Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; Sp 9(4): 698-703
Received: 12-04-2020
Accepted: 15-05-2020

Sumedha Thakur
Department of Soil Science and Water Management, College of Horticulture and Forestry, Dr. YS Parmar University of Horticulture and Forestry, Neri Hamirpur, Himachal Pradesh, India

Dr. Rakesh Sharma
Department of Soil Science and Water Management, College of Horticulture and Forestry, Dr. YS Parmar University of Horticulture and Forestry, Neri Hamirpur, Himachal Pradesh, India

Dr. Anil Kumar
Department of Soil Science and Water Management, College of Horticulture and Forestry, Dr. YS Parmar University of Horticulture and Forestry, Neri Hamirpur, Himachal Pradesh, India

Dr. Swapana Sepehya
Department of Soil Science and Water Management, College of Horticulture and Forestry, Dr. YS Parmar University of Horticulture and Forestry, Neri Hamirpur, Himachal Pradesh, India

Corresponding Author:
Sumedha Thakur
Department of Soil Science and Water Management, College of Horticulture and Forestry, Dr. YS Parmar University of Horticulture and Forestry, Neri Hamirpur, Himachal Pradesh, India

Natural farming

Sumedha Thakur, Dr. Rakesh Sharma, Dr. Anil Kumar and Dr. Swapana Sepehya

Abstract
Agriculture has been the fundamental source of sustenance for man over thousands of years. Majority of the Indian population (65%) still relies on agriculture for employment and livelihood. In last few eras, after the introduction of green revolution, Indian agriculture has made impressive progress by significant increase in the food grain production through the use of high yielding varieties and higher levels of input like fertilizers and pesticides. But it has now been realized that the increase in production was achieved at the cost of loss in soil fertility, environment pollution and majority of the farmers are in debt. Therefore, the only way to deal with this ever-rising problem is "Natural Farming". Natural farming is an ecological farming approach established by Masanobu Fukuoka (1913 to 2008), a Japanese farmer and a philosopher. Natural farming is not just for rising crops, it is for the cultivation and perfection of human beings. Natural Farming is a sustainable farming. Natural Farming makes all inputs from natural constituents. The products developed from natural farming have high quality, good taste and better yield. There are different variants of natural farming i.e. fertility farming, biodynamic farming, homa farming and zero budget natural farming.

Keywords: Natural farming, principles, natural inputs, soil

Introduction
Agriculture with its related sectors is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their employment. After green revolution, India has made excellent progress by increasing the food grain production by using chemicals like fertilizers, pesticides and high yielding varieties. But the enhancement in food grain production was achieved by irrelevant consumption of chemical fertilizers. Pesticides consumption in India increased from 39773MT in 2005-06 to 57000MT in 2016-17. Fertilizers consumption in India also increased from 6.00 MMT in 1981-82 to 25.95 MMT in 2016-17[Directorate of Plant Protection, Quarantine and Storage (2016-17) & Agriculture Statistics 2017)]. It has now been realized that this type of farming totally depends on use of chemical fertilizers and pesticides for enhancing crop productivity, but it has led to several ill effects on soil, environment and majority of farmers i.e. marginal farmers were in debt (NSSO 70th round data, 52% of the farmers in the country indebted, majority were marginal farmers). Therefore, to increase the agricultural production on sustainable basis and to meet the requirement of the intensifying population, it becomes imperative to change the practices. Thus, natural farming is the solution.

Natural Farming
Natural farming is an ecological farming approach established by Masanobu Fukuoka (1913 to 2008), a Japanese farmer and a philosopher. It is a sustainable farming (Fukuoka, 1975). Natural farming uses methods that respects life, observes the law of nature and utilizes natural products. Natural farming includes the use of earthworms, micro-organisms and small creatures instead of using appliance. It opposes human exploitation on life. The soil and water become clean and ecology is recovered, where natural farming is experienced. It aims to have a good impact on environment. Natural farming heals the soil diminished by chemicals and machines. Natural farming products have good taste, high quality and improved yield. Natural farming products have high nutritional content (Korn, 2001) [12].

Principles of Natural Farming
Masanobu Fukuoka gave the four principles of natural farming.
1. No cultivation
2. No fertilizers
3. No pesticides
4. No weeding

1. No cultivation

Natural farming does not till the land. In natural farming, nature's tillers (aerobic and anaerobic bacteria, fungi, crickets, earthworms and moles etc.) are used instead of using technologies like tractors etc. The earth cultivates itself naturally by means of the penetration of plant roots and the activity of micro-organisms and earthworms.

Machine can plough 20 cm at best, whereas earthworm will dig 7meters. The excretions or cast of earthworms are rich in nutrients, valuable soil micro-organisms and growth encouraging substances. Earthworms help to turn the soil bringing down organic matter from the top and mixing it with soil below (Fukuoka, 1975) and converted the organic matter into humus and also improving the soil fertility. The secretions in intestinal tracts of earthworms helps in making nutrients readily available for plant uptake including micro nutrients.

2. No fertilizers

The second is no chemical fertilizer [For fertilizer Mr. Fukuoka grows a leguminous ground cover of white clover, returns the threshed straw to the field and added a little poultry manure]. According to Fukuoka, if left to itself the soil maintains its fertility naturally in accordance with the orderly cycle of plant and animal life. Natural farming does not use chemical fertilizer. Nor does it follow the common practice of applying over half of the fertilizer as base manure.

The nutrient element i.e. N, P and K which is given in the form of chemical fertilizers are replaced from natural farming inputs. The inputs of natural farming are not only inexpensive but highly effective. Natural farming inputs like fish amino acid provides nitrogen, eggshells give calcium and animal bones are source of phosphoric acid (Reddy, 2011) [19].

3. No pesticides

The third is no dependence on pesticides. Mr. Fukuoka does not use any chemicals to grow his crops. He occasionally uses a machine oil emulsion on some orchard trees for the control of insect scales. He uses no persistent or broad-spectrum poisons.

Harmful insects or pests and plant diseases are always existing but do not occur in nature to an extent which requires the use of noxious chemicals (Korn, 2001) [12]. The reasonable approach to insect and disease control is to grow sturdy crops in a healthy environment. Nature, left alone, is in perfect equilibrium.

4. No weeding

The fourth is no weeding by tillage or herbicides. Weeds play their part in building soil fertility. Weeds also help in balancing the biological community. As a basic principle, weeds should be controlled not eradicated. Mulching is used in the field to reduce the weed growth like straw mulch, a ground cover of white clover interplant with the crops and temporary flooding provide effective weed control in the fields (Fukuoka, 1975).

Natural Farming Philosophy

1. Environment friendly

Natural farming is a sustainable farming. Natural resources are used for making inputs. Natural farming compliments the rights of crops and livestock and perceives the law of nature. Natural farming heals the soil slashed by chemicals i.e. pesticides, herbicides and machines (Palekar, 2012) [16].

The soil and water become clean and ecosystem is recovered, where this type of farming is practiced. It is even being used as a tool to fight desertification. Natural farming inputs protect the crops from harmful chemicals used as fertilizers in modern agriculture. No wastewater is emitted and also wastes are used and converted to resources.

2. Respect for Life

Natural farming respects life. It opposes human exploitation on life. The best way to achieve top quality and yield is to admire the nature. We prevent disease rather than curing with medicines. We rear healthy animals rather than feeding them antibiotics. Crops and livestock reared by natural farming are very vigorous and healthy. They show especially strong resistance to climatic fluctuation and almost no disease. Natural Farming gives respect and care to the crops and animals.

3. High quality

Natural farming products have high quality. Natural farming products have high nutritional content, protein, amino acid and other essential nutrient were identified to be as much as higher than ordinary products. Chemical residue such as nitrate is almost undetectable.

Variants of Natural Farming

1. Fertility farming
2. Homa farming
3. Biodynamic farming
4. Zero budget natural farming

1. Fertility farming

Newman Turner advocated the practice of fertility farming in 1951. The fertility farming featured the use of a cover crop, no tillage, no chemical fertilizers, no pesticides, no weeding and no composting. Although Turner was a commercial farmer and his "Fertility Farming" principles share similarities with Fukuoka's system of natural farming. Turner also supported a 'natural method' of animal husbandry (Turner, 2009).

2. Homa farming

Homa farming is originated from Vedas. Homa farming is based on the principle that "if you heal the atmosphere, the healed atmosphere will heal you". It makes some interesting promises based on Vruksha Ayurveda which tells that atmosphere is the biggest single factor which contributes about 75 percent nutrition to the plants (Johnson and Heschl, 2009) [10].

It is an exclusively spiritual practice that dates from the Vedic period. The basic characteristic of homa farming is the chanting of Sanskrit mantras (Agnihotra puja) at specific times in the day before a holy fire. Homa Farming is holistic healing for agriculture. Agnihotra is the basic Homa fire technique, depend on the bio-rhythm of sunrise and sunset. During Agnihotra, ghee, brown rice and dried cow dung are burned in an inverted, pyramid-shaped copper vessel, along with which a special mantra is sung (Kumar *et al*. 2017) [13].

Table 1: Effect of different treatments of homa farming on growth and yield of Okra

Treatments	Plant height (cm)	Yield t/ha^{-1}
T1- Compost and VC, 50% each equivalent to RDF and seed treatment with bio-fertilizers (organic control) at homa site	73.21	12.38
T2- T1+ soil application of Non-homa ash (41.5Kg/ha) at sowing, 30, 45 and 60 DAS	73.62	12.94
T3- T1 + soil application of Agnihotra homa ash (41.5Kg/ha) at sowing, 30, 45 and 60 DAS	77.12	13.95
T4- T1+soil application of Gloria Biosol (1850 liters/ha) at sowing, 30, 45 and 60 DAS	78.39	14.21
T5- T1 + soil application of Jeevamruta (500 liters/ha) at sowing, 30, 45 and 60 DAS	76.20	14.01
T6- T1+ soil application of Jeevamruta (500 liters/ha) + Agnihotra homa ash (41.5Kg/ha) at sowing, 30, 45 and 60 DAS	78.91	14.52
T7- T1+ Foliar application of Non-homa ash (41.5Kg/ha) at 30, 45, 60 and 75 DAS	73.50	12.32
T8- T1+ Foliar application of Agnihotra homa ash (41.5Kg/ha) at 30, 45, 60 and 75 DAS	76.02	12.97
T9-T1+ Foliar application of Gloria Biosol (1850 liters/ha) at 30, 45, 60 and 75 DAS	77.08	13.35
T10- T1+ Foliar application of Panchagavya (5%) at 30, 45, 60 and 75 DAS	76.05	13.20
T11- T1+ Foliar application of Panchagavya (5%) + Agnihotra homa ash (41.5Kg/ha) at 30, 45, 60 and 75 DAS (41.5Kg/ha)	77.01	13.30
T12-T1+ Foliar application of Panchagavya (5%) and Gloria Biosol (1850 liters/ha) at 30, 45, 60 and 75 DAS	77.06	13.27
T13- T1+ Soil application of Non-homa ash (41.5Kg/ha) and its foliar application at 30, 45, 60 and 75 DAS	81.23	14.73
T14- T1+ Soil application of Agnihotra homa ash (41.5Kg/ha) and its foliar application at 30, 45, 60 and 75 DAS	83.12	14.80
T15-T1+ Soil application of Gloria Biosol (1850 liters/ha) and its foliar application at 30, 45, 60 and 75 DAS	88.06	15.03
T16-T1+ Soil application of Om Tryambakam homa ash (41.5Kg/ha) and its foliar application at 30, 45, 60 and 75 DAS	84.10	14.91
T17-Conventional control at non-homa site	65.10	11.02
T18-Compost and VC, 50% each equivalent to RDF and seed treatment with bio-fertilizers at non- homa site	69.21	11.76
SE m ±	2.41	0.12
CD at 5%	6.87	0.31

Kumar *et al*. (2017) [13]

Kumar *et al*. (2017) [13] studied the effect of homa organic farming on growth, yield and quality parameters of okra and reported that the foliar and soil application of Gloria Biosol was better over all other treatments in terms of yield, growth and quality attributes and recorded 21.41% more yield and 20.28% more plant height than organic treatments.

3. Biodynamic farming

Biodynamic farming treats the farm as a living system. It interacts the environment to build healthy soil and to produce food that nourishes and helps to develop mankind. The methods of biodynamic farming are derived from the teachings of Rudolf Steiner. Rudolf Steiner is the father of biodynamic farming (National Centre of Organic Farming, Ghaziabad).

Components of biodynamic farming:

Not using chemical fertilizers and pesticides, keeping soil covered by pasture crops or mulch and not destroying the soil structure by poor farming practices such as excessive use of rotary hoe.

Table 2: Biodynamic preparations their ingredients and use.

Preparations	Main ingredient	Use
500	Cow manure	Field spray
501	Finely ground silica from quartz	Field spray
502	Yarrow bloosoms (*Achillea millefolium*)	Compost
503	Chamomile bloosoms (*Matricaria recutita*)	Compost
504	Stinging nettle shoots (*Urtica dioica* L.)	Compost
505	Oak bark (*Quercus robur* L).	Compost
506	Dandelion flowers (*Taraxacum officinale*)	Compost
507	Valerian flower extract (*Valeriana officinalis* L.)	Compost
508	Horsetail plants (*Equisetum arvense* L.)	Field spray

Steiner (1951)

Table 3: Influence of different treatments on yield of lentil.

Nutrient source	Grain Yield (kg/ha^{-1})
Biodynamic compost	2030
Non – biodynamic compost	1930
Mineral NPK	1740
None	1960
Biodynamic sprays	
Yes	1960
No	1860

Boggs *et al*. (2000) [2]

Boggs *et al*. (2000) [2] investigated the short term effects of biodynamic preparations on crops, soils and weed populations and they found that lentil grain yield was lowest in plots applying mineral NPK fertilizer, the yield was 14% lower than grain yield in plots applying biodynamic compost, but not significantly lower than control or non-control treatments.

4. Zero Budget Natural Farming

Mr. Subhash Palekar innovate a new method of natural farming called 'Zero Budget Natural Farming'. He studied natural system and verified natural processes of the forest on his farm for six years, since 1989 to 1995 (Palekar, 2006) [14]. He got the package of technique about Zero Budget Natural Farming which he was given to the farmers throughout India. He also awarded by Padma Shri Award in 2016. ZBNF is self-nourishing and symbiotic in nature - Subhash Palekar (Palekar, 2014) [14]. Four pillars of ZBNF i.e. Jeevamrit,

Bijamrit, Acchadana and Whapasa (Bishnoi and Bhati, 2017) [1]. Mulching, soil protection techniques, natural pesticides and fertilizers are used by zero budget farmers (Sreenivasa *et al*., 2010) [20].

The principal methods of ZBNF includes

Crop rotation, green manures, compost, biological pest control and mechanical cultivation.

Table 4: Effect of different organic input treatments on growth attributing characters of Soybean at harvest.

Treatments	Plant height (cm)	Pod number plant^{-1}
T1- Control	45.80	30.23
T2- FYM 5 tha^{-1}	51.31	39.69
T3- Vermicompost 2 tha^{-1}	52.91	42.32
T4- FYM+VC (50+50)	57.72	50.95
T5- FYM+Jeevamrit 2 times (30&45 DAS)	51.33	40.51
T6- VC+ Jeevamrit 2 times (30&45 DAS)	56.23	43.34
T7- FYM+VC (50+50) +Jeevamrit2times (30&45 DAS)	63.21	58.53
T8- Jeevamrit 2 times (30&45 DAS)	49.40	36.32
S.E. ±	2.15	2.38
CD at 5%	6.43	7.12

Patil and Udmale (2016) [17]

Patil and Udmale (2016) [17] conducted experiment to study the response of different organic inputs on growth and yield of soybean on Inceptisol and reported that soybean crop subjected to FYM + vermicompost (50% each) + Jeevamrit 2 times (30 and 45 DAS) had higher values for growth, yield attributes and yield of soybean.

Table 5: Influence of liquid organic manures on growth and yield of tomato (*Lycopersicon esculentum Mill.)* in the sterilized soil.

Treatments	No. of fruits plant^{-1}	Fruit weight (g/plant)
T1- RDF	11.12	167.23
T2-Panchagavya only	16.12	216.60
T3- Jeevamrit only	7.87	149.43
T4- Beejamrit only	8.62	147.51
T5- RDF + Beejamruth + Panchagavya	20.25	276.87
T6- RDF + Beejamruth + Jeevamrit	20.00	274.32
T7- RDF + Beejamruth + Jeevamrit + Panchagavya	23.25	316.64
T8- Beejamruth + Jeevamrit + Panchagavya	19.65	271.53

Gore and Sreenivasa (2010) [20]

A study conducted by Gore and Sreenivasa (2010) [20] resulted that significantly highest plant growth and root length was recorded with the application of RDF + Beejamrit + Jeevamrit + Panchagavya and it was found to be significantly better over other treatments.

Natural Farming Inputs

All-natural farming inputs are made by the farmers using only natural materials. Even though we don't use chemicals sold in the market, our inputs have enough effect to supersede them.

Our important inputs include

1. Indigenous Microorganism (IMO)
2. Fermented Plant Juice (FPJ)
3. Lactic Acid Bacteria (LAB)
4. Fish Amino Acid (FAA)
5. Insect Attractant (IA)

1. Indigenous Microorganism (IMO)

When the land cultivated has an excellent soil condition for crops, natural farming produces a good yield. Microorganisms play an important role in making soil good quality for growing plants. These microorganisms can also be collected and cultured (Umi and Sariah,2006) [23]. Natural Farming promotes the utilization of Indigenous Microorganisms (IMOs). The microorganisms that have been living in the local area they are very powerful and effective and good for farming (Chiemela, 2013) [4].

They can survive the extreme climatic conditions of the confined environment much better than artificially produced microorganisms, which are cultured in artificial environment. They are considered the best inputs for conditioning the soil. In order to collect different kinds of microorganisms it is better to culture microorganisms from different areas (Microbial Diversity). In non-chemical agriculture practices, we do not nourish the plant, we nurture the soil and the soil nurtures the plant through the IMOs (Joshi *et al*. 2019) [11].

Microorganisms have two major functions in farming

Microorganisms decompose organic compounds such as dead bodies of plants and animals and wastes into nutrients and making them easily absorbable by plants. They can create compounds such as enzymes, antibiotic and lactic acids that can suppress various diseases. They promote healthy soil conditions.

Table 6: Nutrient composition of compost residue

Treatment	Macronutrients			Micronutrients			
Imo Solution	30 days decomposition			30 days decomposition			
	N (%)	P (%)	K (%)	Fe ppm	Cu ppm	Zn ppm	Mn ppm
T1-Control-01/L	4.4	1.08	1.20	40	17	150	198
T2-2Tbsp/1L	6.22	3.08	2.12	58	20	1	222
T3-3Tbsp/1L	6.4	3.82	2.18	61	22	182	280

Chiemela *et al*. (2013) [4]

Chiemela *et al*. (2013) [4] reported that the percentages of NPK in the compost residue were higher in T2 and T3 (6.4%, 3.82%,) than the control treatment (2.18%). T3 had higher percentage of macronutrient than T2 among other treatments. In this study Mn, Fe, Zn, and Cu increased moderately in T2 and T3 compared to the control.

2. Fermented plant juice

Fermenting plant juice is made by fermenting plant parts in brown sugar. Sprouts and full-grown fruits with high hormone concentration and plant with strong vigour are used. FPJ is a fermented extract of a plant's juice and chlorophylls. It is a rich enzyme solution full of microorganisms such as lactic acid bacteria and yeast that rejuvenate plants and animals.

FPJ is used for crop treatments. It is used in a period of germination to vegetative growth to help crops become resistant against cold and grow fast and strong. FPJs should be used at lower concentration, preferably at a dilution of 1:1000. FPJ can be used to keep pests away from fruits.

Table 7: Yield of hot pepper per hectare (kg).

		Mean	
		Pinatubo(A)	**Red Hot(B)**
Fertilizer			
	B1- Control- no application	3678^{ab}	4690^{ab}
	B2- Banana psedustem + santing leaves	4509^{ab}	3997^{ab}
	B3- Banana psedustem + wedelia leaves	5603^{a}	3417^{b}
	B4- Banana psedustem + acacia leaves	4678^{ab}	4623^{ab}
	B5- Banana psedustem + madre de cacao leaves	4617^{ab}	5350^{a}
	B6- Combination of all FPJ materials	5154^{a}	3036^{b}

Racoma *et al*. (2017) [18]

Racoma *et al*. (2017) [18] resulted that the *Pinatubo* variety had the higher yield per hectare compared to *Red Hot* variety and also found that among the fermented plant materials evaluated, banana pseudostem + wedelia leaves has good as nutrient source for organic hot pepper production.

3. Lactic Acid Bacteria (LAB)

LAB is anaerobic but they can also survive with oxygen. In the absence of oxygen, they break sugar into lactic acid. LAB is very helpful in improving ventilation of air in the soil. It promotes rapid growth of fruit trees and leaf vegetables. LAB has power to resistance to some fungi. LAB is used during the vegetative growth period of fruiting vegetables. Plants may be kept for longer periods in storage by using LAB.

4. Fish Amino Acid (FAA)

The Fish Amino Acid (FAA) is made from fish. FAA is rich in nitrogen and it is good fertilizer for applying both to soil and foliage since it enhances the growth of crops during their vegetative growth period when used with other natural farming materials. It is possible to use FAA continuously to increase yield, taste and fragrance of leafy vegetables.

Table 8: Effect of fish amino acid and egg amino acid foliar spray along with recommended dose of fertilize on yield of rice.

Treatments	Grain yield (kg/ha^{-1})
T1- Recommended dose of fertilizers (RDF) (187.5:50:50kg NPK ha^{-1})	3870
T2- Egg amino acid 0.5%	2855
T3- Egg amino acid 1.0%	3005
T4- Egg amino acid 1.5%	2780
T5- Fish amino acid 0.5%	2996
T6- Fish amino acid 1.0%	3127
T7- Fish amino acid 1.5%	2846
T8- RDF + Egg amino acid 0.5%	4610
T9- RDF + Egg amino acid 1.0%	4763
T10- RDF + Fish amino acid 0.5%	4355
T11- RDF + Fish amino acid 1.0%	4471
S^{ed}	222
CD(P=0.05)	462

Priyanka *et al*. (2019)

Priyanka *et al*. (2019) found that among the different concentration of foliar spray egg amino acid 1.0 % + recommended dose of fertilizer recorded high yield of 4763 kg ha^{-1}. Yield increase was 23 per cent over recommended dose of fertilizers.

5. Insect attractant (IA)

Natural Farming is completely chemical-free and environment-friendly agriculture. Aromatic insect attractant (AIA), fluorescent insect attractant (FIA) and the method of using fish odour are few of the methods developed by natural farming for pest control.

Advantages of Natural Farming

1. Reduced exposure to pesticides and chemicals

Pesticides allow disease resistance to build up in plants, plant eating insects, weeds and microorganisms. Pesticides and chemicals sprayed on plants contaminate the soil, water and air.

Sometimes these harmful pesticides stick around for decades. Synthetic chemicals also discourage smart farming practices such as crop rotation and cover crops which in turn, may cause other harmful environmental problems like erosion.

2. Natural farming builds healthy soil

We must start with healthy soil, if we want to grow healthy food. If you treat the soil with harmful chemicals like pesticides and herbicides, you may end up with soil that cannot flourish on its own. Natural farming practices are far better than chemical soil management.

3. Combatting erosion

Not only does natural farming build healthy soil, but it helps combat serious land and soil issues, such as erosion (Committee on Long Range Soil and Water Conservation, 1993).

4. Supporting animal health and welfare

Insects, birds, fish and all sorts of other creature's experience problems when humans swoop in and destroy their natural habitat. Natural farming not only helps preserve more natural habitat areas but also encourages birds and other natural predators to live happily on farmland.

Animals that live on organic farms are exposed to clean, chemical-free grazing that helps keep them resistant to disease and naturally healthy. As an advantage for organic farmers, happy and healthy organic animals are productive.

Conclusions

Natural Farming makes all inputs from natural materials, therefore they save the cost of fertilizers and plant protection chemicals. The soil and water become clean and ecosystem is recovered. Natural farming is an environment friendly practice. Natural farming products have good taste, high quality and better yield. Their inputs are very effective in improving soil health and enhancing crop yield. It heals the atmosphere by preventing it from minimizing the use of chemical fertilizers which are toxic for human as well as plant and livestock health.

In conclusion, savings on the cost of fertilizers, seed and plant protection chemicals has been important. The new system has not tied up the farmers from the debt trap and has instilled in them a renewed sense of confidence to make farming an economically viable venture.

All the natural farming practices can be adopted to minimize the pollution of the environment and for maintaining the sustainability.

Acknowledgement

I would like to thank and express my sincere gratitude to Dr. Rakesh Sharma (Scientist), Department of Soil Science, for giving me the privilege to write this review article. I also wish to express my gratitude to the professors and other staff members of College of Horticulture and Forestry Neri, Hamirpur (H.P.) who rendered their help during the period of my work.

References

1. Bisnoi R, Bhati A. Zero budget natural farming. Journal of Biosciences. 2017; 10(46):9314-9316.
2. Boggs LC, Reganold JP, Kennedy AC. Biodynamic preparations short term effects on crops, soils and weed populations. American Journal of Alternative Agriculture. 2000; 15(3):110-118.
3. BP, TR, SR, PB. Foliar application of fish amino acid and egg amino acid to improve the physiological parameters of rice. International Journal of Current Microbiology and Applied Sciences. 2019; 8(2):3005-3009.
4. Chiemela FA, Serafin LN, Ricardo LI, Joseph LN. Application of indigenous microorganisms for bio-conversion of agricultural waste. International Journal of Science and Research. 2013; 4(5):2319-7064.
5. Committee on Long Range Soil and Water Conservation, Board on Agriculture, National Research Council. Soil and Water Quality, An Agenda for Agriculture. National Academy Press, Washington D.C.1993, 519.
6. DAC&FW, Pesticide Wise Consumption of Indigenous Pesticides during 2010-11 to 2016-17. Directorate of Plant Protection, Quarantine & Storage, Department of Agriculture Cooperation, New Delhi, 2017.
7. DAC&FW, Agriculture Statistics at a Glance. Directorate of Economics and Statistics, Department of Agriculture Cooperation and Farmers Welfare, Govt. of India, 2018.
8. FAO, India at a Glance, 2020, http://www.fao.org/india/fao-in-india/india-at-a-glance/en/
9. Gore and Shreenivasa. Influence of liquid organic manures on growth, nutrient content and yield of tomato (Lycopersicon esculentum Mill.) in the sterilized soil. Karnataka Journal of Agricultural Sciences. 2010; 24(2):153-157.
10. Johnson B, Heschl K. Homa organic farming, In: The proceedings of the brain storming conference on bringing homa organic farming into the main stream of Indian agricultural system held at Tapovan, Parola-Amalner Road, Parola, Distt. Jalgaon, Maharashtra, 2009, 84-94.
11. Joshi H, Somduttand, Choudhary P, Mundra SL. Role of effective microorganisms in sustainable agriculture. International Journal of Current Microbiology and Applied Sciences. 2019; 8(3):172-181.
12. Korn L. One-Straw Revolutionary: The Philosophy and Work of Masanobu Fukuoka. Isted. Sujit patwardhan for the other India press at Pune, India.2001, 178.
13. Kumar R, Kumar A, Chakraborty S, Basarkar PW. Effect of homa organic farming on growth, yield and quality parameters of Okra. Journal of Applied and Natural Science. 2017; 9 (4):2205-2210.
14. Palekar S. Shoonya bandovalada naisargika krushi. Swamy Anand, Agri Prakashana, Bangalore, India, 2006.
15. Palekar S. 2014, http://www.palekarzerobudgetspiritualfarming.org/
16. Palekar S. The Principles of Spiritual Farming. Atharva Publication, Maharashtra, 2012.
17. Patil HM, Udmale KB. Response of different organic inputs on growth and yield of soybean on inceptisol. Scholarly Journal of Agricultural Science. 2016; 6(5):139-144.
18. Racoma, Detorio A, Beato, Lovino L. Growth and yield performance of hot pepper (*Capsicum frutescens*) fertilized with fermented plant materials. International Journal of Advanced Research. 2017; 5(10):25-30.
19. Reddy R. (ed.). Cho's Global Natural Farming. South Asia Rural Reconstruction Association, Bangalore, India. 2011, 92.
20. Sreenivasa MN, Nagaraj MN, Bhat SN. Beejamruth: A source for beneficial bacteria. Karnataka Journal of Agricultural Sciences. 2010; 17(3):72-77.
21. Steiner R. Agriculture: A course of eight lecture given at Koberwitz, Silesia. Biodynamic Agricultural Association, London, 1974.
22. Turner N. Fertility Farming. Faber and Faber Limited, London, 1951.
23. Umi K, Sariah M. Utilization of microbes for sustainable agriculture in Malaysia: current status. Bio prospecting and management of microorganisms. National Conference on Agro Biodiversity Conservation and Sustainable Utilization. 2006, 27-29.
24. Yadav AK. Organic Agriculture (Concept, Scenario, Principals and Practices) National Centre of Organic Farming, Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India, Ghaziabad. 2011, 59.