

(Source: APEDA, 2018-19)

Although sales of organic food products are increasing at a healthy rate, persistent challenges still exist. Like, the demand for organic products mainly remained concentrated in North America and Europe. Although their shares are declining now, still they occupy a large share of global sales. Unites States is having the single largest market for organic products (40.6 billion euros, 42 per cent of the global market) followed by European Union (37.3 billion euros, 38.5 per cent) and China (8.1 billion euros, 8.3 per cent). The highest per capita consumption was found in Switzerland and Denmark (312 euros) followed by Sweden (231 euros) and Luxembourg (221 euros).

Indian organic food market is extremely unorganized and fragmented. It is mainly oriented towards exports. The domestic consumption of organic food products in India is marginal and is mainly concentrated in the metropolitan cities of the country. The organic food and food items found their place in urban areas having high-income group of people. As conventional products are available relatively at a cheaper rate than the organic products, this makes the domestic market unstable [9]. The organic products are about 20-25 per cent more expensive than conventional products; which most of the people in India cannot afford [7]. As the domestic consumption is low; the primary market for Indian organic food industry lies in the US and Europe. India has now become a leading exporter of organic spices, herbs, organic basmati rice, organic cotton etc.

Table 3 indicates the growth of organic exports from India and the percentage change in exports as compared to the previous years. The exports have increased over the years from 37.5 thousand MT in 2007 to 614.1 thousand MT in 2018 at a compound annual growth rate of 28.71 per cent. Similarly, the export value of the organic products was 498 crores in 2007 which has increased to 5150 crores in 2018. The compound annual growth rate for the value of organic products is 22.92 per cent. In 2018-19, India witnessed a jump of nearly 50 per cent in organic product exports touching the 5150 crore-mark (757 million dollars) with an export volume of 614.1 thousand MT as compared to the previous year. However, the domestic demand for agricultural organic produce is around 2500 crore. These achievements are considered to be the fruits of various government initiates that have taken to boost the exports by introducing schemes under the National Mission for Sustainable Agriculture (NMSA).

Among the various countries, share of organic exports in terms of volume was highest for USA (54.41 per cent) followed by the European Union (25.28 per cent) and Canada (16.60 per cent). Similarly, in terms of volume, the USA is having the largest share (56.73 per cent) followed by the European Union (29.45 per cent) and Canada (9.06 per cent). Switzerland, Australia, Japan, New Zealand, Israel, Vietnam and Lebanon are other major destinations for Indian organic exports [5].

India exports almost all kinds of organic products because of the rising global demand for nutritious foods that is free from residues of chemicals and pesticides. The organic products having high demand are sesame, flax seeds, and soybean; pulses like red gram, pigeon pea; and rice besides medicinal plants, tea and coffee etc. Table 4 depicts the commodity-wise exports of organic products from India. In terms of export value realization, processed foods including soya meal (45.62 per cent) lead among the products followed by oilseeds (17.72 per cent) and cereals and millets (7.54 per cent). Spices and condiments (5.68 per cent), plantation crops such as tea and coffee (6.44 and 1.29 per cent), organic sugar (3.93 per cent), dry fruits (5.34 per cent) etc. are some other important products that occupy a major place in India's organic exports.

The Indian organic food industry is rising at an enormous pace. Although, compared to the overall agricultural export, the share of organic products is quite less. But the rate of growth is undoubtedly impressive. The success of our organic industry cannot solely rely only on the numbers. There is a lot that needs to be achieved along with these numbers. Consistency in quality, organic traceability, maintenance of quality, the achievement of pre-established standards and integration of supply chain are essential for achieving business sustainability.

4. CONCLUSION

It can be inferred from the above discussion that people in India are embracing organic farming at a higher rate. This can be witnessed from the results of compound annual growth rate of cultivated area under organic agriculture in India; which is even higher than that of the world during the period under study. However, organic area under wild cultivation has witnessed a decline

during the ibid period. India exports almost all kind of organic products and has achieved a tremendous growth in organic exports during the past years. The rising scope of organic agriculture as discussed in the present study along with the potential environmental, social and economic benefits associated with it makes it a great development vehicle for the developing nations like India. Therefore, there is need for some strong and comprehensive national policies which brings positive outcomes by addressing the current issues and obstacles in the system.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/62363