Indian Agri-Export doubling by natural farming management in horticulture & Africa focus

ABSTRACT

Aims: We explore the scope of escalating agriculture export in doubling farmers income and rational use of the growing Indian agriculture surplus and consequent glut, farmer distress.

Study design: The study is exploratory type and was conducted by literature survey and discussion with farmers, experts and industry.

Methodology: The study was conducted by field visits to exporting, farmer exporters and experts during 2017 to 2022 by visiting farmers in Amaravati and Palghar districts, exporters in Mumbai city and experts at Pune city. Their data were triangulated with the literature from reputed agri-research institutions.

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Results: Doubling agri export can help to doubling farmer's income (DFI) as export price is premium and profitability higher, besides increasing foreign exchange. Fruits & vegetables (F&V) is the largest agri-export segment globally but meagre 9th rank among Indian agri-export basket. Focussing on larger or costly market segment such as fruits & vegetables having higher productivity &surplus, rather than the cereals can help. Recent natural farming mission can aid in it and safeguard consumer and farmer's health such as from the cancer. Indian F&V production more than doubled in the past 2 decades to exceed grains production, due to their health benefits. Maximum residue level (MRL) is the export benchmark so promoting low/ no pesticide techniques under the recent Indian natural farming (NF) mission can help to triple Indian agri-exports to $ 100 billion by 2030 from $35 billion in 2023, through horticulture, dairy and tea, cocoa that are in demand and valued. African markets can be tapped as it imports majority of its food and has less entry barriers. Policy may focus on fruits like Banana and premium for NF produce.

Conclusion: Focusing on fruits & vegetables (F&V), dairy, lipids &adopting the low/ no “pesticide residue” standard etc. can boost Indian agri-exports.

Keywords: Fruits, vegetables, ecoagriculture, international trade, pesticide, healthy, organic

1. INTRODUCTION

Agriculture forms the largest share (45%) of workers in India though it is 3rd largest contributor (10%) to the economy i.e. Gross Value Added (GVA) [1]. India has 111 million registered farmer beneficiaries of the Govt. subsidy “Prime Minister Farmer Dignity Fund” [2], comprising nearly 40% of the Indian households. Exports comprise 9% of GVA in agriculture sector and have the potential to both improve the income and employment [3] and help to realize the Indian dream to be $ 5 trillion economy by 2027. The horticulture production has surpassed food grains production, both causing huge surplus, market glut and price crash, farm indebtedness and suicides are rising since economic liberalisation 3 decades ago [4]. So agriculture development and export can reduce the surplus and add value to improve the income of the masses [5]. We assess the promising agri-export options for this purpose by analysing literature data and consulting few stakeholders.

2. MATERIAL AND METHODS

We asked the following questions to assess the export scope of different commodities-

a) What are the main agri-export commodities of India and their growth trend?
b) What are the main agri-trade (import-export) commodities in the world?
c) Which of the top world trade commodities can produced be in India easily for export?
d) Can the emerging non-pesticide management (NPM) techniques help to improve the farm profitability, reduce the product cost and for higher export scope?

We analysed the Government data/ research publications to answer the above queries.

We visited farmers in Amaravati, Madurai and Palghar districts and exporters at Mumbai and Pune cities during 2015 to 2020 and National expert institutes at Hyderabad- National Institute of Rural Development and Panchayat Raj (NIRDPR, https://nirdpr.org.in), National Institute of Agricultural Extension Management (MANAGE, https://www.manage.gov.in) in 2019. Their data were triangulated with literature including Govt. of India expert panel [3].

3. RESULTS AND DISCUSSION

3.1 India's top agri-export commodities

India's agri-exports have soared to $50 billion in the year 2021-22 [6] and formed 12% of Indian export basket of about US $ 0.45 Trillion [7]. The agri- and allied export touched $41 billion in 2022-23 as depicted in Table 1 [8], probably stagnated due to the Ukraine war caused demand slump or supply chain disruption , after impressive growth even during the COVID-19 pandemic [9]. It shows that the fruits and vegetables (F&V) comprise nearly 6% of it ($ 2.4 billion) but registered nearly 10% annual growth, and is 5th top segment of agri-exports after marine products, rice, meat and spice, . India exported 44 million ton of fruits-vegetables in 2023 i.e. about 12% of its total produce- nearly 350 million ton/ year [10].

Table 1- **Top agri-export commodities of India[7,8,10,13]**

COMMODITY	Export value $ Million 2022-23	% Change over 2021-22	Share % of Total
1. Cotton	626	-20	2
2. Rice	7,319	-0.5	18
3. Marine	8,078	-9	20
4. Leather	2236	-13	5
5. Meat, dairy, poultry	3577	-	9
6. Spices	3785	**12**	9
7. Fruits-vegetables (incl. seeds, processed)	2418	9	5.8
8. Cereal prep. (Bakery etc.)	753	**15**	1.8
9. **Oilmeal**	1,602	**55**	3.9
10. Tobacco	822	**44**	2.0
11. **Oilseeds**	1337	**20**	3.2
12. Coffee	1146	**12**	2.8
13. Tea	387	-5.23	0.9
14. **Other cereals**	1,194	**10**	2.9
15. Cashew	356	-21	0.9
16. Sugar	5771		13.9
TOTAL	41,407		

Note- 1) Commodities showing annual growth > 10% are in bold font as promising ones.

2) This matches Reserve bank of India (RBI) estimate of Indian agri-allied-export of $45 billion in 2022-23[53] but it pegs cotton export 3 times higher- at $ 1.5 billion and says its 5-6% of total agri-allied exports.

3.2 Global priority - F&V, Beverages, Fats/ Oil

The global agriculture trade is dominated by 11 top commodities as depicted in table 2 [11, 12]. It reveals that Indian exports are negligible in the 4 important trade segments globally- F&V (14% of the total global agri-trade), beverages (7%), Fat/ oil (6%), and Dairy (5%), together forming 1/3rd of the global trade [3,7]. Indian export's total value in the global trade in these segments is 5.7%, 5.3%, 5.1% and <2% respectively, totalling 18% only [13, 8]. It is only 50% of the share of these commodities in the global basket. This imbalance can be managed if India improves their production and export as it did with say Mint, used for making menthol [14].

Table 2- **Top Agri-commodities traded globally**[11]

COMMODITY	Value $Billion/ year	Share of total
1. **Fruits and vegetable**	200	14%
2. *Fish/ marine#*	*150*	*10%*
3. *Cereals/ preparation*	*150*	*10%*
4. *Meat/ preparations*	110	*8%*
5. Beverages	85	7%
6. Fats/ oil	75	6%
7. *Cotton@*	61	5%
8. Dairy	60	5%,
9. *Leather shoes*	*50*	*4%*
10. *Sugar*	*30*	*2%*
11. *Spice*	20	1%
12. Others	500	38%
TOTAL	$ 1,400	**100**

Note- (1) **Bold font**- Mainly ignored/ low priority currently, needs to upscale from India.
(2) *Italics font*- Commodities where India has already significant share/ good beginning.
Ref.- @- https://oec.world/en/profile/hs/cotton,
#- https://www.fao.org/3/cc0461en/online/sofia/2022/trade-of-aquatic-products.html

Thus, India needs "demand driven" management- to grow what the market needs and not the prevalent/ traditional produce i.e. "supply side management" where surplus of what we traditionally grow easily is sold somehow by finding the market! Our dominance in spices export is an example of such strategy but has limited value among other global food basket. Our tea export share declined from 20% in the globe to 14% due to chemical residues, besides price etc. in the past few decades [15]. Coffee export from India is rising but it will take long to match the growth seen in F&V sector. Cocoa is cultivated along the coasts and can be exported. The dairy sector forms 5% of India's export, but is not in the top 10 of India' agri-export commodities, despite 8th rank trade globally. Improving it requires much andD to meet the stringent global export quality standards.

3.3 **New products scope- Banana, Guava, Litchi, Papaya, Pineapple**

We underline few commodities that are easy to cultivate and export and having large and growing market opportunities. Banana is the most exported tropical fruit globally at about 20 million ton/year valued at $ 8 billion/year at $ 400/ ton [16,17]. Its leading 5 exporters include Ecuador, Philippines, Costa Rica, Guatemala and Colombia, exporting between 2 to 6 million ton/ year. India's is an emerging exporter with the west Asia focus but its rank is lower, with 0.36 million ton/ year export (*ibid.*). The average export price is $ 400/ ton i.e. Rs. 32/kg and is suitable for the Indian exporters, as the farm gate price in India is Rs. 10-12/- kg and the rest is trading margin including logistic cost- which is 70% i.e. majority of retail price (see Fig. 1). Banana is the most profitable horticulture crop, with 2:1 benefit: cost ratio and Rs. 6 lakh/ ha gross income, at 56 ton/ ha productivity. This exceeds even the Sugarcane, leading cash crop of the 20th century in west of the Maharashtra state but is now replaced by Banana Grand Naine (G9) variety (dominating with 90% of market share) using tissue culture technique making Pune city it a dominant banana export hub in the country [18]. Yet, the quality is inadequate to compete with the G9 banana produce form Latin American or Philippines respectively in the premium markets of USA and EU respectively. So Indian Banana produce is sold mainly in low income countries like in the central Asia- Azerbaijan, Kyrgyzstan etc.

Fig. 1- Banana- Export value chain analysis (2015)

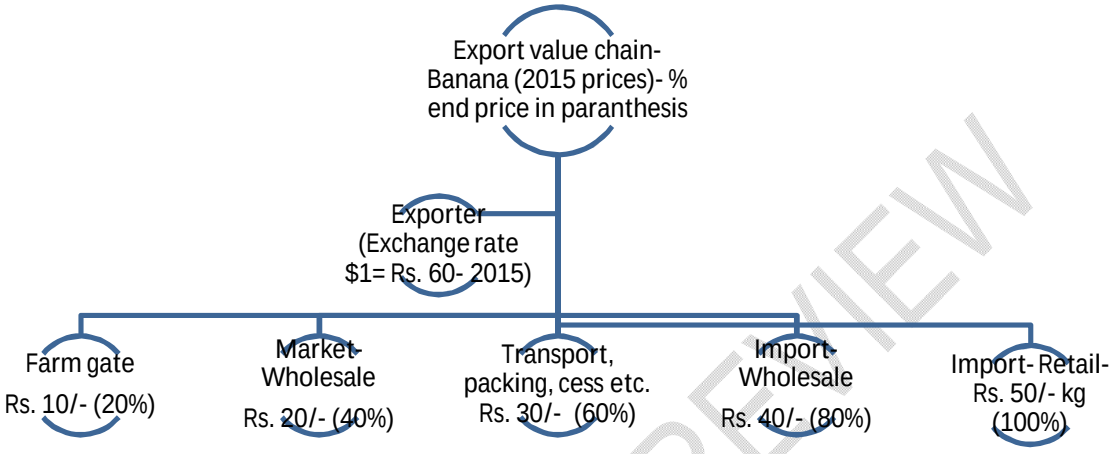


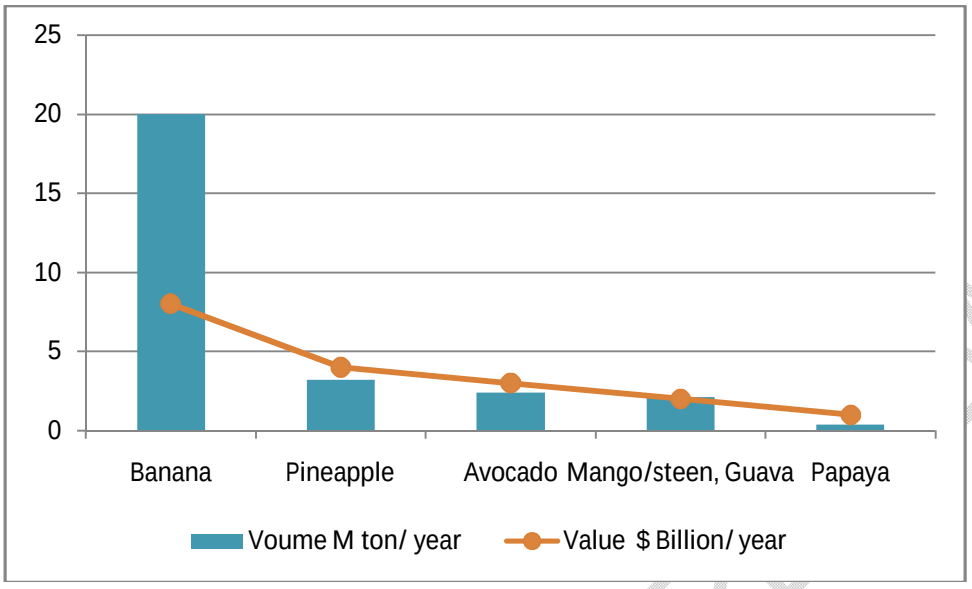
Figure 2 shows top fruits in the global trade. Similar efforts are now needed in the Pineapple fruit where the coastal states like Goa and Orissa excel in its production. Litchi is the famous fruit from Bihar especially Muzaffarpur and Guava from Uttar Pradesh especially “Allahabad” type besides Maharashtra lately are also famous for high production and some export. Local i.e. desi varieties taste better or red coloured than the Big, tasteless “Thai” variety fruit. Cluster development approach is suggested to enhance export of such agri-commodities in a recent NABARD sponsored research compendium [5].

The major global tropical fruits export commodities ranked below Banana are valued at $ 10 billion altogether are the following [16]-

a. Pineapple (3.2 million ton/ year),
b. Avocado (2.4 million ton/year),
c. Mango, Mangosteen, Guava (2.1 million ton together),
d. Papaya (0.37 million ton/ year).

But these top global trade commodities are not in the current APEDA focus list except Banana and thus need to be added to the policy focus list [10, 19].

Fig. 2- Top fruits volume and value- Global trade- 2022 (10)



3.4 Quality standards and Natural farming scope

Pesticide sprays are linked to the rising cancer prevalence in the farming community and also the urban consumers of affected food. A recent epidemiology study in USA has reconfirmed the cancer correlation pesticides being strongest regarding myeloid leukaemia (AML) and colorectal cancer (CRC) [20]. Another study mainly based on data from the countries USA, France, India, and Brazil showed that many cancer types were associated exposure to pesticides, including multiple myeloma, non-Hodgkin's Lymphoma, leukaemia, and bladder, breast, and prostate cancer [21]. Hence, the developed countries have now begun to prohibit the use of strong pesticides and promote natural farming.

Fruits and vegetables are recognized as healthy foods and research has shown that their higher consumption has led to lower COVID-19 damage in India or even European countries [22] so this sector presents enormous opportunity as some fruits/ vegetables have emerged as "superfoods" due to high health benefits with global export rising e.g. Pomegranate, rich in Quercetin flavonoid, a health ingredient called "bioactive", occurring mainly in Apple and onion peels too . This was made possible through mix strategies of production and marketing such as improved varieties/ seeds, training programs, minimum support price (MSP) and

distributed procurement system. Similar system is needed for other segments also to boost production, marketing and exports. Integrated pest management (IPM) techniques such as pheromone traps can reduce the pesticide use and farming cost [23, 24, 25] and for export.

Similar turnaround is now needed in the above 3 sectors- for turning from India's "minor" to "major" exporter status. For, F&V segment is "low hanging" fruit where much export is possible in the fresh/ raw form segment than the value added products that requires investments and many regulations such as Good manufacturing practice (GMP) [15]. Similarly, India is edible oil importer since long but the production is rising and demand gap closing in the past decade. India was once importer of menthol used in cough syrup, aromatic industry but became exporter by promoting high yielding varieties and allied agri-technology since a decade [14]. Similarly, India turned from net importer to self-sufficient in pulses just 4 years (2013-17) due to the support policies such as better MSP and quality seed supply, guidance [26].

However, export requirements are stringent, much higher than the domestic trade, in terms of fruit quality (size, shape, colour, taste, aroma etc.) and phytosanitary standards such as pesticide residue [27] as evident from the Mango export quality fruit weight preference being 250 gram minimum while Indian average fruit weighs 200-225 gram only. Similarly, maximum residue level (MRL) is adopted by most importing countries, even for the non "organic" certified crop produce. This requires minimum pesticide sprays of the safer grade, only in emergency and proper post-harvest management such as fumigation to reduce the pesticide residue. Even small Indian exporters have learned to work through these conditions. For example, a Mumbai based export co. Kaybee export house (https://kaybeeexports.com) achieved a landmark of $20 million (Rs. 16 core/ year) by focussing on Mango, Pomegranates, Okra and Chilli. Proper documentation and certifications required for routine export [19] need to be extended to NF farmers for rapid growth.

3.5 Natural farming mission

National Mission on Natural Farming (NMNF) announced at 2022 end [28] by the central Government can be vital to achieve these standards, as it focuses on on-farm, low cost inputs production and FPOs (Farmer producer organizations/ companies) can be roped in for marketing [23]. For, it is less stringent than organic and limited and safe chemical inputs are not prohibited in it, unlike organic which is more amenable to large, rich farmers due to the high input cost. NMFN was triggered by similar initiative by the Andhra Pradesh state inspired by the so called "zero budget" natural farming (ZBNF) principles (Box 1) [23]. It adopts inventive techniques such as pre-monsoon dry seeding (PMDS) of fast growing manure crops like Sesban, Drumstick, Cowpea etc. for mulching, to improve soil carbon, whose growing deficit (<0.5%) in majority of Indian farmlands is a major national productivity constraint, as higher fertilizer doses also cannot arrest the declining yields [29].

Export orientation needs to be strengthened in NMNF for its viability by incentivising farmers constrained by the lower productivity in the absence of the chemical inputs-apparently a barrier to its upscaling. Premium for the NMNF produce is needed as in the organic farming sector. Besides, agronomic techniques to customize quality such as nutrients/ irrigation schedule are required to be taught such as high potassium inputs for fruit/ root quality, even by using organic microbial inputs such as mycorrhiza [30]. Artificial intelligence (AI) application is farming is rising rapidly globally [25] but nature based solutions (NBS) such eco-agriculture/ regenerative farming aim to avoid it manage pest-diseases-nutrients using common sense/ traditional wisdom.

Box 1- Zero budget natural farming (ZBNF)

Zero budget natural farming (https://zbnf.org.in, https://www.fao.org/family-farming/detail/en/c/429762/) is advocated by Mr. Shubhash Palekar who was bestowed with "Padmashree" among the highest civilian awards in India in 2021. Natural farming is also termed as "eco-agriculture" or "regenerative" farming. The ambitious and pioneering project led by Mr. T. Vijaykumar, ex Additional Chief Secretary (agriculture) of the state is now supported by even international organisations such as Rainforest Alliance (https://www.rainforest-alliance.org) through projects like UNDP GEF (Global Environment Facility, https://www.thegef.org/projects-operations/projects/10204). The Andhra Pradesh Community Natural Farming (https://apcnf.in) spread to over 6 million farmers by 2023 and triggered the formation of National Mission on Natural Farming in India [28] and won the global Gulbenkin prize, 2024 (https://www.aninews.in/news/business/the-andhra-pradesh-community-managed-natural-farming-apcnf-wins-the-gulbenkian-prize-for-humanity-20242024071218144 2/).

3.6 Exploring African and emerging markets

Low value markets such as south and east Asia comprise 20% of Indian exports, as evident from table 3 on agri-export destination countries share [2]. Majority of Indian agri-exports have recently started landing in East Asia, including China with limited phyto/ sanitary barriers, but fetch low prices as the importing countries are poor e.g. Bangladesh/ Vietnam. High quality and standards markets pay better such as USA and EU but form only 22% of Indian agri-exports as table 3 shows. While we need to improve quality and compliance, to access USA/ EU markets for the premium produce such as "organic certified", we need to target Africa is an emerging market especially using "NF" label. Even developed countries like USA and Netherlands are penetrating in Africa as Africa imports 82% of its food from other continents [31]. It's

also easy to enter due to lower export barriers like India did successfully in East Asia. India needs to prioritise Africa, not among the exports to top 10 countries today (Table 3) that make 40% of the total agri-exports. Govt. lists only Mango, Grapes, Dairy for Africa [19, 32]. African countries prioritized herewith their "ease of doing business (EDB)" ranking [33] are- Algeria-48, Ghana- 60, Morocco- 73, Libya-32, Nigeria- 57, Tanzania- 54 etc. can and these comprise over 2/3rd of the African trade [34]. India's EDB rank is 71, so it can easily manage exports to these African nations as in the past. The need today is to showcase Indian agri-products like "brand India" campaign earlier and the "international millet year" campaign recently.

Table 3- Top Export Destinations of India in Agro-Food Products (2020)(32)
Ranked by Countries Total Value (US$ Billion) Share (%)

COUNTRY	EXPORT $ Billion	% Share
1. US	4.09	12.4
2. *EU*	*2.61*	*7.9*
3. China	2.40	7.3
4. UAE	1.70	5.2
5. Saudi Arabia	1.61	4.9
6. Iran	1.50	4.6
7. Bangladesh	1.12	3.4
8. Malaysia	1.11	3.4
9. Vietnam	0.99	3.0
10. Nepal	0.98	3.0
11. United Kingdom	0.70	2.1
TOTAL	18.81	57

Source: UNComtrade Trade Statistics (https://comtradeplus.un.org).

Major agricultural commodities imported by Africa from India: cereals, edible meat, sugar and sugar confectionery, beverages/spirits/vinegar, and coffee and spices, with cereals, followed by meat and sugar and sugar confectionery. Africa imported agricultural products worth $ 4.2 Billion in FY13 from India, where Indian share was 5.1% and it stood 6th among supplier countries [35]. Europe is the most dominant supplier of agri-foods in Africa with 10% share, especially Netherlands and Brazil (8%), Russia (7%) while USA (4.4%) trails India [36]. European and even American nations find it profitable to export to Africa, so India can also excel in it with focus.

The top imported commodities in Ghana for instance are Onion, Tomato and Chilli [37].

3.7 **Food processing enterprises and policy stability**

The rising horti-production in India in the past 3 decades has also caused surplus and glut, forcing the farmers to throw Tomato or Onions on road or protest through road-blocks etc. A major constraint here is the inadequate cold storage and agri-processing facilities to make long shelf life products like powder, pulp etc. to make end food products such as Chutney, Pickles, jam, jelly, Sauce. Ministry of Food Processing Industries (MOFPI) has started many schemes to support agri-enterprises for value addition and marketing including exports such as training, easy loan facility and subsidy [38]. This can hopefully show results in few years and reduce food wastage and improve farmer's income and perhaps agri-export of value added products (VAP). Pradhan Mantri Formalizing Food Enterprise (PMFME) scheme launched recently has many incentives for food processing and can boost export too, besides startup or export promotion schemes. For instance, India is a leading exporter of dehydrated white onion anchored by Gujarat state (Mahua block, Bhavnagar district). India made 65,000 ton white onion powder in 2015 and 85% of it was exported at $,2600/ ton price. However, competitors Turkey and China exported at lower price ($700-$2,500 per ton), with competitive edge [39]. White Onion is produced elsewhere also in India such as Amaravati district, Maharashtra state or near Madurai district, Tamilnadu state. But while white Onion price was Rs. 4/-kg in Gujrat due to technology such as mechanisation and Irrigation, it was double (Rs. 8-10/- kg) in Amaravati with manual labour, limited irrigation, being unviable. Using agri-machinery can improve yield and reduce the product cost.

Rice exports form 20% of India's agri-export basket and its sudden suspension in 2021-22 sent price shocks globally. Similarly Onion exports are often switched on and off based on domestic and political compulsions. Export tariff is kept high such as $800/- per ton as in 2023. This hurts the rising Indian agri-exports and instead we need sound buffer stock and price stabilisation policy as suggested by the high level

advisory group of Govt. of India [3] that prioritized for exports the commodities Shrimp, Buffalo, Mango, Vegetable Oil, Wood, Chilli, Rice.

3.8 Product quality, precision farming, IPR and branding

Precision agriculture techniques such as measured water and nutrient inputs such as Potassium rather than Nitrogen can enhance fruit/ vegetable/ spice quality and can open new vistas in hinterland for evergreen revolution as suggested by late Prof. M. S. Swaminathan, the father of India's "green revolution" [30]. The higher content of healthy ingredients such as "Curcumin" or other "polyphenols" or anti-viral compounds like "gluco-sinolates" in Mustard or vitamins found in fruits/ vegetables can be branded for premium price and market access than promoting unhealthy, trans-fat rich Palm oil [40]. This can help to double the farmers' income- both horticultural export and IPR price premium. However, uniform quality needs to be maintained and high quality in packaging, organic/ maximum residue limit (MRL), phyto/ sanitary standards and traceability required in the export sector. For instance, Indian Pomegranate is 300 gm weight on average but export markets standard is 500 gm [27]. Such healthy crops are called "superfoods" and in growing demand [41].

India has protected intellectual property rights (IPR) some of its localized, special crop varieties under Geographic Indication (GI) such as "Kandhmal" Turmeric in Odisha or Alphonso Mango [42]. This can prevent potential piracy of Indian commodities abroad after their export increases as in the case of Basmati, and the Indian entrepreneurs can protect or enhance profit. Trade mark is now being increasingly preferred globally as suitable intellectual property rights tool as it has infinite life by extension every 10 years [43] rather than patents or plant breeders rights (PBR) that have life span of only a decade or two [44].

Indian Government has launched "make in India" campaign to invite global investors to make Indian manufacturing and export hub. So foreign horticulture companies can use Indian land to produce and market premium fruits such if they get

trademark protection. This matches the emerging global agri-supply chains and Indian multi-national companies too now own farms abroad and import agri-products to India such as Renuka Sugars [45].

India's fruits export is rising rapidly with mangos (Alphonso variety), Apples (Shimla variety), Banana (G9 variety- not special), amongst others. Over 20 million non-resident Indians (NRI) settled/ working abroad is a big market for Indian/ Desi (indigenous) speciality goods like Jackfruit as proven in the "Basmati" rice case earlier [46]. India has started exporting special fruit varieties such as "Nendran" from Kerala to Gulf using special packaging technique [47]. India today exports fresh fruits and vegetables mainly to poor or nearby countries such as Bangladesh. But if India enters western country markets, it needs to improve quality and seek IPR protection. States like Maharashtra have progressed rapidly in horticulture exports in the last decade or two with elaborate infrastructure and farmer's skilling drives for fruits such as Mango, Grapes, Pomegranate and vegetables/ spices such as okra and Chilli [48].

India can benefit by promoting trade mark for uniform colour, size, shape and taste, aroma fruits by agri-enterprises for rapid growth in the fruits export. Similar effort is needed for other fruit species and varieties e.g. Apple (Kashmir and Shimla), Guava (Allahabad), Pineapple, Black Grapes (Medak), Green Gapes (Nasik) Sapota (Palghar) etc. this will help to improve farmers' income and India's foreign investments and exchange. NRI population focus can help as being done in EU, USA and middle east due to their demand for such "desi" i.e. indigenous products. For instance, Thailand led the export of such tropical fruits especially Mangosteen by penetrating the Chinese, using competitive strategies, the largest global importer after EU and USA [49]. Its proven useful to boost AYUSH i.e. traditional medicinal and herbal products export from India [50]. South-south countries agri-trade form large share of the global trade [12, 51] so India can tap it deeply easily. Climate smart farming techniques also need to be adopted to minimize the risk of extreme weather events and make safeguard farmers [52]. The export valued of top 16 agri and allied commodities quoted here- $41 billion- matches with the Reserve Bank of

India (RBI) report [53]. The paper examined the relative export competitiveness (REC) of eight agricultural commodities (rice, wheat, maize, gram, groundnut, onion, bovine meat and shrimp) from 1990 to 2020. The findings reveal that India's export of rice was the most competitive, followed by groundnut, shrimp, gram, onion and bovine meat. The REC has generally been lower for India than its global competitors. It has, however, improved more recently, particularly for rice, groundnut, onion and bovine meat.

4. CONCLUSION

Focussing on fruits and vegetables (F&V), dairy, lipids and redefined beverages etc. can boost Indian agri-exports to help in doubling farmer's income (DFI. F&V is the largest agri-export segment globally but meagre 9th rank in the Indian agri-export basket. Adopting the low/ no "pesticide residue" standard can enhance the export volume and share as by minimizing the cancer risk. Natural farming mission 2002 launched by Indian Government can help in this transition. Maximum residue level (MRL) is the yardstick followed in exports so promoting no/ low pesticide techniques can help to double Indian agri-exports to $ 100 billion by 2030 from $50 billion in 2023. African focus can double or triple Indian exports to $10 or 15 billion/ year even in rice, wheat, Sugar, besides fruits andvegetables, spices, due to low quality and regulatory requirements here, besides India's premium export to EU or USA.

DECLARATION

Artificial intelligence (AI) is not used in this manuscript making and this information is new and not published elsewhere.

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