IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Organic Farming In India: A Study On Contemporary Dynamics

Dr.M.V.Dinesha, Assistant Professor, Department of Studies in Economics & Co-operation, Manasagangothri, University of Mysore, Mysore.

Abstract

Sustainable development has become the buzz word all over the globe from past few decades. Sustainable agriculture is necessary to attain the goal of sustainable development. Green revolution has brought spectacular increase in production and productivity in our country. Food production has increased from 69 million tonnes in 1965 to 275 million tonnes in 2016-17. The increased food grains supply during the last five decades in many parts of the country has ensured national food security. But it has shown the undesirable effects on natural resources, such as soil, water, biodiversity and human health. Farmers are using more fertilizers to get the yield as they were getting with lesser fertilizers twenty to thirty years ago. Consumption of chemical fertilizers {NPK) has been increasing in India during the past fifty three years. It was only 5.43 lakh tones in 1963-64 i.e., before green revolution and reached 259.49 lakh tones in 2016-17. Consumption of pesticides increased from 24.32 thousand tonnes in 1970-71 to 52.75 thousand tones in 2016-17. Injudicious use of fertilizers and exorbitant use of pesticides has led to enormous levels of chemicals buildup in our environment. . It is adversely affecting the health of human being, plants and animals. The present system of agriculture is unsustainable and self destructive. In this context the present study focus on the trends in consumption of fertilizer and pesticides in Indian agriculture and the need for organic farming in India.

Key words: Organic farming, Indian farmers, Agriculture

Introduction

Sustainable development has become the buzz word all over the globe from past few decades. Sustainable agriculture is necessary to attain the goal of sustainable development. Sustainable agriculture "is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources"(FAO). Sustainable agriculture laid great emphasis on maintaining an agriculture growth rate, which can meet the demand for food of all living things without draining the basic resources.

Green revolution has brought spectacular increase in production and productivity in our country. Food production has increased from 69 million tonnes in 1965 to 275 million tonnes in 2016-17. The increased food grains supply during the last five decades in many parts of the country has ensured national food security. But it has shown the undesirable effects on natural resources, such as soil, water, biodiversity and human health. The fertility of the soil has been declining due to soil erosion, salinization. Water resources are over exploited due to use of high yielding varieties seed and use of chemical fertilizers. Farmers are using more fertilizers to get the yield as they were getting with lesser fertilizers twenty to thirty years ago. In Punjab, the average fertilizer use in rice and wheat has become much higher than the recommended dose. Residues of harmful pesticides in food and drinking water pose a serious threat to consumer's health.

Modern agriculture involves high cost of cultivation compared to the revenue generation. There has been rise in the prices of agricultural inputs as well as use of more external inputs in agriculture. At present the question is to continue with the chemical based intensive technologies or to go back to the traditional environment friendly economic development of the farming community. These questions have made us to think of some other alternative methods of increasing food production. In this context, organic farming has drawn the attention of agricultural scientists, planners and policy makers across the globe.

In developing countries the twin challenges are, growing more food to meet the demand of increasing population with available land and prevention of environmental degradation. Growing more food means more environmental degradation or giving priority to environmental protection means less food production. To balance these two problems we have to adopt a compromising practice that is "organic farming".

Review of Literature

Tulsi Bharadwaj and Sharma (2013) observed that, application of pesticides adversely affecting non target species in the environment such as plants, fisheries, birds and wildlife. They also found that excessive use of pesticides pose potential risk to humans and cause many side effects to the environment. Hence, the major victims are children. Some of the acute health problems noticed among respondents include cancer, neurological problems, reproductive risk etc.

Murugan M and Shetty P K., et al.,, (2014) conducted surveys with regard to pesticide use on Cardamom and tea during 2009-2012. The survey found that, Cardamom consumed 26 Kg. per hectare pesticides compared to tea (8 kg per hectare). As a result pesticide residue present in the soil in Cardamom growing region found to be highest leading to pesticide poisoning. Therefore study suggested that pesticide use in Cardamom and tea growing regions have to be taken care of seriously to safeguard agro forestry ecosystem.

Pujeri Pujor et al., (2015) conducted a study on an economic analysis of pesticide residue in vegetables in Vijayapura, Karnataka. The study found that, pesticide ensures high crop production and helps in post-harvest treatment of agricultural commodities. However, indiscriminate use of these chemicals have

contaminated environment and resulted in short term/ long term chronic health problems like headaches, nausea, cancer, reproductive harm etc. The study further found that, presence of pesticide residues in food products.

Greenpeace (2015) in its report on "Pesticides and our health" finds how industrial farming and the use of chemical in particular is presently adversely affecting farmer's health and their family. The report also highlights on pesticides residues found in food and human breast milk, cancer development in children etc.

Mayur Prajapati et.al., (2017) in their study observes that during the last decade organic farming has gained international recognition as a viable option to conventional farming. In many parts of the country farmers practice organic farming by default or in absence of resources. The organic farming movement is spreading gradually in all most all states of the country. Indian organic sector is steadily making in-roads into world organic food market. India having variety of geographical and climatic regions has great potentiality to export various agricultural commodities in world market.

Yudhishther Singh Bagal et.al (2018) in their study found that farmers were irrational in both usage and purchase of fertilizers. The quantity of fertilizer applied per hectare dependent on the type of crops grown and almost all the farmers apply more dosage of fertilizer than recommended. The NPK ratio applied was not in accordance as compared to the recommended. While estimating the preference for purchase, the farmers opined that easy availability, brand and price irrespective of nutrient composition of fertilizers. It is therefore, imperative that farmers need to be trained to use fertilizers in the right proposition and timely information should be given about different forms and kinds of fertilizers that are available.

Research gap: From the above reviews it is clear that studies have been undertaken by the researchers on pesticide consumption, fertilizer consumption and importance of organic farming. These studies are related to the negative impacts of pesticides and fertilizer consumption on environment, human health and other living organisms at national and state level. Literature on consumption of pesticide consumption and fertilizer consumption are scarce. In this context an attempt has made to study the trends in of fertilizer and pesticides consumption in India over a period of time and also the need for organic farming.

Objectives: The study has two objectives.

1. To study the trends in consumption of fertilizer and pesticide in India.
2. To analyze the need for organic farming in India.

Methodology: The study is based on secondary data. It is collected from the reports of Agricultural situations in India and Agricultural statistics book.

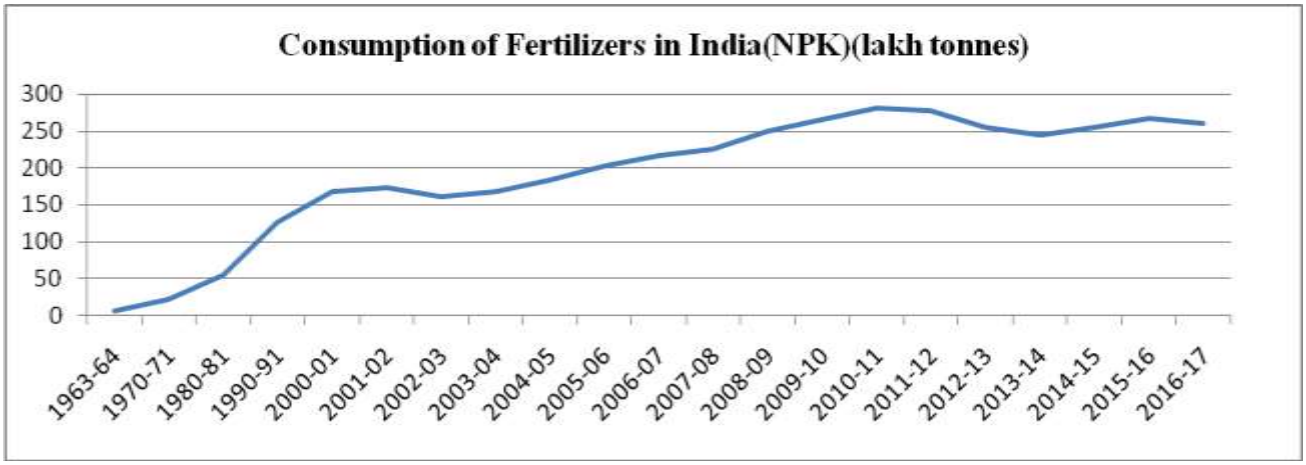
Consumption of Fertilizers in India: India is the second largest consumer of fertilizers in the world, after China. Trends in fertilizer consumption in terms of total quantities in the country are presented table no. 1 and figure no 1.

Table No.1 Consumption of Fertilizers in India (NPK) (lakh tonnes)

Year	Consumption of Fertilizers in India (NPK) (lakh tonnes)
1963-64	5.43
1970-71	21.77
1980-81	55.16
1990-91	125.46
2000-01	167.02
2001-02	173.6
2002-03	160.94
2003-04	167.99
2004-05	183.98
2005-06	203.4
2006-07	216.51
2007-08	225.7
2008-09	249.09
2009-10	264.86
2010-11	281.22
2011-12	277.9
2012-13	255.36
2013-14	244.82
2014-15	255.76
2015-16	267.52
2016-17	259.49

The above table no.1 represents the data of consumption of fertilizer in India from 1963-64 to 2016-17. Consumption of chemical fertilizers {NPK) has been increasing in India during the past fifty three years. It was only 5.43 lakh tones in 1963-64 i.e., before green revolution. At the time of onset of green revolution in 1966-67 consumption of fertilisers were about 1 million tones. In 1970- 71, total fertiliser consumption increased to 21.27 lakh tonnes, which further increased to 55.16 lakh tonnes in 1980-81. Fertilizer consumption increased significantly from 55.16 lakh tones in 1980-81 to 125.46 lakh tones in 1990-91. In 2000-01 fertilizer consumption was 167.2 lakh tonnes and reached 281.22 lakh tonnes in 2010-11. 2010-11 recorded highest consumption of fertilizer consumption in India. After 2010-11 there has been a decline in consumption of fertilizer consumption. In 2011-12 it was 277.9 lakh tones further declined to 244.82 lakh tones and reached 259.49 lakh tones in 2016-17.

Fig No.1: **Consumption of Fertilizers in India (NPK) (lakh tonnes)**



Introduction of new technology, high yielding crop varieties, expanded irrigation, availability of credit, changing cropping pattern, introduction of Retention Price Scheme, distribution of fertilisers to farmers at affordable prices, expansion of dealer's network, improvement in fertiliser availability and virtually no change in farm gate fertilizer prices for 10 years (1981-1991), agricultural extension services were the major reasons for increase in fertilizer consumption in India.

Impact of consumption of fertilizers: - Increase in use of fertilizer in agriculture has resulted in rise in food production but not to the expected level particularly in the regions where it is being regularly used. Experts are of the opinion that efficiency of fertilizer use is only 35 percent and the remaining 65 percent of nutrients are reaching the underground water. Nitrate and phosphates joining water bodies and polluting water. Injudicious use of fertilizers, neglect of organic and bio-fertilizers causing soil health deterioration. It is adversely affecting the health of human being, plants and animals. Some adverse effects of using more fertilizers are

Nitrate pollution: About 65 per cent of nitrogen applied is lost by volatilization run off, de-nitrification and leaching. The leached nitrate causes the following ill effects. They are

- Plants become succulent and dark green in colour thus becoming, more susceptible to pests and disease.
- Due to high growth, stems become weak causing lodging in crops like paddy but also reduce the quality of the seed.
- Using of ground water which contains nitrate causes disease like "Methemoglobinemia" a disease that interferes with oxygen carrying capacity of blood.
- Excess use of urea in paddy fields leads to vector causing disease called Japanese encephalitis. Children in the age group of 4 to 14 years are mainly affected.

- Nitrosomine illness is caused by the presence of secondary amines, which causes cancer in human beings.
- Feroxyl nitrates, alkyl nitrates, vapors of nitric acid and nitrate aerosols cause respiratory disease.
- Nitric acid in aerosols may lead to acid rain causing lot of damage to ecosystem and buildings.
- Nitrate oxide produced by de-nitrification damages the stratospheric ozone layer.

Soil acidification and alkalization: This causes non-availability of certain nutrients to crops and reduction in activities of micro organisms. Some examples are

- Excessive application of chemical fertilizers effects physical properties of soil such as infiltration, soil aeration, soil structure and bilk density.
- Malnutrition is another ill effect of excessive use of fertilizer as carbohydrates and proteins both are degraded quantitatively and qualititatively.
- Vitamin C and carotene content in fruits and vegetables are decreased due to excessive use of potassium fertilizer.
- Continuous use of potassium fertilizer results in the development of trace metal contaminants such as arsenic and cadmium.
- Iron, aluminum and manganese toxicities in acidic soil and sodium toxicity in alkali soil affect the availability of other nutrients and deteriorates fertility and productivity of soils.

Eutrophication: Process of enrichment of surface water bodies such as lakes, reservoirs and streams with nutrients, particularly phosphorus and nitrogen results in intense proliferation of algae and higher aquatic plants in excessive quantities deteriorating water quality.

Consumption of Pesticides in India

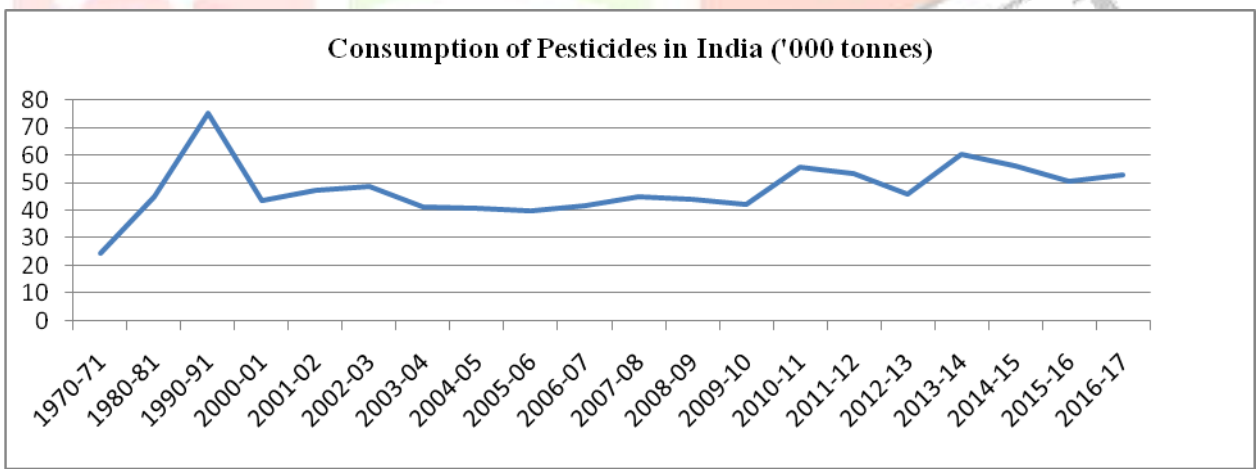
The use of chemical pesticides began with the discovery of toxicological properties of DDT and HCH during the Second World War. Many chlorinated hydrocarbon insecticides like aldrin, dieldrin, toxaphane, chlordane, endosulfan, etc. came into the market during the second half of the last century. Simultaneously, organophosphate and carbonate compounds were employed in agriculture. A new group of insecticides, such as premethrin, cypermethrin, fenalerate, etc. which were effective at low doses came into being in the 1970s.

Pesticide consumption in India from 1970-71 to 2016-17 is shown in Table 2 and figure no.2. Consumption of pesticides increased from 24.32 thousand tonnes in 1970-71 to 75 thousand tonnes in 1990-91. After 1990-91 there has been a decline in the consumption of pesticides in

Table No 2: Consumption of Pesticides in India ('000 tonnes)

Year	Consumption of Pesticides in India ('000 tonnes)
1970-71	24.32
1980-81	45
1990-91	75
2000-01	43.58
2001-02	47.02
2002-03	48.3
2003-04	41
2004-05	40.67
2005-06	39.77
2006-07	41.51
2007-08	44.77
2008-09	43.86
2009-10	41.82
2010-11	55.54
2011-12	52.98
2012-13	45.62
2013-14	60.28
2014-15	56.12
2015-16	50.41
2016-17	52.75

Fig No.2: Consumption of Pesticides in India ('000 tonnes)



.

India. Lowest consumption of pesticides was recorded during 2005-06 it was 39.77 thousand tonnes. Later there has been an increase in the use of pesticides, it increased to 60.28 thousand tonnes in 2013-14 and reached 52.75 thousand tones in 2016-17.

The use of pesticides increased considerably with the introduction of new agricultural strategy in the mid of 1960's as the new varieties are more prone to attacks by pests and insects. The main reason behind the introduction of pesticides was to reduce crop yield losses due to pests and diseases and to increase crop

production. Increase in use of fertilizer leads to increasing use of pesticides to control pests and diseases. The trend of increasing fertilizer use also compels the farmers to enhance the use of pesticides as well. After 1991, subsistence agricultural sector was transformed into commercial sector. As the intensity of production increases towards market orientation, farmers invariably used high dosages of pesticides to generate income through production. Another reason for the increase in pesticide consumption in agriculture was liberal policies of the government to Agrochemical units and provision of subsidies to farmers. In India the consumption of pesticides significantly increased from 1971 to 1990s. 1991 onwards declining trend was observed may be due to the slowdown in the spiraling effects of green revolution and increased awareness among farming community about the negative externalities of pesticide use.

Impact of pesticide use; - The injudicious and exorbitant use of pesticides has led to enormous levels of chemicals buildup in our environment. In the name of growing more food we have taken wrong route and created problem of sustainability. Pesticides enters environment mainly through

- Volatilization from soil and water
- Water mainly by surface runoff, sediment transport from treated soil, industrial wastes and direct application of pesticides to control aquatic pests.
- Improper use of systematic fungicides(carbendazium) has resulted in development of resistant strains of different plant pathogens.
- Adverse effects on beneficial organisms like honeybees, pollinators, parasites and predators. American bollworm problem in Guntur and Prakasham districts of Andhra Pradesh in 1986, almost all the predaceous bird fauna were totally exterminated. The crisis in cotton cultivation posed by bollworms, white flies etc., lead to total crop loss and suicides by farmers in Andhra Pradesh.

The present system of agriculture is causing damage to the ecology. It is unsustainable and self destructive. In this context there is a need for organic farming in the country.

Organic farming

Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture. Organic farming is a production system which avoids the use of chemical fertilizers, pesticides, growth regulators and livestock feed additives to the maximum extent possible. It also promotes and enhances the agro ecosystem health which includes biodiversity, biological cycles and biological activities. Organic farming relies mainly on crop residues, animal manures, legumes, green manures, wastes and biological pest control which aims at producing high quality nutritional food with sustainable yield.

There are several definitions of organic farming and the one given by the US Department of Agriculture (USDA) is considered the most coherent and stringent. It is defined as 'a system that is designed and maintained to produce agricultural products by the use of methods and substances that maintain the integrity

of organic agricultural products until they reach the consumer. This is accomplished by using substances, to fulfill any specific fluctuation within the system so as to maintain long term soil biological activity, ensure effective peak management, recycle wastes to return nutrients to the land, provide attentive care for farm animals and handle the agricultural products without the use of extraneous synthetic additives or processing in accordance with the act and the regulations in this part'.

International Federation of Organic Agricultural Movement (IFOAM), an international organization established in 1972 for organic farming organizations defines goal of organic farming as

"Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes bio-diversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved…"

The Food and Agriculture Organization of the United Nations (FAO) defines organic farming as "It is a system that begins to consider potential environmental and social impacts by eliminating the use of synthetic inputs, such as synthetic fertilizers and pesticides, veterinary drugs, genetically modified seeds and breeds, preservatives, additives, and irradiation."

Development of organic farming

The term 'organic farming' is getting popularity in recent days, but it was initiated in 10000 years back when ancient farmers started cultivation depending on natural sources only. In fact, organic agriculture has its roots in traditional agricultural practices that evolved in countless villages and farming communities over the millennium. Major milestones in the area of organic farming are presented in Tables 3.

Organic farming was started in India during 1900 by Sir Albert Howard, a British agronomist in North India, Development of Indore Method of aerobic compost (Howard, 1929), Bangalore method of anaerobic compost (Archarya, 1934), NADEP Compost (ND Pandari Panda, Yeotmal, 1980)initiated organic agriculture in India.

Table -3: Key milestones on organic farming

Sir Albert Howard (1900-1947)	Father of modern organic Agriculture, developed organic composting process (mycorrhizal fungi) a Pusa, Samastipur, India and published document" An Agriculture Testament".
Rudolph Steiner (1922)	A German spiritual Philosopher built bio dynamic farm in Germany.
J.I. Rodel (1950), USA	Popularized the term sustainable agriculture and method of organic growing
IFOAM	Establishment of 'International Federation of Organic Agriculture Movement", in 1972
One Straw Revolution	Release of the book by Masanobu Fukoka (1975), an eminent microbiologist in Japan
EU Regulation	EU Regulation on Organic Food, 1991
Steiner (1992)	A German spiritual philosopher, popularized bio dynamic farming
Codex	Codex guideline on organic standard, 1999.

The year 2000 is very important year for India from organic point of view. The four major happenings were made during the year 2000. They are as follows.

1.The Planning Commission constituted (2000) a steering group on agriculture who identified organic farming as National challenge and suggested it should be taken in the form of a project as major thrust area for 10th-plan. The group recommended organic farming in North East Region, rain fed areas and in the areas where the consumption of agro chemicals is low or negligible.

2. The National Agricultural Policy (2000) recommended promotion of traditional knowledge of agriculture relating to organic farming and its scientific up gradation.

3. The Department of Agriculture and Cooperation (DAC), Ministry of Agriculture constituted (2000) a Taskforce on organic farming under the chairmanship of Shri KunwarJi BhaiYadavand this task force recommended promotion of organic farming.

4. The Ministry of Commerce launched the National Organic Programme in April 2000 and Agricultural and Processed Food Products Export Development Authority (APEDA) is implementing the National Programme for Organic Production(NPOP) Under the NPOP, documents like National standards, accreditation criteria for accrediting inspection and certification agencies, Accreditation procedure, inspection and certification procedures have been prepared and approved by National Steering Committee (NSC).

Features of organic farming:- It involves three agricultural practices. They are

1. Protection of long term fertility: Following organic materials are used to maintain organic matter and nutrients in the soil.

- Farm Yard Manure cow dung
- Green Manure
- Coir pith
- Vermicompost
- Biofertlizer, living cells of different types of micro organisms, which can convert important elements from non-usable to usable form.
- Careful mechanical intervention to maintain and enhance the ecological balance.
- Use of nitrogen fixing plants.
- Recycling of plant and animal residues

2. Crop protection without chemicals: It means

- Pest-resistant plant varieties are used
- Deep ploughing the fields during summer season kill pests, larval and eggs.
- Use of bio-pesticides like Trichoderma to control pests.
- Use of pheromone traps and light traps.
- Organics also prohibits the use of Genetically Modified Organisms.

3. Adoption of proper management techniques to control pests

- Disinfect soil by adopting soil solarization.
- Soil management techniques such as mulching.
- Proper water management.
- Use of fallow periods.
- Various cropping systems such as inter cropping/agro forestry.
- Proper crop selection and rotation.
- Change in time of sowing.
- Growing of trap crops.
- Due consideration to be given to animal welfare.
- Use of manual, mechanical and thermal weeding.

Organic farming is gaining importance now a day due to increase in education levels of the people. There is growing conscious of health and environmental hazards posed due to contamination of farm produce from the use of chemical fertilizers and pesticides. The consumers are ready to pay a premium for environmentally responsive safe products because of the following

- Increasing occurrence of life threatening diseases like cancer, encephalitis, drug resistant diseases in human beings due to eating food with chemical buildup.
- Consumer concern over the high levels of saturated fats, sugar and salt in foods, as well as from food additives and pesticides residues, has stimulated the demand for health foods and led to significant changes in the food sector.
- People are aware of organic food which is healthier option because it contains 50 percent more vitamins, minerals enzymes and other micronutrients than intensively farm produced food.
- Organic vegetables have higher levels of secondary nutrients. These include antioxidants, which help mop up harmful radicals implicated in cancer.
- Organic food taste better this is the simple message given by many people who eat organic.
- Organic farming places great emphasis on animal welfare and is more animal friendly, where animals are not treated with synthetic growth hormones or drugs.

Conclusion: There is growing awareness of the negative impacts of chemical input on soil, human health and environment. Both developed and developing countries are shifting towards organic products. India has a large land area with different eco regions. There is wide scope for producing organic products in India. Government of India is giving all support for organic farming through policy and programmes. Farmers have to take initiative to adopt organic farming for future India.

References:

1. Green peace (2015) report of "Pesticides and our health" A Growing Concern www.greenpeace.org . pp18-26
2. Handbook of Agriculture (2018) Agricultural Statistics at a Glance,2017 Directorate of economics and Statistics , Ministry of Agriculture, Govt. of India.
3. Jitendra Pandey and Ashima Singh (2012), Opportunities and Constraints In Organic Farming: An Indian Perspective Journal of Scientific ResearchBanaras Hindu University, Varanasi, Vol. 56:47-72
4. Ms. Manisha Gaur (2016), Organic Farming in India : Status, Issues and Prospects, SOPAAN-II Volume 1, Issue 1, January-June.
5. Murugan, M and Shetty, PK and George, Thomas and Ravi, R and Subbiah, A andVijayakumar, K (2014) Pesticide Use in Indian Cardamom Hills: Factors, Patterns and Intensity. International Journal of Social Ecology and Sustainable Development, 5 (3). pp. 65-80
6. P. Bhattacharyva an G. Chakraborty (2005), Current Status of Organic Farming in India and other Countries Indian Journal of Fertilisers. Vol. 1 (9). December. PP.111-123.
7. P.Mala (2013), Fertilizer Scenario in India, International Journal of Social Science & Interdisciplinary Research,Vol.2 (1), January .
8. Sartaj A. Wani1, Muneeb Ahmad Wani, Sheikh Mehraj, Bilal A. Padder, Subhash Chand (2017) Organic farming: Present status, scope and prospects in northern India,Journal of Applied and Natural Science 9 (4): 2272 –2279.
9. TulsiBhardwaj and J.P. Sharma.,(2013) Impact of Pesticides Application in Agricultural Industry: An Indian Scenario , International Journal of Agriculture and Food Science Technology. Volume 4, Number 8, pp. 817-822
10. Vijay Paul Sharma and Hrima Thaker, (2011), Demand for Fertilisers in India: Determinants and Outlook for 2020, Ind. Jn. of Agri. Econ.Vol.66, No.4, Oct.-Dec.