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Relevance of Organic agriculture in the twenty-first century- A Review

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ABSTRACT
Organic agriculture has a history of being contentious and is considered by some as an inefficient approach to food production. Yet organic foods and beverages are a rapidly growing market segment in the global food industry. Here, we examine the performance of organic farming in light of four key sustainability metrics: productivity, environmental impact, economic viability and social wellbeing. Organic farming systems produce lower yields compared with conventional agriculture. However, they are more profitable and environmentally friendly, and deliver equally or more nutritious foods that contain less (or no) pesticide residues, compared with conventional farming. Moreover, initial evidence indicates that organic agricultural systems deliver greater ecosystem services and social benefits. Although organic agriculture has an untapped role to play when it comes to the establishment of sustainable farming systems, no single approach will safely feed the planet. Rather, a blend of organic and other innovative farming systems is needed. Significant barriers exist to adopting these systems, however, and a diversity of policy instruments will be required to facilitate their development and implementation.
Keywords: Organic farming, sustainable, farming systems.

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INTRODUCTION

India's growth story is service sector led. Manufacturing sectors growth remaining stagnant, relevance of agriculture is fast declining. Even though contribution from agriculture to national income and economic growth is fast receding still agriculture is capable of leading our growth path. In the name of special economic zones and mega projects, huge fertile agricultural lands are in industrial use today. Land available for cultivation is declining. In spite of all these India is able to achieve self-sufficiency in food production. The economic and trade liberalization and adoption of food security bill are exerting heavy pressure on India's land resource partitioning in sectors such as forestry, agriculture, pasture lands, human settlements and industries. Thus, the coupled effect of meeting food demand under limited area and toxin-free agricultural produce have become an important factor forcing countries like ours to explore possibilities for opting conventional agriculture to the dominant farming approach called organic farming, a holistic production management system which is supportive to environment, health and sustainability. Development should not be at cost of destruction of ecology. Sustainable development is the need of the hour. With the increase in population our compulsion would be not only to stabilize agricultural production but to increase it further in sustainable manner. Through organic farming a healthy interface between human resource and natural resources in general and commons in particular can be ensured. A humane approach to agronomy will mean a quality assurance for people and the environment [1]. Thus, a natural balance needs to be

maintained at all cost for existence of life and property for the present and future generation also. The obvious choice is organic farming. Organic farming emerged as a potential alternative for meeting food demand, maintaining soil fertility and increasing soil carbon pool. With more and more education, information and awareness people are going in for green products.

The protection of environment through sustainable consumption is possible only through green products. With rising concern of health issues and food safety, many consumers have turned their site to organic products. The increased consumers' interest in organic food has been attributed among others to the growing demand for food free from pesticides and chemical residues. Organic foods promote balance among humans, other living organisms and the nature. It also promotes no artificial preservatives and best maintains the originality of food. This prevents excess use of harmful ingredients and thereby ensures health [2]. According to Bello [3], "Agricultural development strategy for developing countries needs to be geared towards increasing the productivity of land under cultivation, with reduced cost, higher efficiency uses of inputs with little or no harm to both human and the environment. The prime requisite is the promotion of a healthy soil-plant-environment system to reduce Land degradation and abuse of the inputs. A new strategy of promoting eco-friendly farming is through the modification of the present systems of farming in the area of soil nutrient restoration to encourage the use of organic materials, termed organic farming." This paper discusses the problems and prospects of adopting this system in India.

What is organic farming? According to Veeresh [4], "No one would be able to give a simple answer to the question: What is organic farming? The common answer to this question is that organic farming is farming without chemicals. The generally accepted organic rules prohibit use of synthetic fertilisers, pesticides, growth regulators, livestock feed additives and, stress on long-term soil management, though there is no single international regulation for organic production. The ethics of organic farming is to generate all the required plant nutrients within the farm and adopt crop protection using local resources, restricting external inputs to the bare minimum, if not completely dispensing with them. Organic farming is essentially a soil-building mechanism; to keep the soil 'alive', make the soil 'live' and sustain fertility. Building 'live' soil is the primary concern of all organic farming. In organic farming, soil - and not the crop - is fed. Enhancing soil health is the cornerstone of organic farming [5]. The soil has to hold the organic matter and create conditions for microorganisms to work on it to release nutrients. Therefore, organic farming is neither merely replacing the chemicals with organic matter in it, nor is it going back to traditional agriculture. It is the conversion of soil from 'non-living' to 'living'. To sustain life in the soil, several techniques are involved, such as conversion of soil and moisture, and maintenance of minimum soil organic matter. Farmers must practise green manuring, compost making, vermicomposting, and use of bio-fertilisers and bio-pesticides. Once that is achieved, the soil will take care of itself with minimum maintenance cost and minimum external inputs". Organic farming system emphasizes on the use of organic matter for enhancing soil properties, minimizing food chain associated health hazards and attaining closed nutrient cycles, the key factors for sustainable agriculture. Organic agriculture is a production system which includes agriculture with biodiversity, ecosystem and biological cycle and excludes all chemical and synthetic inputs. It avoids chemical fertilizers, hormones, feed additives and pesticides and promotes natural techniques like crop rotation, animal manure, off-farm waste, crop residues, plant protection and nutrient mobilization [6]. According to the International Federation of Organic Agriculture Movement [7] the major objectives of organic farming include: production of high quality food in sufficient quantity in harmony with natural systems and cycles, enhancing biological cycles within the farming system involving microorganisms, soil flora and fauna, plants and animals, maintaining long-term soil fertility and genetic diversity of the production system and its surroundings including plant and wildlife, promoting healthy use with proper care of water resources and creating harmonious balance between crop production and animal husbandry, and minimizing all forms of pollution. It includes ecological management strategies that maintain and enhance soil fertility, prevent soil erosion, promote and enhance biological diversity, and minimize risk to human and animal health and natural resources. Today, many kinds of farm products are produced organically including vegetables, fruit, herbs, grains, meat, dairy, eggs, fibers, flowers etc.

The International Federation of Organic Agriculture Movement (IFOAM), which is the worldwide umbrella organization for organic agriculture, was founded in 1972 in Versailles, near Paris, by five organizations from three continents, Europe, the USA and Africa. The broad principles and practices that are expected to be followed in organic farming as per IFOAM Standards are as follows:

o To encourage and enhance biological cycles within the farming system;
o To increase, enhance and maintain long term soil fertility;
o To mobilize organic matter and nutrient elements locally within closed systems;
o To use, as far as possible, renewable resources in locally organized agricultural systems;
o To avoid all forms of pollution;
o To maintain genetic diversity;
o To allow livestock to express their innate behavior;
o To allow adequate returns to the producer; and
o To produce qualitative food in sufficient quantity this is acceptable socially and economically.

Organic farming although is a modern practice is in a way going back to Nature Farming. It is a subset of Ecological Farming.

Organic Vs. conventional Organic farming is relatively small-scale, with independent operations, will not use purchased fertilizers and other inputs; low mechanization of growing and harvesting process often local, direct to consumer. Conventional farming is large-scale, often owned by or economically tied to major food corporations intensive chemical programs and reliance on mechanized production, using specialized equipment and facilities wholesale, with products distributed across large areas and sold through high-volume outlets. Example: broad bean - This plant has a special characteristic of high protein content. Further, this plant enhances the soil density, increases organic matter and fixes biological nitrogen in soil in association with Rhizopus sp. through biological effects. The addition of organic matter in soil does not affect the environment. On the other hand, the organic manure has effects on soil characters and improves the relationship among soil, plant and water in addition to viscosity, soil density and LER. Organic fertilizers do not cause harm on ecology and help to release nutrition slowly through microbiological processes that release minerals from organic matter to aid the plant growth with best appearance [8]. Also, being labor-intensive, organic farming involves high wages [9]. With clear environmental benefits, organic farming can contribute a larger share in sustainable feeding the world. It is significantly more profitable than conventional agriculture and can expand globally [10]. Organic farming as a concept is more intrinsic than the conventional agriculture. Traditional agriculture does not completely fit into organic agriculture as it did not involve maneuvering of oil, plant, environment and people to achieve sustainable production [11]. A study by Inder Pal Singh and D.K. Grover from Punjab Agriculture University has revealed that with one percent increase in expenditure on farmyard manure + jeev amrit, biodynamic and machine labor, the organic wheat productivity would increase by 0.114 percent, 0.703 percent, 0.556 percent, respectively, showing significant impact on value productivity. Also, a wide varietal distribution of wheat was observed under organic than inorganic cultivation [12]. Global scenario The global organic food industry was valued at US$88.1 billion in 2015 and is expected to grow at a CAGR of 12.1 percent to reach US$156.3 billion by 2020. The market research company Ecovia Intelligence estimates that the global market for organic food reached 89.7 billion US dollars in 2016 or more than 80 billion euros. Table 1 gives this information. The United States is the leading market with 38.9 billion euros, followed by Germany (9.5 billion euros), France (6.7 billion euros), and China (5.9 billion euros). In 2016, most of the major markets continued to show double-digit growth rates, and the French organic market grew by 22 percent. The highest per capita spending was in Switzerland (274 Euros), while Denmark had the highest organic market share (9.7 percent of the total food market). In Russia the organic sector has been steadily growing since the beginning of 2000s. It could be developed as a part of protectionist strategy. Already ecologization of Russian agricultural policy is taking place. By 2014 - 15 the total amount of land under organic farming almost doubled to a total of 385,000 hectares and the organic market value grew by 10 times. One factor that helps marketing is the 'general' categorization. In the Russian Supermarkets (mostly "premium" stores) - such as Azbuka Vkusa and Globus Gurme - there are no special shelves for

organic food in such stores and organic products are placed in the “healthy foods” section of the supermarket. In the small health food stores - for example, Gorod Sad and LavkaLavka sales are based on healthy diets, healthy lifestyle promotion, and face-to-face marketing. Consumers’ attention is not focused on specific labels; it is rather on the concept of a healthy lifestyle [13,14], specific feature has much relevance for India where paradigm shift in marketing is taking place wherein e-tail market has taken a firm foothold. For organic products there are already hypermarkets. Himalaya Herbals has tried used to increase visibility by investing in shop-in-shops system, which allows the brand to set up a stall within a departmental store. Besides the big and the small markets, hybrid markets also have a space in India, given the nature of the economy. India has shown that retail and e-tail can coexist [15].

At a time when we are discussing so much about global warming and the ill-effects of climate change on environment in general and agriculture in particular, it is appropriate that we also discuss alternative systems of farming like organic, integrated, mixed, perennial grains and conservation agriculture. Organic agriculture is the most popular of these with global sales growing 170 percent to $63 billion from 2002 to 2011. Yet organic farming is still at a low 1 percent of global crop land [10].

In 2016, 2.7 million organic producers were reported. India continues to be the country with the highest number of producers (835’200), followed by Uganda (210’352), and Mexico (210’000). A total of 57.8 million hectares were organically managed at the end of 2016, representing a growth of 7.5 million hectares over 2015, the largest growth ever recorded. Australia is the country with the largest organic agricultural area (27.2 million hectares), followed by Argentina (3 million hectares), and China (2.3 million hectares). Almost haft of the global organic agricultural land is in Oceania (27.3 million hectares), followed by Europe (23 percent; 13.5 million hectares), and Latin America (12 percent; 7.1 million hectares). The countries with the largest organic share of agricultural land of their total farmland are the Liechtenstein (37.7 percent), French Polynesia (31.3 percent), and Samoa (22.4 percent). In fifteen countries, 10 percent or more of all agricultural land is organic, a new record [7].

Present status of organic farming in India Growing awareness about health and environmental issues paved way for increasing demand for organically produced agriproducts across the world. Globally 1.6 million farm producers use organic methods and approximately 80 percent of these producers are in developing countries. The estimated global market for organic products in the year 2012 was approximately 70.1 billion US dollars. In India the organic food market is approximately of INR 5.6 billion and is an emerging opportunity for generation of employment and income at village level. India is blessed with and has the potential to produce all varieties of organic products due to its various agro climatic regions. Organic farming is an inherited practice in India and adds to our advantage. This holds the key for organic producers to tap the market which is steadily growing at 15 - 25 percent in the domestic market. Farmers living in lands untainted by pollutants and away from the perils of modernity are rediscovering the benefits of traditional and holistic farming that maintains soil health and bio-diversity. In 2016 the total area under organic farming in India stood at 1'490'000.00 ha. Currently India ranks 33rd in terms of total land under organic cultivation and 88th in terms of the ratio of agricultural land under organic crops to total farming area. Today the land under organic cultivation is 4.43 million hectares and is increasing at steady rate. India is home to 30 percent of the total organic producers in the world, but accounts for just 2.59 percent (1.5 million hectares) of the total organic cultivation area of 57.8 million hectares, according to the World of Organic Agriculture 2018 report [16]. India is world’s largest organic cotton grower with more than 50 percent of total world’s organic cotton. India exported more than 300 organic products for a volume of 69837 MT realizing value of USD 157 million in 2010-11. The major products exported were cotton and textiles-17363 MT (25 percent), basmati (5243 MT) and non-basmati rice (1634 MT) (10 percent), Oil crops-17966 MT (26 percent) except sesame-2409 MT (3 percent), Process foods -8752 MT (13 percent), tea-2928 MT and coffee (5 percent), honey-2408 MT (3 percent), dry fruits -1472 MT (2percent), spices, medicinal plants and their processed products, miscellaneous (13 percent). The other products categories (5 percent) are cereals, spices, medicinal and herbal plants, coffee, vegetables, aromatic oil and pulses. 44 percent of the organic products were exported to Europe followed by Canada (22 percent), USA (19 percent) and Asia (13 percent). Currently,

India is emerging as a key player in the global arena, exporting over 300 products in 20 different categories to over 20 countries. Additionally, India is the largest exporter of organic cotton and houses the largest number of organic producers in the world. Alongside the developments pertaining to the global markets, the domestic markets are growing at a rate higher than the global average and are expected to keep growing at a 25 percent CAGR through 2020. Sikkim became India's first fully organic state in 2016 with 75,000 ha under organic cultivation, thereby providing impetus to other states to pursue similar objectives. Meghalaya, for instance, aims to make the switch by 2020 [17]. The debate The controversy centers on the overall value and safety of chemical agriculture, with organic farming popularly regarded as the opposite of modern, large-scale, chemical-based [18]. In recent decades, food production has moved out of the public eye. In developed nations, where most of the world's wealth, consumption, and agricultural policy-making are centered, many are unaware of how their food is produced [19]. If the methods used to produce food are rapidly destroying the capacity for continued production, then sustainable, organic farming has a crucial role to play [20]. This proposition is at the center of most organic farming issues. Organic farming does not result in the release of synthetic pesticides into the food supply or the environment, but it does allow certain socalled natural pesticides, such as those derived from plants [21]. Organic farming is now gaining popularity and is being accepted by people all over the world. A growing consumer market is naturally one of the main factors encouraging farmers to convert to organic agricultural production. Increased consumer awareness of food safety issues and environmental concerns has contributed to the growth in organic farming over the last few years [22]. Sustainability Although it is common to equate organic farming with sustainable agriculture, the two are not synonymous. Sustainability in agriculture is a broad concept, with considerations on many levels, such as environmental health, economic profitability etc. Organic farming methods strikes balance between what is taken out of the soil with what is returned to it, without relying on outside inputs. Organic farming today is only a small part of the agricultural landscape, with a relatively minor impact on the environment [22].

Lessons from Kerala In God's own country Kerala, whichever party came to power, the state agricultural policy continued to be vibrant and active towards organic farming. Farmers, political parties and coalitions, universities, NGOs, Biodiversity Board, Agriculture Department - all contributed. They realized that they were fighting a losing battle with the "high yield variety fertilizer-pesticide pack" of the Green Revolution. They have also realized that the degradation and disruption of the fragile ecosystems of the state are the chief culprits for the water scarcity, nutritional insecurity, loss of primary productivity and agrarian crisis being faced by the State [23]. They wanted an evergreen revolution. The farmers were convinced that the only way is to return to the traditional sustainable ways of cultivation without harming the ecosystem through organic farming, a system with the broad principle of "live and let live" recognized nationally and internationally. Agreeing on this language and forging the policy, however, was no easy feat, and it took four turbulent years to come to fruition, with back and forth debate. The Kerala State Biodiversity Board does not have any regulatory authority. It is only a statutory body that advises the state government. Yet it succeeded in making its organic farming policy officially part of state's regulatory structure in the Agriculture Department and in getting it funded. The National Biodiversity Bill was implemented in true spirit in the state. NGOs like the Kudumbashree are working hard. The rest is history. That is Kerala's contribution to Incredible India. The famous Gadgil report suggests the adoption of Kerala's organic farming policy across state lines: "The Organic Farming Policy of Kerala. Could be adopted as a model not only for the Western Ghats, but also for all the six States benefitted by the mountain system." The Gadgil Report, therefore, gave the proponents of Kerala's organic farming policy a vehicle for protesting the Green Revolution and scaling up organic agriculture nationally, using Kerala as an exemplar. It is now endorsed by the equally famous Kasturirangan Report [24]. The sustainable food advocacy in the USA and the agrarian policy in Kerala - the success stories - carry messages of inspiration for the rest of the world. Challenges Developing countries are already producing a wide range of organic products are often faced by a number of constraints, such as lack of technical know-how, for example organic farming practices and production methods, and lack of market information like which products to grow, which markets and distribution channels to choose, competition, market access poses not only a

technical problem but adds considerable costs to the product, which have to be borne by the consumer in one way or another. Further importers, food manufacturers, retail organizations and consumers also look for guarantee of Organic origin. Organic products are expensive. Organically produced foods should adhere to strict regulations like certification and intensive management. Organic farming is still faced with the problem of higher labour input in its operation. In-addition, organic farming is still hampered by lack of clarity: Consumers were not always sure about what was really covered by organic farming. Despite all constraints, Organic farming has mostly come from small farmers and is gaining acceptability in developing countries including India. In India one of the foremost problems is the financial constraint confronting the farmers in the initial ('conversion') phase of a switchover from non-organic to organic farming. Another hassle is the enormous amount of mandatory documentation involved that affects the illiterate farmers. And then there is the problem of inability to sell the produce at a premium price because at the transition period the products cannot be sold as 'organic'. Further, domestic marketing is underdeveloped in India [25]. Suggestions Organic farming in India needs both technical and institutional support. Systematic training with a strong network across regions is the need of the hour. Low cost and hassle-free certification need to be put in place. Even group certification can be encouraged through cooperatives and self-help groups. Well-developed domestic market circuits - contacts, contracts, information, pricing - should be set up. The Indian Council of Agricultural Research (ICAR and the National Project on Organic Farming (NPOF) should play dynamic role in promoting organic farming not simply as a source of export revenue but as an alternative model of agricultural development. Conclusion For several years, conventional agriculture has been increasingly subject to strict environmental and animal welfare rules. The organic farming sector needs to see where it stands in relation to these new developments. From mastering nature to nurturing its resources, there is already a paradigm shift. Organic farming can provide quality food without adversely affecting the soil's health and the environment. There is need to identify suitable crops/ products for organic production that has international market demands. It will provide ample opportunity for employment and bring prosperity and peace in the nation. So, there is the urgent need for favorable policy initiatives to strengthen this sector. Such policies lay a solid foundation to promote sustainable development and the dream of sustainable development will be a reality.

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