

PAKISTAN BIOTECHNOLOGY INFORMATION CENTER

International Service for the Acquisition of Agri-biotech

WELCOME TO OUR NEWSLETTER



• IN THIS NEWSLETTER YOU WILL FIND:

MESSAGES OF DIRECTOR AND COORDINATOR INTERNATIONAL NEWS **NATIONAL NEWS AGRI-BIOTECH NEWS HEALTH-BIOTECH NEWS**

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MESSAGE OF DIRECTOR AND COORDINATOR:

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The Pakistan Biotechnology Information Center (PABIC), located at the Latif Ebrahim Jamal National Science Information Center, is the first national non-profit organization established under the patronage of International Service for Acquisition of Agri-Biotech Applications (ISAAA) and National Commission on Biotechnology in 2004. 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 national levels.

The PABIC also work to design educational approaches to train interdisciplinary scientists in emerging area of health, agriculture, bioinformatics and environmental biotechnology. The PABIC and ISAAA are working with the aim to enhance the global distribution of information about the biotechnology

I hope the newsletter in hand will contribute to disseminate information about new developments and novel applications of biotechnological approaches in various exciting fields of sciences and technology

Prof. Dr. Sammer Yousuf Coordinator PABIC (Karachi Chapter) International Center for Chemical and Biological Sciences, University of Karachi, Karachi 75270, Pakistan



The Newsletter in hand is an attempt to aware the scientific community about the most recent advancements in various the field of biological sciences.

We at the platform of PABIC hope that this newsletter would contribute in enhancing the concept, knowledge and understanding of modern techniques in various fields of biological sciences, among the young researchers of Pakistan, and will inspire their carriers in the fields.

INTERNATIONAL NEWS:

SANYA HYBRID RICE PROJECT EXCEEDS 2,000 KILOGRAMS PER MU:

The annual yield of the Sanya hybrid rice project in South China's Hainan province has exceeded 2,000 kilograms per mu, according to an assessment that occurred on Dec 30, which has set a new record for hybrid rice cultivated in tropical areas of China, Xinhua News Agency reported.

The third season of the project's yield assessment showed that the average yield per mu (1 mu≈0.0667 hectare) reached a whopping 546.7 kilograms. The average yield of the first season was 843.6 kg per mu and the second season was 656.2 kg per mu, so the total annual yield of the three seasons amounted to 2046.5 kg per mu.

The rice growth period in Sanya is relatively short, and its average yield is often not high. To explore the improvement of the three-season rice production capacity in the tropical city, and evaluate and screen new varieties and technologies, the Sanya municipal bureau of agriculture and rural affairs organized the implementation of the Sanya hybrid rice project, and carried out seed breeding in the 40 mu of experimental demonstration area in the Yazhou base of the Chinese Academy of Agricultural Sciences in Sanya.

The rice in the demonstration area has good comprehensive characteristics. It has balanced growth, a strong stem, fine lodging resistance, good leaf shape, high seed setting rate, large ears and many grains, according to field observations and assessments of experts.

With superior light and temperature conditions, Yazhou District of Sanya city explores the cultivation of rice in three seasons a year, and collaborates on key issues to improve multiple cropping of main grains, thereby increasing rice yield and contributing to China's food security, said Qian Qian, academician of Chinese Academy of Sciences.

Original Link: Sanya hybrid rice project exceeds 2,000 kilograms per mu - Chinadaily.com.cn

NATIONAL NEWS:

VITAL ROLE OF AGRICULTURE IN ECONOMY HIGHLIGHTED:

LAHORE: Iftikhar Ali Sahoo, Chairman Planning and Development (P&D) Board, highlighted that agriculture constitutes 22.7% of GDP and employs 37.4% of the workforce.

Speaking at a consultation session for the formulation of ADP 2024–25, he urged stakeholders, including government officials, academia, researchers, farmers, and corporate representatives, to contribute ideas for enhancing the crucial agriculture sector.

Sahoo stressed the need for fresh and creative approaches to improve the agriculture sector, instructing relevant officers to generate innovative ideas. The session aimed to identify challenges, gaps, and priority areas for development projects in ADP 2024–25, focusing on boosting the agrarian economy.

Secretary Agriculture Nadir Chatha addressed smart mechanization, advocating for modern agriculture centers to reduce losses caused by manual sowing and outdated machinery.

Secretary P&D Muzaffar Khan Syal highlighted ongoing consultations with stakeholders to ensure comprehensive representation in the upcoming ADP.

Chairman Nestle Pakistan, Syed Yawar Ali, called for transforming traditional agriculture into a modern system by providing tools and educating farmers. Progressive farmer Babar Ali emphasized the inclusion of the livestock sector in ADP to enhance exports.

Nazeer Ullah Khan, a fertilizer expert from the corporate sector, suggested introducing reverse engineering in mechanization for cost-effective solutions. The consultation session included participation from key figures such as Special Secretary Agriculture Shahanshah Faisal Azeem, Chairman Nestle Pakistan Syed Yawar Ali, and progressive farmer Khalid Khokhar, who collectively shared insights to uplift the agrarian economy.

Original Link: Vital role of agriculture in economy highlighted - Business & Finance - Business Recorder (brecorder.com)

AGRI-BIOTECH NEWS:

MICROALGAE PROTECTS RICE FROM BACTERIAL BLIGHT:

Scientists from India identified that the Chlorella thermophila (CT) microalgal strain possesses antimicrobial activity against pathogens that cause bacterial rice blight. The microalgae can also help with wastewater treatment.

Rice is a food staple for over 65% of the world's population, so it is necessary to have a huge supply in different countries. However, its production is affected by various threats, one of which is bacterial leaf blight (BLB). This disease can negatively affect the straw's quality and reduce grain yield by up to 80%.

To address this issue, researchers from the Indian Institute of Technology Guwahati and the Karunya Institute of Technology and Sciences conducted a study to help eliminate Pantoea agglomerans and Xanthomonas oryzae pv. Oryzae, which are bacterial pathogens that can cause BLB. They cultivated Chlorella thermophila in nutrient-rich dairy wastewater to produce a biomass extract that inhibited the growth of the two bacterial pathogens, which will help in crop protection against bacterial rice blight. The results demonstrate how the microalgae can serve as an alternative to harmful pesticides without affecting crop yield.

For more information, read the journal article on **BMC Plant Biology**.

SCIENTISTS CRACK THE CODE FOR BIGGER BARLEY GRAINS:

Researchers from the Hungarian University of Agriculture and Life Sciences and partners have identified a gene in barley that controls grain size and protein content. Their findings are reported in Plant Science.

Grain Width and Weight 2 (GW2) is a gene that controls cereals' size and weight. Switching off this gene may lead to improving crop productivity. In the study, the research team used CRISPR-Cas9 to deactivate GW2.1 in barley, leading to longer grains and better protein content and significantly reducing overall yield by limiting seed production. The same contrasting effects remained consistent across various growing conditions, indicating a delicate balance within the gene, influencing individual grain quality and overall crop output.

This discovery could help create barley varieties with higher nutritional value, but researchers need to find ways to overcome the yield decrease.

Read more in Plant Science.

GENE ENHANCES ROOT DEVELOPMENT AND MULTI-STRESS TOLERANCE IN RICE:

Scientists have discovered a novel <u>gene</u> in rice that promotes root development and provides tolerance to abiotic stresses. The gene can be utilized as a molecular marker to develop rice that is tolerant to extreme environmental conditions.

Root architecture and function are essential for plants to obtain water and nutrients from the soil. However, environmental stresses can affect the development of the roots. Jasmonic acid (JA), a phytohormone that controls plant growth and stress response, can help with this issue, but its function in root development for environmental adaptability has not been thoroughly studied.

Researchers from various institutions in Taiwan discovered a JA Upregulated Protein 1 gene (JAUP1) that works together with JA to enact various functions in <u>rice</u>. JAUP1 induces JA biosynthesis, which activates a eries of genes that promote root growth and multi-stress tolerance in rice. Increased expression of JAUP1 also minimizes grain yield loss even if there is a limited water supply, which will help with water conservation.

Read the journal article on <u>Plant Biotechnology Journal</u> for more information.

DEVELOPING BETTER CEREAL CROPS WITH TALENS:

Improving cereal crops is vital for ensuring global food security. This is according to the chapter on gene editing tools authored by Arunima Chakraborty from the book *Application of ZFNs and TALENs for Improvement in Cereal Crops*.

Conventional breeding tools are vital in the improvement of crops, but they have limitations. For instance, introducing precise genetic modifications can be tedious and time-consuming, often involving undesirable traits. This is where cutting-edge genome editing Transcription Activator-Like Effector Nucleases (TALENs) come into play.

According to the book chapter, TALENs are easy to use, very precise, and can be used to target any gene. At present, the tool is still expensive to develop and use, but as the tool continues to improve, it is expected that TALENs will become more affordable soon. TALENs have been used to improve cereal crops, such as brown plant hopper-resistant rice, drought and heat-tolerant wheat, and more nutritious barley varieties.

Read the chapter in ResearchGate (login required) or purchase the book via Amazon.

VIB SUBMITS APPLICATION FOR FIELD TRIAL OF GENOME-EDITED MAIZE:

VIB has submitted an application for a new field trial of genome-edited <u>maize</u>. The field trial will look into the development and composition of plant cell walls and how they can be changed to optimize applications in the paper and pulp industry, bioenergy, but more so in the use of plants in animal feed.

Scientists from the VIB-UGent Center for Plant Systems Biology have disabled specific genes in maize that are involved in cell wall formation. Using <u>CRISPR-Cas</u> gene editing technique, changes were made in genes involved in lignin production. The result is that there is 20% less lignin in the cell wall, which is expected to improve the digestibility of maize, making it easier for the animals that consume this crop to absorb energy and nutrients. This field trial is an important step in research aimed at improving the nutritional value of crops. The maize plants have only been tested in a greenhouse. Through the field trial, the researchers want to determine whether the maize also has less lignin in its cell wall under normal growing conditions.

In 2022, VIB also submitted applications for the conduct of three field trials of genome-edited maize after greenhouse observations showed that the modified plants are more resistant to climate stress or easier to digest.

For more details, read the announcement on the VIB website.

HEALTH BIOTECH NEWS:

NOVEL APPROACH SHOWS BIOMARKERS FOR DEVELOPMENT AND DISEASE:

Scientists from Singapore developed a novel approach to sequence single-cell RNA. This method will help examine the roles of RNA structure in single cells.

RNA structure is essential for several stages of <u>gene</u> regulation. However, how transcript structures differ within and between different cells is unknown.

That's why researchers from A*STAR's Genome Institute of Singapore produced Single Cell Structure Probing Of RNA Transcripts (Sc-SPORT) that simultaneously analyzes secondary structure and abundance at a single cell level. The technique can acquire information from RNA structure to determine cell types in diseases and development. The RNA structure could also be used as a potential biomarker or drug target for disorders with stable RNA levels.

Read the journal article on Nature Methods for more information.