ICFA

भारतीय कृषि एवं खाद्य परिषद्

INDIAN COUNCIL OF FOOD AND AGRICULTURE

ECO AGRICUTULRE AND BIO PRODUCTS

NATIONAL ROUND TABLE CONFERENCE

22 May 2017

INDIA INTERNATIONAL CENTRE, NEW DELHI

ECO AGRICUTULRE AND BIO PRODUCTS OVERVIEW

INTRODUCTION

Since green revolution, land has witnessed indiscriminate use of chemicals and the effects of this prolonged over use of chemicals viz. human health hazards, environment and ground water pollution etc. have been discussed and debated over widely. At present, the issue is whether to continue with the chemical inputs-based intensive technologies or to go back to the traditional environment friendly farming practices. Thus, leading to the emergence of the concept of eco-agriculture. The developed countries as well as many developing countries are shifting towards eco agriculture. The main aim of eco-agriculture is to manage the resources of rural communities to improve their welfare, preserve biodiversity and ecosystem and develop more productive as well as sustainable farming systems. Eco-agriculture, is emerging as a holistic approach to ecologically plus socially responsible land use. It further aims to reduce the load of chemicals for crop production and to make use of more and more natural and bio inputs.

Eco-Agriculture explicitly recognizes the economic and ecological relationships and mutual interdependence among agriculture, biodiversity and ecosystem services. Eco-agriculture landscapes are mosaics of areas in natural/native habitat and areas under agricultural production. Effective eco-agriculture systems rely on maximizing the ecological, economic and social synergies among them, and minimizing the conflicts.

It keeps agriculture sustainable. This form of agriculture conserves soil and water resources, protects climate, enhances agro-diversity, ensures biodiversity, meets the demand for food and safeguards livelihoods. In short, it ensures that the environment thrives, the farm is productive, the farmer makes a net profit and society has enough nutritious food.

The methods of ecological agriculture are based on modern ecological science combined with time-tested indigenous knowledge, giving emphasis on the mode of cultivation through Integrated Crop Management (ICM), Integrated Farming System (IFS), Integrated Pest Management (IPM) for crop production.

ECO-AGRICULTURE PRACTICES

The eco-friendly agricultural practices, which can be adopted, are as follows:

CROP PLANNING

It deals with growing crops for use of food and fiber. Knowing that different plants have different requirements for nutrients, a good crop planning and management is required in order to optimize the use of nutrient in the soil. Crop rotation, intercropping, cover crops and green manures represent the main alternatives to the farmers to manage soil health and fertility.

SOIL MANAGEMENT

The sum total of all operations, practices and treatments used to protect soil and enhance its performance is referred to as soil management. To minimize the negative impacts of soil management while benefiting from its advantages, the farmer should aim on reducing the number of interventions to the minimum and choose methods that conserve the natural qualities of the soil.

WATER MANAGEMENT

Good agricultural water management means using water in a way that provides crops and animals the amount of water they need, enhances productivity, and conserves natural resources for the benefit of downstream users and ecosystem services.

Eco-Friendly farming aims at optimizing the use of on-farm resources and at a sustainable use of natural resources. Active water retention, water harvesting and storing of water are important practices, which needs to be adopted. Also, it is more important to first improve the water retention and the infiltration of water into the soil.

WEED CONTROL

It is the process of keeping or minimizing the weed population and their growth below the level of economic injury to the crop with minimum environment pollution.

Good weed management in eco-friendly farming includes creating conditions which hinder weeds from growing at the wrong time and in the wrong place and then become a serious problem for the crop cultivation.

ECOLOGICAL INSECT-PEST CONTROL

Ecological Pest Management (EPM) is an approach to increasing the strengths of natural systems to reinforce the natural processes of pest regulation and improve agricultural production.

AGRICULTURAL ENGINEERING

Agricultural engineering incorporates many science disciplines and technology practices to the efficient production and processing of food, feed, fiber and fuels. It involves disciplines like mechanical engineering (agricultural machinery and automated machine systems), soil science (crop nutrient and fertilization, etc.), environmental sciences (drainage and irrigation), plant biology (seeding and plant growth management), animal science (farm animals and housing) and much more.

CLOTHING AND TEXTILE

Textile processing affects the nature there is an alternative for an eco – friendly process. The eco – friendly fabrics like Hemp, organic cotton, Soy silk, Ingeocorn fibre, Bamboo etc. are some of the substitutes. Jute and Tencel is one of the

great alternative fibre used for producing eco – friendly products.

An eco – friendly process like bleaching the fabric using sunshine, using eucalyptus for stain remover and so on may be opted by clothing and textile industry in India. Eco-friendly labels are available to identify the product which is produced under Eco – friendly process.

ANIMAL HUSBANDRY

Integrating animal husbandry into crop producing farms is one of the ways of practicing eco agriculture. It helps creating a closed or semi-closed system where energy and nutrients are recycled. Animals can convert non-edible biomass (e.g. grass, straw, kitchen waste) into food, while increasing soil fertility with their manure.

APPROACH TO ECO-AGRICULTURE

Some of the approaches for eco-agriculture are as follows:

ORGANIC FARMING

Organic farming is a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming system rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests.

BIOLOGICAL FARMING

Biological farming allows the use of selected chemical fertilizers (avoiding disruptive materials such as anhydrous ammonia and potassium chloride) and adopts low-inputs approaches to use of herbicides and insecticides. Diagnostic instruments to monitor plant and soil conditions are frequently used in biological farming. These include refract meters to monitor sugar content (Brix) in plant tissue sap; electrical conductivity meters to monitor ERGS (or energy released per gram of soil); ORPS meters (or oxygen reduction potential of soil); and radionics.

REGENERATIVE AGRICULTURE

Regenerative agriculture bunds on nature's own inherent capacity to cope with pests, enhance soil fertility, and increase productivity. It implies a continuing ability to recreate the resources that the system requires. In practice, regenerative agriculture uses low-input and organic farming systems as a frame work to achieve these goals.

PERMACULTURE

Permaculture is concerned with designing ecological human habitats and food production systems, and follows specific guidelines and principles in the design of these systems. To the extent that permaculture is not a production system, per se, but rather a land use planning philosophy, it is not limited to a specific method of production. Thus, practically any site-specific ecological farming system is amenable to permaculture.

In spite of presence of various concepts as stated above distinguished definitions are still absent resulting in confusion rather than options for adoption.

ECO-FRIENDLY FARM EQUIPMENTS

The emergence of eco-friendly farming is impacting agricultural equipment industry significantly. Every day new sorts of environment friendly equipment are introduced to cater the demand. In order to fulfill escalating demand for environment friendly farm machinery various new products are launched every year to promote mechanization of agriculture without damaging environment.

Demand for machinery that works with use of renewable energy is increasing. Solar power fence installation helps farmers to produce solar electricity by themselves. This system is also known as photovoltaic system.

Solar powered tractor is also receiving superb appreciation amongst farmers of India. Such tractors use solar energy as its fuel and work efficiently without providing any damage to the environment. Further, farms are making greater use of solar pumps, threshers, harvesters, etc. in their farms.

Further, since eco-friendly farming completely restricts from using chemicals and pesticides on land, demand for chemical and DDT free pesticides and insecticides is increasing in India.

Water conservation is one of the utmost goals of eco-friendly farming and for this reason recycling of water is becoming a fad amongst farmers. Thus, for this purpose higher use of efficient irrigation equipment is practiced. Further, recycling runoff machineries are of higher admiration. Better tillers are demanded in order to conserve soil and prevent any sort of soil erosion. Machinery with low pollutant emissions is becoming extremely popular amongst farmers.

Though green farming is quite in vogue these days, there are many challenges in the industry that must be eliminated to provide massive boost to sustainable agricultural equipment industry. Many a times these agricultural equipment are quite expensive and hence farmers shun from using such machinery and rather focus on cheaper substitutes. Further, restrictive promotion of such equipment by the government and lack of education amongst farmers is making sale of such machinery quite restrictive.

Though, opportunities for environment friendly farm equipment are quite vast and are expected to rise massively in future, also government policies are working to promote both mechanization and sustainability in agriculture laden to sky high demand for environment friendly and modern agricultural equipment in India, but will take substantial time for scenario to change at farmers field.

CHALLENGES

The concept of sustainability has many dimensions. It can be used to mean economic sustainability, social sustainability, institutional sustainability as well as environmental sustainability. The environmental sustainability agenda in agriculture covers the protection of the resource base, the reduction of negative externalities and the promotion of positive externalities. Principal issues include the following:

- **Water Quality and Quantity Concerns:** Issues here include leaching of nutrients and pesticides, water extraction and drainage and flooding. Contamination of both ground and surface waters caused by high levels of production and use of manure and chemical fertilizers is a serious problem, particularly in areas of intensive livestock or specialized crop production.

- **Air Quality Concerns:** The issues here are emissions of ammonia and greenhouse gases. At EU level, agriculture is responsible for about 8% of total greenhouse gas emissions but due to the pastoral nature of Irish farming, the proportion here rises to 30%.

- **Biodiversity Concerns:** Issues include genetic, species and ecosystem diversity. The intensification of agriculture has led to widespread reduction of species and habitats, which needs to be restored.

- **Landscape Concerns:** The marginalization of agricultural land can lead to its abandonment if farming ceases to be viable. Alternatively, intensification of agriculture can lead to the loss of important landscape features such as hedges and ponds, the enlargement of fields and the replacement of traditional farm buildings with industrial structures. Rights of access may be restricted in interests of more efficient farming.

- **Soil Erosion Concerns:** Overgrazing particularly in mountain areas has led to the erosion of vegetation cover with the consequent loss of soil, the silting of rivers, etc.

- **Food Safety and Animal Welfare Concern:** The issue here is the effect of agricultural practices on human health and animal well-being rather than the physical environment. There is concern about the consequences for the quality and safety of the food supply of the increasing use of pesticides and drugs, as well as the consequences of introducing genetically-modified organisms.

CONCLUSION

In a healthy farm system, agriculture works in harmony with the natural environment. This begins with healthy soil that stores water and nutrients and provides a stable base to support plant roots. In a sustainable system, soil is kept in balance. Crops are rotated through the fields to replace nutrients in the soil. Where there is livestock, animals graze the land, then waste from those animals is used to fertilize the soil. The idea is that as farmers take from the land they also give back. Industrial farms disregard that need for balance and degrading the resources of nature. It's high time for mankind to shift towards ecological agriculture by integrating physical, cultural, mechanical and biological measures in agriculture to restore the natural balance and reduce the harm done to environment as well as animal, plant and human health.

DELIBERATIONS

Eco-Agriculture explicitly recognizes the economic and ecological relationships and mutual interdependence among agriculture, biodiversity and ecosystem services. Eco-agriculture landscapes are mosaics of areas in natural/native habitat and areas under agricultural production.

Recognizing the significance of Eco Agriculture Revolution for health, environment, biodiversity preservation and sustainability, Indian Council of Food and Agriculture constituted a Working Group on Eco Agriculture, which was launched on May 22, 2017 at a National Round Table by Dr. Ramesh Chand, Hon'ble Member, NITI Ayog. The working group shall be chaired by Padma Shree Dr. M.H. Mehta and co-chaired by Mr. J.S. Khorakiwala, MD, Biostadt India and Dr. Krishan Chandra, Director National Centre for Organic Farming, under the Ministry of Agriculture. The working group will act as a coordinator across stakeholders, enabling an interface by organizing workshops, seminars, policy dialogues on various critical aspects of organic agriculture. The forum will follow up on important recommendations with concerned national and international agencies; facilitate farmer's sensitization; promote quality certification infrastructure and international collaborations.

The brain storming session was chaired by Mr. Jalaj Srivastava, Additional Secretary, Ministry of Agriculture and Farmers Welfare and co-chaired by Dr. Shyam Khadka, FAO chief for India and Sri Lanka. Around 60 global CEOs, heads of businesses, national institutions, academicians, researchers, farmer leaders and top experts participated in the conference.

Dr. M.J. Khan, Chairman, ICFA, welcomed all the participants and expressed gratitude to Dr. Ramesh Chand, Dr. M.H. Mehta, Mr. J.S. Khorakiwala, Dr. Krishan Chandra, Mr. Jalaj Srivastava and Dr. Shyam Khadka for gracing the event with their presence. He mentioned that eco-agriculture can be adopted on a large scale by every type of farmer. He also pointed out that government plans cannot be successfully implemented unless industry participates and industry is supporting and making sure that government plans are implemented for larger benefit.

Mr. Parshottam Rupala, Hon'ble Minister of State, Ministry of Agriculture, in absentia, quoted "Honorable Prime Minister, Shri Narendrabhai Modi has put a high priority on Sustainable and Eco Farming. In fact, I recall that last year he has even invited a Global Expert Committee consisting of 4 International Experts namely Dr John Fagan from USA, Dr Hans Harren from UN, Dr MH Mehta from India & Dr A Thimmaiah from Bhutan and had detailed deliberations and later announced a major initiative in Sikkim for Eco Agriculture / Organic Farming.

I congratulate Dr. M.J. Khan, Chairman of ICFA for this commendable initiative to launch this Working Group with Dr. Mehta as Chairman to prepare a detailed Road Map to bring in the Eco Agriculture Revolution. I am particularly happy as you have top experts and farmers as the members of this important Working Group.

In fact, we feel that India is in an ideal situation to bring Eco Agriculture Revolution which can help better environment, improve farm productivity in a sustainable manner. It is particularly very relevant and important for small and marginal farmers and in rain-fed areas where we can help them bring down the cost of inputs with the help of Agri Bio Inputs like Bio Fertilizers, Bio Pesticides and Bio Composts from farm wastes. With these eco-friendly inputs, we can improve the environment, health of people and sustainability of our farms and help our farmers in increasing their income in a sustainable manner.

I will also suggest to your Working Group to make a detailed program and also have several such Round Tables organized in different parts of the country and even in neighboring countries so that the knowledge and technology transfer for Eco Agriculture Revolution can be speeded up and benefit all. With these words, I am very happy to announce the launch of this WORKING GROUP on ECO AGRICULTURE and BIO PRODUCTS."

Dr. M.H. Mehta, Chairman, Gujarat Life Sciences, pointed out that there have been continuous discussions about India moving from green revolution to evergreen revolution and organic farming is one of its major components, which comes under umbrella of eco agriculture. He also mentioned that there is a need to maintain the ecological balance as ill effects of chemicals gradually vanish, but alternatives are being created and new generation agri-bio products are being introduced, which will help in sustaining the eco agriculture model.

He suggested to organize such RTCs in other parts of the country along with the neighboring countries and pointed out that:

- Everybody should have correct understanding of eco agriculture, it being important.
- There is a requirement of comprehensive definition and standards for eco agriculture.
- Everybody has clearly emphasized that now there is a time for Eco Agriculture Revolution. By appropriate definition, Eco Agriculture or Agro Ecology is the approach of producing without harming environment and includes the term Organic Agriculture, Integrated Farming etc. Eco Agriculture is therefore the broad term. It is regarded as the need for the coming years.
- The range of new generation Agri Bio Inputs will play a very important role in Eco Agriculture especially for higher productivity and lowering input costs.
- We have to make a road map to reach Eco Agriculture model, which has highest priority for small and marginal farmers and rain-fed areas.

Mr. Shyam Khadka, India Representative, Food and Agriculture Organization FAO, mentioned that the privatization of land led to division of the land into smaller pieces, which ultimately increased the productivity but ecological landscape was disturbed. Thus, according to him there is a need to create a mechanism to manage landscapes along with the biodiversity management, which has been ignored for long. He also talked about the water management at the basin level.

Dr. Krishan Chandra, Director, National Center of Organic Farming, stated that some farmers are well informed about this concept of eco agriculture but are afraid to adopt it as there is no well-planned eco agriculture model. Thus, there is a need to develop a well-planned eco agriculture model for the farmers. He also threw light on the bio products which are being imported to India from various countries, which may not be in accordance with the requirements of the Indian soil and mentioned that similar is the case for bio stimulants. He raised the question on quality of bio products being sold in the market as till now no regulatory regime is available in the country. Thus, he suggested regulating the market for every product being launched by the company. However, everything cannot be provided to the farmer from the market as the concept of eco agriculture or organic farming itself means to produce some inputs on farm.

Mr. J.S. Khorakiwala, Managing Director, Biostadt India, stated that a lot of things are to be considered for bringing food from the farm to the table such as crop protection, water management and etc. He also affirmed with the points raised by Dr. Krishan Chandra for the need for regulation for bio products and suggested this to be one of the agendas for the working group formed by the ICFA.

Mr. R.D. Kapoor, Mayank Singhal MD, PI Industries, agreed with Mr. J.S. Khorakiwala for the need of proper analysis and stated the history of micro nutrients regulations. He brought to the notice that even industry faces challenge of storing bio stimulants with pesticides as bio stimulants are not regulated, the pesticide inspector does not allow to store bio stimulants in the same warehouse of pesticides. Thus, he expressed the interest of industry to get the bio stimulants regulated.

Mr. Marco Rosso, Global Corporate Affairs Director, Valagro, talked about his company and mentioned the definition of bio stimulants and bio fertilizers in Europe and the U.S. He stressed for the federal regulations for bio stimulants and bio fertilizers so that companies can increase their production. He also talked about the nature of bio stimulants and cannot be mixed with crop protection.

Mr. Roger Tripathi, President, Acadian Plant Health, affirmed with the point of Dr. Krishan Chandra that many products coming from China or other countries are not suitable for the Indian Soil, but he had a different opinion about farmers producing their own inputs as it is not viable. He further expressed the need for more and more companies which believe in sustainable agriculture, to enter the market. He also pointed out that time has come to minimize and optimize the usage of chemical fertilizers. He opined that usage of chemical fertilizers cannot be eliminated rather there is a need to balance the usage of chemical inputs with the bio stimulants and fertilizers. This is also because sometimes the stress from abiotic factors is adverse than the biotic stress. Thus, there is a requirement of consistent regulatory framework, globally.

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Dr. Ramesh Chand, Hon'ble Member, Niti Ayog, brought to the notice that now days, even illiterate farmers know harmful effects of chemical fertilizers. He also mentioned about the increasing poverty gap and decline in nutritional content of the agricultural produce. He mentioned that though the usage of chemical fertilizers in India is quite low when compared to other countries, the crop residue is high. He also talked about the removal of crop residue content because of inadequate monitoring, which posed a challenge for the Indian agricultural sector. He pointed out that farmers are totally dependent on the chemical fertilizers which need to be changed. According to him, there is a requirement of eco agriculture where bio products take the primacy rather than the chemical fertilizers.

Dr. Nutan Kaushik, Senior Fellow & Convener, Plant Biotech & Sustainable Agri, TERI, talked about eco agriculture as landscape planning. She pointed out that the shelf life of the bio products is less and by the time it reaches the farmers, it's already expired and unable to deliver the desired results. She also mentioned that not all bio products are safe. Moreover, farmers are not ready to put in labor to produce their own inputs.

Dr. P.V.S.M. Gouri, Vice President Organics, RoundGlass Partners, gave a holistic view of the eco agriculture and aspect on sustainability. She highlighted about the existing integrated management of organic agriculture, the major constraints the organic farmers are facing today such as high cost of organic inputs, lack of training and demonstration on the usage of the products, short shelf life & dependability on these products and on the economics of production resulting to high cost of production and eventually leading to high price premium tagged to organic products.

She was of the view that the production cost could be economically attained for achieving sustainability resulting the farm gate cost could be equal to convention cost with short supply chains and with a provision for open and transparent marketplace for the farmers to sell and buyers to source.

Dr. P.P.S. Pangli, President, Borlaug Farmers Association, talked about the crop rotation carried out in Punjab, with kanola variety of mustard which is helpful for maintaining soil quality and stressed that this kind of practices should be promoted.

Mr. Indranil Das, Vice President, Asia, Agrinos India, stressed on the importance of microbes for healthy soil and better productivity. He mentioned that in order to shift towards eco-friendly agriculture it is of utmost importance to preserve and nurture the microbiome of the crop. In accordance, he underlined the importance of adopting new and improved technologies for sustainable agricultural ecosystem. He voiced the need to move to probiotic agriculture by the way of reduction in gene sequencing and increasing immunity of the plants. He however, felt that there is no need to abandon chemical pesticides and fertilizers rather a balance needs to be restored to make agriculture eco-friendly.

Mr. Bharat Bhushan Tayagi, CEO, EVST, brought to the notice, the survival issue faced by the farmers along with the changes which have occurred in the soil due to the disturbance caused by the humans in the ecological landscape of the nature. According to him, this disturbance has caused a lot of destruction and need to be taken care off now.

Dr. Ashok C Shah, Organic Farming Expert, Consultant, talked about the value addition in the agricultural sector and enriched the conference with the glimpse of the vast knowledge available in Indian ancient literature, which has solution for every problem. He also mentioned that this knowledge have been tested but not adopted. Thus, there is a huge potential, which needs to be tapped.

Mr. M.J. Saxena, Managing Director, Ayurvet Limited, stressed on the revival of the Indian traditional farming and pointed out three basic needs for switching to eco agriculture – health for human, environment and removing farming distress.

Mr. Ajay Katyal, Director & CEO, Nature Pearls Pvt. Ltd., referred to the earlier mention of teaching the economics to farmers and said that farmers are already economist and they are not required to teach the economics of agriculture. From his experience, he also stressed that farmers does not want to practice farming as it is not profitable for them. Thus, there is a need to make proposal for farmers so that they get back their interest for agricultural practices. Moreover, he also pointed out that the traditional produce of India can be tapped for export market.

Ms. Poornima Savargaonkar, Author – Natueco Farming, NGO - Organic Farming, pointed out that robotization is not eco agriculture. According to her, eco agriculture must be decentralized along with the customization of knowledge as per the needs. She also emphasized on making use of the traditional Indian knowledge in agriculture as it will help in adoption of eco agriculture in a better way.

Ms. Zareen Myles, Executive Director, Women's Action for Development (WAFD), talked about her initiative and mentioned that eco agriculture is working for the nature. In this context, she pointed out that there is a need to reach out to the small farmers at hilly and remote areas, especially women.

Mr. Bipin Bihari, CEO, Agrigenome Limited, drew the attention of the house towards the animal husbandry, which is also the part of agriculture. He also mentioned that there is a need for farmers' economic value chain.

Dr. H Purushotham, CMD, National Research Development Corporation, stated that the knowledge base is available but there is a need to take that into consideration and set targets.

Dr. Ashok Patel, Vice Chancellor, SD Agricultural University, pointed out that we all are stuck in the jugglery of words for eco agriculture as there is no clear definition for the same. Further, he mentioned that farmers should produce their own inputs as the eco products brought from the market may be adulterated due to small shelf life. He also brought to the notice, the food dryer systems.

Mr. Rajesh Umatt, COO, Gujarat Life Sciences, stated that there is a need to look into the both quality and quantity of the inputs used for farming. He also stressed on farmers' economics and calculation of farmer's ROI and etc. so as to achieve the desired goals.

Mr. Dhananjay Edakhe, Chief Executive Officer, Zytex Biotech, mentioned that the shelf life of the bio products is extendable up to 2 years depending upon the carrier used.

Mr. Harendra Rana, Organic Farming Expert, NCOF, requested to take timely action as he feared that delayed decision will limit its adaptability as well as profitability.

Mr. Jalaj Shrivastava, Additional Secretary, Ministry of Agriculture, concluded the august meeting by summing up the points mentioned by various speakers and made the following additions:

- Quality check of products is important.
- Depleting resources and quality deterioration needs to be addressed.
- Attempt has to be made to formulate the regulatory framework for bio stimulants, nationally with customization as per state requirements.
- Technology for rubber and plastic decomposition is being developed and will revolutionize the sector.
- Soil enrichment should be focused along with water management techniques such as water harvesting, recycling, micro irrigation and etc.
- Phytoherbicides should be used instead of weedicides.

Dr. M.H. Mehta, Chairman, Gujarat Life Sciences, in his concluding remark, pointed out that it was emphasized by all the participants that Eco Agriculture or Agro Ecology is capable of producing enough food in a sustainable manner without harming the environment. Eco Agriculture through its broad definition incorporates organic agriculture, integrated agri systems; new generation agri bio inputs etc and offers all inclusive elements to manage agri system. Eco Agriculture, therefore, is being recommended as more critical and essential requirement for an environment-friendly future. It was visualized that this Working Group will play a vital role in drafting a road map or ushering in implementing ever green – eco agri revolution in a sustainable manner.

It was realized that the new agri bio inputs including Bio Fertilizers, Bio Stimulants, Bio Pesticides, Bio Composts etc can play a very important role in Eco Agri practices to improve farm productivity in an environmentally sustainable manner. The farmers are totally depending on chemical fertilizers which need to be changed and there is a requirement of eco agriculture practices where Bio products taking the primary role rather than chemical inputs.

It was decided that the Working Group will take up preparation of road map for the entire country for Eco Agriculture. In the process, the expertise and inputs of international experts, organization would also be taken.

The working group would be divided into various experts sub-group such as (a) Key strategy of promoting Eco Agriculture and action for transformative change at village level (b) Role and future plan for Agri Bio Input Industries (c) Technology transfer and extension at grass root level to bring green revolution.

For each of the sub-group, there would be coordinators and the various members of Working Group depending on their expertise would join as experts of group members. Based on these inputs a final road map and action plan would be prepared.

It was recommended to hold several such Round Tables on Eco Agriculture in different parts of the country as well as some of the neighboring countries so as to involve all the people and help take up the implementation program.

It was also recommended that such session will be organized on Eco Agriculture at the Global Agri Summit to be held in Delhi in September 2017.

Finally, the formal vote of thanks was presented by **Mr. Alok Sinha, Director General, ICFA,** who expressed his gratitude toMr. Jalaj Shrivastava, Additional Secretary, Ministry of Agriculture for sparing his valuable time and gracing the conference. He also thanked all other dignitaries for active participation and making the discussion worthy.

RECOMMENDATIONS

1. Eco Agriculture is a broad term which could encompass concepts like organic agriculture, natural agriculture etc. In the absence of concrete definition, standards and specifications of these various forms of agriculture, a scope for ambiguity exists. As such, for the sake of abundant clarity and understanding, it is of utmost importance to define, specify and standardize these various forms of agriculture, as is done in the case of organic agriculture.

2. Eco friendly agriculture represents a holistic approach encompassing all the farm activities and should not only restrict to crop production. It covers on farm production of inputs while reducing the harmful effects on environment and health of plant, animals and humans from all the farm activities and not only crop production. Hence, while defining the various concepts and standardizing different variants of eco agriculture, components like animal husbandry, poultry etc. should also be included.

3. To ensure effective as well as gainful implementation through full participation of stakeholders, it is imperative that complete knowledge pertaining to concepts, contents and practices of Eco Agriculture are widely disseminated, in particular to the farmers being the main practitioners. In order to effectively educate and enlighten the farmers about the Eco Agriculture, specialized trainings would be required to be undertaken by the State Agricultural Universities, Extension Departments and Institutions running Ag. Extension network line ICAR. In order to extensively promote eco agriculture and bio products, pilot projects in selected states showcasing its potential needs to be undertaken especially for high commercial value crops like fruits and vegetables.

4. Bio products for agriculture represent nearly 25 years old industry offering a wide range of products like bio fertilizers, bio pesticides, bio stimulant etc. Despite of bio-products being a crucial input for agriculture and being advocated by scientists and promoted by government, still the industry remains unregulated leading to spurious quality products being sold to farmers resulting in unsustained usage and lack of faith in the products on part of farming community. It is therefore urged that government and industry should join hands and together put in place a systematic regime for regulating and standardizing the products. Further, the testing protocols should be made available for the same.

5. Under the proposed regulatory procedure for bio products, it would be necessary that product labeling is not only standardized but also systematically enforced. This would ensure transparency, quality standards stamping out the malpractices of selling spurious chemicals to the farmers in the guise of bio products.

6. Transparency in market operations of bio products is essential to build trust among farming community and promote the eco-friendly agriculture. An e-mechanism needs to be devised for open data availability and sharing of details like products licensed, products tested and products standardized etc. with farming community to empower them and reduce fraud in the industry.

7. Government should make a provision for the allocation of more funds especially to promote research on bio products like bio fertilizers, bio stimulants, bio pesticides etc. as well as to develop technologies for ecofriendly agriculture in the public sector institutions, to extensively support and promote eco agriculture and reduce chemical load.

8. A vast amount of knowledge is available with farmers and even larger is present in our ancient literatures pertaining to natural ways of practicing agriculture, which should be widely shared and popularised to revamp present day agriculture; appropriately backed by researches and make farming eco-friendly as well as remunerative to benefit the farmers and mankind. Thus, it would greatly aid and strengthen eco agriculture revolution if ancient knowledge on such practices is researched, scientifically evaluated, validated and systematized as well as popularized among the farming communities for widespread adoption.

9. Financial support should be extended to all those small and marginal farmers directly practicing eco agriculture like organic farming or traditional farming etc. Specifically, proper marketing support needs to be ensured for such small and marginal farmers by organizing them into clusters so as to accumulate the small produce for marketable size.

10. Notwithstanding its declining relative contribution to the overall GDP, agriculture as a sector continue to provide core resilience to the Indian economy and providing livelihood dependence to more than half of the population directly or indirectly. Despite of this, elementary knowledge of agriculture is not being imparted by our school education system as part of the standard curriculum. In order to build an agri-sensitive society and make farming as an attractive enterprise, it is required to incorporate agriculture as a subject in schools, which will attract students to the fi

11. Industry, corporate and the private sector in general needs to be prompted including through appropriate incentivization to invest and extend resources and adopt blocks or villages under corporate social responsibility (CSR) activities to support eco farming and make a profound impact on climate change. Government should also put in place policies for recognizing and adopting eco villages and to promote such practices including through widespread dissemination of success stories and models.

12. Eco agriculture is an upcoming field and just gaining momentum. Environment friendly agriculture with whatever name we term it like Prampragat Kheti, Natural agriculture, Organic agriculture or Eco agriculture is the only real hope for the future sustainability of national food security, environmental and biodiversity preservation none of which can be compromised in any way. The future growth of this eco agriculture forming the basis of India's cherished Evergreen Revolution really hinges on the availability, access and affordability of various bio products, bio stimulants and bio agri inputs. Presently such bio products are levied 0% vat by most of the states while a few states levy only below 6% vat on these. Therefore while implementing the new tax regime in the shape of Goods and Services Tax (GST), it is imperative that the Government group these bioproducts either in the 0% or at the most in the lowest tax slab so as to keep these critical agri bio inputs accessible and affordable to the farmers.

LIST OF PARTICIPANTS

1. Mr. Jalaj Shrivastava, Additional Secretary, Ministry of Agriculture
2. Dr. Ramesh Chand, Hon'ble Member, Niti Ayog
3. Dr. M.H. Mehta, Chairman, Gujarat Life Sciences
4. Dr. Ashok Patel, Vice Chancellor, SD Agricultural University
5. Dr. V.V. Sadamate, Former Advisor Planning Commission
6. Mr. Dhananjay Edakhe, Chief Executive Officer, Zytex Biotech
7. Mr. Indranil Das, Vice President, Asia , Agrinos India
8. Dr. P.P.S. Pangli, President, Borlaug Farmers Association
9. Mr. Harendra Rana, Organic Farming Expert, NCOF
10. Dr. T Kotaiah, Managing Director, Indbro Research and Breeding Farms
11. Mr. Krishan Guptaa, Managing Director, Organic Wellness
12. Mr. Ajay Katyal , Director & CEO, Nature Pearls Pvt. Ltd
13. Ms. Poornima Savargaonkar, Author – Natueco Farming, NGO - Organic Farming
14. Ms. Zareen Myles, Executive Director, Women's Action for Development (WAFD)
15. Mr. M.J. Saxena, Managing Director, Ayurvet Limited
16. Dr. Venkat Maroju, CEO, Source Trace Systemsli
17. Fr. Jilson James, Joint Director, PDS Organic Spices
18. Mr. G.K. Narayana Swamy, Consultant, Multiplex Group
19. Dr. Anup Kalra, Executive Director, Ayurvet Limited
20. Mr. Arun Kumar Singh, Founder & CEO, Armon International
21. Dr. Ashok C Shah, Organic Farming Expert, Consultant
22. Mr. Rajesh Umatt, COO, Gujarat Life Sciences
23. Mr. Bipin Bihari, CEO, Agrigenome Limited
24. Mr. R.D. Kapoor, Mayank Singhal MD, PI Industries
25. Mr. Bharat Bhushan Tayagi, CEO, EVST
26. Mr. Luca Fornara , Country Manager, Valagro
27. Mr. Marco Rosso, Global Corporate Affairs Director, Valagro
28. Mr. J.S. Khorakiwala, Managing Director, Biostadt India
29. Mr. Roger Tripathi, President, Acadian Plant Health
30. Mr. Shyam Khadka, India Representative, Food and Agriculture Organization FAO
31. Mr. Sourabh Agarwal, Managing Director, Stevia Biotech
32. Dr. H Purushotham, CMD, National Research Development Corporation
33. Mr. Dinesh Awasthi, GM – Agri Business, DS Group
34. Mr. Mohan Bist, HR, DS Group
35. Dr. P.V.S.M. Gouri, Vice President Organics, RoundGlass Partners
36. Dr. D.K. Mishra, GM - Tech and Devt , International Panaacea Ltd.
37. Mr. D.K. Sharma, Deputy Manager – Technical, International Panaacea Ltd.
38. Mr. Nitiin R Sonar , VP Operations, Biostadt India
39. Mr. Rahul Garg , Startup Mentor, Alex Panels Group
40. Mr. Rajeev Ranjan, Director, Agpulse Private Limited
41. Dr. Nutan Kaushik, Senior Fellow & Convener, Plant Biotech & Sustainable Agri, TERI
42. Mr. Soumendu Ghosh, Country Head, Acadian Plant Health
43. Mr. Mahendra Rawat , GM-Product Strategy, Crystal Crop Protection
44. Mr. N.K. Arora, Advisor, Crystal Crop Protection
45. Mr. Akhilesh Yadav, RM - Social Investments, ITC Group
46. Dr. Krishan Chandra, Director, National Center of Organic Farming
47. Mr. Rajpal Singh Gandhi, Chairman and MD, GVS Biotech (Stevia)
48. Ms. Rutaksha Rawat, Editor, Pure & Eco India
49. Dr. Suresh Motwani, GM – Soy & Palm Oil, Solidaridad
50. Mr. A.K. Thakur, Regional Manager, Maple Orgtech
51. Mr. N.P. Deshpande, Senior Manager – Agriculture, Advanced Bio Agro Tech Pvt. Ltd,
52. Mr. Charly Tastet, Representative India, Kuhn India
53. Mr. Saurabh Sharma, Sales & Business Development Manager, Cropin Ltd.
54. Mr. J. Mandrah, Manager – Food Chain, Bayer CropScience Ltd.
55. Mr. Reze Jivani MD Vikas Crop care
56. Ms. Phalguni Dasbiswas, Director, Inhana Organic Research Foundation
57. Mr. H M Gupta
58. Mr. V.P. Chopra
59. Dr. M.J. Khan, Chairman, ICFA
60. Mr. Alok Sinha, Director General, ICFA
61. Mr. N.S. Randhawa, Executive Director, ICFA
62. Mrs. Mamta Jain, Director, ICFA
63. Dr. Sucheta Arora, Director – Knowledge Management, ICFA
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