



Dr. A. Mujeeb Kazi paying tribute to Nobel Peace Laureate Prof. Dr. Norman Borlaug



Prof. Dr. M. Iqbal Choudhary, Director PABIC, highlighting the PABIC and ISAAA activities

Prof. Dr. M. Iqbal Choudhary (Director, Pakistan Biotechnology Information Center, PABIC) in his welcome remarks and presentation highlighted the importance of judicious application of agriculture biotechnology to achieve food security and sustainable development. He also briefed the audience about the PABIC and ISAAA activities. Advisor Federal Minister of Food and Agriculture (MinFA) on wheat, Dr. A. Mujeeb Kazi was the chief guest at the event. Dr. Kazi has worked with Dr. Borlaug over 14 years as a close associate and co-worker. Dr. Kazi is currently leading a team of over 90 scientists at the NARC (National Agricultural Research Centre) to achieve sustainable growth in wheat production.

Dr. A. Mujeeb Kazi in his presentation highlighted the following points:

- a) Honoring Dr. Norman E. Borlaug: Memories Over Four Decades.
- b) Biotechnology Focused on Some Wheat Aspects: Its Relevance as a Conduit to Food Security.

Prof. Dr. Tashmeem Razzaki (Sindh Institute of Urology and Transplantation) (SIUT), and Founding chairperson of Department of Biotechnology (University of Karachi), the first biotechnology department in any university of Pakistan, delivered a lecture on “A critique of biotechnology development in Pakistan: challenges and possibilities”.



Prof. Dr. Tashmeem Razzaki delivering the lecture



Prof. Dr. M. Iqbal Choudhary, Dr. A. Mujeeb Kazi and Prof. Dr. Tashmeem Razzaki during press conference

In this event, more than 70 participants including faculty members, research officers and M. Phil. and Ph.D. scholars of various Institutes have participated.

The seminar was followed by a press conference which was attended by a large number of print and electronic media representatives. In the press conference, Dr. A. Mujeeb Kazi, Prof. Dr. Tashmeem Razzaki and Prof. Dr. M. Iqbal Choudhary responded the questions of media relevant to food security and application of agriculture biotechnology. They also focused on the role of print and electronic media in raising awareness about biotechnology to solve major problems of the agriculture sector.

Dr. A. Mujeeb Kazi emphasized the need of conducting research in the field to produce various crops which are drought, salinity and pests resistance. He also said that wheat production can be increased by developing hybrid varieties and by encouraging appropriate management practices in agriculture.

Dr. Choudhary emphasized the need of access to affordable food to the masses of peoples as the crime and suicidal rates has increased in Pakistan due to shortage of foods for people to survive. Peace in Pakistan is the only possible with the availability of foods items which are essential for human survival, he also said that by developing indigenous capacity in biotechnology to grow more with less input and to protect the interest and livelihood of small farmers.

Prof. Dr. Tashmeem Razzaki encouraged media to show programs in field of science and technology, which increase the knowledge of people, and also there should be biotechnology related subjects in mass communication department for the training future journalists which help them to develop understanding related to biotechnology.



Launching of ISAAA briefs 41



Participant of the event

National News

Eight BT Cotton varieties and one hybrid variety has been approved by Punjab Seed Council for cultivation in Punjab.

The 39th meeting of Punjab Seed Council was held at the Agriculture House, Lahore, chaired by Malik Ahmad Ali Aulakh, Minister for Agriculture, Punjab. The proposals of cultivation of 11 varieties of BT cotton / hybrid evolved by research institutions of the Government and private sectors were presented in the meeting. While discussing and considering for approval, the breeders of BT varieties presented the case of their varieties for approval by highlighting trial results and performance of the candidate varieties and their characteristics. After discussing at length and based on the data presented for candidate varieties IR-3701 evolved by Nuclear Institute for Bio-Technology & Genetic Engineering (NIBGE), Faisalabad, Ali Akbar-703 developed by M/s. Ali Akbar Seeds, Multan, MG-6 and Sitara-008 developed by M/s. Nawab Gurmani Foundation, Kot Addu and M/s. Agri. Farm Services, Multan, were approved for cultivation. Whereas BT varieties including IR-1524 developed by NIBGE, Faisalabad, FH-113 of Cotton Research Institute, AARI, Faisalabad, Ali Akbar-802 of M/s. Ali Akbar Seeds, Multan and Neelam-121 developed by M/s. Neelam Seeds, Multan, were approved for one year for field performance / monitoring of the varieties. One hybrid variety GM-2085 developed by M/s. Guard Agricultural Research Services, Raiwind Road, Lahore, was also approved. Two candidate BT cotton varieties, CEMB-01 and CEMB-02 developed by Centre of Excellence in Molecular Biology, University of Punjab, Lahore were deferred by Punjab Seed Council.

While concluding the Minister for Agriculture, Punjab, underlined that BT cotton varieties are being approved by Punjab Seed Council for the first time since the process was initiated eight years earlier. He congratulated the breeders for their research and performance. He hoped that cotton production of Punjab will significantly increase through cultivation of these BT varieties which have effective resistance against Bollworms. The Minister for Agriculture, Punjab also directed the Federal and Provincial Government organizations to take strict action against seed companies who are involved in selling fake and sub-standard cotton seeds.

<http://www.agripunjab.gov.pk/index.php?n=3>

Memorandum of Understanding (MOU) between China and Pakistan to Improving Agric Sector

Pakistan Agricultural Research Council (PARC), China's Jiangsu Mingtian Seeds Science Technology Co. Ltd (JMSSTCL), and Four Brothers Group of Pakistan signed a Memorandum of Understanding (MOU) to develop the agricultural sector in Pakistan.

PARC Chairman Dr. Zafar Altaf said China will provide seeds and technology through field trials to determine the best varieties of cotton, rice, corn and rapeseeds for maximum productivity. JMSSTCL will provide germplasm for production of high yielding seeds, share local planting experiences, and facilitate training of farmers. The PARC chairman added that Pakistan President Asif Ali Zardari visited China and had identified possible areas of cooperation between the two countries which include: hybrid seeds, modern agriculture technologies, water management, high efficiency irrigation, and water pumping through solar technology.

View the original article at http://www.seedtoday.com/info/ST_articles.html?ID=90759

KARACHI, International Center for Chemical and Biological Sciences (ICCBS), Karachi University (KU), has successfully produced foreign variety of tomatoes known as cherry tomatoes in its green houses on large scale.

This is for the first time in the history of Pakistan that any institution is producing these types of tomatoes by using state-of-the-art plant technology. The cherry tomatoes have been cultivated since last two years, while this time, the cherry tomatoes have been produced on the large scale as compared to the last year. Director ICCBS Prof. Dr. Muhammad Iqbal Choudhary, while delivering a lecture at the ICCBS said that the biotechnology wing of H.E.J. Research Institute of Chemistry, working under the umbrella of ICCBS, was working on this new front. He said, "Seeds of cherry tomato were initially obtained from Canada and germinated at the biotechnology wing. For initial adaptation, the plant has been grown in green houses where environmental conditions were controlled and insects free environment was provided. After first cultivation from seeds, disease-free and healthy plants were propagated at mass scale using plant tissue culture techniques and cutting techniques. The newly propagated plants are allowed to grow for fruiting in such a system that they utilize the maximum light, humidity, and nutrient sprayed. Liquid fertilizers (greener, blooming enhancer and stress supplement), developed at the ICCBS, were also used.

The synergetic effect of growing techniques, such as plant tissue culture, cutting and auto pot system, and liquid fertilizers bestowed upon plant the several characteristic features, including fruiting round the year, longer fruit shelf life (more than 30 days), increased number of fruits, untiring successive, flowering and fruiting and full of pulp. With these characteristics, cherry tomato growing facility has been developed at ICCBS Green houses since last one year and introduced among scientific research community.

He said that the tomatoes could be picked when they are glossy and evenly colored, except in the case of streaked heirloom tomatoes. A handful of plants will produce a large volume of the small tomatoes, especially once they really get going in the hot summer months, he added. "In cooler climates, cherry tomatoes do best in a greenhouse, especially if temperatures get below 64 degrees Fahrenheit (18 °C). The mass scale propagation using above-mentioned techniques is in a successful progress and soon will be introduced for marketing as a new variety of tomato fruit with excellent features and its plants for local farmers for cultivation in mass scale. In near future novel characteristic features will be developed using Genetic engineering, Dr. Iqbal said.

<http://www.pabic.com.pk/FT.htm>

Pakistan Sets Production Target of 9.7 M Bales of Cotton

Punjab Minister for Agriculture Malik Ahmad Ali Aulakh says that the target production of 9.7 million bales of cotton will be achieved by cultivating newly approved genetically modified (GM) and hybrid varieties of cotton. He made this forecast during a meeting with farmers in Lahore.

The Minister also stressed that strict measures are being taken against seed companies who are involved in selling fake and sub-standard cotton seeds. Officers of the agriculture department have been directed to guide farmers on timely cultivation of the crop. About 78 thousand acres have been designated for cotton cultivation in Punjab province this year with 2 thousand acres already being cultivated. But cotton varieties were approved for commercialization by the Punjab Seed Council after a process which took eight years.

For the full report visit <http://www.agripunjab.gov.pk/index.php?n=13&r=0>

Pakistan losing \$1bn annually on cotton yield.

Australian cotton expert Dr. Neil Forrester said that Pakistan is losing around \$1 billion on account of shortfall in cotton production and its imports every year, he was speaking at the seminar on Biotech Cotton in Pakistan via satellite link at National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, he said in order to meet the rising demand of local textile industry it is the right time for Pakistan to get latest cotton technologies otherwise economic cost of imports would continue to rise. He said low Bt toxin and poor gene expression in Bt cotton seeds could make trouble for Pakistan's cotton crop.

International News

Sweet Pepper Genes Inserted to Banana to Fight Pest

In Uganda, banana is the leading non-cereal crop, with around 70 percent of the population regarding it as their staple food. However, the banana industry has faced a US\$ 200 million loss in 2001 due to a disease called banana Xanthomonas wilt (BXW). Thus, scientists have developed a genetically-modified banana with resistance to the BXW disease.

Dr. Leena Tripathy, biotechnologist from International Institute of Tropical Agriculture, Nigeria, together with other scientists, transferred two genes from sweet peppers (*Capsicum annuum*) to banana and the transgenic banana showed promising resistance to the disease, but it is still subject for field trials. However, the Ugandan farmers would not be able to plant the GM banana's seeds until the 2010 National Biotechnology and Biosafety Bill has been approved by the parliament recently.

Read more at <http://allafrica.com/stories/201006141950.html>.

Wild Potato Germplasm Holds Key to Disease Resistance

Breeding for multiple resistance against several fungal diseases in potato is being conducted using wild potato germplasm as source of resistance at the Agricultural Research Service in Madison, Wisconsin, USA. Geneticists Dr. Dennis Halterman and Dr. Shelley Jansky have identified wild potato species that contain resistance genes against late blight, early blight and Verticillium wilt diseases.

The wild potato *Solanum verrucosum* which contains the resistance gene against late blight was crossed with another wild potato that contains resistance to early blight. This hybrid is currently being used to introduce the resistance genes to cultivated potato. In addition, genes for resistance against Verticillium wilt found in *Solanum chacoense* is also being introduced into the cultivated potato germplasm. Molecular markers have been identified to aid the breeders in fast tracking the development of multiple fungal resistance in cultivated potato.

See the news article at <http://www.ars.usda.gov/is/pr/2010/100616.htm> for details

Weed Tolerant and Environment-friendly Sorghum

Sorghum produces a natural defense chemical that prevents growth of weeds in its immediate vicinity. The compound sorgoleone is produced in the plant root hairs and when overly generated, results a soil toxicity, making multiple cropping with sorghum impossible.

A group of research scientists at the ARS Natural Products Utilization Unit in Oxford, UK, led by Dr. Stephen O. Duke found that a special type of enzyme is responsible for the production of sorgoleone. The team found the gene sequences associated with that class of enzymes through sequence tagging in the sorghum genomic database. Experiments conducted to determine the gene function through gene silencing revealed reduction in sorgoleone emitted by the sorghum plants produced.

Further studies will lead to the development of sorghum lines which does not cause soil toxicity problem and environmental hazards, but could still ward off weeds. Similar studies are also being conducted in other crops, and recent findings show that rice contains similar sequences involved in the production of defense-related enzymes.

For details, see the news article at <http://www.ars.usda.gov/is/pr/2010/100615.htm>

Arsenic Tolerant Fern May Clean Toxic Land

Scientists at Purdue University were amazed upon finding that the fern *Pteris vittata* can tolerate 100 to 1,000 times more arsenic than other plants. "It actually sucks the arsenic out of the soil and puts it in the fronds. It's the only multi-cellular organism that can do this," said Dr. Jody Banks, a professor of botany and plant pathology at Purdue University, USA.

Dr. David Salt, a professor of horticulture, attempted to isolate the gene that allowed fern to tolerate the high levels of arsenic through yeast functional complementation. Thousands of different fern genes were combined with thousands of yeast cells and exposed to arsenic. Surviving yeast cells were picked, further studied and the DNA sequences introduced back in reverse order to the fern, to knock down the gene function. The resultant plants were not able to survive upon exposure to arsenic.

Further studies showed that the protein encoded by the gene is found in the plant's cell vacuole, where it serves as a pump to move arsenic out of the cytoplasm. This study could lead to ways to clean up arsenic-contaminated land.

The journal article was published in *Plant Cell* and the news article and abstract can be found at <http://www.purdue.edu/newsroom/research/2010/100610BanksFern.html>

Novel Approach to Produce Biofortified Flour

A novel approach combining plant breeding and high-intensity X-rays is being used by scientists at the Rothamsted Research in the UK to explore the possibility of developing wheat which could be used to make mineral enriched flour. Andrew Neal and colleagues are using high powered X-rays to carry out fluorescence analysis in favor of traditional staining techniques to identify new wheat varieties with added health benefits. The team exposes wheat grains to micro focused high intensity X-rays. Characteristic fluorescence X-rays are emitted as the X-rays encounter different minerals. Scanning across the energy range of fluorescent X-rays

shows a great deal about the properties of the grains including where and how much of each mineral is present, and how each mineral is complexed within the various regions of the grain.

"It is certainly 'early days' for this approach, but already we are showing that we can screen-out unsuitable lines early on, preventing breeders wasting investment in them and we are able to view wheat grains in a whole new way. I am hopeful this new approach has real promise to aid nutritious grain development and help answer some of the pressing issues on providing more nutritious food from limited productive farmland to feed our increasingly growing population," Neal said. Neal and colleagues' work is being funded by the Biotechnology and Biological Sciences Research Council (BBSRC).

Visit <http://www.bbsrc.ac.uk/media/releases/2010/100121-xray-vision-nutritious-flour.html> for the original story.

Turkey Prepares to Ban GMOs

According to an article published by the US Department of Agriculture's Foreign Agricultural Service (USDA-FAS), Turkey's Ministry of Agriculture submitted a bill to severely limit the propagation of genetically modified (GM) plants and livestock. The bill, which is expected to be passed next year, introduces a complete ban on the production of GM plants or livestock either as food for humans or livestock and on the introduction of any GM organisms into the wild. The USDA-FAS sees the bill as a preparation for Turkey's eventual ascension to the European Union. Last November, Turkey's Agriculture Ministry issued a biotech regulation that banned all imports of food and feed that might contain genetically-engineered materials. The ban was eventually lifted after a month.

Read the article at

http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20News%20for%20Italy%20and%20the%20EU%20-%20December%202009_Rome_Italy_1-12-2010.pdf

Scientists Find the Female Hormone Progesterone in Plant

Researchers at the University of Illinois in Chicago are reporting for the first time the discovery of the female sex hormone progesterone in a plant. Dr. Guido F. Pauli and colleagues said they have found the steroid hormone in *Juglans regia* (common walnut). The discovery came as a surprise since scientists thought that only animals could make progesterone. A steroid hormone, secreted by the ovaries, progesterone prepares the uterus for pregnancy and maintains pregnancy. A synthetic version, progestin, is used in birth control pills and other medications.

"The significance of the unequivocal identification of progesterone cannot be overstated," Pauli and colleagues wrote in the article published by the *Journal of Natural Products*. "While the biological role of progesterone has been extensively studied in mammals, the reason for its presence in plants is less apparent." They speculate that the hormone, like other steroid hormones, might be an ancient bio-regulator that evolved billions of years ago, before the appearance of modern plants and animals. The new discovery may change scientific understanding of the evolution and function of progesterone in living things.

The original paper is available for download at <http://dx.doi.org/10.1021/np9007415>

Turning Sexually Reproducing Plant to Asexual Reproduction

Apomixis, the old elusive dream of molecular biologists to produce offsprings in sexually reproducing plants through asexual means, could be a reality in the discovery of Argonaute 9 protein. The research which will be available in the online version of *Nature* discussed the generation of viable seeds in the absence of a fusion of sperm and egg in *Arabidopsis thaliana* by the group in Mexico led by Jean-Philippe Vielle-Calzada and Cold Spring Harbor, USA team lead by Dr. Rob Martienssen. Shutting down the activity of Argonaute 9 protein led to the production of multiple gametes in Arabidopsis which carry the full genetic material of the plant instead of half. In the process, the plant was able to produce a clone of itself asexually.

A deeper study of the protein showed that Argonaute 9 binds small interfering RNAs (siRNAs). These small molecules are related to the activation of transposons or jumping genes which is closely associated with sexual reproduction. Thus, Argonaute 9 could inhibit asexual reproduction by silencing the transposons.

The paper can be viewed online at: doi: 10.1038/nature08828. See this story at http://www.cshl.edu/public/releases/10_mexico.html

New Simple Biomass Process Yield Fermentable Sugars for Bioethanol

Research efforts on the production of biofuels through the use of inedible plant materials such as corn stover, switchgrass and wood chips across the United States have been a response to a federal mandate that biofuels and ethanol would not be derived from food sources. However, the plant's cellulose's energy-rich sugars are inaccessible for processing by biofuel converting enzymes.

Dr. Ron Aines, a University of Wisconsin-Madison Professor of biochemistry and chemistry, and his graduate student Joe Binder recently published in the March 9 issue of *the Proceedings of the National Academy of Sciences*, a new approach that can convert three quarters of the inaccessible sugar in the raw cotton stover. The technique involves the use of an ionic liquid and dilute acid, both of which can slip past layers of plant lignin to dissolve the long chains of sugars in biomass and break them up into simple sugars, glucose and xylose. With other procedures including the addition of water during the process, an overall yield of 75 percent sugar was obtained. Using this cost-effective and efficient method, the researchers were able to convert half of the sugars available in plant biomass into liquid fuel.

For details, see the story at <http://www.news.wisc.edu/17780>

Research Tools for Longer Lasting Blooms

Researchers at the USDA-Agricultural Research Service's Crops Pathology and Genetics Research Unit, Davis, California, USA, in collaboration with co-investigators from the Universities of Florida and Reading (UK) have been probing the underlying causes and gene controlled mechanisms of aging. In one study conducted by University of California Davis, Dr. Cai-Zhong Jiang and Dr. Michael Reid found that spraying of low concentrations of thidiazuron (TDZ), extended the life cycle of potted plants' leaves and flowers. To understand further how TDZ works and to make it more effective to potted flowers other than roses, the team used the molecular technique called "virus-induced gene silencing" or VIGS.

The technique involves the insertion of desired genes into the virus, infection of the plant with the modified virus and comparing the infected plant with the non-infected plants. The technique relies on the plants' natural defense mechanism to silence the invading virus. Proof of concept experiments conducted with Petunia showed that gene silencing sequences for imparting color and ethylene production inserted into the infecting virus resulted in the development of white splotches of sectors in purple flowers and reduced production of ethylene - the compound that induces aging. "The basic idea here is that we can use the virus as a tool to quickly turn off genes, to see which ones control senescence," says Jiang.

More details can be found in the news article at <http://www.ars.usda.gov/is/AR/archive/apr10/blooms0410.htm>.

Genes Delaying the Aging of Flowering Plants

In the future, cut flowers and potted plants may stay fresh longer than they used to be. This can be made possible by delaying the aging process or senescence of flowering plants. Thus, U.S. Department of Agriculture Agricultural Research Service (ARS) plant physiologist Dr. Cai-Zhong Jiang and colleagues are studying the gene-controlled mechanism of aging in plants.

To determine the role of genes in aging plants, they used tobacco rattle virus with inserted genes of interest. In this technique called virus-induced gene silencing, plants are exposed to the genetically-modified virus which makes the plants exhibit natural defense mechanisms such as "switching off" the virus together with the genes inserted into the virus. To prove this concept, Jiang and University of California-Davis Prof. Michael S. Raid conducted experiments using purple petunia exposed to virus with color-imparting gene and another gene fragment responsible for producing ethylene, an aging compound. This resulted to flowers with white splotches and with less ethylene produced compared to plants exposed to unmodified virus. These may be evidences that the genes in the virus were switched off.

For more information, visit <http://www.ars.usda.gov/is/pr/2010/100524.htm>.

ARS' Research Efforts to Develop Better Potatoes

Each American consumes an average of 130 pounds of potato every year, which makes it as the top vegetable crop in America. Worldwide, it is the fourth largest crop next to wheat, rice and corn. However, there are numerous pests and diseases affecting potatoes and these include the Columbia root-knot nematode, the potato tuber moth, and the Irish Potato Famine culprit - the late blight. To combat such pathogens, potato producers result to extensive use of chemicals which raises several environmental concerns. Thus, scientists of the USDA Agricultural Research Service are finding ways to develop new varieties of potato which are pest-resistant, with good storage quality, and nutritional value.

The Small Grains Potato Germplasm Research Unit is one of the units in ARS working on developing new potato lines. One of their late blight-resistant cultivar is labeled as Defender, which helped potato producers minimize their expenses for fungicides. On the other hand, the Sugarbeet and Potato Research Unit, in cooperation with Northern Plains Potato Growers Association, are working on cultivars with more than nine months of storage and these are named Dakota Crisp and Dakota Diamond. ARS' Vegetable and Forage Crop

Research Unit are developing potatoes with improved anti-oxidant activity and increased amounts of phytochemicals.

For more information, read the complete article at <http://www.ars.usda.gov/is/AR/archive/may10/potatoes0510.htm>.

Scientists Investigate the Nitrogen and Genotype Effects on Protein and Amino Acid Distribution in Rice

Rice is an important staple food that provides energy, protein and nutrients to consumers across the globe. Nine percent of its dry weight is attributed to protein, which is quite low compared to other cereals' protein content. The grain proteins found in rice is also lacking in lysine, an essential amino acid. Milling process also contributes to the loss of proteins. On the other hand, nitrogen has been studied to promote grain protein accumulation, but no study has been conducted to investigate the effect of varying nitrogen.

Huifeng Ning of Nanjing Agricultural University in China together with other scientists conducted field testing of six japonica rice cultivars with different agronomic characteristics. The cultivars were subjected under seven nitrogen fertilizer treatments to "examine the nitrogen effect on protein distribution in milled rice and brown rice; and identify genotypic differences in response to protein distribution as a result of nitrogen treatments."

Results showed that for brown and milled rice, proteins albumin and globulin were mainly controlled by genotype and not by nitrogen; while proteins prolamin and glutelin were highly affected by nitrogen. There were also significant differences in the reaction of milled/brown (M/B) ratios of proteins to nitrogen treatments. Compared with cultivars with large panicles, the small-panicle cultivars exhibited lower ratio and more consistency under varying nitrogen treatments. In both milled and brown rice, amino acid composition increased with increasing N rate, except for methionine, cysteine and lysine. And also, nitrogen showed no significant effects on the M/B ratios of the majority of the amino acids.

Visit <http://dx.doi.org/10.1016/j.jcs.2010.03.009> for the abstract.

PABIC Achievements (Establishment of IrBIC)

In continuation of PABIC plan to established 5 BICs, in OIC member countries through the financial support of COMSTECH we invited Prof. Dr. Behzad Ghareyazie President of Biosafety Society of Iran, Tehran. The Distinguished Iranian scientist, visited the PABIC, during April 12 -15. PABIC had an extensive discussion with Dr. Behzad on the infrastructure and the training requirements of the nominated staff of the proposed IrBIC, including the venue of the Biotechnology Information Center. It was decided that the venue will be the office of the Biosafety Society of Iran in Tehran.

What is PABIC?

The Pakistan Biotechnology Information Center (PABIC), at Latif Ebrahim Jamal National Science Information Center, University of Karachi, is a national non-profitable organization under the patronage of International Service for Acquisition of Agri-Biotech Applications (ISAAA) and National Commission on Biotechnology. The initiative of the establishment of Pakistan Biotechnology Information Center is an attempt to promote the multidisciplinary research and enhance the awareness and appreciation of biotechnology at the local and international levels. PABIC also works for the development of industries, educational approaches designed to train interdisciplinary scientist in emerging area of health, agriculture, bioinformatics and environmental biotechnology.



Pakistan has several good institutions currently working on various aspects of biotechnology. There are a number of universities which offer various degrees in this discipline. However there is a serious lack of appreciation of biotechnology at the public and industrial levels. Coordination and exchange of information among Institution and practitioners of biotechnology is less than adequate. Therefore there is a need of a resource center in Pakistan which can serve as a hub to disseminate information, to support the collaborative efforts and to develop a network of institutions and Individuals working in this field.

Aims and Objective

- Launching of Biotechnology based information programs.
- Create awareness in public sector, education sector, and industrial sector.
- Provide first time learning services using the latest learning technologies that can be emulated by educational institute.
- Dissemination of information.
- Exchange of ideas.
- Education & awareness.
- Focus on presenting / discussing key issues affecting the industry.