Concept Note

Virtual Regional Workshop on

Investment in Modern Agricultural Biotechnology and its Socio-economic Impact on Livelihoods of Farmers in Asia Pacific

Date: August 2-3, 2021

Background

Agricultural biotechnology offers innovative technologies and applications in many key aspects of agriculture and environmental protection. While supporting sustainability, agricultural biotechnology provides technically and commercially viable solution to mitigate the challenges of food and nutritional security to burgeoning population which is expected to increase to 8.6 billion by 2030 (about 60% in Asia-Pacific region), thereby contributing significantly towards achieving the 2030 Sustainable Development Goals (SDGs).

The Food and Agriculture Organization (FAO) of the United Nations organized an International Symposium on "The Role of Agricultural Biotechnologies in Sustainable Food Systems and Nutrition", on February 15-17, 2016, at Rome. The Director General of FAO underlined a statement during his welcome address to the above symposium "W*e must count on a broad portfolio of tools and approaches to eradicate hunger, fight every form of malnutrition and achieve sustainable agriculture in the context of climate change*". He further added "*we cannot lose sight of the fact that biotechnology, knowledge and innovation must be available, accessible and applicable to family farmers. Otherwise, they will have a limited impact*"[1].

Biotechnology adoption is seen as the economic driver that could trigger extensive national growth and provide solutions that will improve the quality of human life. According to recent report by the United States National Intelligence Council (NIC), biotechnology could potentially account for about 20% of the global economy by 2040, with agricultural and manufacturing applications as the main drivers and also expanding health care applications, it will represent a significant leap from biotechnology's current contribution to the global economy[2]. While the attempts to commercialize various research, outputs have been done for many years, the results still vary with many countries experiencing various hurdles and researchers experiencing unexpected difficulties. The main issues that seemed to hamper efforts of biotechnology commercialization were found to be lack of local scientific talent, public perception, lack of entrepreneurial skills among the academics, financial assistance, and lack of political will of

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[1] http://www.fao.org/about/who-we-are/director-gen/faodg-statements/detail/en/c/383121/

[2] https://www.dni.gov/files/ODNI/documents/assessments/GlobalTrends_2040.pdf

governments. These very same issues if tackled strategically will also be the key factors which could ensure commercialization success of biotechnology processes and products[3].

Rational

Agricultural biotechnologies are a diverse collection of appropriate technologies, ranging from low-to very-high-level systems, applications, tools or techniques. The development of climate change resilient and productive crops is necessary if we are to meet the challenge of feeding the growing world's population. We must be able to increase food production despite the projected decrease in arable land and unpredictable environmental conditions. Technological and conceptual advances in genomics that have the potential to transform plant breeding, help to overcome the challenges of climate change, and initiate the next plant breeding revolution. Integration of genomic and phenomic data provides an opportunity to identify new agronomically relevant genes and characterize their functions. This knowledge has direct practical implications and can be translated to crop plant improvement using genome editing[4],[5],[6].

Over past two decades genetically modified (GM) crops, as many as 10 crops (soybeans, maize, cotton, alfalfa, canola, sugar beets, potatoes, papaya, squash, and apples.), are being grown in 29 countries globally, some being grown in Asia-Pacific (Australia, Bangladesh, China, India, Indonesia, Myanmar, Pakistan, Philippines, Vietnam). Genetically modified organisms (GMOs) have a deliberate controversial connotation due to fierce propaganda by antagonists of science and technologies. However, the fact remains that GM crops have been grown successfully in total of 190.4 million hectares in 29 countries in 2019, contributing significantly to food security, sustainability, climate change mitigation, and upliftment of the lives of up to 17 million farmers and their families worldwide. Double-digit growth rates in biotech crop areas were recorded in developing countries, particularly in Vietnam, the Philippines, and Colombia[7]. GM technology has had a significant positive impact on farm income derived from a combination of enhanced productivity and efficiency gains. In 2018, the direct global farm income benefit from GM crops was $18.95 billion. This is equivalent to having added 5.8% to the value of global production of the four main crops of soybeans, maize, canola and cotton. Since 1996, farm incomes have increased by $225 billion[8].

Similarly, genome editing (GE) is gaining importance as one of the new plant breeding techniques (NBTs), since it provides opportunities to develop improved crops with high precision and speed. Several countries have viewed positively and realized the potential of NBTs. Genome edited crops are on the verge of being placed on the market and their agricultural and food products will thus

[3] https://apctt.org/sites/default/files/2020-05/18Oct-Dec_tm_final.pdf
[4] https://www.nature.com/articles/s41588-019-0401-3
[5] https://www.cell.com/action/showPdf?pii=S1360-1385%2821%2900090-X
[6] https://www.frontiersin.org/articles/10.3389/fpls.2020.00922/full
[7] https://www.isaaa.org/resources/publications/briefs/55/default.asp
[8] https://pgeconomics.co.uk/pdf/globalimpactfinalreportJuly2020.pdf

be internationally traded soon. National regulations, however, diverge regarding the classification of genome edited crops. Most applications of genome editing entering the market in the near future selectively mutate or modify few base pairs without adding foreign DNA to the genome (SDN-1). Market-oriented research has taken place in 99 different applications with 28 different plant species[9]. Most applications have been carried out in rice, followed by tomato, maize, potato, wheat, soybean and rapeseed[10]

Concomitant to the above-mentioned positive developments, there has been expansion of investment portfolio to adopt the existing and new biotechnologies and innovations but despite the proven socio-economic benefits of these technologies, much more investment is need of the hour to promote the agri-biotechnology which is still viewed as one of the major constraints. A committed research funding is required to address the risk analyses on the future biotechnology products. In the changed new era, be it low-tech or high-tech biotechnology, political, economic and business considerations (particularly return on investment) are playing an important role for taking the decisions for future investments. Asia-Pacific region has a few countries, who can make large investments over a long period, considering the fact that many countries are resource poor in the region. Keeping the entire region in view, regional cooperation is imperative to attract the investors from private sectors while ensuring commitment of adequate availability of funds from public sector. It also includes the pooling of resources in order to not only generate and adopt the innovations created through biotechnology but to develop the research and training institutions in form of 'Centre of Excellence' to conduct research and develop the capacities in various areas of rapidly evolving agricultural biotechnology. This will help to harness the maximum potential of biotechnology for the farming community in different farming systems. In fact, both funding and regulations are the foundation for progress in biotechnology.

Public-Private partnership is considered very vital for an upward trajectory and is being advocated all over the world for successful transformation to innovation and technology-based new economy and farming sector. Public sector has been successful in creating trained human resources for GM research while private sector has focused approach to develop and commercialize GM crops with desired traits. Therefore, public sector funding in agricultural biotechnology is essential, the role of investment by private sector is equally important. Private sector needs to act as an active partner for publicly supported training and research programmes in agricultural biotechnology through direct grants and contracts to organizations, cooperative agreements with laboratories at regional level, and education and communication strategies to create awareness to the general public about the impacts of agricultural biotechnology.

[9] https://www.econstor.eu/bitstream/10419/222972/1/1726752283.pdf
[10] https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-019-0171-5

Objectives

In the changing scenario and realization of evidence-based potential of agri-biotech research and innovation to contribute to the SDGs, a Regional Workshop will be organized with following objectives:

1. Assessing the investment in agri-biotechnology and its impacts on livelihoods of farmers in Asia-Pacific region
2. Scoping innovative ways of enhancing the investment in important areas of agri-biotechnology in Asia-Pacific region
3. Enabling government policies to attract the investors from private sector for R&D and to promote agri-biotechnologies in the region

Expected Outcomes

- The Regional Workshop will provide a platform to have an overview of investment in agri-biotechnology R&D by public and private sectors and its impact in the region.
- Identification of potential areas for investment/co-investment in modern agri-biotechnology and way forward on innovative funding mechanisms by public and private sectors.

Participation

Participants includes researchers, representatives of various NARS organizations (public sector) and private sector, ICRISAT/CG Centre, advanced research institutes, funding/donor agencies, NGO and Farmers Organizations. Recognized experts will be invited to make presentations and participate in panel discussion.

Organizers and Collaborators

Asia-Pacific Association of Agricultural Research Institutions (APAARI), under its programme Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources (APCoAB), will organize this Regional Workshop in collaboration with the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD), Philippines; Council of Agricultural (COA), Taiwan; CropLife Asia (CLA), Singapore; Federation of Seed Industry of India (FSII), India.