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# Organic Farming: Paradigm Shift during Pandemic to ‘Food Safety’ Complying ‘Food Security’ in India

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### Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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## ABSTRACT

The organic farming is gaining worldwide acceptance since the conventional farming gratifies the demand of both *food security* and the *food safety* especially during the pandemic year 2020 of COVID 19. Though demographic rise demands for high yielding grains, fruits and spices but under present scenario it fails to satisfy the food safety. The high yielding highbred seeds, chemical fertilizers and pesticides are degrading the fertility gradually and raising health concerns and do not meet the cosmetic standard. The organic farming is labour intensive with higher input costs and lower yields as compared to conventional farming yet it is in demand for its food safety. The search is to uncover whether the yields from Organic farms in India is capable to ameliorates manage pests and diseases, economic feasibility, food safety, nutrient requirement, environmental sustainability, augment food quality. The influence of shut downs are revealed. The producers face the challenges of certification, beating income during transition, seeds and manures and marketing etc. In India, the end produce of organic products are highly expensive and have high end consumers. The cost amelioration needs to be attended by government institutions as tribal and hilly areas in India like Sikkim, Meghalaya and other tribal areas. The tribal population has high organic farming inputs, logistics facilities and huge organic produces from food grains to fishes and cosmetics and spices. But the novice cropping pattern needs “cluster approach for organic lands

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(ODOP)", "compensation for incomes losses during transition phase", "active participation of Corporate houses and NGOs", "assuring adequate return on investments", for registering phenomenal rise in the organic farming in India.

*Keywords: Food security; organic farming; transition phase; food safety; bio magnification; export markets; ARIMA model.*

## 1. INTRODUCTION

The mother earth and the nature is the supreme epitome human existence and for their food, water livelihood through agricultural farming, it is self-sufficient for not to use any other inputs nor demand irrational water quantities from seedling to crop yield. The soil has its own living entity, fulfilled with nutrients and living organisms to supplement all requirement of the plant that grows in the duricrust. FAO -2014 [1] reported organic agriculture a food security adaptation induces distinctive yield management structure that endorses and boosts agro-ecosystem health, including ecosystem cycles, biodiversity, and biological activity between soil and agriculturists via on-farm agronomy, agro-mechanical methods excluding all synthetic off-farm involvements [2,3].

Organic farming or soft agriculture is an eyeball confrontation between the man and the soil. Though this biodynamic farming is a novice concept incorporated in farm procedure was popularized after the proceedings released from BioFach-2009 [4] at Nuremberg, Germany, 17-20 Feb, 2010. The processes and theories of natural organic farming was initiated by Lady Balfour (England) and Sir Albert Howard (India) during 1940's, has advanced to shelter about 71.5mHa in the world and 1.94mHa in India [5].

The research is to unearth whether the yields from organic farms in India is capable to upgrades to manage pests and diseases in crops, economic feasibility, food safety and security nutrient requirement, environmental sustainability, augment food quality. The influence of shut downs under the influence of different strains of SARSCov-2 virus are revealed.

### 1.1 History of Organic Farming

Out of numerous methodologies for sustainable agriculture, various techniques like mixed cropping, mulching and rotational cropping and livestock used in natural farming are the inclusions in the traditional agriculture are practiced in countries like china and India in past.

It dates back to Neolithic age in the mid Holocene epoch (2500 to 1500BC) where the citation of organic farming was in practice as per the Mahabharat (5500BC) the Rig-Veda, the Atharva Veda, (1000BC), the Kautilya Arthasastra (300BC), the Quran (590BC) in India [6,7,8]. Using old practices to sustain fertility of soil and biodiversity such as rotation of crop, use of compost, recycling organic matter recycling, mulberry trees combining to fish ponds were practiced dates back to 4000 yrs BC in China [9,10].

The basic advantages of organic farming is sustainable, self-balancing, environment friendly, protecting neighboring flora and fauna, diminishing weed infestation by rotational farming, only harnessing nature, regenerative capacity, indigenous knowledge, optimization of input and perfect nutrient and resource conservation. Whereas orthodox conventional present farming need mechanization, chemicals, and hybrid seed, finally yielding nutrition deficient food grains making the labour oriented practice to mechanization producing mono output like food grains, trees or species through expert technicians but Maximum yields with control of weeds [11,12,13]. The Oceania continent has maximum % of land used for organic farming in the globe (Fig. 1). The world has 172 countries of the globe of 650000 organic producers, 699 numbers each processors and exporters cultivated over 71.49 mHa of Land. India is one that had produced 1.35 MMT (FY 2015) (2.60% of the globe) of organic products (1.94 mHa) in 2018 (L-1)<sup>1</sup>.

### 1.2 Organics Rhetoric Issues India

The organic agriculture in India of 21<sup>st</sup> century is to maintain ecological balance. The food security cannot be addressed by augmenting the organic farming though ecologically and health advocating but confronted by less productivity, rising demography and high cost of production (Fig. 2). The claim that organic products has zero

<sup>1</sup><http://www.agademy.in/2019/06/status-of-organic-farming-in-india-prospects-and-challenges/>

toxic chemical residues and higher yield is under discussion as USDA data confirm 21% of organics have toxic chemical residues (residue from cattle's, nearby farms) and organic farmers use pesticides, if not the natural options are vulnerable to spoil of yield. The organic harvests is significantly lesser than the conventional farming [14,15,16,17].

Organic farming started from Harappa age and hilly NE states are well conversant with the agro-technique with developments. The state Sikkim is ranked-one state in the globe and fully organic based from 2016. The Food Safety and Standards Authority of India (FSSAI), National Program for Organic Production (NPOP), Participatory Guarantee System (PGS), and the Agra-export Policy 2018 have controls over production and marketing of organics. However less focus is given on One District one Product

(ODOP), organic cluster, Zero budget natural farming which need attention.

Total globe has 13.4 bi Ha lands and cultivable are is 1.5 bi Ha where India's share of agriculture land 159.7 mi Ha (Wiki data). The Global and India's organic area in total is 50.9-miHa and 4.78 mi Ha respectively. India ranks top with 585200 producers (FiBL data 2015). Arable soils of India have organic carbon less than the threshold level. Economically the farmers are poor (backward or tribal) and incapable of purchasing fertilizers and pesticides.

The Economic feasibility of the organic crops is possible with on-farm source generation, technology and sustaining crop productivity. The organic farm is possible by the trained farmers, timely supportive policies subsidies from the Government sector. The vulnerability is high that

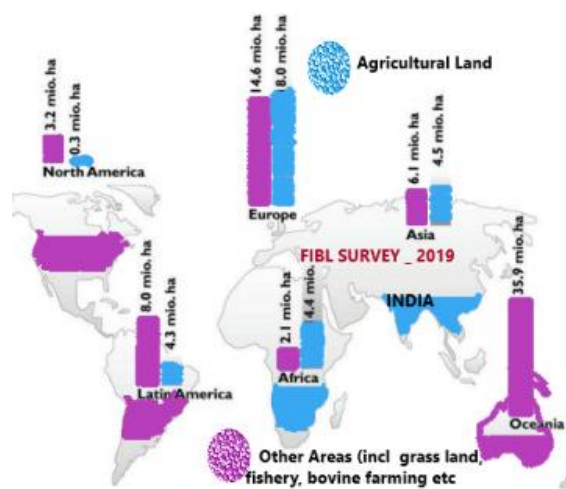


Fig. 1. Worldwide organic farming: Source: FIBL



Fig. 2. The traditional ploughing methods and the organic cereals cultivated in India

beat of crop productivity, inadequate livestock size, biomass shortage, poor land, organic waste control and infertile soil, seeds *etc.* deprived of preservation, packaging, transport and reliable market. The debate is the possibility that a low and marginal organic farmer in India can achieve the entire requirement fulfilled within his available resources.

## 2. REVIEW OF LITERATURE

Howard's [18] advocated for Indore method (Arid zones) of control of soil erosion and the method advises to reestablish and sustain the soil fertility. Soft agriculture farming is the extensively documented substitute agricultural system to the conservative as an adverse effect of the green revolution in 1970's and 1980's [19,20,21,22]. IFOAM The International Federation of Organic Agriculture Movement considers organic farming is a production arrangement that relies upon adaptation during climate change, environmental processes and cycles modified to native conditions, and not to stress upon the chemical and mechanical inputs to sustain the soils fertility, the biomes and the society finally sustainable utilization of all resources [23,24,25,22].

The organic farming is otherwise called "soft agriculture", "alternative agriculture", "natural farming," "permaculture", "biodynamic farming", "indigenous agriculture", 'sustainable agriculture', "alley cropping" and "home therapy farming (agnihotra) (Link-2)<sup>2</sup>. Krishnaprabhu S., 2020 suggested to optimize external farm inputs and suggested components like seeds, bio-manures, compost, crop diversification, soil treatment, bio-fertilizers and microbial inoculants, microbial pesticides, botanical pesticides and naturally occurring salts in the organic farming. Deshmukh & Babbar [26], Krishnaprabhu S., [27] conclude that organic agriculture appears to be one of the options for sustainability of agriculture by working out compound growth rate. The certified organic products of Indian origin include cotton, tea, coffee, cardamom, oil seeds, sugar cane, millets, pulses, pineapples, capsicums, medicinal plants, spices, dry fruits, organic cotton fibre and functional food products. Sikkim has been recognized as the organic state in India and other regions of North Eastern India has been identified as potential region for intensive and extensive adoption of organic farming. (Website of Agricultural & Processed Food Products

Export Development Authority). The Indian organic products are mainly exported to USA, UK, Netherland, Germany, Belgium, Sweden, France, Switzerland, Italy, Spain, Japan, Singapore, Australia, South Africa, Canada and Saudi Arabia and UAE (Link-3)<sup>3</sup>.

Sharma & Kumar [28] reported that organic agriculture such as social, economic, environmental, cost, prices, crop protection, yield and livelihood can incorporate sustainability and resilience in agricultural production system. The productivity falls by 6.7% to 30% during the transition period of switching from conventional farming to organic farming and it is extremely significant for the Government to support the farmers during this transition phase. (Indian Council of Agricultural Research and The Report on Doubling of Farmers' Income by Ashok Dalwai, 2019 [29]). ICRIER has found that small and medium sized farmers' faces challenges especially located in hilly, tribal and inaccessible regions to access both domestic and export markets, Mukherjee et al 2017, ICRIER [30].

The organic food is expensive due to higher labour costs and comparatively lower yields as compared to conventional food due to high cost involvement in handling, processing, transporting, preserving, certifying, packaging, logistics and distribution costs adding to relatively small quantity of organic produce in post harvesting period.(Website of ASSOCHAM), Down to Earth), The organic agricultural practices followed since generations placed their heritage and healthy life and standardized living recognized Sikkim as topmost organic state in India in 2018 [31]. Promotion of Organic farming in Odisha India has fantastic room to provide livelihood of small and marginal farmers and to live on sustenance farming, [32].

Crowder & Reganold [33] reported that without organic premiums; the benefit/cost (b/c) ratios were (-8 to -7%) and net present values (-27 to -23%) of organic agriculture were significantly lower than conventional agriculture and also the labour cost rises by 7-13%, and significantly profitable (22-35%) with b/c ratios (20-24%) than conventional agriculture Link -4<sup>4</sup>.

The major constraints are loss of yield, failure to achieve the desired quality and quantity, higher cost of certification, high cost of quality analysis,

<sup>2</sup> [http://agritech.tnau.ac.in/org\\_farm/orgfarm\\_miscellaneous.html#amp](http://agritech.tnau.ac.in/org_farm/orgfarm_miscellaneous.html#amp).

<sup>3</sup> [http://apeda.gov.in/apedawebsite/about\\_apeda/about\\_apeda.htm](http://apeda.gov.in/apedawebsite/about_apeda/about_apeda.htm)

<sup>4</sup> <http://www.pnas.org/content/early/2015/05/27/1423674112>

lack of quality seeds, poor pesticide and insecticide management, erosion of consumer trust, shortage of biomass and livestock, vested interest of chemical and pesticide lobby, lack of storage infrastructure and marketing framework and overall lack of supportive policy [11,34]. But it is observed that during drought and in arid regions the yield of organic farms is higher than traditional farming 6.7% if genetic modified seeds [35].

### 2.1 Present Scenario

People confuse untreated seeds those are pre-soaked in fungicide as organic, but only those seeds are organic if they are sowed in organic soils with agro-ecological observes and certified as organic. The status and statistics of the cultivated are, exports and imports along with local consumption of organics for the 21<sup>st</sup> century is shown in Table 1.

About 2.7% million organic land holders were reported from India. India is considered as the nation having the utmost number of producers of 835200 numbers, the 2<sup>nd</sup> largest as 210352 numbers in Uganda, and followed by Mexico possessing 210000 numbers. In the year 2016 [36].

### 2.2 Statistical Analysis

ARIMA model (Autoregressive integrated moving average model) is a stochastic modeling that predict future values between two

limits. Present study of prediction is executed by using IBM ( SPSS) Statistics Software by using model ARIMA (0,1,0) i.e. RW with drift model. In this case the autoregressive coefficient is 1. The time series % of cultivated land in India has been considered for the period 2000 to 2018 and the normal distribution is 0.4079. The descriptive statistics, the pp-model and Arima predictive model is given in Fig. 3 and Table 2.

The ARIMA (p,d,q) model forecasts considering only one variable taking each observation. The key notion of the models is to consider the past patterns and forecasts future expected values. The model is given by  $Y_{t+1} = \alpha \sum_{k=0}^{i-1} (1 - \alpha)^k * Y_{t-k}$  where  $Y_{t+1}$  = forecast value (weighted moving average of past observations),  $\alpha$  is the weight of the series for individual data and  $Y_{t-k}$  are the lagged observations [37]. The stochastic parametric values  $R^2$ = root mean square error, MAE= mean absolute error, MAPE= Mean absolute % error. Presently the  $R^2$  =0.997 which is a good metric.

The P-P plot (probability– probability plot) in the present model signifies a contrast between the observed cumulative distribution function (CDF) with standard residual to the expected CDF of the normal distribution. The pp-plot indicates the skewness of a distribution. The figure indicates there is no outlier in the data and better normal distribution (Fig 3). The model trend specifies that the organic land in India shall increase in future.

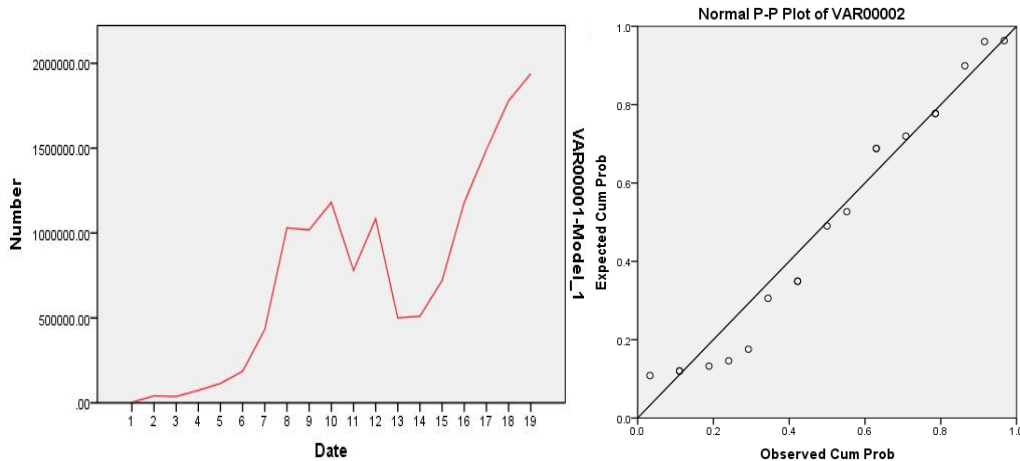


Fig. 3. The area of organic tillage vs %of Land with normal pp-plot in Arima Model (for the year 2000-2018)

**Table 1. Status of the Indian/global organic cultivated area, exports, sales and consumption**

|      | Organic area | Organic area | Organic area/total GCA | Organic exporters | Organic exports | Organic retail sales | organic consumption | Organic retail sales |
|------|--------------|--------------|------------------------|-------------------|-----------------|----------------------|---------------------|----------------------|
|      | India        | World        | India                  | India             | India           | India                | India               | World                |
|      | Ha           | Ha           | %                      | Nos               | million Euro    | mill. Euro           | Euro/ capita        | million Euro         |
| 2000 | 2775         | 14973991.83  | 0                      | NA                | NA              | NA                   | NA                  | 15156.5              |
| 2001 | 41000        | 17302299.63  | 0.02                   | NA                | NA              | NA                   | NA                  | 16355.2              |
| 2002 | 37050        | 19879439.92  | 0.02                   | NA                | 13.44           | NA                   | NA                  | 18797.7              |
| 2003 | 73500        | 25765459.78  | 0.04                   | NA                | 13.15           | NA                   | NA                  | 19615.4              |
| 2004 | 114037       | 29973069.44  | 0.06                   | NA                | 15.7            | NA                   | NA                  | 20937.7              |
| 2005 | 185937       | 29248420.33  | 0.1                    | NA                | 17.26           | 38.7                 | NA                  | 23559.6              |
| 2006 | 432259       | 30173401.52  | 0.24                   | NA                | 49.12           | NA                   | NA                  | 27938.3              |
| 2007 | 1030311      | 31509670.58  | 0.57                   | NA                | 74.46           | NA                   | NA                  | 31734.3              |
| 2008 | 1018469      | 34472530.4   | 0.57                   | 299               | 81.31           | 7.84                 | 0                   | 34117.2              |
| 2009 | 1180000      | 36271079.68  | 0.66                   | 233               | 87.73           | 13.23                | 0                   | 36895.9              |
| 2010 | 780000       | 35713927.04  | 0.43                   | NA                | 118.68          | 20.3                 | 0                   | 412330.1             |
| 2011 | 1084266      | 36676917.84  | 0.6                    | NA                | 128.41          | 31.49                | 0                   | 43865.23             |
| 2012 | 500000       | 36839284.75  | 0.28                   | 669               | 291.2           | 50.89                | 0                   | 49533.65             |
| 2013 | 510000       | 43074263.08  | 0.28                   | 669               | 291.2           | 69.5                 | 0                   | 54812.57             |
| 2014 | 720000       | 48700984.25  | 0.4                    | 669               | 303             | 101.32               | 0.1                 | 61352.27             |
| 2015 | 1180000      | 50360386.24  | 0.66                   | 669               | 268.58          | 144.2                | 0.1                 | 75635                |
| 2016 | 1490000      | 58175562.17  | 0.83                   | 669               | 268.58          | 171.65               | 0.1                 | 84770.24             |
| 2017 | 1780000      | 69492495.31  | 0.99                   | 669               | 456.26          | 185.89               | 0.1                 | 92848.04             |
| 2018 | 1938221      | 71494738.75  |                        | 669               | 641.39          | 185.89               | 0.1                 | 96682.56             |

Source: FiBL and IFOAM – Organics International. (2019). [38]

**Table 2. The stochastic statistics of the organic data of India for the years 2000-2018**

| Fit Statistic | Mean  | Minimum | Maximum | 5     | 25    | 50    | 75    | 90    | 95    |
|---------------|-------|---------|---------|-------|-------|-------|-------|-------|-------|
| R-squared     | .997  | .997    | .997    | .984  | .984  | .984  | .984  | .984  | .984  |
| RMSE          | 34623 | 34623   | 34623   | 34623 | 34623 | 34623 | 34623 | 34623 | 34623 |
| MAPE          | 2.135 | 2.135   | 2.135   | 2.135 | 2.135 | 2.135 | 2.135 | 2.135 | 2.135 |
| Max APE       | 10.66 | 10.66   | 10.66   | 10.66 | 10.66 | 10.66 | 10.66 | 10.66 | 10.66 |
| MAE           | 12640 | 12640   | 12640   | 12640 | 12640 | 12640 | 12640 | 12640 | 12640 |

### 3. DISCUSSION (GROUND REALITIES)

As primary data, questionnaires are framed, circulated and interacted; related to organic agriculture, service providers, intermediaries, traders, certifying and testing agencies and exporters to assess the ground realities.

Various challenges faced by the farmers; on interaction at ground disciplinarians, intimated that the steps involved in organics are to prepare the land for meeting the criteria for certification (Fig. 4).

The respondents on interaction are replying to the questionnaire mainly reported that in addition to the seeds, manure, live stocks etc.; the other constraints that drag from back are the organic farmers are raised cost of certification/ quality analysis; satisfy with buyers/ exporters quality demand, and norms [39] and [40]. Organic farming protects the landscape, biodiversity, pollutions (soil, air and water) and main a sustainable flora, fauna and avifauna of the environment (IFOAM 2005).

Organic agriculture aims at indigeneness Natural ecosystem, food assets, small carbon foot print intrinsic inland activities, habitat heterogeneity, ecofriendly, nontoxic procedures and just improvement to conventional farm practices but have differences like surged GHG emissions, water pollution, soil erosion, and impends human health (Link-5<sup>5</sup>, Link-6<sup>6</sup>). The final cost-effective procedures improve the soil stabilization, C-sequestration and least energy consumption with present global demand of organic products. Least use of machineries and more application of local labour make the farming procedure cost effective and generate huge labour employment. Under the economic degradation due to Covid-19 pandemic; India need the application of organic high valued crops to effectively engage the interstate migrant labourers as the availability of organic cultivated land potential is high.

#### 3.1 Organic Farming Status in India

Though the organic agriculture has been practiced in India from pre-Vedic period; the methodology has been dis-popular than the traditional farming due to the low yield; need upright infrastructure, time consuming process

and economically antagonistic, poor awareness among farmers under the population explosion during post Holocene period.

Apart from social acceptance; as per norms of certification; the preparation of fields takes minimum 2-3 years (transition phase) to achieve "nil presence of chemicals". Isolated lands are selected for organic cultivation to avoid contaminations/ cross contamination from adjacent fields. The organic farmers expressed their concern of short supply of cow dungs and Verme-compost to for rejuvenate the soil and the micronutrients. The labour intensive crop farms are prone to pest attacks and the entire crop cycle expenditure is lost.

#### 3.2 Demand of Organics in India

The demand of the product is in Cosmo polis and the less health concerned niche segment avoids purchasing organics due to high price for high costs of labour, seed, manure, transportation and logistics specially small and medium farmers. Farmers complained about drop in yield of organic farm produces as compared to chemical farming. Interference of middle man, unethical forgery practices of some of the farmers, packers, agents and sales outlets losing confidence of buyers. Physical appearance of the organic crops is not very attractive as it lacks polish and uniformity in appearance but a health card.

#### 3.3 Transition Phase from Traditional to Organic

The funds required for the survival of the family of farmers during the transition phase is crucial for popularising the organic agriculture. These agro-products need specialized and scientific storage facilities as perishable. The illiterate and semiliterate farmers are hesitant to deal with various certifying and testing agencies. The sections of organic farmers located in hilly, tribal and remote locations faces immense difficulties in delivering the produce in the designated markets for sales.

#### 3.4 Demand of Organic Produce

Gradually lucrative domestic market is developing in India for the organic produce due to change in life style, concern for the health and environment. Many of the business, trading and production houses resort to "contract farming" concept for getting assured supply base. The agriproducts preferred are rice, pulses millets, oats, tea, coffee, fruits like mango, banana, litchi,

<sup>5</sup> <https://rodaleinstitute.org/why-organic/organic-basics/organic-vs-conventional/>

<sup>6</sup> <http://www.fao.org/3/ca8430en/CA8430EN.pdf>





**Fig. 4. Steps involved in organic farming synchronized(A-J)**

pineapple, pomegranate and vegetables like capsicum, carrot, broccoli, cabbage etc.

There is huge demand for organic products in European Union, USA, Japan, Korea and Taiwan. The export consignments are duly certified at the load port in India by the independent certifying agencies duly tested in the laboratories. Since it is organic products there is random sampling at the destination ports by the custom and health authorities of importing nations. The large buying houses in EU have their in-house laboratories to test the products. If there is any trace of pesticides and insecticides the consignment is rejected. If the export cargo is in the container the exporter has the option of calling back the cargo to India. This process involves huge expenditure and associated paper works to bring back the container. If the cargo has been de-stuffed from containers then exporter has the only option of destroying the cargo in the foreign soil.

The reputed buying houses of Japan, Korea, Europe and US employ the services of sourcing agents based in India to look after the interest. The exporters prefer to export dry products like pulses millets, tea, coffee, oil seeds instead of vegetable and fruits and other perishable products from India. The exporters have to incur additional expenditure on packing, transportation, storage, and shipping in containers, mechanical loading and unloading to rule out “cross contamination” during the transit and delivery.

Hence the exporters rely on lucrative and ever-growing domestic markets for better margin and improving the bottom line of the operations.

### 3.5 Improvements

India has achieved food security through green revolution and presently self sufficient in food grains. Due to rise in level of income, change in style of living and concerns for health and environment there is gradual growth in demand for organic foods. The concept of organic farming though practised by Indians from the Vedic ages, the practice is in upward trend during the last 2-3 decades.

The Government of India has led down elaborate procedures, guidelines and audit systems for organic farming. But the entire system is required to be streamlined with minimal documentations and cost involved. The participation of local administrations at Panchayat level with the help of NGOs and self help groups would go long way in encouraging organic farming [40].

### 3.6 Popular Organic States in India

The hilly and tribal belt especially, in North East and states of Jharkhand, Chhattisgarh, Odisha and part of Central India can be earmarked and developed as exclusive organic agriculture zone. Moreover, the entire India can be mapped with pockets of organic farms. The cluster approach, by consolidating the village lands as a cluster



and same can be developed for organic farming under the supervision of local administration. The farmers adopting organic farming would be delivered adequate funding for the transition period with banking and semi banking instructions chipping in interest free and liberal dosage of funds.

### 3.7 Actions by Government

The Government should ensure fair and remunerative pricing for the produce so that the producers can recover the input cost with adequate margins as 85% are small and marginal farmers in India. The organic farming is opposed to conventional chemical farming needs continuous and regular updates on soil, seed, bio-fertilizer, irrigation information and crop variety. The Government should provide training at regular intervals to educate the farmers in the organic farms.

The organic produce especially, the foods and vegetables need scientific storage facility for a longer shelf life and agencies both private and government should build storage facility with all amenities for the produce. The transportation and logistics facilities between farm gate up to delivery/sales point required to be streamlined with minimum time period so that consumer get the benefit of fresh produce. For regulating market it is essential to exclude unethical and unprofessional farmers/packers/sales outlets regular monitoring of quality to be carried out.

Similarly, for the export markets the logistics operations has to be structured in such a manner that the delivery to the foreign outlets takes minimum time period. The custom clearance need to be expedited including the testing facilities and the cargo to be categorised as priority for clearance within minimum time period. There should be earmark zone in the entry port area for aggregating the produce so that a full container load is shipped to keep the freight economically.

### 3.8 The Role of Government

Though the Government is making all sincere efforts to promote the organic produce in the overseas market, the participation of Corporate Houses and NGOs are essential for increasing the acreage for cultivation and volume of productions. Some of the big Corporate Houses can earmark their funds and capacities to promote organic farming. The large hotel and restaurants chains should be given incentives for promoting organic farming in their dining tables.

The Government should give adequate tax incentives and liberal funding so that the existing producers adopting conventional chemical farming should gear up organic farming.

Presently there is a demand for organic products of Indian origin in the developed countries like EU, USA, Japan, Korea, and Taiwan. There is enough scope for increasing the organic produces especially, organic fish, meat, and organic vegetables in Middle East countries.

Finally the socially and economically acceptable organic culture should be prioritized throughout India maintaining stabilization of fertility of soil, health issues, ecofriendly and sustainability. The new culture should enhance the biological system in agriculture, action plan for long term land fertility, make it pollution free, genetically diversified organized agricultural system [36].

### 3.9 Organic Farming and the COVID-19

At the advent of Covid-19, the industries, hotels, institutions, temples in India are behind shutters and transportation totally jeopardized constrained by series of lockdowns. Confinement at home has encouraged busy Indians to enhance their organic sector for nutrient and delicious food at home for better food safety, quality and security from their kitchen garden [41]. During series of lock downs it was ubiquitous that that food, spices, vegetables and cosmetics requirement of the family was tried to mend from the nearest agricultural land when economy slowed down and all urban based workers migrated to their native place for their life leaving livelihood, and all Indians were stressed under uncertainties, restriction for export, import and movement, unemployment, and supply chain slowdowns, Schmidhuber et al. [42], Kumar et al. [35]. Under blue sky, non-polluted drainage channels, less contaminated ground water, non-availability of fertilizer and more workforces at home has boosted and triggered many Indian farmers and ranchers to go for organic farms, more yields and nutrient demand of their family. The pandemic in India has made a paradigm shift to the marginal and labor class to rebuild their livelihood through organic farming in India for lively hood with crop and bovine residue as bio-fertilizers and vermi-compost for their fields.

## 4. CONCLUSION

The bottom line of success in any market operation is the criteria of "return on investment"

and “generating margins” and organic agriculture is no exception. For the farmers organic farming means loss of income in initial year of transition phases, higher input costs, exorbitant and cumbersome certification costs, loss in production, limited customer base, competition from unethical business practices etc. The producers face the immediate challenges of “food security” and “income for survival”. The farmers can move up in the next hierarchy i.e “food safety” resulting from ‘organic farming’ if producers are assured of regular incomes. Hence the organic farming is caught between vicious cycle of ‘food security’ and ‘food safety’ in a developing country like India.

India needs increased cognizance amongst consumers, ranchers, policymakers and ecologists about the ill-effects traditional produce with increasing the price premium. Organic farming needs “cluster approach for organic lands (ODOP)”, “compensation for incomes losses during transition phase”, “active participation of Corporate houses and NGOs”, “assuring adequate return on investments” for registering phenomenal rise in the organic farming in India.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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