Future Research for Coconut as a Sunrise Industry

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Background

Coconut is a crop of the small holder farmers of the tropical countries. Though coconut is classified as an oilseed crop, it is an integral part of the daily life of the farmers for food, fuel and shelter thus contribute largely to the social well being of rural communities. It is a crop with multifaceted uses, known to mankind for generations through traditional knowledge and is rightly referred to as the Tree of Life. Research in coconut has been undertaken both by the coconut growing and importing countries for over a century. As agriculture sector evolves from subsistence farming to commercial production, the research objectives are also varying to be not just about increasing production or productivity but oriented to cater to the requirements of the consumer markets.

The recently concluded 47th APCC COCOTECH Conference was witness to various innovations in coconut research. The Conference also served as an eye opener towards the "half full and half empty" situation in coconut research, especially in scientifically proving the nutrition and health benefits of coconut. The deliberations and discussions not only gave an indicative direction for the future road map in coconut research but also succeeded in collaborations and networking of scientists from various countries, for the sustainable development of the coconut sector to benefit millions of small holder coconut farmers around the world.

Research for Production

Research on coconut breeding has taken a major step from the normal breeding for high productivity and disease resistance to breeding for higher content of oil, lauric acid, protein in the meat, inflorescence sap and tolerance to drought as well as shorter statures.

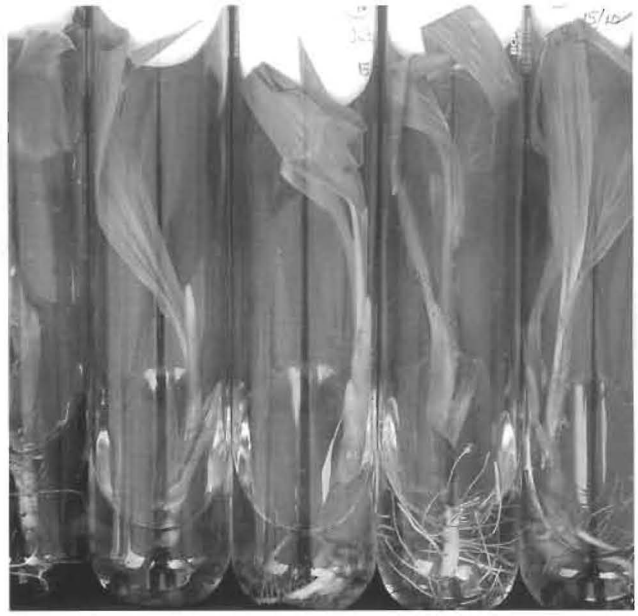
With over 50% of the coconut plantation in the major coconut growing countries approaching senility, the urgent need is the requirement for planting materials which can be materialsed only through use of modern technological applications. Biotechnological research should be intensified along the lines of embryo culture,

cryopreservation and somatic embryogenesis. Research on embryo culture will help in the production of high value elite coconuts like Kopyor, Makapuno, Aromatic Coconut and similar which are in high demand and not easily propagated otherwise. Cryopreservation gains importance as a potential mode for preservation of the coconut germplasm, when gene banks are under threat of climatic disasters and lethal diseases. Also cryopreservation would be useful in transfer of germplasm between countries and help in biosecurity. The research on cryopreservation has to go a long way with regard to survival and recovery. Research on micropropagation techniques based on somatic embryogenesis for mass production of planting materials is gaining momentum in most of the coconut growing countries. Though research using explants like embryo, pollen, unfertilised ovaries, plumules etc have been tried in many countries, Mexico has been successful in achieving the break through in somatic embryogeneisis through development of protocol using plumules as explant and successfully producing around 100,000 somatic embryos from a single plumule. Major challenges in somatic embryogenesis experienced by researchers are issues of tissue browning, inefficient proliferation and low regeneration which have to be addressed. The recent Bali Conference provided a forum for the networking of scientists engaged in tissue culture work, which would be developed to an International Network or Forum for Coconut Tissue Culture. This would foster collaboration between institutes and scientists thus avoiding duplication of research, hence better integrate various research work undertaken by different countries. The successful testing of proven protocols on different genotypes could also be achieved through proactive efforts in networking and collaboration.

With diminishing trend in the natural resources such as land, nutrients and water available for crop production, research on the optimum use of the available resources through engineering structures that will ensure provision of the resource at the feeder point gains importance. The technologies for drip irrigation and fertigation continue to be improved to ensure maximum benefit with minimal investment.

Research for Plant Protection

Effective management of the incidence and threats of pests and diseases necessitates collaborative research for the development of international phytosanitary standards, risk analysis, diagnostic tools, identification and development of synthetic pheromones, bio-control agents and so on. At the Bali Conference a consultative meeting for the formation of a network of scientists engaged in Integrated Pest Management was organised which would lead to the establishment of the International Coconut IPM Network, as a result of a



recommendation of the FAO Report. (The Report of the FAO High Level Expert Consultation on Coconut Sector Development in Asia and the Pacific has recommended to "Establish an Integrated Pest Management (IPM) Network for Coconut Pests and Diseases and design and implement a programme for transfer of technology on IPM of coconut pests and diseases"). Networking would help IPM and biosecurity planning. Natural enemies of invasive pests could be located only in the country of origin and countries could collaborate in this regard.

With the increasing incidence of devastating phytoplasma diseases like Lethal Yellowing and Bogia Disease, research on development of diagnostic tools like Loop Mediated Isothermal Amplification (LAMP) for the detection and tracking of phytoplasma DNA in plants and insects, remote sensing for identifying symptomatic palms and other biotechnological tools help in cheaper and easier tracking of the phytoplasmas which are crucial to contain the spread and manage the disease. An emerging area of interest in research is phytoplasmology dealing with study of endophytic organisms like fungi and bacteria and their interactions with plants. Reports of spontaneous remission or recovery of plants from phytoplasma infection incraese the importance of phytoplasmology.

Another priority area is study on the changes in expression of resistance to pests and diseases in cultivars having temperature sensitive genes, an impact of climate change. Changes in expression of different genes is expected to occur with the devastating and diverse impacts of climate change. Higher temperatures are found to reduce the period for reproductive maturity thereby increasing the reproduction rates. Genomic studies on host plant resistance to pests and diseases is

also an important area for further research.

Research for Downstream Processing

Research in innovative technology for processing, integration of different processing technologies, packaging to improve shelf life and efficient utilisation of by-products are very important to the profitability of enterprises. The hybrid system of virgin coconut oil processing presented during the COCOTECH Conference aims to utilise the correct technology to obtain the right quality so that the products attain competitive prices on the existing markets.

Research should also identify the specific differences in qualitative parameters in the final product based on the technology used or type of raw material. This is particularly significant in the case of virgin coconut oil where various technologies are used for production, it results in the brand label that carry different wordings of product type such as Extra Virgin Coconut Oil, Virgin Coconut Oil, Pure Coconut Oil, Cold Pressed Oil and so on. The consumer should be able to know the content of the product by its label. In a similar case, the changes in qualitative parameters between beverages, whether using young coconut water or mature coconut water holds significance in the global market since water from the mature coconut is just as good a beverage with most of same nutritional attributes.

Research for Health Benefits

There is a dearth of validated research to support the claims for coconut products. A comparative analysis of clinical studies conducted reveals that over 256 clinical studies were done on olive oil, but only 36 conducted for coconut oil (including virgin coconut oil). It is crucial now for conclusive studies to be conducted to establish uncontestible scientific evidence. APCC has since established a Scientific Advisory Committee on Health (SACH) that is made up of eminent international clinical scientists from India, Indonesia, Philippines, Sri Lanka and the Pacific. Current Study proposals under discussion are :

1. A Randomised Controlled Investigator Blind Dietary Study to compare Virgin Coconut and Corn Oil Effects on Inflammation in Psoriasis and its Co-morbidities, Arthritis, Depression, Diabetes, Heart Disease, Hyper tension and Obesity. The study is led by Dr. Vermen M. Verallo-Rowell who is CEO and founder of VMV Skin Research Centre and Clinics in the Philippines.

2. A prospective, randomized, parallel group study in normal healthy adults to assess the cardiovascular endpoints like myocardial infarction, death, stroke as primary end points and assessment of lipid related biochemical parameters as secondary endpoints that is led by Dr. M. Vijayakumar of Amrita Institute of Medical Sciences in Kochi, India.

3. Effect of Virgin Coconut Oil on HIV positive people by Dr. Kadek Dharma Widhiarta of the University of Jember in Indonesia.

4. Effect of Virgin Coconut Oil on Fasting Serum Glucose, Insulin, Ketone and Tri-glyceride concentrations among Indonesian non-insulin dependent diabetics by Dr. Drupadi HS Dhillon of the University of Indonesia in Jakarta, Indonesia.

Research for By-Product Utilisation

Research on the utilisation of the coconut timber is a priority area with many countries implementing programmes for replacement of senile coconut palms. Commercial technology is to be developed for the large scale utilisation of coconut wood. Technology for utilisation of coconut husk for various products like coconut fibre, coco peat and crushed husk for grow slabs has ample room for improvement. With increasing applications in geotextiles, horticulture and floriculture, there is immense potential for coco fibre, coco peat and the crushed husk.

Research is continuous, often used to establish facts, reaffirm the results of previous work, solve new or existing problems or create, innovate and make for the benefit of future generations. In the coconut sector, as the environment changes, new problems arise in production and plant protection for which solutions are needed. As civilization progresses, their needs and demands for products changes. As science progresses, technological advancements also follow hence the innovative methods of processing and packaging. There never reaches a point where we are self sufficient. For the coconut sector to experience real inclusive growth and sustainability, it needs scientific research that is geared for development, impacting in real time positively for the coconut farming families and the global coconut community. ■