Commercialization of Low Cost (CSUP) Micropropagation for Export and Production of Improved Ornamental Plants through Genetic Modifications

Low cost (CSUP) micropropagation technique which can be applied to produce high quality plants in a short duration has been already perfected. Plant tissue culture laboratories can be established with very low investment using this technique as 90 % cost for equipment is reduced. Arrangements to export the *in vitro* plants through Hayleys Agro Biotech Pvt. Ltd. is already arranged. Thus growers are encouraged to establish plant tissue culture laboratories using the CSUP technique and there is a possibility of earning Rs. 150,000.00 per month by exporting 5000 *in vitro* plants which can be raised in a space of 17.5 m^2. As the export product is high quality plants in the *in vitro* level growers do not have to experience the difficulty of acclimatizing and exporting acclimatized plants which will have to undergo rigorous quarantine protocols. According to information reveals by Mr. A. Samarasinghe, deputy Manager, Hayleys Agro Biotech Pvt.Ltd. the demand for in vitro ornamental plants is very high and will be there for many years.

Application of house hold bleach, which contains sodium hypochlorite to sterilize glassware and media used for *in vitro* culturing, reduces the cost incur for an autoclave used for this purpose conventionally. As a further improvement TiO2 doped electric bulb will be developed to sterilize glassware and media. Once optimized to achieve less or no microbial contamination and high growth of plants in cultures this nanotech application will be automated to cater large scale sterilization. Activities such as watering and chemical spraying under greenhouse technology will also be automated. New ornamental plant varieties will be produced through CRISPR-CAS9 (Clustered Regularly Interspaced Palindromic Repeats) the new gene editing technology, the use of a chemical mutagen Ethyl Methane Sulphonate (EMS) and physical mutagen gamma rays.

Through in vitro growers' association CSUP low cost technique and TiO2 nano tech sterilization technique will be commercialized. Growers who adopt one of these sterilization methods do not have to invest heavily to establish tissue culture laboratories. Thus, new tissue culture laboratories will emerge to export *in vitro* ornamental plants.

Funds will be allocated as 3.5 Mn for goods, 2.9 Mn for works and 6.1 Mn for other value-added activities.

Nano technological application for plant tissue culture media sterilization will be the expected innovation which has to be protected through an international patent. The responsibility of developing this new technology will be done by the team member Prof. N. Kottegoda who has experience in getting international patents.

Responsibility of the commercial partner, Hayleys Agro Biotech Pvt. Ltd., is to undertake the exporting of in vitro plants. As this company has been dealing with such an activity for more than 20 years exporting of plants will be progressed smoothly and it will encourage growers to establish plant tissue culture laboratories. Further investment for a tissue culture laboratory which adapt low cost CSUP technique is very low as the equipment cost is reduced by 90%. These two reasons will encourage the growers to establish new labs as well as growers with existing labs to join exportation of *in vitro* plants through the association which is operated by SLIIT HEI-SL.

Team Members

Name	**Role of the Project**
Prof. Sriyani Peiris, [BSc (PDN, SL), MSc (Penn State., USA), PhD (Lond, UK], Head / Biotechnology and Biological Sciences, SLIIT	• In vitro establishment of identified plants • Formation of the exporters' association • Train the growers • Supply of in vitro plants to growers • Testing the nanotechnology application on rate of microbial contaminations and performances of in vitro cultures • Genetic improvement experiments • Supervisor- Mphil student
Prof. Colin N. Peiris B.Sc. (UOP, SL), M.Sc. (Penn State, USA) Ph.D. Penn State, USA) D.Sc (SUSL, SL)	• Automation of media sterilization • Establishment of the greenhouse • Formation of the Exporters' Association
Prof. Nilwala Kottegoda B.Sc.(UOP,SL), Ph.D. (Cambridge, UK)	• Improvement of the media sterilizing method with nanoparticals
Dr. Chandrika Perera B.Sc.(UOP,SL) Ph.D. Birmingham, UK	• Application of crop improvement techniques • Selection of mutants by PCR based molecular markers • Selection and confirmation of mutants in the field

Mr. Arjuna Samarasinghe B.Sc. (UOP, SL)	• Supply stock cultures/plants to SLIIT for • Multiplication. • Training in vitro growers • Commercial production • Quality checking and packing for export • Supply plants to Hayleys
Dr. Dilrukshi S. K. Nagahatenna University of Adelaide Waite Campus, Urrbrae, Australia	• Training of the Research Assistant in CRISPR Cas • Crop improvement experiments

Grant Type:

AHEAD Research, Innovation and Commercialization Grants for non-state HEI (RIC Grants)

Grant Amount: LKR 12.5 million