



**CHARTERED INSTITUTE OF ENVIRONMENTAL AND  
PUBLIC HEALTH MANAGEMENT OF NIGERIA**  
*Creating Value For Healthy Environment*

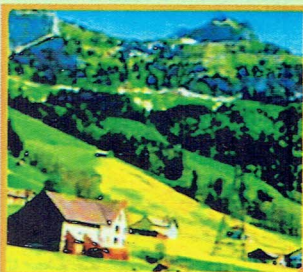
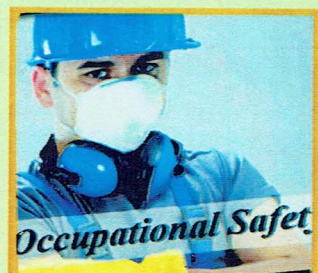
*Annual*  
**INTERNATIONAL ENVIRONMENTAL MANAGEMENT  
STAKEHOLDERS' CONFERENCE**

*Theme:*

**SCIENTIFIC APPLICATION OF BIOTECHNOLOGY TO ORGANIC FARMING, FOOD  
PRODUCTION AND SUSTAINABLE ENVIRONMENTAL MANAGEMENT IN THE 21ST CENTURY**

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**INDUCTION OF NEW MEMBERS**



**DATE: FRIDAY, 27TH OCTOBER, 2017**  
**VENUE: LAGOS AIRPORT HOTEL, IKEJA, LAGOS TIME: 10:00AM PROMPT**

## PROF. RAMAR KRISHNAMURTHY CITATION OF DISTINGUISHED GUEST SPEAKER



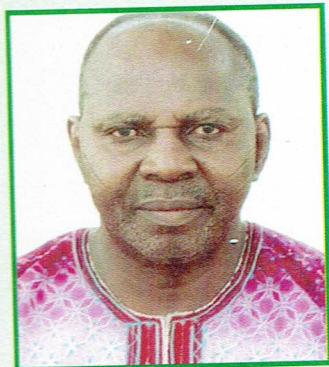
**P**rof. Krishnamurthy is currently the Director of C. G. Bhakta Institute of Biotechnology (since Sept. 2011) & Dean of Faculty of Science (2011-2013; Sep 2016 till date) at Uka Tarsadia University, Bardoli, Gujarat, India. He is a great visionary researcher and a very meticulous administrator. He impeccably executes multidimensional responsibilities viz. teaching, research and associated administrative activities with enthusiasm. He is a Visiting Professor to University of Ilorin, Nigeria and an Associate Research Guide for Nigerian students in their academic research work since March 2013. He completed his B.Sc. and M.Sc. in Botany from University of Madras (1978-1983) and Ph.D. (Botany), M.S. University, Baroda (1988). He is a recipient of several Research Fellowships Awards and grants. He served as member of academic bodies of Universities in India. He has been honoured with Best Project Appreciation Award for Transfer of technology to Industry in 2002 by DBT-DST, Government of India. He has so far completed 7

Government R & D Projects and three Joint -Venture Projects with Foreign Countries on Medicinal Plants. He has a vast experience of almost three decades in the Industry and Academic Institutions. He is a research advisor to many companies in both India and Nigeria. He has technologically helped Uka Tarsadia University, India (in 2013) and University of Ilorin, Nigeria (in 2015) to set-up commercial scale Plant Tissue Culture Laboratories for developing horticultural, food and medicinal crops.

He has organized several National and International seminars/Conference Jointly with an Indian Medicinal Plant-based Industries and University of Ilorin at Uka Tarsadia University, India. He was the Organizing Chairman of SFEC-2017, an International Conference (Feb 23-25, 2017) on Ethnopharmacology and Medicinal Plants in association with the Indian and International Societies for Ethnopharmacology held at Uka Tarsadia University, India.

He has to his credit an European patent, written and edited important book chapters and more than 96 research publications in peer reviewed journals. He is a reviewer of many international journals and members scientific societies. His major research areas are plant tissue culture, value addition & cultivation of medicinal plants and promoting clean and green environment. He collaborates with overseas Universities for research work. Expanding his horizon & not keeping himself limited to the Academia, he ventures in helping farmers in India and Nigeria.

## DR. MOSES OLATUNDE OYATOGUN CITATION OF DISTINGUISHED GUEST SPEAKER



**D**r. Oyatogun was born 27<sup>th</sup> March, 1954 in Jos, Plateau state, Nigeria. He is the first product of the marriage of Maria Olalonpe and Emmanuel Ogundele Oyatogun both of blessed memory. Moses attended Baptist day School Azikiwe road (1960-1966) ; Baptist High School, Jos (1967-

1971); Government college Keffi, Keffi, Nigeria where he did HSC (1971- 1973). In November 1973 he was admitted to read Forestry at the University of Ibadan, Ibadan (1973-1976) He graduated with BSc (Forestry). He served the nation for NYSC at Forestry Research Institute of Nigeria Eastern Research Station Umuahia where he was posted to Enugu to be in charge of the Enugu Ngwo field Station (1976-1977). He served by planting teak, gmelina, Pinus caribea and Pinus oocarpata reclaim the heavily eroded soils around Enugu Ngwo. In 1977 immediately after the NYSC programme, he joined the then Kainji Lake Research Institute (now National Institute for Freshwater Fisheries Research, (NIFFR). He is a member of more than 13 renown reputable Forestry and Wildlife Conservation

He represented Nigeria in 1984 in Nairobi Kenya for the 2<sup>nd</sup> International Training for Agroforestry Research for Development and also in Baltimore, U.S.A at the 26<sup>th</sup> International Conference of the Society for Conservation Biology. He has three thesis and Dissertations, 22 journal articles, 8 edited Conference Proceedings, and numerous Technical Reports/Exhibitions and Internal Seminar papers to his credit. He presented COLERM College FUNAAB , University lecture series titled "Utilization of biodegradable wastes for alternative energy sources to generate Methane gas and liquid Organic Fertilizer in Nigeria." Oyatogun the current Director of FUNAAB Zoo Park has supervised over 55 undergraduate projects, co-supervised eight Masters and Four PhD projects in the area of Environmental Utilization, Waste Management and alternative Energy Sources. His major activity interests are in the area of Wildlife and Range Conservation, Ecology, Resources Utilization, Agro-ecotourism, Integrated Farming Systems, Biogas development and Utilization. He is currently the National Co-ordinator of the Olusegun Obasanjo Presidential Library Non-Governmental Initiative tagged Green Economy Nigeria and the National Treasurer of the Nigerian Association of Zoological Gardens and Wildlife Park (NAZG)

# Scientific Applications of Biotechnology To Organic Farming, Food Production And Sustainable Environmental Management

BY PROF. RAMAR KRISHNAMURTHY

*(Visiting Professor, University of Ilorin, Nigeria); Dean, Faculty of Science & Director, C. G. Bhakta Institute of Biotechnology, UkaTarsadia University, Bardoli, Gujarat India. [krishnamurthy@utu.ac.in](mailto:krishnamurthy@utu.ac.in)*

**Preamble:** In the past decades, agricultural production inputs and inorganic fertilizers is becoming more expensive. Also, the sustainability of soil productivity as land began to be intensively tilled to produce higher yields under multiple and intensive cropping systems is of serious concern. In some cases, waterlogging and secondary salinization have been reportedly associated with excessive irrigation. The groundwater table has declined sharply as more and deeper bore wells were drilled and the recharging of groundwater is reducing due to severe deforestation. Indiscriminate use of chemical pesticides and herbicides over the years have destroyed many naturally occurring effective biological control agents. The consequences of all these devastating anthropogenic activities have done great damages to our environment. Health hazards associated with intensive modern agriculture, such as pesticides residues in food products and groundwater contamination are matters of concern. The occurrence of multi-nutrient deficiencies and overall decline in the productive capacity of the soil due over-application of chemicals have been widely reported. To mitigate and ameliorate these effects, various biotechnological approaches could be a solace.

Introduction of high-yielding varieties, extension of irrigated areas, use of high quality organic inputs and increase in cropping intensity can propel a nation towards self-sufficiency in food production. In the process, relative contribution of organic materials as sources of plant nutrients would substantially reduce the use of toxic and non-ecofriendly chemicals. The concerns and problems posed by modern-day agriculture gave birth to new concepts in farming, such as organic farming, natural farming, biodynamic agriculture, do-nothing agriculture, eco-farming, etc. The essential feature of such farming practices imply, back to nature. Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes, the use of management practices in preference to the use of off-farm inputs. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system.

## **Why Organic Farming Biotechnology?**

Agriculture became a high investing and low yielding due to uncontrolled use of synthetic chemicals which are becoming harmful to the ecosystem. To protect our ecosystem, organic farming can be practiced without using harmful chemicals. These chemicals are replaced by bio-fertilizers, bio-pesticides etc. to maintain the soil fertility. Organic farming

such as vermi composting, crop rotation, green manure, bio-fertilizers and biological pest control. Organic farming is an adapted practice in developing countries, where animals are used for tilling the land and manures prepared by dung and other animal waste materials to support crop yield and quality of production

## **Organic Farming and Sustainable Agriculture**

Sustainable food and agriculture policies aim to improve the efficiency of agricultural production systems while at the same time preserving the diverse ecosystem services upon which the world's food supply depends. (e. g. agricultural lands, soil nutrients, forests and oceans, climate regulation, and biodiversity, etc.) These twin objectives are central to the Sustainable Development Goal of ending hunger/under nutrition and achieving long-term food and nutrition security for all. Thus, widespread environmental degradation, severe poverty around the globe and the burning concerns about achieving and maintaining good quality of life were the principal factors for taking interest in intergenerational equity, in relation to access to natural resources. So, the necessity of having an alternative agriculture method which can function in a friendly ecosystem while sustaining and increasing the productivity is talk of the day among not only agricultural scientists but also even common men. Organic farming is recognized as the best known alternative in this regard. It is economically feasible to practice when the farmers are able to get premium price for their products and the cost of cultivation will be reduced by not depending upon the purchased off-farm inputs.

It is a matter of fact that the modern agriculture is based on the use of high yielding varieties seeds, chemical fertilizer, irrigation water and pesticides etc. These is to satisfy the ever growing demand for food grains not only to fulfil the problem of food security but also to earn foreign exchange at the cost of environmental quality which cannot be sustainable in future because of the adverse changes to it. Organic farming is not only revival to the farming community, it also revival to the consumers to lead a "Healthy and Happy life". So a paradigm shift to Organic farming is the need of the day to enhance the quality of life. Organic farming is essentially an agriculture employing a knowledge/understanding of naturally occurring processes. Organic practice maintains soil health, re-enliven soil fertility and balances useful and harmful insect-pests ratio.

## **Eco-Friendly Biotechnology**

Reconciling organic crops and Biotechnology, on one hand there are hundreds of millions of malnourished people, to

achieve food security in 2050, we will need 50% or more food than at present. On the other hand, there is massive waste, significant over-consumption of calories. In the real world demand for food will increase as the population grows in parts of Africa, Asia and other regions. In addition, the means of food production will be challenged by climate change, water shortage, soil erosion and the need to preserve biodiversity. In the light of these factors it is difficult to reject the conclusion that we need new, safe technology for food crop production. The technology we need will allow global yield to increase but without using additional land and without degrading the environment. One of such new technologies is organic farming; agro-ecological methods and approaches that avoid synthetic chemicals or genetic manipulation. Ingenious strategy of promoting organic products must surely inspire the development and refinement other methods of crop managements. In combination with biotechnology they could allow yields to be maintained at the level of current industrialized agriculture but with a lower environmental footprint. In less developed countries, especially those in Africa where average yields are very low, there could be a massive increase in agricultural productivity.

**Benefits of Biotechnology to Organic Farming and Safe Crop Production:** Organic farming is an important form of doing agriculture which has many benefits to ecosystem such as:

**Nutrition:** Organic food is rich in nutrients and it is free from harmful chemicals, it also increases the nutrients in the soil so the grown crop is healthier to consume.

**Free from chemicals :** In organic farming chemicals are not used to control pests and other harmful plant diseases, which causes cancer and other diseases to the consumers. But organic farming is free of toxic chemicals

**Quality food:** The organic food is having quality with nutrients and it tastes better than the food grown by using synthetic chemicals and quality of food is determined by its taste.

**Longer shelf Life:** Organic food has the capability of longer time storage due to its metabolic and structural integrity in their cellular structure than the other crops grown by using synthetic chemicals.

**Low input cost:** Expenditure on agriculture is low with organic farming because it need animals to till the land, manures which are easily available and they can prepare their own, and the bio fertilizers are prepared with low cost

**Other benefits:** It increases productivity at lower cost; Environmental friendly; It reduces food contamination and increased food equality.

**The Environmental Promise of Agricultural Biotechnology**

There are at least four areas of potential biotechnology contributions: gains in yields through new plants resistant to environmental stresses; lower costs of labor and agriculture inputs (including irrigation water); higher-quality food and value-added products, and environmentally benign methods of managing weeds and insect pests.

Many of these potential contributions are environmental. For example, the new transgenic crops could reduce the use of chemical pesticides and lower the environmental risks of pesticides still in use. There may also be savings in energy and air emissions from more efficient transport of less perishable products. If drought resistant transgenic plants become a reality, not only could yield losses be minimized, but irrigation water could be reduced allowing for better protection of environmental values, such as adequate in-stream flows (e.g., fish habitat). Also, if transgenic crops translate into higher yields, there might be a reduction in the amount of grassland or forest land converted into agricultural production with attendant environmental benefits. While the potential for these environmental benefits from agricultural biotechnology is real, it is yet unrealized.

Agricultural biotechnology is clearly in its infancy—emphasizing first generation input traits such as herbicide resistance. The next wave of output quality traits is on the horizon. While environmental benefits may be forthcoming from both of these generations of products, there is little research or empirical evidence to date as to whether such benefits are significant. In addition, there are concerns that unintended negative environmental impacts will emerge and accumulate. These concerns have been heightened not only by the rapid pace of product innovation, but also by recognition that the biotechnology products are possible because of the existence of a new technology, one with which the world has little experience.

**Limitations:** Apart from advantages of organic farming its demerits are: Organic farming is a time taking process in getting the result, which makes the farmers to neglect this kind of farming; Organic farming promotes creation of organic waste intentionally so that industries would utilizes them to produce organic farm input which may be expensive; It requires more labor force and should have regular observation compared to conventional farming; Organic farming is a skill based work and farmers should be trained time to time according to the seasons and the condition of the crops; Low productivity is the major problem in organic farming compared to conventional farming, but in conventional form of agriculture the fertility of soil is decreasing time to time with excess use of chemicals.

**Conclusion:**

Application of biotechnology to organic farming and safe crop production would enhance adequate global food security and eco-friendly agricultural practices. Biotechnological approach to organic agriculture would address low yield and create remarkable impact on the future of agribusiness. Since this is a new area in which many developing countries lack technical expertise, there is need for technical assistance and capacity-building on biotechnology and on risk assessment of its application to various agricultural practices to allow for adequate biosafety measures to be implemented by countries.