INTERNATIONAL TRAINING COURSE ON PLANT TISSUE CULTURE, AGRICULTURAL GENETIC ENGINEERING RESEARCH INSTITUTE (AGERI), GIZA, (EGYPT), APRIL 2-13, 2005

PARTICIPATING COUNTRIES: 12 (INCLUDING 8 MEMBER COUNTRIES OF THE CENTRE)

NUMBER OF PARTICIPANTS: 19 (INCLUDING 10 FROM THE MEMBER COUNTRIES OF THE CENTRE)

Agriculture is at the forefront of socio-economic development in all developing countries. Horticulture and plantation crops constitute a significant component of the total agriculture. These are high value commercial crops of great importance playing a vital role in the country's export. There is an urgent need today to concentrate on the research aspects for improvement of these crops and plant tissue culture offers major tools to accomplish this objective.

Plant tissue culture is an important area of biotechnology, which is used for the propagation of problem-species, rapid propagation of selected / developed genotypes, production of secondary metabolites, etc. The plant cell, tissue and organ are cultured in a defined medium under strict aseptic conditions and incubated under artificial environment to induce growth and development. The developmental fate of the plant tissues to be manipulated towards desired ends is by inclusion of growth regulators (plant hormones) and other chemicals in the medium. Tissue Culture is considered a cost-effective technology but with a palpable impact which is clearly visible in the form of improved yields, supply of virus-free clones of true-to-type cultivars with provision of improved germplasm.

The application of tissue culture has several advantages, including the rapid reproduction and multiplication of cultivars; production of healthy cultivars free of viruses and pathogenic agents; rapid adaptation and selection of cultivars that are resistant to specific stress factors (for instance, salinity and acid soils); availability of seed material throughout the year (rather than seeds which are subject to the seasonal cycle); possibilities to produce species that are difficult to reproduce or that reproduce and grow slowly; and improved possibilities for the storage and transportation of germplasm. Since the application of tissue culture does not require very expensive equipment, this technology can be applied easily in developing countries and can help to improve local varieties of food-crops. In many developing countries, better selection from the varieties that are already available locally may help to improve food production considerably.

A step ahead in tissue culture is genetic engineering which has even a broader spectrum as genes from any living organism e.g. viruses, bacteria and fungi could be isolated and inserted into the candidate crops for desired results. Genetic engineering confers important agronomic traits such as viral resistance, microbial resistance, insect resistance, herbicidal resistance, modified reproductive capacity, delayed senescence and altered macromolecular composition. Thus varied technologies of genetic engineering, such as genetic transformation of plants, bring about plant improvement. This could have an enormous economic impact on the agricultural front and play a decisive role in boosting the per hectare yields of value added commodities.

In order to acquaint the biotechnologists, agronomists and researchers to a variety of the currently used and prospective plant tissue culture and transformation

techniques, the Centre for Science and Technology of the Non-Aligned and other Developing Countries (NAM S&T Centre) with the approval of its Governing Council organised a 10-days international training course on this subject at the Agricultural Genetic Engineering Research Institute (AGERI), Giza, Egypt during 2-13 April, 2005 in association with Egyptian Academy of Scientific Research and Technology (ASRT) and Agricultural Genetic Engineering Research Institute (AGERI) of Egypt. The contents of the 10-day training course comprised lectures on topics such as introduction and application of plant tissue culture, problems arising during micro propagation techniques, DNA structure and replication, genome organization, extraction of DNA, restriction and other Enzymes used in molecular biology, cloning and cloning vectors, plant transformation techniques, detection of transgens, principles and application of serological methods, PCR and its applications, electrophoresis, IPR, Bio-safety etc. The main parts of the practical sessions included protocols such as preparation of tissue culture media, plasmid DNA preparation, explants and the different growth stages of in vitro cultures, Extraction and purification of DNA, agarose gel electrophoresis, regeneration and micro-propagation of wheat, maize, potato and melon, greenhouse adaptation and acclimatization of in vitro plantlets, preparation of agrobacterium, transformation via agrobacterium, coating of micro projectiles with plasmid DNA, biolistic transformation, leaf painting and gus assay, PCR and its applications, serological detection using indirect ELISA method were arranged. Each and every participant practiced these methods by him/herself or in small groups.

Prof. Mohsen M. Shoukry, Vice-President, Academy of Scientific Research and Technology (ASRT), Egypt, Prof. Hanaiya A. El-Itriby, Director, Agricultural Genetic Engineering Research Institute (AGERI) and Vice-President, Agricultural Research Centre of Egypt and Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre inaugurated this training course at AGERI on April 2, 2005. There were nineteen course participants from 12 countries including Mr. Emad Eldin Hamy Fahim, Demonstrator, Faculty of Agriculture and Mr. Ahmed Abd Elhady Rashedy, Administrator, Department of Pomology, Cairo University from Egypt; Dr. Tadesse Mehari, Associate Professor and Director of Academic Affairs, University of Asmara**,** Dr. Tsegay Berhane, Director, Crop Improvement Division, National Agricultural Research Institute and Ms. Sandra Ann McSheffrey, lecturer, University of Asmara in Eritrea; Mr. Jeetendra Jaysing Solanki, Research Scholar, Nirmal Seeds (P) Ltd. India; Dr. Mohammad Kafi, Science Counsellor in the Embassy of Iran in India; Ms. SP Lukita Devy, Deputy For Agro-industry and Biotechnology, Agency for the Assessment and Application of Technology of Indonesia; Mrs. Catherine Nyambura Ngamau, Research Officer and Ms. Salome Mallowa Obura, Research Assistant in the International Service for the Acquisition of Agri-Biotech Applications (ISAAA) in Kenya; Dr. Zaleha Aziz, Lecturer, School of Science and Technology, University of Malaysia; Dr. Sheikh Saghir Ahmed, Associate Professor, Department of Food Technology, Sindh Agriculture University and Dr. Saifullah Khan, Assistant Professor In-charge Plant Tissue Culture and Biotechnology Division, University of Karachi in Pakistan; Mrs. Amel A. Al Mahmoud and Mr. Hadi Abdulla Shaief, Researchers in the Department of Agriculture and Water Research, Ministry of Municipal Affairs and Agriculture of Qatar; Dr. Prathiba Aruni Weerasinghe, Senior Lecturer and HoD of Plant Sciences, Faculty of Agriculture, Rajarata University in Sri Lanka; Ms. Ali Bacha Nabila, Researcher-Assistant in the Ministry of Agriculture and Agrarian Reform, General Commission for Scientific Agricultural Research (GCSAR), Syria; and Dr. Gerald Kyeyune Muwanga, Senior Technician in the Faculty of Agriculture, Makerere University in Uganda.

The training course comprised 11 seminars and 19 practical sessions. The resource persons were Prof. Taymour Nasr El-Din, Dr. Emad Anis, Dr. Hala Eissa, Dr. Shireen Assem, Dr. Gihan Hosny, Dr. Osama Momtaz, Dr. Ayman Diab, Dr. Naglaa Abdalla, Dr. Nahed Abdel-Ghafar, Dr. Ahmed Bahi El-Din, Dr. Tamer Zaki, Dr. Mohamed Salama, Dr. Taymour Nasr El-Din and Dr. Ismail bdel Hamid. The course exposed the trainees to the latest developments in the area of the plant genomics; enabled them to have a general understanding on the principles and usefulness of different types of novel gene transfer techniques with comparison to conventional techniques such as hybridisation. In addition, the participants also gained hands–on experience in basic and advanced plant tissue culture techniques, which is an indispensable tool in modern biotechnology. The training provided international exposure to scientists to improve their personal development, exchange of ideas and information among participants, and find remedies for burning scientific problems and further collaboration with host organisations and scientists from different countries. The presentations held by the participants during the course also facilitated the exchange of information on the status of technology development made in the respective countries in the field of plant tissue culture and transformation techniques.

Finally, the participants also got chance to visit the Giza pyramids, Egyptian museum and some famous mosques and other landmarks of Cairo in the weekend during the course. One of the biggest private companies in Egypt, actively involved in the area of tissue culture, also organized a visit for the participants, to their site.