

**CENTRE FOR SCIENCE AND TECHNOLOGY OF THE NON-ALIGNED
AND OTHER DEVELOPING COUNTRIES
(NAM S&T CENTRE)**

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2ND TRAINING WORKSHOP ON

INDUSTRIAL BIOTECHNOLOGY: DRIVING VALUE ADDITION AND BENEFICIATION

HARARE, ZIMBABWE

22-24 AUGUST 2017

BRIEF REPORT

Industrial Biotechnology is one of the most promising new approaches to pollution prevention, resource conservation, cost reduction and creation of new markets while protecting the environment. Most of the countries, including those with emerging economies, acknowledge the role being played by this upcoming area in the conversion of natural resources into value added products of benefit to humans. Novel biotechnologies for adding economic value to under-utilised biological resources in developing countries are capable of meeting specific developmental and biodiversity conservation goals. Industrial Biotechnology is among the most efficient and growing sectors today with enormous scope for innovation, research and development, and by innovative advancements in this area a country can achieve new heights in the fields of agriculture, medicine, renewable energy, climate sustainability and many more.

Keeping the above in view, the NAM S&T Centre in partnership with the Ministry of Higher and Tertiary Education, Science and Technology Development, Zimbabwe and the National Biotechnology Authority (NBA) of Zimbabwe organised the 2nd Training workshop on 'Industrial Biotechnology: Driving Value Addition and Beneficiation' during 22-24 August 2017 in Harare which brought various stake holders, viz. scientists, experts and professionals engaged in R&D, policy making and implementation to a common platform for improving their skills and sharing views and experiences in various aspects of Industrial Biotechnology.

The Training Workshop was organised in the International Conference Centre of Harare in the same hall where the 8th NAM Summit was earlier held in September 1986. The Inaugural Session of the Workshop commenced with a Welcome Note by Prof. F.P. Gudyanga, Permanent Secretary, Ministry of Higher and Tertiary Education, Science and Technology Development of Zimbabwe. This was followed by a power point presentation by Dr. Mufandaedza Jonathan, Chief Executive Officer and Registrar, National Biotechnology Authority (NBA) of Zimbabwe on the NBA activities. Prof. C.J. Chetsenga of the University of

Zimbabwe delivered a scientific keynote address on Biotechnology with specific reference to GM Crops. Prof. Dr. Arun P. Kulshreshtha, Director General, NAM S&T Centre presented the genesis of the event touching upon some important issues related to Industrial Biotechnology and its growth aspects and also gave a short description of the functions and accomplishments of the NAM S&T Centre aimed at South-South Cooperation. The Training Workshop was formally inaugurated by Hon. Dr. Godfrey Gandawa (MP), Deputy Minister of Higher and Tertiary Education, Science and Technology Development of Zimbabwe. The Ambassadors of South Africa, Malaysia and Cuba were also present on the podium. The proceedings of this Session were conducted by the Director of Ceremonies and concluded with a photo session.

The Harare Training Workshop was attended by 68 scientists, experts and professionals from 17 developing countries, including Cuba, Egypt, The Gambia, India, Indonesia, Kenya, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, South Africa, Sri Lanka, Sudan, Tanzania, Togo and Zimbabwe.

The foreign participants were from Cuba [Mrs. Marisol Romeu Hernández, Head, Biotechnology Unit, Ministry of Science, Technology and Environment, Havana City]; Egypt [Dr. Mostafa M. Abo Elsoud, Researcher, Microbial Biotechnology Dept., National Research Center, Cairo]; Gambia [Ms. Bintou Dibba, Lecturer, University of The Gambia, West Coast Region, Brikama]; India [Dr. N. Y. Kadoo, Principal Scientist, Biochemical Sciences Division, CSIR-National Chemical Laboratory, Pune and Dr. Muktinath Mishra, Scientist (Synthetic Biology), Department of Biotechnology, CSIR-Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow]; Indonesia [Dr. Taryono, University Instructor, Faculty of Agriculture, Universitas Gadjah Mada, Institut Pertanian Yogyakarta]; Kenya [Mr. Willis Abwao Adero, Research Scientist, Kenya Agricultural and Livestock Research Organisation (KALRO), Biotechnology Centre, P.O. Box 14733-00800, Westlands, Nairobi]; Malaysia [Dr. Farizul Hafiz Kasim, Deputy Dean (Students Affair & Alumni) / Senior Lecturer, School of Bioprocess Engineering, Kompleks Pusat Pengajian Jejawi 3, Universiti Malaysia, Perlis, 02600, Arau, Perlis]; Mauritius [Mr. Gunshiam UMRIT, Research Officer in Charge, Mauritius Cane Industry Authority, 1, Moka Road, Reduit]; Myanmar [Dr. Win Min Than, Deputy Director, Biotechnology Research Department, Building No. 21, Department of Research Innovation, Ministry of Education, Naypyitaw]; Nepal [Dr. Buddhi Ratna Khadge, Secretary, Nepal Academy of Science & Technology, Khumaltar, Lalitpur]; Nigeria [Mrs. Deborah Asabe Ashigye, Chief Scientific Officer, Raw Materials Research and Development Council (RMRDC), No. 17 Aguiyi Ironsi Street, P.M.B. 232 Garki, Abuja]; South Africa [Dr. Konanani Justice Rashamuse, Director, Industrial Bioinnovation, DST Building, Building No. 53,

CSIR South Gate Entrance, Meiring Naude Road, Brummeria, Pretoria; Mr. F.K. Chikava, Discipline of Chemical Engineering, University of KwaZulu-Natal. Howard College Campus, Durban, 4041; Ms. K. Mugadza, School of Chemistry and Physics, University of KwaZulu, Natal, P Bag X54001, Durban, 4001; Mr. E.T. Marondedze, School of Chemistry and Physics, University of KwaZulu-Natal, P Bag X54001, Durban, 4001; and Ms. W.P. Mafunga, School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Pietermaritzburg Campus, Scottsville, 3029]; Sri Lanka [Mrs. Wasundara Divisekera, Research Scientist, Food Technology Section, Industrial Technology Institute, 363, Bauddhaloka Mawatha, Colombo]; Sudan [Dr. Abdelhelim Abdullahi Hamza Ahmed, Assistant Professor, Department of Microbial Biotechnology, Commission for Biotechnology and Genetic Engineering National Center for Research. Khartoum]; Tanzania [Mr. Twahir Magoolo, Quality Assurance Officer, Laboratory Scientist, Medical Stores Department, P.O. Box 9081, Dar Es Salaam]; and Togo [Dr. Glato Kodjo, Research Assistant, Plant Physiology and Biotechnology Laboratory, Department of Botany, University of Lomé, 1BP 1515 Lomé]. The NAM S&T Centre was represented by its Director General Prof. Dr. Arun P. Kulshreshtha and Ms. Keerti Mishra, Research Associate.

The overall programme of the Training Workshop was conducted in seven Technical Sessions, six Training Lecture Sessions, three Hands-On Training Sessions, two Biotechnology Industry Familiarisation Tours, Concluding Session and the Farewell Dinner that included the Awards Ceremony.

The presentations made by the foreign participants were on ‘Advances of Biotechnology in Cuba’ by Mrs. Marisol Romeu Hernández; ‘The Mathematical Language Of Biotechnology’ by Dr. Mostafa M. Abo Elsoud; ‘The Application of Biotechnology in Aquaculture: Strength, Weakness, Opportunities and Challenges in The Gambia’ by Ms. Bintou Dibba; ‘Engineering Fatty Acid Biosynthesis Pathway in Microbes for Production of LCPUFAs’ by Dr. N. Y. Kadoo; ‘Development of An Improved Bacterial Host for the Production of Anti-Malarial using Synthetic Biology Approach’ by Dr. Mukti Nath Mishra; ‘Promotion of Biotech Industry in India’ by Ms. Keerti Mishra; ‘The Use of In-vitro Derived Seedlings In Indonesian Cocoa Replanting Programme’ by Dr. Taryono; ‘Development of Frozen Yoghurt Supplemented with Date Pulp’ by Mr. Mahdi Salih Hameed; ‘Development of an Affordable, Rapid, Sensitive and Specific Field Based PCR Assay for Detection and Quantification of Newcastle Disease (NCD)’ by Mr. Willis Abwao Adero; ‘Lipase Production Potential of A Locally Insolated Extremely Halotolerant, *Aspergillus* sp. Strain using Agro-Industrial Wastes as Substrate’ by Dr. Farizul Hafiz Kasim; ‘Technology Development for the Biosynthesis of the Bioplastic Poly-(3-hydroxyalkanoate)

using Sugarcane Harvest Residues’ by Mr. Gunshiam Umrit; ‘Study on the Antifungal Activities of Effective Fungi as a Control of Plant Pathogenic Fungi’ by Dr. Win Min Than; ‘Commercialization of Bioorganic Fertilizer for Sustainable Agriculture’ by Dr. Buddhi Ratna Khadge; ‘Current Status of Industrial Biotechnology in Nigeria’ by Mrs. Deborah Asabe Ashigye; ‘Bioinformatics for Biotechnology: a Fundamental Building Block to Exploit Natural Resources in Developing Countries’ by Prof. Yaqoub Ashhab; ‘Towards the Development of a Sustainable Bio-industry in South Africa’ by Dr. Konanani Justice Rashamuse; ‘Biopharming of HIV Neutralising Chimeric Antibodies’ by Dr. Ofentse Jacob Pooe; ‘Sri Lankan Finger Millet (*Eleusinecoracana*) Varieties as Potential Probiotic Source’ by Mrs. Wasundara Divisekera; ‘Isolation, Characterization and Molecular Identification of New Sudanese *Streptomyces* spp Producing Bioactive Secondary Metabolites in Sudan’ by Dr. Abdelhelim Abdullahi Hamza Ahmed; ‘Development of Medical / Pharmaceutical Industries under Public Private Partnership (PPP), A Case of Medical Stores Department, Tanzania’ by Mr. Twahir Magoolo; and ‘Using Biotechnology Tools to Enhance Sweet Potato Production in Togo’ by Dr. Glato Kodjo.

The 27 papers presented by the participants of Zimbabwe were ‘Monitoring Starch and Sugar Changes in Maturing Sweet Potato Tubers and Cassava’ by Mr. Kelvin T. Nyamajiwa; ‘Development and Characterization of Food Products from *Parinaricuratellifolia* Fruit’ by Dr. C. Benhura; ‘Isolation of *Streptomyces* Species from Zimbabwean Agricultural Soils and Screening for Production of Vitamin B₁₂’ by Mr. Tapiwashe Claudious Madeya; ‘Applicability of Nanotechnology in Food Processing with references to Zimbabwe Industry’ by Mr. Mgciniwethu Mazula; ‘Optimization of Bio-Ethanol Production from Barley Waste Using Response Surface Methodology’ by Mr. S. Manhokwe; ‘Comparison of Droplet Digital PCR and Quantitative PCR in the Quantification of *Spongoporasubterranea* f. sp. *subterranea* in Soils from Sandveld, Limpopo and KwaZulu Natal Potato Fields’ by Mr. Kenedy Simango; ‘Using Analytics and Bio-informatics to improve Healthcare Delivery provide Bio-technology Services and Monitor the Bio-economy.’ by Dr. Rufaro L. Nyabako; ‘Unlocking the Potential of CRISPR Technology for improving Livelihoods in Africa’ by Dr. Nyamusamba, Reagan Mudziwapasi; ‘Synthesis of Hydraulic Brake Fluid from *Jatropha* Oil’ by Dr. Damascus Masawi; ‘Physicochemical Quality of Opaque Beer Industry Wastewater and Metagenomic Characterisation of Its Microbial Diversity’ by Mr. Zephaniah Dhlamini; ‘Achievements and Prospects of Industrial Biotechnology in relation to Biomining and Bioenergy in Zimbabwe: Review’ by Mrs. Thamari Sengudzwa; ‘A Comparative Investigation of the Reduction of Coliform Bacteria in Waste Water by

Agaricusbisporus Pleurotus and *Pleurotustostreatus*' by Mrs. Eunita Chidziya; 'Prospects for Biocatalysis in Zimbabwe' by Dr. Musengi; 'Biotechnology in Zimbabwe, Opportunities, Challenges and the Way Forward' by Dr. Scelo Mguni; 'Status and Prospects of Industrial Biotechnology in Relation to Sustainable Production of Bovine Serum Albumin from Abattoir Waste in Zimbabwe' by Ms. Shumbeyi Muzondo; 'Opportunities of Industrial Biotechnology in the Pharmaceutical and Food & Beverage Industry in Advancement of Zimbabwean Industries: Review' by Dr. Travers Kudzai Chirova; 'Disaster Victim Identification using DNA isolated from Burnt Human Remains' by Ms. Anita Dube; 'Pesticidal Plant Use for Post-Harvest Grain Protection. A Case Study of Bikita District, Masvingo Province, Zimbabwe' by Mr. Munamoto Mabhegedhe; 'Molecular Characterisation of Newcastle Disease Virus (group VII) from Chickens in Zimbabwe' by Mr. Joshua Mbanga; 'A Review on the Role of Tissue Culture in the Propagation of Planting Materials' by Mrs. L.G. Muusha and Ms. Trish Nyarumbu; 'Evaluation of Genetic Diversity in Coffee Grown in Zimbabwe using Molecular Markers' by Dr. Chidoko P.; 'Bioprospecting for Industrial Enzymes from the Hindgut Metagenome of A Higher Termite' by Dr. Walter Tendai Sanyika; 'Closing the Loop: Making Fuels, Chemicals and Materials from Biomass as An Opportunity for the Agricultural Sector of South Africa' and 'Butanol Recovery from Fermentation Broths-A Technoecomic Assessment in the South African Context' by Prof. F.K. Chikava; 'Strides towards Bio-Based Economies through Integrated Biorefineries, A South African Sugar Industry Case Study' by Ms. Mafunga W.; 'Use of Biomass Precursors to produce Carbon Based Nanostructured Materials for Sustainable Energy' by Mr. K. Mugadza; and 'Strategies for the Separation of Carboxylic Acids from Fermentation Broths' by Mr. E.T. Marondedze.

Training Lectures were delivered by Prof. H. Matarira (University of Zimbabwe) on Medical Biotechnology; Dr. C. Kashangura (Tobacco Research Board) on Biotechnology Services; Eng. P. Muredzi (Harare Institute of Technology) on Food Biotechnology; Dr. E. Whingwiri (Zimbabwe Earthworm Farm) on Environmental Biotechnology; Dr. A. Phiri (Harare Institute of Technology) on Biochemicals and Bioenergy; Dr. J. Mufandaenda (NBA) on Biotechnology Ethics and Regulations; and Dr. D. T. Savadye (Scientific Industrial Research Development Centre) on Agriculture Biotechnology.

For their training the participants visited three Labs in small groups. These were the African Institute of Biomedical Science and Technology (AiBST), where Dr. J.Manasa conducted the programme on Genomics; University of Zimbabwe Biochemistry Department, in which Dr. F. Robertson held the programme on

Tissue Culture; and the National Health Research Institute, where the programme was conducted by Mr. P. Shumbaon Malaria Research.

As part of the training programme the visits of all the participants were also organised to Delta Breweries and the Harare Agricultural Show.

In the Concluding Session, extensive discussions were conducted by Mrs. R. Karimanzira of MHTESTD on a 'Harare Resolution on Industrial Biotechnology -Driving Value Addition and Beneficiation', which was finally unanimously adopted by the participants with a number of recommendations for its submission to the concerned ministries, agencies and other authorities in their countries.

The Certificates of Participation signed by Prof. F. P. Gudyanga and Prof. Arun Kulshreshtha were handed over by Dr. Johnathan Mufandaedza of NBA to the foreign and local participants and all others concerned with the Training Workshop during a Concluding Dinner hosted by the Zimbabwean organisers of the event.

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