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43. Indigenous Knowledge system and sustainability: Local ecological practices and their implications for sustainability
(Natural Farming: A sustainable way of agriculture)

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Abstract

Expanding environmental pollution, decreasing soil fertility, enhancing ground water contamination, deterioratingvegetables, fruits, edible grains and milk quality due to poisonous chemical and therebyincreasing healthhazards are great threat at global level. The toxic chemicals laden agriculture is one of the crucial causes for such consequences and leading to contaminate all our biosphere. It is well known that more than seven decades past, our food and water was safer but now a days it is more contaminated. Owing to fast phase of industrialization, increased population and scarcity of food and land we exploiting huge amount of synthetic fertilizers and pesticides resulted the adverse impact on our life. So there is a need to reduce the load of such contaminants in the food chain. In this regard our indigenous farming practices like natural farming will play a significant role. The natural farming is broadly synonym to Vedic agriculture, cosmic farming and Homa therapy using Agnihotra ash. This technology isencompassedwith treating seeds with Beejamrit to improve seed germination, application of Jeewamrit, Ghana jeewamrit to improve soil health and crop growth. Spraying of Neemastra, Agniastra or Bramhastra are used to control insect, pests and plant diseases without polluting environment. The promotion of microorganism, Indian earthworms, Indian breed cows andwater conservation through crop residues or intercropping practicesare the key epithets of natural farming. This technology has been found to be cost effective and pollution free, that's why it called as 'Zero Budget farming' since all the inputs are natural and domestically produced. The pros and cons of this technology with a view to make a sensibledecision for its adoption at local, regional, state, national and international level is needed. The scientists/technologist may play a crucial role to upgrade natural farming technology and maintain healthy environment, harvest higher crop yield andassure food security for our growing populationin near future.

Keywords: Agnihotra,Vedic agriculture, Biodynamic agriculture, Homa organic agriculture

Introduction

The natural farming or farming with nature is a chemical-free agricultural system rooted in Indian tradition enriched with modern understanding of ecology, resource recycling and on-farm resource optimization. The natural farming considered as agroecology based diversified farming system which produce healthy food, to keep ourselves healthy as well as

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keep the land healthy. Natural farming considered as a cost- effective farming practice with scope for increasing employment and rural development.

Since dated back, the Britishers amended many agricultural systems in India especially, the order for compulsory cultivation of indigo for "neel" production on fertile soil resulted less grain production in Indo-Gangetic plains including that in Bengal province. India faced Bengal famine of drought including malaria, starvation and malnutrition in1942-43 and country exhausted buffer stock of food grains (Mukerjee, 2014). Subsequently on 15th August 1947, India came out of British rule which was followed by racial clash between Hindustan andPakistan during partition. Millions of Hindus migrated from Pakistan to northern part of India. The population swelled and India faced acute shortage of foodgrains. Wheat imports under PL40 Scheme from USA was one of the supports to India.

It is imperative to mention that except developed countries, the major populace of the world including India were facing acute shortage of food grains during the year 1960-1970 (Misra et al., 2019). Many people in India prepared bread from the undigested wheat grains picked up from the dung of bullock. These bullocks used to consume excess of wheat grain while threshing wheat. Hence, harvesting higher yield of food grain through chemical laden agriculture using improved seeds developed by Nobel Laureate Norman Borlaug (1960-1965), high doses of chemical fertilizers, irrigation, chemical insecticide, pesticides and weedicideswas the urgent need of the day. India came out of that crisisalmost by 1968 under the leadership of Dr. M. S. Swaminathan, the then DG, ICAR, New Delhi, and has now registered fourth place among ten top most countries of the world producing and exporting agricultural products and food grains.

Now a days the chemical laden agricultural practices have contributed significantly in causing soil sickness/soil in fertility, chemical contamination of food grain and ground water and environmental pollution which have become acute problem in all the countries including India. However, the chemical overloaded agricultural practices also culminated significant decline in beneficialsoil micro and macro biota population besides,killing of all earth worms which are considered as soil bioreactors.

Why Natural farming?

Agriculture is at epicentre of the country's journey towards Atma Nirbharta (Self-reliance) with farmers at its core. The efforts of our government have consistently focused upon upliftment, empowerment and stability of farmers in the technical, economic and social realm. In this endeavour, we continuously explore various methods to achieve ecologically sustainable and economically viable methods. The natural farming is one such method that holds potential to realise all these goals. It is backed by our rich traditional knowledge, and is a practice of agriculture based on locally available resources, which makes it a sustainable and viable practice.

Conversely, our Hon'ble Prime Minister Shri Narendra Modi ji, addressing the nation from the Red Fort on Independence Day in 2019 said, "The way we are using chemical

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fertilizers and pesticides, it is damaging the soil health. As a farmer, as a child of this soil, I have no right to damage its health. I have no right to make my mother India sad nor do have I right to make her sick. We should cut down the use of chemical fertilizer in our fields by 10% or 20% or 25% and if possible we should launch a Muktikar Abhiyan (campaign). This would be a great service to the nation. This would be a great step in saving our "Mother Earth.'' As we know the substantial increase in input costs has led to a decline in crop income over the years. The price of urea, DAP and potash has risen by 60% - 600 % in last decade. Though, per hectare real value of output increased for most crops in recent years, but the rise in input cost was much higher, resulting into reduced farm income.

Natural agricultural practices, free from chemical use is considered as panacea of all type of disorders caused due to present chemical laden agriculture and had been prevailing in India since long i.e. about 10,000 BC (Kumar and Singh, 2021). This practicesappears to have logistic approaches to rescue world populace from contaminated food andconcomitantly health disorders. Moreover, the Japanese farmer Mr. M. Fukuoka, is considered as father of modern day natural farming whereas in India Mr. Subhash Palekar for the first time after 1985, un-earthen and promulgated this technology and named as '*Zero Budget Natural Farming (ZBNF)'*, since natural and domestically produced materials are used in this technology with a little dependence on the market. In 1988 Gerlecka and in 1989, Paranjpe published effect of old Indian technology '*Agnihotra'* on agricultural crops and human health based on experiments conducted in USA, India and Germany. Subsequentlythe details on Vedic agriculture, cosmic agriculture and Agnihotra leading to pollutant free higher crop yield based on climate and seasonal conditions, natures gesture and biodynamic almanac wasunearthed by Pathak and Ram (2004).

Subsequently, Mr. Subhash Palekar from Amarawati district (Maharashtra) formulated Beejamrit (for seed treatment), Jeevamrit, Ghanjeevamrit (for soil application) and Neemastra, Agniastra and Brahmastra (warding off insects), with the help of old literature (Palekar, 2021). In different states especially in Maharashtra, farmers followed Palekar technology and harvested good yield with higher return. Similarly, Acharaya Devvrat (presently the Governor of Gujrat state) working at Kurukshetra, Haryana recorded beneficial effect of Subhas Palerker's technology on paddy and wheat crop and grain quality right from first year of 2011 to 2016 unlike organic farming.

The natural farming differs from organic farming since later requires addition of 4-5 tons/ acres Vermi-compost (VC) + 200 kg bio fertilizer besides bio pesticide to control pest and diseases. Thus, it is market dependent and costly farming practices. Secondly,VC ismade through the involvement of European earthworms e.g. *Eisenia fetida, Lampitomauritu* and *Perionyx excavates,* and have heavy metals such as Pb, Cr, Cu, Cd, As, Si, which are added in it through their excreta. Heavy metals content in VC was withinlimit of United State Environment Protection Agency for biosolid which could be used safely for agricultural purposes (Pandayet al 2014). However,based on soil sickness experienced by chemical laden farming, Palekar (2021)views, appeared logical and conversing that regular use of heavy

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metals contaminated vermicompost under organic farming would be dangerous to soil one day. On the other hand, in natural farmingthe domestic products are used as input which isnot market dependence and do not use even a pinch of chemical. This is most cost-effective technology that's why it is called as 'ZBNF'. Natural farming' promotes the use of *Deshi (Indigenous breed)* Cows, its dung and urine for agriculture purposes and minimise the dependence of farmers on the purchase of inputs such as fertilizers, weedicide, insecticide and fungicide and thereby reducing the cost of cultivation and making farming profitable.

Basic objectives of Natural Farming

The natural farming aims to create a harmonious and sustainable relationship between the environment, farmers, and consumers, promoting ecological balance and long-term viability. It focus on creating a sustainable, eco-friendly, and self-sufficient agricultural system. Here are the key objectives are:

1. *Soil Health and Fertility:* To maintain and improve soil quality by avoiding chemical fertilizers and pesticides. This is achieved through practices like crop rotation, composting, and mulching, which enhance soil structure, biological activity, and nutrient content.
2. *Biodiversity Conservation:* To promote biodiversity both on the farm and in surrounding ecosystems. This includes encouraging a variety of plant and animal species, which helps maintain ecological balance and reduce the risk of pest outbreaks.
3. *Sustainability:* To create farming systems that are economically viable, socially just, and environmentally sound. This means working in harmony with nature, reducing dependency on external inputs (like chemical fertilizers and pesticides), and using renewable resources.
4. *Water Management:* To manage water resources efficiently, ensuring that water is used in ways that conserve it and prevent pollution of water systems.
5. *Resilience to Climate Change:* To build resilience against the adverse effects of climate change by practicing soil conservation, water retention, and using drought-resistant crops and integrated pest management.
6. *Animal Welfare:* To ensure ethical treatment of animals by focusing on natural, free-range, and humane practices in livestock management.
7. *Reduction of Chemical Inputs:* To eliminate or reduce the use of synthetic chemicals, fertilizers, and pesticides, thus minimizing environmental pollution, preserving human health, and protecting wildlife.
8. *Local and Indigenous Practices:* To integrate traditional knowledge and local farming practices, which are often more sustainable and adapted to specific ecosystems.

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9. *Economic Viability for Farmers:* To create a more profitable farming system for small-scale and family farmers by reducing the need for expensive external inputs and focusing on value-added, locally marketed products.
10. *Healthier Food Production:* To produce food that is healthier for consumers, free from harmful chemicals, and full of nutrients due to the healthier soil and farming practices.

Table: Alteration between natural and organic farming

Attributes	Natural farming	Organic farming
1. Rearing of Indian breed cow/ha	One cow will cater the need of 4 ha land	25-30 cows
2. Kind of input/manure/fertilizer required	Beejamrit, Jeevamrit, Neemastra, Mulching, Indian cow breed,Indian earthworms.	Vermicompost, Biofertilizer, Garbej Enzymer, Waste decomposer, Bio Insecticide, European Earthworms.
3. Earthworms	Indian breed- *Pheretima cummunissima, Pheretima posthuma, Eutyphacus, Cubricus* and *Lumricus terrestis* are required for humus preparation and porosity of soil. Survivewell under Indian environment and burrow soil up to 15feet deep. No/littlereplenishment of earthworm is required.	European breed- *Eisenia fatida, Lampitoma uritii, Perionyxex cavatus*. They remain mostly on soil surface and do not survive for longer period in Indian soil at 25-40^0 C. Hence require regular replenishment and thereby investment.
4. Rain fed agriculture and cropping pattern	In India about 70% agriculture is rain fed. Natural farming technologies through Beejamrit and Jeevamrit/Ghanjeevamrit are suited to protect rain fed crops. Inter cropping and mix cropping ispreferred besides sole cropping.	Regular irrigation is required for crop growth. Not much suited to rainfed crops or inter cropping and mix cropping concept.
5. Mulching	Mulching is essential feature. It helps in reducing water requirement of crop, promotion of soil microorganism, earthworm population, soil porosity, water holding capacity	Mulching is not essential feature.
6. Seeds	Deshi seeds and Hybrid seeds are used	Deshi seeds are not preferred
7. Soil health	Natural Farming balances soil and eliminate pollutant and heavy metal from soil by activating micro-organism through harnessing cosmic energy.	Regular use of vermi compost increases the chance of accumulation of heavy metal(Cd, Hg, Pb, Si, As and Cu)in soil above permissiblelimit.

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8. Farming response	On practicing natural farming, the crop yield within 3 years is stabilised and reaches at peak.	Even at the end of IIIrd year crop yield remain much below. Farmers run in deficit at least for two years while following organic farming practices
9. Cost of cultivation and net profit	Natural and domestic product are the inputs hence cost of cultivation is low. Net profit is higher than organic faming	Cost of cultivation is higher than present chemical laden agriculture. Net profit is very low.
10. Cosmic Farming	Farming practices in consonance of energy through nature's gesture using Biodynamics calendar for different crops have been practiced since ancient Vedic era. Higher yield is assured.	It does not consider cosmic energy harvest, natures gesture and Biodynamics calendar for crop production
11. Homa therapy	This is very cost effective ancient Indian technology and its impact are operative on large area. Agnihotravis-a-vis Homa practices and use of its ash in Agriculture combat all types of environmental pollution and provide relief to crop from insect-pest attack.	This is not practiced in organic agriculture.

At present, thousands of farmers have taken up initiatives for natural farming promotion from different states including Andhra Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Kerala, Karnataka, Meghalaya, Odisha, Maharashtra, Madhya Pradesh, Rajasthan, Uttarakhand, Uttar Pradesh and Tamil Nadu states. As of now more than 10 lakh ha, area is covered under natural farming in India.

Basics of Natural Farming

Natural agriculture farming has been livelihood of people in India since long which is consider as old as 10,000BC (Kumar and Singh, 2021). This technology is now termed as "Rishi Agriculture", since the natural products are used for crop cultivation. Basic concept of natural farming is the use of natural resources and domestic products in a manner to supply sufficient nutrients to plants, guard their growth and development, and sustain soil fertility, maintain pollution free environment and finally to achieve higher yield of good quality health friendly edible products. The following components are essential for natural farming:

1. Rearing of Indian breed cows and monitoring of cow's milk, curd, ghee, dung and urine production.
2. Promotion of microorganism in rhizosphere together with elevation of Indian earthworm in soil and enhancing of soil humus.
3. Performance of Homa therapy and use of Agnihotra ash in agriculture.

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4. Use of mulching with dry plant products.
5. Use of bioenhancer and promotion of biocontrol of insect pest and weeds.
6. Promotion of inter cropping concepts and cosmic agriculture.
7. Promotion of animal forces with a view to use bullocksfor small farmers, reduce pressure on fossil fuel, environmental pollution and raisecowdung andurine for FYM production and other agricultural uses.

Major aims of natural farming

- ❖ Preserve natural flora,/fauna restore soil health and fertility
- ❖ Maintain diversity in crop production
- ❖ Efficient utilization of land and natural resources (light, air, water)
- ❖ Promote natural beneficial insects, animals and microbes in soil for nutrient recycling and biological control of pests and diseases
- ❖ Promotion of local breeds forlivestock integration and uses of natural / local resource-based inputs
- ❖ Reduce input cost of agricultural production and improve economics of farmers

Role of Indian cows in natural farming

Indian cows have been regarded as "Kamdhenu" (means provider of all which you demond), even before Vedic era (1500BC-500BC). Vedic literatures say "Gawwah SarveSukh Prada" means "Cow can give all pleasures to human being, wealth as well as health". Cows have specific rumen potential in which all left over materials like Bhusa (coarse powder of dry wheat straw), Paddy straw, grasses, sugarcane leaf, cakes, chuni etc., produced under chemical laden agriculture consumed are digested and inturn cow provides dung, urine and milk free from all contaminants. Production of such contamination free products useful for plant, animal and human being is not possible by any industry or laboratories (Pathak and Ram, 2004).

Hump of Indian cows is pyramid in shape, belly a replica of many cosmoses and hornshave capacity to mediate cosmic energy. All these in turn result the production of dung, urine, and milk enriched with energy, advantageous microbes, bacteria, antioxidant properties and nutritional values. Italian scientist Prof. G.C. Bea Gad, has proved that cow dung kills bacteria that causes malaria and T.B. (Pathak and Ram, 2004). Cow's rumen, udder and teats are full of beneficial bacteria (*Bacillus* sp.) and they produce 6 beneficial materials e.g. dung, urine, milk, curd and ghee for human beings as discussed in Bhavishya Purana in between 1st to 8th century.

Moralities of natural farming

A healthy soil microbiome is the key to retaining and enhancing soil organic matter. Bio stimulants are necessary to catalyze this process. There are different ways of making bio stimulants. In India, the most popular bio-stimulants are based on fermentation of animal

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dung and urine, and uncontaminated soil. Increasing the amount and diversity of organic residues returned to the soil is very important. These include crop residues, cow-dung, compost, etc. Pest management should be done through better agronomic practices (as enshrined in Integrated Pest management) and through botanical pesticides (only when necessary). As per the farmers who are regularly practising the following has been considered as the most important components of natural farming:

- Beejamrit
- Jivamrit
- Mulching
- Whapasa
- Plant Protection

1) **Beejamrit** (Seed treatment): The seeds are treated with *Beejamrit* and dried in shade before sowing so as to get better germination and high seedling vigour. *Beejamrit* is prepared as follow:

5 kg cow dung + 5 L cow urine + 50 g lime + about hundred-gram dry soil from the cropped/cultivated field + 20 L water are mixed together in container and kept for 24 hrs. This mixture is stirred at least two times by wooden stick in 24 hrs. In this mixture 100 kg seeds are added and mix properly. Such seeds are dried in shade and sown in the field. Beejamrit has anti-oxidant properties and have millions of microbes which enhance germination, sustain very good seedling vigour and reduce seedling mortality.

2) **Jivamrit** (Soil Treatment):Soil treated before sowing by *Jeevamrit.* It contains millions of microbes which help in releasing soil nutrients to rhizosphere regions for better plant growth. Jeevamrit is prepared as follow:

Cow urine 5 L+ cow dung 5 kg + solid jaggery 2 kg +2 kg legume seed powder + 100 g dry soil form+ 100 L water are mix properly in a container and covered with jute bag. Stirring of this mixture is done clockwise in morning and evening. After 48 hrs of incubation, the mixture is filtered and use for treating soil. This Jeevamrit should be used within 7 days after preparation. To take a crop soil is treated 5 times as follow:

1. 200 L Jeevamrit is sufficient to treat 0.4 ha (i.e.1acre) land area.After one month of sowing 5 L Jeevamrit mixed with 100 ml water is sprayed on 0.4 ha land area.
2. After 21 days 10 L Jeevamrit mixed with 150 L water is sprayed on crop.At interval of 21 days 20 L Jeevamrit mix with 200 L water is sprayed over one acre crop land area.
3. Final spray is done at milking stage of crop by mixing 5-10 L sour butter milk (chaach) with 200 L water.

The jeevamrit is very effective source of nutrients because it is a rich bioformulation which contains a consortium of microbes consisted of nitrogen assimilation, nutrient release and quick decomposing microbes. Inabsence of *Jeewamrit,* the soil treatment is done with Ghan

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Jeevamrit by applying the powdered manure in the field. Ghan Jeevamrit is prepared as follows:

50 kg cow dung + 1 kg powdered legume seeds +100 gm dry soil from +5 L cow urine are mixed thoroughly to form a paste. This paste is covered with jute bags for 48 hr in shade. After this, it is allowed to dry which is powdered and filled in the bag. This can be used for 6 months after preparation. 100 kg Ghan Jeevamrit is required for 1 acre land area.

3) Mulching: It is considered essential growth forms rainfed and irrigated conditions. Major role played by mulches as enumerated by Pathak(2018) are:

1. Helpful in saving water requirement through minimization of run off and evaporation by cutting solar radiation.
2. Reduces overheating and promote cooling of soil and thus help in maintaining continue root and soil biological activities
3. It encourages development of white fibrous root, real organs for absorption of plant nutrition from soil and cytokine's production.
4. The fibrous roots grow in upper layer of soil and hence it is essential to keep top upper layer few inches deep in friable conditions, this is done very well through mulching.
5. Continuous mulching and its drenching with bioenhancer, enhances organic carbon and microbial population in soil and its maintenance.
6. Mulching helps in weed management, enhancing dark condition to soil, earthworm and termite activities, quick decomposition of mulching layer and there by enriching soil humas friability and aeration

4) Whapasa (Earthworms): Earthworms are known as pulse of soil. They play major role in maintenance of soil fertility and quality production. Earthworm a chief operator of nature's microbial factory. Local earthworms and uncountable micro-organism in the soil are chief source of plant nutrition. They eat gravels lime stone organic biomass, move upwards and downwards making capillaries in soil. This encourages better infiltration of water and helpful in upward movement of nutrition in available forms. Earthworm's excrement contains five times more nitrogen, 7 time more phosphorous, 11 times more K and 2-time Mg and Ca than normal soil (Pathak 2018). Earthworms inoculated areas are found to be warmer at night and cooler during day than surrounding earthworm free area. Improved porosity of soil with earthworms shows an increase in soil-air volume from 8-30%, thereby water in filtrations and water holding capacity. The most striking effects of earthworms may be stimulation of microbial activity including *Actinomyceties*, *A. steptomyces, Azotobactor* and *Azospirillium,* thereby help in managing soil born fungal disease, reducing root disease and mediating nitrogen from biosphere (Pathak, 2018).

5) **Plant Protection:** Visualising the lethal effect of chemical insecticide, fungicide and pesticide on human health, environmental pollution, ground water pollution and

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contamination of edible grains, Palekar developed organic insecticide and fungicide in1988 (Palekar, 2021). The plant leaves, cow dung and urine, butter milk, tobacco leaves, chillies, asafoetida, turmeric, ginger and garlic which are health and eco-friendly and many of that form the constituents of our daily diet are used to prepare pesticides (Palekar, 2021).

i. **Phafudinashak** (Fungicide): 5 L sour butter milk (3-4 days old) mix with 200 L water when sprayed on crops the fungus are killed.

ii. **Keetnashak** (Insecticide):

a. ***Neemastra***: It is sprayed on the crop to kill sucking insects, larvae, pupa, beetles, and grasshoppers. The nemastra prepared as Neem leaves/ fruit 5 kg (crushed) + Indian cow urine 5 L + Indian cow dung 1 kg + water 100 L.

b:***Agniastra***: Similar to Neemastra it is sprayed on crop to kill sucking insects, larvae, pupa, beetles and grasshopper. The agniastra prepared as Indian cow urine 10 L + Neem leaves 2.5 Kg (crushed) + Tobacco leaves powder 250 g + pungent green Chillies paste 250 g + Indian garlic paste – 250 g. Finely cut neem leaves and other materials are mixed with cow urine and heated on low flame till boiling. This mixer is placed under shade and stirred morning and evening with a wooden stick. It is filtered with cloth. Six L of filtered mixture is mix with 200 L water and sprayed on crop to control the insects. Active, life of this mixer is expired within three months.

c:*Brahmastra*: Spraying of this control big sucking insects, beetles and grasshoppers.The brahmastra is constituted as: cow urine 05 L + Neem leaves 5kg(crushed)+ paste of leaves, 2 kg each of guava, papaya, mango, and castor. Mix the paste of these leaves in cow urine. Heat on low flame till boiling. Keep it in shade for cooling for 48 hrs. Filter with cloth. 2.5 – 3.0 L filtrate is mixed with 100 L water and sprayed on 1 acre land to kill the insects. This extract is effective for 6 months.

d:*Dasparni* Ark: This is sprayed on crop to kill all type of insects. This ark is prepared as water50 L +cow dung2 kg + leaves of Neem/ Castur/ Bel/ Sitaphal/ Genda/ Dhatura/ Mango/ Guava/ Anar/ Pungent/ karela/ Goldmohar/ Arjun/ Kaner/ Papaya: Leaves of any 10 plants each of 2 kg is used + turmeric pastes250 g +ginger paste 250 g + asafoetida 05 g + Tobacco leaves – 500 gm + pungent green chillies – 1 kg + Desi Garlic pest – 500 gm. Mix well all with wooden stick. Cover with jute bag and keep in shade for 30-40 days. Stir well two times in a day. Filters with cloth and keep extract in separate container. Six litre of extract can be added in 200 L water and sprayed on 1 acre crop. The affectivity of extract expires after six months.

It is well known that the natural farming encourages growth and development of soil biota and there by sustain good soil health, disease tolerance in plant and higher crop productivity unlike that of chemical laden farming. Further the biodynamic and homa practices also leading to increase crop productivity in relation to natural farming.

The biodynamic agriculture

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The English word Biodynamics was derived from Greek word "Bios" means life and "dynamic" means energy (Greek civilization 1200 BC- 600 AD). This Greek word appears to be translation of Sanskrit word "Jeevityorjavanum Krishi" which was popular in /India since about 10000 BC and Vedic era/Krishi 1500BC-500BC. In Sanskrit Jeevitva mean living and urjavanam means energy and Krishi means Agriculture.

In Indian literature, natural agriculture (Biodynamic and Agnihotra) is describe in Artherveda (1500BC-500BC) however, visualizing in western literature the biodynamic faming was spawned by Late Anthroposophist, Rudolf Steinar which become popular since 1922 (Pathak and Ram, 2004).

Biodynamic farming refers to working with energy which creates and maintains life. In biodynamic agriculture, the use of all five energies from Water, Air, Earth, Fire and Cosmic (WAEFC) are utilized prudently. In fact, when soil is balanced then only healthy plant will grow and transmit both life giving and life maintaining substances and the energy food on which human and animal survival isbased. It has been observed that in this system energy from Cosmas, mother earth, cow and plants are systematic, complimentary and harnessed synergistically. Biodynamic agriculture is based on following eight principles as narrated by Pathak and Ram (2004).

- Restoration of the soil, through incorporation of organic matter in the form of humus, which holds its fertility.
- Augmentation and maintenance of soil activity since soil is aliving system.
- Maintaining higher level of organic matter as the basic factor for soil life.
- Biodynamic method is not only fertilizing the soil but skilful application of factors contributing to soil life and health,
- Establishing a system that brings into balance all factors which maintain life,
- The biodynamic way on the knowledge of enzymes, hormones and related factors besides treating manure and compost arealso considered.
- It puts special emphasis on the importance of crop rotation, green manuring and cover crops.
- Soil is not only a chemical, mineral or organic system, but it also has a physical structure. The maintenance of a crumbly, friable, deep, well aerated structure is essential features of biodynamic agriculture.

In biodynamic farming all agriculture operations starting from preparation of soil, planting to harvesting and storage of crop produce are done as per cosmos oscillation and interaction period and especially of moon ascending and descending period. Almanac prepared in India based on mathematical calculation and star movement take care of agriculture operation. Performing of agricultural operations as per Almanac result better germination, least pest attack, higher yield and superior storage environmentto crop produce.

The homa in natural farming

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The homa therapy an ancient "Indian vedic science" promulgated by an Indian Sant Paranjpe 1989 and called as "Yagna" or "Yajna" or "Yagya" have given the hope of rescue and relief from such deteriorated state.

Few experiments conducted on homa under deteriorated environmental conditions in different parts of world viz: USA (Paranjpe, 1989;Rathner, 2009), Poland (Bizberg, 2009), Germany (Berk and Johanson, 2009), South America (Garcia, 2009), Turkey and middle east (Szcypior, 2009) and India (Pathak and Ram, 2004; Pathak, 2009;Selvaraj, et al., 2009;Bhujbal, 1981; Paranjpe, 1989) have confirm its effects on environmental rejuvenation, receding of pollution and insect attack on plants, control of plants and human disease and significant improvement in crop yield and quality.

Homa therapy means healing of environment, the atmosphere and the life. The basic tools in Homa therapy are "Agnihotra" – a small fire prepared (Cow ghee, cow cake) in a "Copper pyramid" exactly to synchronize with arrival of first ray of sun rise and last ray of sun set (Pathak and Ram 2004). Homa heals the environment and thereby improves polluted soil, water, air and ground water. Microorganisms, microbiota and predator population protecting plant surface and towards of disease and pests and raise crop yield and quality are enhanced. There are two views are considered in homa:

1. *Ancient views*: At sun rise many fires, electricity, ethers and more subtle energies emanating from Sun and reaching to earth produce a flood effect giving a music that can be heard even today for some time at silent places. The morning Agnihotra mantra is the essence of that music. At Sun set the flood receded. Agnigotra along with mantra activates the quintessential sound of that flood which is maintained till sun rise. Mantra in Sanskrit is quintessential sound of that music and should be chanted in Sanskrit only. This sound enlivens and purifyeverything in its path destroy impure componentsin its wake making all life to rejoice (Paranjpe, 1989; Berk, 2020).

2. *Modern Views*:Using Oscilloscope, the special sound in Homa fire have been recorded. It interacts with sound of Mantra and that creates resonance effect. This invigorates the cells of plants leading to better reproductive cycle (Heschl, 2009). However, the FIR (Far Infrared) rays which are considered as positive energy is more specifically produced when transitional elements are heated and furthered by their oxides. Copper oxides are produced during Agnihotra. FIR of 4-27µm wavelength is absorb deep upto 3-5 cm in any living bodies.Specific FIR is known to kill microbial cells and inhibit cancer cells growth. The aforesaid activities might be reason for killing insect diseases, harmful microbes and induction of resistance against diseases in plants and finally improvement in their productivity and quality (Shendye, 2009). Similarly the effect of Homa therapy on purifying water quality and alkaline, sodic and acid soils, soil microbe, soil biota population, reducing radioactivity (recorded in Australia), air pollution and raising crop yield and crop productivity was reviewed by Berk (2020).

Conclusion

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The natural farming is gaining popularity as farmers and consumers become more aware of the environmental impacts of conventional agriculture. It offers a holistic approach to farming that respects natural processes and promotes sustainability. Moreover, the natural farming offers several compelling reasons for adoption, both for farmers and the environment. By adopting natural farming, we can create a more sustainable, equitable, and resilient agricultural system that benefits farmers, consumers, and the planet. The amendments in technologies and doses should be attempted keeping environmental conservation & control of edaphic and atmospheric pollution, chemical contamination and concept / practices of zero budget natural farming and sustaining of higher crop yield in mind in future.

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