

“Development and Prospects of Agri-Biotechnology in Pakistan”



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ISLAMABAD

On August 15th, 2021 the Strategic Vision Institute organized on “Developments and Prospects of Agri-Biotechnology in Pakistan”. The Webinar was organized to highlight and project Pakistan’s scientific credentials in the field of agri-biotechnology, which is an agrarian economy. Today in Pakistan more than 32 institutes are working in the field of agri-biotech in Pakistan for the last 25 years. The webinar was chaired by Lt. Gen (R) Naeem Khalid Lodhi (Former Defence Minister, Govt. of Pakistan). The guest speakers included Dr. Syed Javaid Khursheed (Member of Advisory Board, Senior Research Fellow, CISS; Former DG Biosciences, PAEC), (Director NIGAB/HoD PIASA, Pakistan Agricultural Research Council) and : Dr. Yusuf Zafar (TI)(Chief Scientist (R), PAEC; Former Chairman PARC)

The event was chaired/moderated by the Lt. Gen. Naeem Khalid Lodhi (Former Defence Minister, GoP). He said that our scientists and engineers in the field of agri-biotech have contributed significantly to increase the yield and production of many crops, revolutionize the poultry industry, and produced many genetically modified fruits and vegetables. It is a very important issue for the prosperity and development of Pakistan because we are an agrarian economy. Moreover, the public discussions and discourse making mostly do not focus on the topic of Agri-biotech, which is an unfortunate situation considering a large part of our population is linked with this particular field. It is important to highlight this particular area because it is interconnected with so many other areas of national concerns such as water, food, and environment, conservation of water, water management, and food sufficiency. Therefore, he expressed the hope that whoever has joined this webinar will be able to learn a lot about this particular field. He said that due to the efforts of our agri-biotech scientist Pakistan was able to increase its crop productivity, in this regard he specially mentioned the achievements of Pakistan’s bio-tech scientists in increasing the productivity and yield of wheat crops per/acre. Therefore, it is necessary that Pakistan should highlight the contributions of our scientists in the highly advanced fields of genetic engineering and biotechnology.

He then handed the session to the first speaker Dr. Syed Javaid Khursheed (Member of Advisory Board, Senior Research Fellow, CISS; Former DG Biosciences, PAEC). He deliberated on

“Pakistan’s Efficient Use of Agri-Biotechnology for Mitigating Impact of Climate Change”. He said that the topic is unique in a sense that mostly the effects of climate change on agriculture but in this topic, the focus is on the use of Agricultural biotechnology for mitigating the impact of Climate Change. He said that he will try to provide background information about the role green biotech currently plays and can play in the future, in helping mitigation of climate change. He said that climate change is happening because of global warming; global warming is the increase in Earth Average Surface Temperature due to the greenhouse gases (GHGs). Climate change is affecting human life on earth and climate is measured by estimating the average of many years of weather observation of specific areas. He then highlighted the effects climate change is having on human life, which included the rise of temperature, melting of ice and rising of sea level, changes in precipitation patterns, effects on organisms, degrading human health, and effects on crops and their outputs. He said that global climate change is happening because of the emission of GHGs which includes Carbon Dioxide, Methane, Nitrous Oxide, Hydro-fluorides, perfluro-carbons, and Sulphur hexafluoride. Global climate change is being caused by the emission of greenhouse gases. Resultantly, global temperature has climbed by 0.6 C, the arctic sea is getting thinner by 40%, Antarctic glaciers are retreating by 50m/year, sea level is rising, acidification of oceans, change in animals’ behavior and breeding cycles and increase in frequency and intensity of the storm is being observed.

While analyzing the impacts of climate change Dr. Khursheed said that it threatens all elements of life, such as water, food, health, environment, and land. This is a dramatic scene where the most obvious symptoms would be the change in weather conditions such as more heatwaves, more storms, and floods caused by the melting of glaciers. GHGs are not a singular aspect all segments of our society are contributing to it, while mentioning the contributions of the different segments he said that portion of agriculture is 13 %, deforestations’ portion is 14%, industrial processes share in 24% and burning of fossil fuel is 49%. However, among all the GHGs it is actually the release of carbon dioxide emission at the rate of 64% which is the major cause of global warming. Therefore, to avoid climate change we have to stabilize the CO₂ levels at 550ppm. For this purpose, we should be mitigating the effects of the emission of CO₂ because climate change is affecting the survival of human beings by its adverse effects on different kinds

of food sources. He further added that there are many answers to this puzzle but one of the most effective is the use of agricultural biotechnology. Agricultural biotechnology is important because it is enhancing agricultural productivity and maximizing the productive capacity of our diminishing resources by increasing crop adaptation and increasing production and yield with fewer resources. Moreover, green biotechnology can also contribute to reducing GHGs by offering the tools to engineer crops using less energy through an increase in yield. As green biotech will develop the crops which have better yield fewer pesticide sprays will be required. Moreover, such crops will not require more use of tractor as tractor produced the 24 billion KGs of CO₂ worldwide. Moreover, better biofertilizers developments will facilitate the less use of pesticides. These measures will ensure less soil erosion as well. While explaining the role of biotechnology in crop adaptation speaker said that it offers solutions that could help farmers in genetic modification and hybridization of crops for better yield. He said the in this regard need is for induction of the nodular structure on the roots of non-leguminous cereal crops to fix nitrogen, utilization of excess CO₂ in the air by staple crop rice CO₂ harness capability. Moreover, efficient assimilation and conversion of CO₂ and the development of insect resistance biotech crops can increase crop adaptation. He further added that due to its benefits green biotechnology has been adopted by 19 countries, 192 million hectares worldwide are under cultivation. Five countries are handling 90 % of Agri-biotech crops namely the US, Brazil, Argentina, Canada, and India.

In the case of Pakistan, Dr. Khursheed said that rise in temperature of 0.6-0.8 C in arid coastal areas; arid mountains and hyper-arid plains have been observed. Approx. 2000 people have lost their lives every year in Pakistan due to dehydration and heat strokes. 5% increase in net irrigation water requirements with no change in the pattern of rainfall; 18-32% increase in rainfall in monsoon zone is also seen. Moreover, the frequency of depression and cyclones increased over the Bay of Bengal and The Arabian Sea during the last 70 years. Thus agri-biotech crops will help Pakistan in less use of water resources, better agriculture and food security, forestry, and usage change. In highlighting the implication of Pakistan's achievement in Agri-Biotech stated that Pakistan is working for the last 25 years in the field, where it is contributing to the reduction of CO₂ emissions and allowing farmers to use fewer fertilizers and

practice soil carbon sequence. He said that 32 institutes of biotechnology are working in Pakistan namely NIBGE, CABB, PABI, NCEMB and HEJ. NIBGE has developed transgenic lines of cotton, wheat, sugarcane, and potato.

Dr. Shaukat Ali (Director NIGAB/HoD PIASA, Pakistan Agricultural Research Council) deliberated upon “Current Dynamics of Agri-biotech in Pakistan”, he started off his presentation with a brief historical perspective of biotechnology in Pakistan. He said that the journey started in the year 1970 when the first tissue culture lab was set up in The University of Peshawar. Later on, in the 1980s various developments took place in modern biotechnology. The first training course on recombinant DNA technology was introduced at NIAB, Faisalabad. The first modern biotech institute CEMB was established in Lahore in the year 1983-1984. Also, in the year 1984 first Science and technology policy was formulated with the subject of molecular biology and genetic engineering as priority areas. Plant tissue culture was established at NARC, Islamabad in the same year. Later on, from 1984 till 1994, the first project on gene cloning at CEMB was completed. In the mid of 1980s, the development of transgenic or genetically modified crop yield took place. In the year 1992, the Cotton Leaf Curl Virus (CLCV) attracted major funding to the plant biotech sector. Biotechnology played a great role in the identification of the virus. In the year 2000s various academic sectors started working on Agri-biotechnology e.g., Higher Education Commission was established, in 2007 National institute for Genomics and Advanced Biotechnology (NIBGE) was established in Islamabad. In 2010, there was the first commercial release of a genetically modified transgenic crop of cotton in Pakistan that was for insect resistance. Later in the following year, there were field trials for a genetically modified crop of corn. There are nearly 45 biotech institutes in Pakistan that are mostly supported by Higher Education Commission. Pakistan has some major biotech research centers that have their specified areas. Centre of Excellence on Molecular Biology (CEMB) at Lahore is related to the health and agriculture industry. National Institute for Biotechnology & Genetic Engineering (NIBGE) at Faisalabad is related to the plant, environment, and health industry. HEJ Research Institute at Karachi works on health and the environment. Karachi Institute of Biotechnology and Genetic Engineering (KIBGE) at Karachi is related to the health and industrial

sector. National Institute for Genomics and Advanced Biotechnology (NIGAB), NARC, Islamabad at Islamabad works on plants and animal biotechnology.

He then discussed the areas in which biotechnology can complement the agriculture of Pakistan. There are various issues that are very difficult to be addressed by conventional means of plant improvements. Hence it is the role of biotech techniques whether it is transgenic crops or other tools etc. For example, it can play a huge role to address the issues of Insects, viruses, drought, salts, fiber quality, weeds, hybrids, etc. in cotton crops. The issue of delayed ripening, insects, salinity, drought in fruits can be resolved. He then discussed the transgenic traits that are under research in Pakistan. Some of the crops of groundnut are under the experimental stage and some are at the field stage. Groundnut crop is being tested to include the trait herbicide resistance and maize crop is being tested for salt and drought tolerance and herbicide resistance. Cotton however is at the commercial stages and experiments are being performed to make it insect resistant with BT, Virus (CLCuV) resistant by using RNAi technology, herbicide-resistant, and sucking insect pests resistant. Brassica is being tested for herbicide resistance and Potato is under experiment for Lectin gene for Aphid resistance. Wheat is also at the experimental stage being tested for Rusts, Drought and salt tolerance, Bio-fortification. Sugarcane is on the field stage for Insect resistance with Cry gene, drought tolerance. Tomato is the first genetically modified vegetable in Pakistan that has been recently in the year 2021 is given approval for field trial. All these crops are given approval by the National Biosafety Center of Pakistan to be tested for different traits. He then identified various institutes that are focusing on specific crops. NIBGE, Faisalabad; F.C. College, Lahore; CABB/UAF; NIGAB, Islamabad, IBGE, Peshawar are working on wheat. CEMB, Lahore; NIBGE, Faisalabad; IAGS, Lahore are working on cotton. NIBGE, Faisalabad; NIGAB, QAU, Islamabad are working on tomatoes. NIGAB; Islamabad is working on groundnut. IBGE, Peshawar; KIBGE, Karachi; ABR/AARI, Faisalabad is working on sugarcane. NIBGE, Faisalabad; QAU, NIGAB, Islamabad are working on potatoes.

While explaining the scenario of transgenic crops in Pakistan he stated that only cotton has succeeded as a commercial GM crop in Pakistan. Currently, the 90% area is under the GM

cotton varieties in Pakistan; this is the 9th largest area (~ 2.5 million hac.) of GM crops in the world. So far there are three transgenic cotton events (Mon531, CEMB-II, GTG) that have been released in Pakistan. Unfortunately, the transgenic maize despite completing all the regulatory channels still awaits the government's decision for its commercial release. There are some regulatory issues that are hurdles in the release of such crops and also to harvest the benefits of such technologies. This technology has now transformed into a new area called genome editing. CRISPR is a “new breeding method”_which is much more predictable, precise, and faster. There are three kinds of genetic changes called SDN1, SDN2, SDN3. Genome editing is the blend of the earlier conventional breeding techniques. Pakistani institutes have started GE crop development but are at a very preliminary stage. There are various crops under the research lab of these institutes for various trait developments. The development of Green Super Rice is the new area of research in Pakistan started at NIGAB, NARC in collaboration with the China Academy of Agriculture Sciences. It is an environment-friendly rice production and is non-basmati rice with a long-grain length. Another new development is ultra-High throughput DNA Sequencing done at NIGAB. It includes the genomic selection of plants and livestock. Then genotyping is done by sequencing (GBS) based DNA fingerprinting for variety. There is a discovery of new genes using NGS for Genome-Wide Association (GWAS) studies in crops. Genome-based breeding by design can be implemented by using NGS.

Talking about the regulations, he stated that there are two basic agreements. Convention of Biodiversity (CBD) in 1992, led to “The Cartagena Protocol on Biosafety (CPB)”. The focus of CBD was the conservation of sustainable use of biodiversity, it took notice that modern biotechnology could have serious effects on the environment and health. Article 8(g) emphasized the need to regulate the risk associated with the use of LMOs. Article 19 (3) set the stage for legally binding internal instruments about biosafety. The CPB entered into force in the year 2003. Its focus was on the transboundary movement of the LMOs. It seeks to lay down an internationally acceptable framework to provide for an adequate level of protection against the possible adverse effects of LMOs on biodiversity and human health. Pakistan signed CBD in 1992 and ratified it on 26th July 1994. Pakistan signed CPB in 2002 and ratified it in April 2009. Pakistan’s biosafety rules were formed in 2015. These rules regulate: i) the manufacture,

import, and storage of modified organisms and gene technological products for research whether conducted in laboratories of teaching, research, and development institute in the public and private sector. ii) The work involved laboratory work, field trial, and commercial release of developed LMOs/GMOs (Plants, Animals, and Microorganisms). iii) The import, export, sale, and purchase of LMOs/GMOs for commercial purposes. There are three mechanisms that ensure the implementation of the rules in Pakistan “Institutional Biosafety The committee”, “Technical Advisory Committee” and “National Biosafety Committee”.

Explaining the Banana Tissue Culture at NIGAB, NARC, he stated that the issue in banana was BBTV ‘Banana Bunchy Top Virus’ and mom-cultivar (Basrai). The development is being done to produce high yielding banana cultivators through soma-clonal variation. So far two varieties of Bananas are created by soma-clonal variants by Sindh Seed Council on 17-11-2020. Yield is increased from 2.0 to 10.0 tons acre. There is a recent activity for the commercialization of potato tissue culture technology. It is being done by a public-private partnership in Pakistan. It includes the production of potato nucleus seed through tissue culture technology and acquisition/evaluation of Chinese potato germplasm and varietal development for heat/cold tolerance. Furthermore, capacity building of private/public sector for establishment/running of tissue culture labs on a commercial basis. Development of DNA based fingerprinting system to verify the disease-free status and purity of potato cultivars.

In his concluding remarks, he stated that for a way forward Pakistan needs to re-visit National Biosafety Rules. There are no SoPs for GM Seed import for Food, Feed, and Processing. There is no regulation for GE crops/seeds. There exists a weak implementation of Intellectual Property Rights. We need to strengthen of National Biosafety System. There is a lack of coordination among National Biotech institutions are a hindrance in future development. We need to work on these lacking areas in order to achieve success in the Agri-biotechnology field.

The third speaker of the session was Dr. Yusuf Zafar, TI (Chief Scientist (R), PAEC; Former Chairman PARC) discussed the “Peaceful Uses of Nuclear Technology for Enhanced Agricultural Output”. He started his argument with the benefits of agriculture in general terms. It is non-traditional security, like others including health security, environment security, water security,

etc. So, it is not a traditional security strategic security that is for the progress of a country, but food security is also very vital. It can be seen in the collapse of the Soviet Union, among other things, the state was unable to provide food security; everybody was standing in the queue for food. In Pakistan, we have direct export of rice, livestock, and fruit. The direct export of rice was worth \$2.2 billion last year. Livestock entails leather, meat, and poultry. Whatever the small industry we have textile, sugarcane, and poultry, the poultry has been going in two digits for the last decade; we had 16 bn eggs, and 2 bn kg of meat-which is a great source of protein, essential for overcoming malnutrition. The raw material for all these industries is coming from agriculture, despite our complaints about the extension in the urban areas, but our rural population in the census of 2017 reduced from 64% to 62% only. So, the urban areas have increased but the rural population remains the same in the villages.

Dr Yusuf continued, agriculture is a complex affair, it may seem simpler, but it is not. Once, the agriculture subsidy was being discussed, in the 1950s, the US President Eisenhower once said, "Agriculture looks simpler to only those who are a thousand miles away from the field, whose plough is a pencil and whose field is a file." It is the only commodity that you cannot take off the shelf. If you see, the best cotton of US is the total failure in Pakistan, due to the difference in soil and temperature and environment, etc., but if take a Mercedes or F-16, you will the same comfort and features. There is a major shift in WTO, as it is no more public good, it is a tradable commodity, so it plays a vital role in the public sector, and is also affected by climate change.

As far as food security, it is not the quantity of food, it must be nutritious. As, for example, you take the milk and it is not pasteurized, it will not give you benefits but will cause dysentery. So, people have added the evolutionary process. They have changes self-sufficiency from food security, and the availability to everyone all the time of the nutritious food. Under that, there is availability, accessibility trade and storage, and safety. So, there is sustainability without compromising the natural resources. S, the green revolution, which is a concept from the 1960s, is now changing to Ever Green Revolution, as people realized the hazardous impact of

climate change. Nuclear technology, innovation in crops, and biotechnology among others are contributing in that direction.

Millennium Development Goal became global agenda in 2015. The 7th goal was “to ensure environment and suitability”. While the first goal entails “eradication of poverty and hunger”. Hence, ‘eradication’ was mentioned, and not ‘zero hunger. So, people realized that MDGs were unable to make an impact on a non-communicable disease, which is also not included, so subsequently, “Sustainable Development Goals”, in the RHIO agenda 2015-2030. In that, the 2nd agenda was ‘zero hunger.’ That means, globally it was decided by 2030, nobody would sleep without food. 8 out of 17 goals were directly related to agriculture in SDGs.

Discussing the food security situation in Pakistan, DR. Yusuf, defined food security as, ‘food security exists, when all the people at all the times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.’(World Food Summit, 1996). So, it replaced the self-sufficiency concept.

The general challenges Pakistan is facing, include the population increase, among the SAARC countries we are the highest in terms of population growth, with currently 220 million populations. So, Pakistan has more burdens on limited resources of land, water, and air. Water availability has reduced from surplus, at 7400m³ in 1947, to scarce in 2015 of less than 1000m³. water availability deficit was 11% in 2004, which is expected to be 31% by 2025. The land per capita availability has reduced from 0.7ha in 1947, to now 0.4ha in 2015, and now scarce to 0.21ha. Dr. Yusuf brings about that we have gone from surplus to scarce only because of the bad management of our precious resources.

He continued further by considering the nuclear aspect in biotechnology. The Pakistan Atomic Energy Commission was established in 1957, the same year Un multilateral body-IAEA, was established, with its headquarters in Vienna.it was the idea of President Eisenhower of ‘Atoms for Peace.it has 153 members, and BoGs are there, and Pakistan has been 18 times on the BoG of IAEA. They have a professional staff of around 2300 professionals and support staff, and also 2 scientific laboratories and research centers. IAEA has a regular budget of €380

million and extra technical cooperation fund of €75 million, by 2020. IAEA has 6 departments. The 'nuclear energy department', which also deals with the formation of electricity, is another example of the peaceful use of nuclear energy. Pakistan has now 5 plants in operation, 4 at Chashma and 1 in Karachi. Other departments include 'Nuclear Science and Application', 'Nuclear Safety and Security', "Safeguards, 'Management', and 'Technical Cooperation. They have selected program areas on which they are working, which include human health, food and agriculture, water and environment, nuclear energy, safety, and security. They are working on crop production, by producing more with less; Insect pest control, for the protection of food, agriculture, livestock, humans, and environment; livestock production, for achieving better health and productivity; and food safety and quality, with the focus on food chain and standards. Moreover, significant work is done in improving water and environmental conditions by sustaining clean water and other natural resources in it through the process of irradiation. He said that Irradiation is simply the act of applying radiation to any material. Through the help of the process of irradiation bacteria, viruses and germs can be killed. He said that foods are also irradiated, by exposing food products to a controlled amount of radiant energy to increase the safety of the food and to extend the shelf-life of the food. This technology is being utilized since the 1960s, it is now in use in the US, Japan, China, etc. As irradiation inactivates the gas-forming microorganisms that make the package swell during storage at room temperature; this process is used factories at the commercial level, one of the major irradiations using factory is producing a product at the scale of 300, 000 tons/ year, since 2013. He said that China and Japan are using irradiation on large scale for garlic and potato.

Then he highlighted that what Pakistan has done in the relevant field. He said that Pakistan started working in the field of peaceful uses of nuclear technology nearly 65 years ago. He mentioned Pakistan atomic energy commission established institutes like; NIA in 1962 was established in Tandojam, NIAB in Faisalabad was established in 1972, NIFA in Peshawar was established in 1982, and NIBGE also in Faisalabad was established in 1992. For crop enhancement, PAEC is working to improve the crops such as wheat, rice, rapeseed, Chickpeas, Mung Bean, lentil, Sesame, Banana, Castro, Soya Bean, and Sugar Cane, etc. He especially

highlighted the achievements of NIIAB, which is rated as the center of excellence and it won the awards of best young scientist and best mutation cotton breeding program by the IAEA in 2021.

Afterward, Dr. Javaid Khursheed added few points regarding the discussion going on he said that the National Biotechnology commission was formed but later it did not carry on its work and was dissolved. Dr. Khursheed said that it was a project of three years taken from the planning commission; through that commission 18 institutes were developed in different universities and provinces. Thinking behind was that these institutes along with the commission will develop and take a biotechnology in Pakistan. He further commented on irradiation and sterilization techniques, he said that the first-ever such institute, PARAS was developed in Lahore, which was working on medicine. Now two other institutes are working which are irradiating the food.

Afterward, the chair opened the session for Question-and-Answer session. Mr. Khalid Raheem (Director, Guides Group) asked that 56 % of the landowners hold less than 5 acres of agricultural land, each trying to compete with bigger holdings, should we not apply production reforms for the cooperation in dairy and horticulture farms, while major landowners should be strict to the production of major crops. Dr. Yusuf Zafar in his answer that if we take into consideration land management, we have two models; one model is of the US and Australia which we try to follow where a big landholding mechanism is going on. The second model is of China, where landholding is even smaller than us but they are producing crops with better yield. So, what is important is technology, policies, incentives, and facilities, not land ownership. Farming is cooperative and many cooperative societies already exist in Pakistan and more than even currently more than 33 commodities are produced through cooperative mechanisms.

Ms. Ayesha Wadood (Junior Scientist, Nuclear Institute for Agriculture and Biology) asked the question that many countries have banned GM crops; even there are problems with exports of GM crops, so why are we doing genetic engineering. Dr. Shaukat Ali answered the question and said that if we see the international scenario, so far 70 countries have adopted GM crops, out of these 70 countries, 26 countries are commercially cultivating and the remaining countries are importing GM crops or seeds for their food, seed, and processing

purpose. He said though Europe has banned the cultivation of GM crops they allow the import of GM, around 30 million tons of GM soya bean in being imported in Europe. So, basically, the issue is of national importance and politics is for countries it has nothing to do with hazards on the environment or human health. Dr. Yusuf also commented on the issue and said that except Europe all other parts of the world are cultivating GM crops, even Europe used GM methods and crops, it is just cultivation is banned.

Dr. Kashif Ameer (Assistant Professor, Institute of Food Sciences and Nutrition, University of Sargodha) asked the next question he said that in there any way to avoid authenticity issues to prevent fraud in the case of GM crops, especially BT cotton as people is making huge gains by selling plagiarized and fraudulent BT seeds in Pakistan. Dr. Shaukat in his answer that there are issues in this regard but in Pakistan there are 4 reference laboratories for testing. Moreover, we have federal seed certification that prevents such mal and fraudulent practices. The only problem is capacity building and strength which if increased will solve all issues related to such matter.

In the same context Gen. Naeem Khalid Lodhi asked the question that Pakistan has developed the seeds of vegetables indigenously, but whenever we go to markets, we have to buy imported seeds, so why not the varieties we have developed are available to our farmers and markets. In his answer, Dr. Shaukat Ali said that as far as major crops are concerned Pakistan, is self-sufficient in seed production, however, for vegetables and other smaller crops Pakistan is using imported seeds, initially due to the lack of regularization, rules, and policies, now it is just a matter of time. The lack of availability of certified seeds is also a major hurdle. Dr. Yusuf also answered this question and he added that the lack of availability of vegetable seeds and their cultivation in Pakistan is not some international propaganda but mostly the case of our own neglect. However, the good news is that Pakistan is working in this regard and is successfully producing and exporting seeds of 5 vegetables, the project was started with the help of a Turkish Firm. Pakistan can work in this regard with China as well.

Ahyousha Khan (Research Associate, SVI) asked a question from Dr. Shaukat Ali, what should be the main components of national biotechnology policy a national policy, if Pakistan is

to develop a one. He said that the main components should be the identification of target crops, target traits, and measures to strengthen the national coordination between institutes and groups to avoid duplication and repetition of work as well.

With the discussants reiterated the need for better measures to achieve better results in the field of Agri-biotech in Pakistan and said that rules, policies, and laws should be made more favorable for this field to grow.

Media Coverage:

The Coverage of the SVI webinar was reported in the electronic media. The recording is also available on the SVI official YouTube Channel.

PTV World News

<https://www.facebook.com/585117914834456/posts/4623126984366842/>

Social Media Coverage

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