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# Traditional & Organic Farming: a Green Technology for Soil Health, Soil Fertility, Food Quality, Nutrition Security & Eco-livelihood Sustainability

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**ABSTRACT:** The future challenge is how our growing global population will survive on the future reality of dwindling resources. The natural resource is limited, food is the daily need and nutritional balance is a necessity of healthy life and fertility. In modern world the farming is not only increasingly mechanized but chemicalization is devastating the natural life forces. The ill health is linked to the soil fertility and water security. The wisdom is the Power of Ideas on a Finite Planet—not only contains a plan; it may be the only plan to save the world. The alternative technique is organic farming -a most modern as well as the oldest basic farming method is not only eco-friendly but a low cost and high return technique that promotes soil health as well food & nutritional security of consumers.

**KEYWORDS:** Food Security; Organic Vision; Eco-Friendly; Nutritional Security; Sustainability; Climate change.

### I. INTRODUCTION

India is mainly an agricultural country, where agriculture contributes to about 14.6 percent in gross domestic product (GDP) and support over 58 percent of nation's population for livelihood (GOI, 2010). India with 2.5 per cent of the global land mass and 16 per cent of the global population recognized the importance of human resources as the engines powering national development and gave high priority to improvement of the health and nutritional status of the population. Article 47 of the Constitution of India promises that it is the primary duty of state is to regard raising the level of nutrition and standard of living of its people and improvement in public health. Organic farms although yield on an average 10-15% less than conventional farms, the lower yields are balanced by lower input costs and higher margins. Its annual growth rate has been about 20% for the last decade (Lotter, 2003), accounting for over 31 million hectares of area and generating over 26 billion US dollars in annual trade worldwide (Escobar and Hue, 2007). Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes, the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system (FAO, 1999). By ensuring that women have the same access to productive resources and farming as men, women could increase yields on their farms by 20 percent to 30 percent; this could reduce the number of hungry people worldwide by 100 to 150 million. Sustainable food and agriculture policies aim to improve the efficiency of agricultural production systems while at the same time preserving the diverse ecosystem services upon which the world's food supply depends (e.g. agricultural lands, soil nutrients, forests and oceans, climate regulation, and biodiversity, etc.) These twin objectives are central to the health goals of ending hunger/under nutrition and achieving long-term food and nutrition security for all.

Thus, widespread environmental degradation, severe poverty around the globe and the burning concerns about achieving and maintaining good quality of life were the principal factors for taking interest in intergenerational equity, in relation to access to natural resources. So, the necessity of having an alternative agriculture method which can be functioned in a friendly Ecosystem while sustaining and increasing the productivity is talk of the day among not only

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agricultural scientists but also even common men - Organic farming is recognized as the best known alternative. It is economically feasible to practice when the farmers are able to get premium price for their product. The cost of cultivation will be reduced by not depending upon the purchased off-farm inputs. Low productivity in the transition stage needs research activities in the national and international level. Organic farming is not only revival to the farming community, it also revival to the consumers to lead a “Healthy and Happy life”. So a paradigm shift to Organic farming is the need of the day to enhance the quality of life.

## II. DISCUSSION

**Organic Vision:** It is a matter of fact that the modern agriculture is based on the use of high yielding varieties of seeds, chemical fertilizer, irrigation water, pesticides etc. to satisfy the ever growing demand for food grains not only to fulfill the problem of food security but also to earn foreign exchange at the cost of environmental quality which cannot be sustainable in future because of the adverse changes being caused to the environment and ecosystem. The term ‘organic’ was first used in relation to farming by Northbound (1940) in his book *Look to the Lad*. Over the past five years, the world has been hit by a series of economic, financial and food crises that have slowed down, and at times reversed, global efforts to reduce poverty and hunger. Today, price volatility and global weather shocks continue to severely undermine such efforts. In this context, promoting livelihood resilience and food and nutrition security has become central to the policy agendas of governments. As most good agricultural land has already been farmed and the region have exceeded the safe limit, the natural resources availability for further farming expansion is practically exhausted. Smallholder farmers need to be at the center of this agenda, and to play a leading role in the investment efforts needed to achieve it. Organic development denotes a holistic system of lifestyle which optimizes productivity in a sustainable manner. Organic technologies are environmentally safe, economically viable and socially replicable. Organic farming is essentially an agriculture employing a knowledge/understanding of naturally occurring processes. Organic practice maintains soil health, re-enliven soil fertility and balances useful and harmful insect-pests ratio. About 74% farmers in India are small and marginal farmers. Organic practice is most relevant to them. The activated and technically upgraded organic farming is known as biodynamic farming. Bio-Farming practices in general and Biodynamic Farming system in particular are increasingly proving to the sustainable farming practice in many countries as well as in different parts of India. Biodynamic agriculture is a cost effective and techno-economically viable, export friendly, farm friendly, eco-friendly farming system. Thus is adoptable and sustainable.

Table 1: summarizes incentives and constraints for farmers adopting organic agriculture in developing nations.

Incentives	Constraints
<ul style="list-style-type: none"> <li>▪ Disillusion with green revolution technologies.</li> <li>▪ The inaccessibility or high cost of green revolution technologies.</li> <li>▪ Organic agriculture incorporates/ gives place to indigenous knowledge.</li> <li>▪ The influence of the environmental and development movements.</li> <li>▪ Premiums and market opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of knowledge about organic agriculture.</li> <li>▪ Lack of economic and political advocacy.</li> <li>▪ Population pressure encourages intensification as priority of government advocacy.</li> <li>▪ The high cost of certification by foreign organizations.</li> <li>▪ Low literacy levels in rural areas make record keeping, necessary in organic agriculture, a problem.</li> <li>▪ Lack of trade liberalization in some countries prevents development of organic exports.</li> </ul>

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Organic farming address the needs of poor and food insecure people by ensuring their access to adequate food at all times through nutrition- and gender-sensitive safety nets; strengthening their access to land, water and other productive assets; building their capacities for sustainable agricultural intensification in the face of multiple natural resource challenges and climate change; enabling them to market their produce on more favorable terms; assisting them to reduce the amount of food they lose post-harvest; strengthening their ability to find economic opportunities off the farm; and supporting them to use the locally produced food they have to improve the nutritional status of all family members. They need to be protected from food price volatility and empowered to manage risks and shocks. There are about half a billion smallholder farms worldwide. In many developing countries, the overwhelming majority of farms are small and family-run, and they produce most of the food consumed locally. Smallholders are also by far the main investors in agriculture in most of the developing world.

**Soil Health & Soil Fertility:** Organic farming is a Green Technology (GT) - environmental healing technology that reduces environmental damages, which contributes to both poverty reduction and sustainable agricultural development. In the long run organic farming will secure the future for sustainable farming. According to public perception, organic food is the healthy option. Sales of organic produce have rocketed over the past few years with the organics industry sending out messages of safer, healthier food created by farming practices which are better for the environment. It is the belief of the organic farming community that organic farming minimizes the need for chemical inputs thereby limiting damage to health and the environment. It is a more sustainable method of farming than conventional techniques and biodiversity is promoted. Intensive farming is said to destroy the fertility of the land, but with organic farming and sustainable crop rotations, soil health is improved. IN particular, lack of sufficient amount of vermi-composting and non-availability of bio-fertilizers in local market further constrain organic producers (Gill et al., 2000). As good agricultural land is already farmed, the natural resource availability for further farming expansion is exhausted. Worldwide urbanization, higher costs of energy, population growth that damage environment have necessitated the development of technology-driven energy and cost efficiency mechanism. Need is to achieve sustainable agriculture that obtain higher yield and increase income without affecting the environment.

**Food Security:** The term “food security” was first used in the international development literature of the 1960s and 1970s. Food security, an important element of poverty alleviation, is a priority focus of sustainable development. World Food Summit in 1996 defined food security as a situation in which “all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. Food security brings into focus the linkage between food, nutrition and health. Food security and nutrition situation in the new millennium showed that the country had been self-sufficient in food grain production for four decades and the threat of famine has been eliminated. But today, with just under 1 billion people going hungry every day, we still have a long way to go. The projected growth in the world’s population to 9.2 billion by 2050 adds an extra challenge for food security. Burgeoning populations mean more demand for food, water and land at a time when the natural resource base for agriculture is being degraded, large areas of farmland are being diverted from food crop production, and climate change threatens to further reduce agriculturally viable land. Food insecurity, mostly seasonal, was confined to poorer segments in remote areas; hunger had been reduced and energy needs met by food grains. But pulses critical to meet protein needs in populations subsisting on vegetarian diets, were expensive and consumption had come down. Vegetables intake which is essential to provide the needed micronutrients continued to be low. Low dietary intake is the major factor responsible for under nutrition but nutrient loss associated with infections comes a close second. Potable water supply and sanitation are critical for prevention of infections. Health care for early detection and effective management of infections can reduce under nutrition due to infections. India has been self-sufficient in food production since seventies and low household hunger rates.

**Nutritional Security:** India has been in the forefront in developing national food and nutrition databases, undertaking research studies and surveys documenting the ongoing agriculture, food, nutrition and health transitions. Human health is directly affected by environmental degradation and climate change, undermining the right to health. Promoting universal access to health care and healthy environments (including water and sanitation, clean air, etc.) can significantly minimize these impacts. The promotion of health benefits of greenhouse gas mitigation policies in sectors such as energy, transport, food and agriculture, water and housing will reduce the adverse effects of climate change on

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health. Health indicators can bolster accountability for the social impacts of development policies, contributing to governance for sustainable development. Food policies should also consider nutrition and health as an outcome, including communicable and non-communicable diseases. Smallholder farmers can significantly contribute to economic growth, as well as to reducing poverty and ensuring food and nutrition security. Food and nutrition security means equitable access for all people to high quality food rich in micronutrients and containing the minimum amount of additives and chemical residues (e.g. pesticides, fertilizers, hormones, antibiotics, etc.) needed to ensure optimal production without compromising human health. Inadequate food and poor health are two direct factors contributing to under nutrition. Major achievements have been reached that most of the people in the world receive sufficient food to meet their energy requirements. However, energy is not sufficient to ensure good nutrition. Adequate micronutrients must also be available. Among the most important micronutrients are: iron, vitamin A, and iodine. Indisputably, iron deficiency is a major public health nutrition problem. According to the estimation of WHO, about 5 billion people suffer currently from iron deficiency - about 80% of the world's population.

**Sustainability:** The basic dimension of sustainable development is environmental, social and economic. Animal manure is the natural soil conditioner & amendment agents. Livestock play multifaceted roles strengthening indigenous agricultural practices, organic farming and generating income and livelihoods for large masses of rural India. However, with the advent of modern mechanized technology in agriculture, livestock population in our country is rapidly declining by 10-30%. FAO strongly advocates that improved pasture and range land management practices are essential not only for supporting livestock production but also for restoring carbon pool, nutrient cycling and soil quality. Thus organic farming supports natural resources & their sustainability. In India small farm holders constitute over 70% of farming community are potential organic farmers. If a proper guidelines on organic inputs, organic, certification and input cost coupled with capital-driven regulation by contracting firms strongly discourage. In terms of sustainability, the negative effects of changing temperatures and precipitation on agricultural production, food security, and under nutrition in developing countries has been described as the largest single negative impact of climate change on global health (McMichael A, et al., 2004) The quality-controlled bio-products are better targeted to global markets and will certainly boost the India's share in the global trade, which is less than 1%. Diversifying agriculture practices could further improve the agribusiness sector. The biodynamic agriculture and organic farming are similar in that both are ecologically oriented and do not use chemical fertilizers, pesticides and weedicides. The main difference between the two is that in biodynamic agriculture eight different preparations (BD500-507) are used, with the cosmic forces, mainly the influence of the moon and the planets through the biodynamic planting calendar, which makes it an activated organic farming system. Biodynamic farming practices rejuvenate and re-enliven the earth so that it could continue supporting a healthy plant and animal life. It is sustainable and promotes natural resources i.e. produce adequate high quality food, environment friendly, protect the soil, and socially viable. Biodynamic (BD) crops products contain more vitamin C, iron, magnesium and phosphorus than conventional crops products, contains significantly less nitrates. Organically grown crops shows better protein quality, higher content of nutritionally significant minerals and lower amount of heavy metals. To be sustainable there should be successful management of resources i.e. it must produce adequate high quality food, be environment friendly, protect the soil, and be profitable and socially viable. Biodynamic crops products contain more vitamin C, iron, magnesium and phosphorus than conventional crops products, contains significantly less nitrates, BD grown crops shows better protein quality, higher content of nutritionally significant minerals, lower amount of heavy metals. Table-2 summaries the nutraceutical value of crops grown in conventional vs. bio-dynamically (influence of cosmic forces). These techniques in combination with traditional methods are of great help in this endeavor.

Table-2

Sr. .No.	Constituents	Biodynamic Products (mg)	Conventional Products (mg)
1	Vitamin C (mg)	89.2	67.9
2	Iron (Fe)	3.7	3.0
3	Magnesium (Mg)	80.0	68.6
4	Phosphorus (P)	124.0	111.8
5	Carotene	14.0	0.3

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## **Bio-farming for Sustainable Development:**

**1. Farm Friendly Technology:** In comparison of the conventional farm the biodynamical farm soils has better physical, chemical and biological properties such as the soil texture, depth and porosity, water holding capacity, organic matter content. The organic matter content, soil respiration, mineralizable nitrogen, and the ratio of mineralizable nitrogen to organic carbon are reported to be higher on the biodynamic farms i.e. higher microbial activity and thicker topsoil on biodynamic farms. Earth worms which are also called as farmer's farm factory are reported to be more than 25 times in number and 8 times in weight on the biodynamic farms as compared to the conventional farm. These characteristics make the biodynamic technology more a farm-friendly technology.

**2. Export -Friendly Agriculture:** The biodynamic farm products are certified organic or biodynamic products- Demeter certification. These bio-grown products are free from all the chemicals. The produce has better nutritive values, taste and due to the natural growth they have good storage capacity. Even perishable vegetables and other produce last longer on biodynamic farms. The demand of biodynamic produce is increasingly growing in the national and international market. In most of the developed countries only certified food and agro-products are now getting entry and recognition. The cost of the biodynamically grown produce fetches premium price up to 25% to 35% higher than the market price of a similar conventional product. As now the economic stability is one of the most significant characteristics of sustainable farming system the biodynamic farm promises a better alternative because of its greater enterprise diversity and less year-to-year variability in gross revenue. In general at a biodynamic farm net returns are about 40% higher than their conventional counterparts.

**3. Eco-Friendly:** Biodynamic agriculture technology not uses any sort of chemical application and the focus is on balance natural growth and recycling of natural resources. The preparations are produced from the plant parts and most of the applications are based on ecological principles. Organic farming helps to adopt a climate justice approach. Although, commercial organic agriculture with its rigorous quality assurance system is a new market controlled, consumer-centric agriculture system world over, but it has grown almost 25-30% per year during last 10 years. In spite of recession fears the growth of organic is going unaffected. The movement started with developed world is gradually picking up in developing countries. But demand is still concentrated in developed and most affluent countries. Local demand for organic food is growing. India is poised for faster growth with growing domestic market. Success of organic movement in India depends upon the growth of its own domestic markets.

**4. Sustainable:** National Planning Commission of India in 2000 recognized organic farming as a thrust area. Sustainable agriculture integrates three main goals— environmental health; economic profitability; and social and economic equity. Among the available technologies such as organic agriculture, biotechnology etc., the challenge is to decide suitable, affordable, and competitive technology. Cycling of nutrients and quality farm produce in adequate amount with the entire environmental safety and profit characters make this farming system as sustainable. India has traditionally been a country of organic agriculture, but the growth of modern scientific, input intensive agriculture has pushed it to wall. But with the increasing awareness about the safety and quality of foods, long term sustainability of the system and accumulating evidences of being equally productive, the organic farming has emerged as an alternative system of farming which not only address the quality and sustainability concerns, but also ensures a debt free, profitable livelihood option.

**5. Adoptable:** The biodynamic agriculture is an activated system of organic farming. Most of the preparations are quite easy to prepare and based on the local resources. The preparations, understanding and application are easy and adoptable. In this farming system approach a piece of land is used optimally and to its fullest potential to produce a range of nutritious and healthy food as well as other required commodities in a manner which can healthily feed a small family, and maintain soil health and productivity by agricultural practices based on principles of nature. Pests (both insects and diseases) are also controlled and managed by the selection of crop mixes and using biological control measures.

**6. Climate change:** Climate change will increase the risk of hunger and under nutrition over the next few decades and will challenge the realization of the human rights for health and adequate food. With a change in patterns of extreme

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events such as heat waves, droughts, floods, and other disasters, vulnerable communities will suffer serious setbacks in terms of food and nutrition security.

### III. CONCLUSION

External input dependent Green Revolution alarm bells have been ringing for a decade or more. The soils of India are dying, the agriculture is becoming increasingly destabilized and farmer's suicides are mounting throughout the length & width of the country. The World Food Summit in 1996 provided a comprehensive definition for food security which brings into focus the linkage between food, nutrition and health. Food and nutrition security (FNS) has evolved dramatically during the last decades in theory and practice.

Ensuring health and food and nutrition security is essential for poverty eradication and climate-resilient sustainable development. In the sixties of the last century the acute or chronic food inadequacy at national, regional or house hold level was widespread among the poor segments of population. With increasing concern about the environmental, economic and social impact of chemical-dependent conventional agriculture have led many farmers and consumers to seek alternative practices that will make agriculture more sustainable. Entrepreneurs see a market for selling food that has been grown chemical free. Bio- farming practices rejuvenate natural resources and re-enliven the earth, promote biodiversity so that it could continue supporting a healthy plant and animal life. Biodynamic is an innovative & activated organic farming system that has significant role to play in the areas of sustainable agriculture with emphasis on ecological conservation and renewable resources. The degenerative effects of intensive farming practices on soil fertility and ecological balance are surfacing which needs immediate attention for sustaining the productivity rate. Increasingly, the movement away from organic methods of farming has resulted in the loss of food, nutritional, livelihood and ecological security and at times, life itself. Many recent reports in the media have written an epitaph for Indian soils, food & nutritional security. When used correctly agro-environment-friendly technology has promoted sustainable agricultural growth and reduced widening rural-urban income disparities. To address these challenges, robust and carefully targeted investment is needed, along with comprehensive policy frameworks at global, regional and national levels.

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