

is expected to be at its peak by 2050. Research of biodiesel had been started in the Pakistan by using different raw material for biodiesel production. PSO has selected only non-edible plants/seeds species, such as castor (Arind), Pongame (Sukh Chain), Jojoba, Jatropha (Karanga), etc., for the production of bio-diesel. However, the company is currently focusing on Jatropha plant/seed for its better qualities as a substitute of petroleum diesel. But microalgae appear to be the cheapest source of renewable biodiesel that is capable of meeting the global demand for the transport fuels. Dr. Musharraf research group at the ICCBS is conducting on the biodiesel production from microalga since last two years. Seven micro algal species have been purified from various fresh and marine water resources including Strain KU-001 (*S. quadricauda*), Strain KU-002 (*S. acuminatus*), Strain KU-003, Strain KU-004 (*Anabaena*), Strain KU-005 (*Chlorella sp.*), Strain KU-006 and Strain KU-007, which contains 7.4, 17, 10.4, 2.98, 5.25, 3.69 and 12.59% oil, respectively. Among the all microalgal species investigated, *Scenedesmus quadricauda* species is found to be most oil producing species so far and found to be suitable for the production of biodiesel on large scale. This research work is under progress, and expected to have economically important outcome.

The scientists of NIBGE have identify a new recombinant virus responsible for the Cotton leaf curl disease virus (CLCuD) in Sindh

Cotton leaf curl disease (CLCuD) is a major disease of cotton in Pakistan which destroy 15-20% of the total crop. CLCuD is caused by begomo viruses in association with a disease-specific symptom determining satellite (Cotton leaf curl Multan betasaellite [CLCuMB]) and, in some cases, a non-essential alphasatellite. The scientists of the National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, have colloned these components from six samples collected from Sindh and the full-length sequences analysis of six begomovirus clones showed that one to be an isolate of Cotton leaf curl Kokhran virus (CLCuKV), a virus previously shown to be associated with CLCuD in the Punjab, whereas the other five clones showed less than 90% nucleotide sequence identity to several known begomoviruses associated with CLCuD. This indicates that these viruses are the isolates of a newly identified begomovirus, for which scientists propose the name Cotton leaf curl Shahdadpur virus (CLCuShV). Further identification indicated that this has a recombinant origin and the virus complex causing CLCuD in Sindh is distinct from that in the adjacent Punjab province.

Bio-Technology Health News

Sialic Acid, A Non-Human Sugar of many Biotech. Drugs can Cause Inflammation

Chronic inflammation is a major issue in different pathological conditions. Researchers of San Diego School of Medicine, at the University of California has discovered a sugar molecule which can provokes a strong immune response in some peoples. This sialic acid sugar is common in many mammals but donot found in humans. As these non-human sugar N glycolyneuraminic acid or Neu5Gc get entered in human body especially through red meat, human body develop antiboidies against Neu5Gc. In some cases the incorporation of Neu5Gc from animal food may result in chronic inflammation, due to the strong antibody response. The problem may also be arises in case of the

use of many recombinant biotechnology drugs having Neu5Gc. The above mentioned studies may explain the association between certain foods and risk of inflammation in different diseases.

Read more: <http://www.medicalnewstoday.com/articles/195824.php>

A Novel Antibody Product to Treat Psoriasis - An Autoimmune Skin Disorder

Scientists at InNexus Biotechnology Inc. has produced a novel antibody product by recombinant technology to treat the auto immune disease psoriasis. The product can be used either in the form of patches to apply on affected areas or in the form of lotions. Previously another company has marketed an antibody product to treat successfully the most serious form of psoriasis but was withdrawn from the market due to the total brain infection caused by the systemic immunosuppression.

Read the full story at <http://www.medicalnewstoday.com/articles/175325.php>

Discovery of New Class of Drugs to Treat Chronic Pain

A team of researchers at the University College London, funded by the Biotechnology and Biological Sciences Research Council (BBSRC) has discovered a new class of drugs to treat the chronic pain due to inflammation condition without numbing the whole body. The Researchers discovered for the first time that the gene involved in the chronic pain are regulated by small RNA, reside inside the cell and the mechanism is different from the already discovered mechanism of the pain. Chronic inflammatory pains are treated with analgesics but they effect the whole body and including the ability to experience acute pain necessary to protect us from various injuries. Currently drugs like aspirin are use to treat but are associated with a large number of side effects, so their was a need for a drug that work in a navel way.

Read the full article at: <http://www.news-medical.net/news/20100817/Discovery-can-lead-to-new-class-of-drugs-for-chronic-pain-treatment.aspx>

Coating of Natural Enzymes to Protect from Methcillin - Resistant Bacteria

Researchers of Rensselaer's Center for Biotechnology & Interdisciplinary Studies (USA) have prepared a nonoscale coating for surgical equipments, hospital walls and other acessories to protect from methicillin resistant *Staphylococcus aureus* (MRSA). The surface enzyme is totally safe to handle and the 100% of the MRSA were killed in 20 minutes after come in to contact with the surface painted with paint mixed with coating, containing a naturally occurring enzyme lysostaphin. The enzyme appear to be toxic against MRSA and can be washed repeatedly without loosing its effectiveness with a shelf life of six months.

Read more on: <http://www.news-medical.net/news/20100817/Scientists-create-nanoscale-coating-to-eradicate-methicillin-resistant-bacteria.aspx>

Agro-Biotechnology News

Nonbrowning Potatoes Proven Safe by Scientists

Researchers are expecting that the next generation of transgenic crops with multiple stacked traits would have better acceptance than the first generation of GM crops with only a single trait improved. This is because of the additional benefits that farmers and consumers can get from the new ones, as long as they are proven to be as safe as the traditionally bred crops. Thus, Briardo Llorente of Universidad de Buenos Aires and colleagues performed a comprehensive study of the "comparative safety approach on a quality-improved biotech crop with metabolic modifications" using three transgenic potato lines with reduced tuber browning. In evaluating the yield-associated traits and photosynthesis, the transgenic and the wild-type (WT) potatoes are the same. On the other hand, primary metabolism analysis revealed that the transgenic tubers have enhanced metabolism compared to the WT controls. Allergenic proteins and unfavorable effects in physiological parameters were not found in the transgenic tubers. Therefore, the results of this study could be an initial evidence that the next generation of biotech crops can be evaluated using the existing evaluation criterion, even if the transgenic lines and the WT plants are not significantly alike.

Subscribers of the Plant Biotechnology Journal can view the original research article at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/123455471/HTMLSTART>.

Developing Viral Disease in Tomato

A major viral disease of tomato, caused by a complex of viruses called Tospovirus, has been found in all tomato producing regions of Brazil. It can totally wipe out young tomato seedlings and the only solution is to breed for resistance against the virus. A resistant gene Sw-5 against the virus was discovered by Eric Campos Dianese of the University of Brazil under the supervision of Maria Esther de Noronha Foresca. The presence of the gene in tomato plants was highly correlated to resistance against the virus. Studies also showed that Tospovirus forms a complex of virus species with different characteristics.

Molecular markers for the gene have previously been identified which have been used in rapid introgression of the Sw-5 gene into commercial varieties. These markers however are located near the gene and can be separated during crossing work. With the discovery of the viral resistance gene Sw-5, new markers derived from the Sw-5 gene itself were developed and are more ideal in differentiating susceptible and resistant plants.

According to Leonardo Boiteus, the coordinator of tomato breeding program at Embrapa Vegetables, the new marker ensures the maintenance of viral resistance in a plant since the Sw-5 gene is dominant and can be expressed in heterozygous state. He added that, "the system can be used for any type of tomato which is important for seed companies that focus on developing new tomato hybrids."

See the news article in Portuguese at: http://www.cnph.embrapa.br/paginas/imprensa/releases/vira_cabeca.html

Plant Pores Give Up Their Secrets

Plant pores or stomates regulate the plants' transpiration and carbon dioxide (CO₂) release. In the process, stomates can have a major impact on plant productivity and climate change as they influence cooling and humidification of the vegetation, influence precipitation, regulate the rate of CO₂ and uptake and water vapor release. Understanding the mechanisms that control the opening and closing of the stomata could be important in designing better crops that would adapt to extreme environmental stresses.

Current understanding on how the mechanism works does not anymore fit to the results of a study published in the Proceedings of the National Academy of Sciences (PNAS). Marie Curie Fellow Roland Pieruschka of the Carnegie Institute said that "For a long time researchers have thought that heat from the sun, which is absorbed by pigments, moves from cell to cell until it gets to the cavities beneath the stomata where evaporation has been thought to take place. This probably happens to some degree, but the results presented in the research paper are more consistent with our hypothesis that much of this heat is transferred through air spaces inside the leaf that are saturated with water vapor.

The original article can be viewed at:

http://cordis.europa.eu/fetch?CALLER=FP6_NEWS&ACTION=D&DOC=8&CAT=NEWS&QUERY=0129fa6e80b0:2830:571d2c39&RCN=32326

BioServe Develops PCR-Based GMO Screening Tests

BioServe, a provider of genomic solutions and services to the biotech industry, has a line of new molecular PCR tests for the detection of any and all commercialized genetically modified organisms (GMOs) to a 0.1% limit of detection of the substance tested. Rama Modali, President of BioServe, says that "These tests for GMOs are the first of what will be a comprehensive portfolio of molecular tests for pathogens and healthcare diagnostics."

The company's laboratories in India have likewise received accreditation from the National Board of Testing and Calibration of Laboratories (NABL) for the detection of GM materials in raw and processed foods.

For more information visit: <http://www.bioserve.com>

Study Shows Bt Cotton Benefits Women in India

The planting of Bt cotton in India has resulted in benefits and employment opportunities for rural Indian women. A study by a team led by Dr. Arjunan Subramanian of Warwick Manufacturing Group in the University of Warwick, United Kingdom analyzed the gender aspect of the technology. Compared with conventional cotton, the researchers found that Bt cotton generated additional employment, raising the total wage income by 40 US dollars per hectare. The largest increase is for hired females with a gain of 55% in average income. About 424 million additional days of employment for female earners were registered for the total Bt cotton area in India. Data show that the increase in returns to hired female labor is mostly related to higher yields in Bt cotton since additional labor is needed to harvest cotton. Harvesting of cotton is primarily a female activity in India.

Dr. Arjunan Subramanian added that "We also found that the use of Bt cotton also improved female working conditions as the reduction in the amount of family male labor involved in scouting and

spraying for pests meant that labor was reallocated to other household economic activities, previously carried out by female family members, increasing the returns to this labor category. Overall, therefore, Bt cotton enhances the quality of life of women through increasing income and reducing 'femmanual' work."

See the University of Warwick press release at:

http://www2.warwick.ac.uk/newsandevents/pressreleases/gm_crop_produces/

Subscribers can view the research article at:

<http://www.nature.com/nbt/journal/v28/n5/full/nbt0510-404.html>

Green Pepper to the Rescue of African Bananas

Banana, an important staple food in Africa is affected by devastating diseases, one of which is the Banana *Xanthomonas* Wilt (BXW). The disease causes half a billion dollars worth of damage yearly. A major breakthrough towards the possible control of the disease was the development of genetically-modified banana that contains the plant ferredoxin-like amphipathic protein (Pflp) or hypersensitive response-assisting protein (Hrap) from green pepper. The research was conducted by a group of research scientists led by Dr. Leena Tripathi of the International Institute of Tropical Agriculture (IITA) and the National Agricultural Research Organization (NARO) of Uganda in partnership with the African Agricultural Research Foundation (AATF).

"The Hrap and Pflp genes work by rapidly killing the cells that come into contact with the disease-spreading bacteria, essentially blocking it from spreading any further. Hopefully, this will boost the arsenal available to fight BXW and help save millions of farmers' livelihoods in the Great Lakes region," she said. The research is published in the **Molecular Plant Pathology Journal** and promising resistant lines will soon be evaluated in confined field trials after the recent approval of the Ugandan National Biosafety Committee.

Details of the story can be viewed at:

http://www.iita.org/news-feature-asset/-/asset_publisher/B3Bm/content/green-pepper-to-the-rescue-of-african-bananas?redirect=%2Fweb%2Fiita%2Fnews

Researchers Discover Novel Mechanism Protecting Plants Against Freezing

Michigan State University biochemists discovered the mechanism how plants protect themselves from freezing temperatures, a breakthrough which could also lead to finding out the plant's behavior during extreme conditions.

Using ***Arabidopsis thaliana***, Christoph Benning and his team observed a novel mechanism on how a specific gene controls the formation of a lipid that protects the chloroplasts and plant cell membranes from freeze damage. Another biochemistry researcher Eric Moellering investigated further the novel mechanism and found out that there is no single mechanism governing plant freezing tolerance. Some species are better in surviving freezing than the others.

The research also suggests that freezing could possibly influence cell proteins to change the composition of the membrane, without activation or slow acclimation process.

Visit http://news.msu.edu/story/8220/&topic_id=2 for the rest of the story.

Scientists Develop Soyscreen Oil to Protect Biological Agent Against Pests

Scientists have discovered protection for the fungus *Beauveria bassiana*, a biological agent that could be a substitute for pesticides. Spores of **B. bassian** were suspended in liquid as insecticide. The destructive insects die when they are exposed to the germinated fungus. However, Rober Behle and colleagues observed that the spores of the fungus are vulnerable to sunlight. Thus, they combined molecules from soybean oil and ferulic acid to form the soyscreen oil which could protect the fungus.

"The spores survive quite well in oil-based formulations. We found that soyscreen had no harmful effects on the fungus spores stored in the oil for 28 weeks. Most important, the 'soyscreen' successfully protected the spores from degrading when exposed to sunlight."

This report was presented at a meeting of the American Chemical Society. For more details, visit: http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=222&content_id=CNBP_025401&use_sec=true&sec_url_var=region1&uuid=9ed05bd6-0ab9-44f4-bf7d-14a5fed1a886

Yeast Gene for Longer Shelf Life of Fruits

A study conducted in Purdue University has revealed the secret why tomatoes can stay fresh longer for about a week. Professor Avtar Handa discovered a yeast gene that stimulates the production of the organic compound spermidine, which delays aging and microbial decay in tomatoes. Handa said that this compound may be transferred to other fruits to extend their shelf life.

Handa's collaborator Avtar Matoo, plant physiologist from USDA Agricultural Research Service, has studied earlier that polyamines like spermidine could improve nutritional and processing characteristics of tomatoes. He said that "shelf life is a major problem for any produce in the world, especially in countries such as in Southeast Asia and Africa that cannot afford controlled-environment storage."

Handa and Mattoo will continue to study polyamines to discover how they control biological functions in fruits.

Visit <http://www.purdue.edu/newsroom/research/2010/100628HandaTomato.html> for the original story.

Energy Crops Growing on Seawater

The development of crops that can grow in marginal lands such as those damaged by salts, is the key to the use of crops as a source of renewable energy. Energy grasses such as sorghum, miscanthus and switchgrass are ideal sources of biomass for biofuel and electricity generation. Energy crop company Ceres Inc. has improved these grasses to thrive on seawater alone. The crops were tested in a greenhouse experiment where sea water from the Pacific Ocean which contains mixtures of salts in high-concentrations were used to water them.

"Soils containing salt and other growth-limiting substances restrict crop production in many locations in the world. This genetic breakthrough provides new opportunities to overcome the effects of salt," said Richard Flavell, Ceres Chief Scientific Officer. The technology developers are convinced that "techniques of modern plant science can continue to deliver innovations that increase

yields and reduce the footprint of agriculture. Improvement of energy crops will enable the bioenergy industry to scale far beyond the limits of conventional wisdom."

See the news article at <http://www.ceres.net/News/NewsReleases/2010/06-30-10-News-Rel.html>

Larger Apples Develop When Cells Don't Divide According to Study

Purdue University professor Peter Hirst discovered some apples from Gala apple trees which are much bigger and heavier than the others because the cells in those apples do not split apart. This new variety called Grand Gala is about 38 percent heavier and 15 percent larger than the diameter of regular Gala apples.

Hirst found out that the Grand Gala had almost equal number of cells with the regular Gala, however the cells of the Grand Gala are larger. He explained that this phenomenon is called endoreduplication, wherein the cells in the Grand Gala replicate their DNA, but do not divide. Instead, the cells become larger, add more copies of their DNA, and continue growing. There are a number of genes that may be responsible for the phenomenon, but it is uncertain if those genes could be used to increase the size of other apples.

Read the press release at <http://www.purdue.edu/newsroom/research/2010/100630HirstGala.html> for more details.

DispersinB[®] Technology to Resist Bacterial Pathogens

A novel way to resist the major bacterial diseases in crops that involve biofilms has been developed and introduced to the farmers by Kane Biotech. Biotech plants containing the DispersinB[®]-antibiofilm enzyme are resistant to plant pathogens due to their ability to inhibit and disrupt biofilms.

"This new discovery has applications in preventing major bacterial diseases in crops that involve biofilms which can be up to 1000 times more resistant to antimicrobials than their planktonic counterparts and has the potential to substantially reduce the agricultural losses in crops such as potatoes, tomatoes and cassava worldwide", stated Mr. Froehlich, President and Chief Executive Officer of Kane Biotech.

For details, see the news at http://www.kanebiotech.com/press_releases/press_release062910.htm

UK Research Studies Shaping Plant Genome

The plant's genome is characterized by immense duplication and deletions, one of the strategies on how they adjust to extreme environmental changes and biotic stresses during its growth and development. University of Kentucky' (UK) College of Agriculture Seth DeBolt investigated how much duplications and deletions in the plant genome is influenced by natural variation using the model plant *Arabidopsis thaliana*.

Arabidopsis plants were sprayed with salicylic acid - a plant hormone plants use for defense, at different concentrations and reference temperatures. Plants were selected every generation for those which have the most seeds, in a span of five generations. For each of the five lineages, three

completely random sibling plants were compared to the reference genome lineage. DeBolt found that copy number variations are stably incorporated into the progenies and some 400 genes were changed, suggesting that plants are probably gene duplicators and deleters.

"It's the way robustness is built into a population, that it has enough variation to adapt to change," he said. "We have to be cautious in that this is only one step showing adaption, but I think it shows a surprising result."

For details of the study, see:

<http://www.kentuckyagconnection.com/story-state.php?Id=487&yr=2010>

Scientists Discover the Direct Link between Development to Growth

It is quite discerning to say that growth and development go hand in hand, leading to the reproduction of right number of cells in specific locations. However, it is only recently that the link has been justified in plants by scientists at the Duke Institute for Genome Sciences and Policy (IGSP). They discovered that a well-known protein called Short-root is responsible for the activity of other genes involved in cell division. Together with its genetic partner Scarecrow, Short-root switches on the the gene cyclin D6, another gene that governs cell growth and division. Cyclin D6 is also present in animals including humans.

IGSP's Center for Systems Biology Director Philip Benfey said that "the discovery in plants has immediate practical relevance given the central role of plants to human life, in the form of 'food, feed, fuel and fiber.' It's also likely that the 'logic' behind plants' growth and development will carry over to other species, perhaps even our own. "

Visit <http://news.duke.edu/2010/07/growthdev.html> for more details.

PABIC Activities (Training of Youth)

The Pakistan Biotechnology Information Center (PABIC) a non-profit, non-government educational organization, is striving hard to design educational approaches to train interdisciplinary scientists in emerging areas of health, agriculture, bioinformatics and environmental biotechnology.

To promote the understanding of the Biotechnology and related sciences among the youth of Pakistan, the PABIC announces the internship program (Dec. 2010, for two weeks), in collaboration with the ICCBS institutions (University of Karachi) for the final year B. Sc. Students (with subjects biochemistry, microbiology, biology) of the **degree colleges of Pakistan** in the following fields:

- 1) Agriculture Biotechnology
- 2) Molecular Biology
- 3) Stem Cell Research
- 4) Cell Biology (Microscopy)
- 5) Bioassay Screening
- 6) Molecular and Cellular Immunology

Selected candidates will be placed in various sections of the ICCBS institutions (www.iccs.edu) for 2-3 weeks.

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 NGO 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 then 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 Objectives:

- To Launch of Biotechnology based information programs.
- To create awareness in public sector, education sector, and industrial sector.
- To provide first time learning services using the latest learning technologies that can be emulated by educational institute.
- To disseminate of information.
- To exchange ideas relevant to judicious use of biotechnological innovation.
- To educate and raise awareness about the biotechnology.
- To focus on presenting / discussing key issues affecting the industry.