PAKISTAN BIOTECHNOLOGY INFORMATION CENTER

Pakistan Biotechnology Information Center (PABIC)

ISAAA International Service for the Acquisition of Agri-biotech Applications

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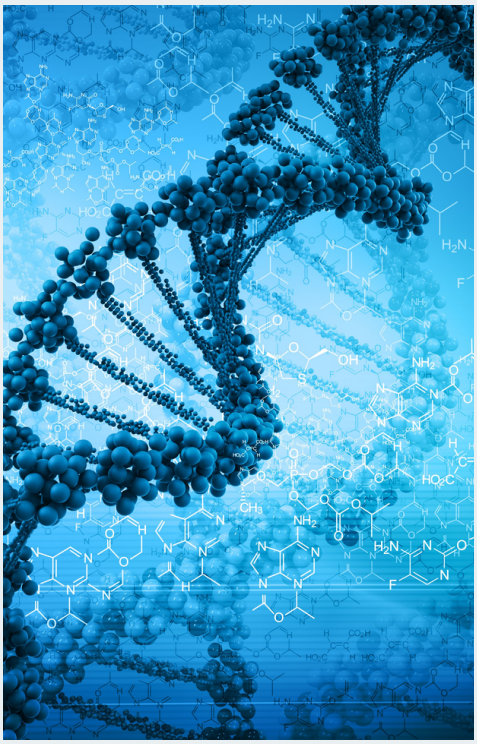

In this newsletter you will find:

- Messages Of Director & Coordinator
- Agri-Biotech News
- Other than Crop Biotech News

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MESSAGE OF DIRECTOR AND COORDINATOR:

Prof. Dr. M. Iqbal Choudhary, Mustafa (pbuh) Prize Laureate, H.I., S.I., T.I.
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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)
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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.

AGRI BIOTECH NEWS:

Researchers Pinpoint Potato Gene for Root Growth and Drought Tolerance:

Good root systems are vital in plant growth. In rice, a gene called *OsDRO1* helps control root development. Scientists from Yunnan Agricultural University and partners wanted to know if a similar gene in potatoes, called *StDRO2*, also plays a similar role in root system architecture. The results of their study are released in the *Horticultural Plant Journal*.

Through CRISPR-Cas9 gene editing, the research team developed potatoes with a mutated *StDRO2* gene. This led to potato plants with longer roots, taller plant height, and heavier tubers, especially under drought conditions. These changes were linked to the plant hormone auxin. The mutation transformed the transportation of auxin in the roots, improving root growth and drought tolerance.

Based on the results, the research team suggests that *StDRO2* is a key gene for root growth and drought tolerance in potatoes, and can help develop new ways of improving potato crops.

Know more about this study in the *Horticultural Plant Journal*.

Experts Develop CRISPR-based Biosensor for GM Maize:

Nanjing University of Information Science and Technology researchers and their partners used CRISPR-Cas12a to develop a groundbreaking biosensor technology for efficiently detecting genetically modified (GM) crops. This breakthrough is reported in Analytica Chimica Acta.

Advances in agriculture have been recorded since the release of genetically engineered crops. The regulation of such crops is dependent on detection techniques. Thus, a sensitive and accurate detection tool is crucial. To detect MON810, the most widely used GM maize globally, the experts employed a DNA tetrahedron as a scaffold that improved the stability and efficiency of the reactions happening at the electrode. The biosensor then targets specific locations in the transgene, making it more precise than real-time quantitative polymerase chain reaction.

Tests have confirmed that using the biosensor leads to high specificity, rapid detection, and accurate results, providing promising solutions to the on-site detection of GM crops.

Read the research article for more findings.

Reducing Arsenic Accumulation in Rice With Gene Editing :

Nanjing Agricultural University scientists explored using gene-editing tool CRISPR-Cas9 to minimize arsenic build-up in rice grains. Environmental Science and Technology journal reports their findings.

Rice, the top staple for many countries, is exposed to inorganic arsenic in the soil. Reducing the build-up of arsenic in rice grains is vital in delivering safer rice grains. The researchers edited the genes involved in silicon uptake in rice roots to reduce arsenic absorption. The transporters genes for silicon uptake, OsLsi1 and OsLsi2, also inadvertently take up arsenic in soil water. Thus, they edited the promoter region of OsLsi1 and the coding sequence of both genes, generating 27 mutant rice lines.

The researchers reported that deleting a portion of the promoter region of OsLsi1 led to reduced silicon uptake, without impacting arsenic uptake of arsenic levels in the grains. Mutations in both OsLsi1 and OsLsi2 coding sequences led to decreased silicon and arsenic uptake and silicon accumulation in husks. OsLsi2 mutations did not affect rice yield.

Know more findings in the Environmental Science and Technology journal.

OFAB Calls for an End to Misleading Information on GM Crops :

The Open Forum on Agricultural Biotechnology (OFAB) in Nigeria, Africa, demands an end to the persistent spread of false and misleading information on genetically modified (GM) crops from the opposition groups, which includes organic farming advocates, philosophical or religious-based groups, and people driven by political and economic motives.

According to Dr. Rose Gidado, the Director of the Agriculture Biotech Department of the National Biotechnology Development Agency (NABDA), there is an urgent need to address misleading information about GM crops. She emphasized the safety measures taken before the release of GM crops, ensuring safety for human and animal consumption and its impacts on the environment.

Dr. Gidado stressed the significance of biotechnology in agriculture, paving the way for drought-resistant and pest-resistant crops. She urges farmers to adopt biotech crops to reduce reliance on traditional farming practices and methods to ensure higher yields and crop production.

For more information, read the article from the Voice of Nigeria.

Australia Approves Commercial Planting of GM Banana :

Australia's Office of the Gene Technology Regulator (OGTR) has issued license DIR 199 to Queensland University of Technology (QUT), to commercially cultivate QCAV-4, a genetically modified (GM) variety of Cavendish banana resistant to the fungal disease Fusarium wilt tropical race 4 (TR4), also known as Panama disease.

On February 16, 2024, the Food Standards Australia New Zealand (FSANZ) also notified the Food Ministers' Meeting (FMM) that it has approved QCAV-4 as suitable for human consumption. FSANZ approved this GM banana for sale as a food in Australia and New Zealand. The GM bananas and any derived food products are subject to mandatory GM labeling.

The QCAV-4 banana is the world's first GM banana to be approved for commercial production and also the first Australian GM fruit approved for growing in Australia. QCAV-4 offers a potential safety net against the devastating Panama Disease tropical race 4 (TR4) which threatens the global US$20 billion banana industry.

Panama Disease TR4 has already crippled Cavendish banana production in Asia, has started to take a foothold in South America, and occurs in Australia in the Northern Territory and North Queensland. QCAV-4 is a Cavendish Grand Nain banana that has been bioengineered with a single banana resistance gene, RGA2, from the wild, south-east Asian banana, Musa acuminata ssp malaccensis.

The GM banana plants may be grown in all banana growing areas in Australia, subject to restrictions in some Australian States and Territories for marketing reasons. The Regulator has not imposed any specific measures to manage risk, as the risk assessment concluded that this release of GM banana plants poses negligible risk to the health and safety of people or the environment.

For more details, read the license details for DIR 199 on the OGTR website or read the news release on the QUT website.

Researchers Examine the Impact of Nanotechnology to Crop Growth and Development :

Researchers from South Africa reviewed the usage of nanotechnology and proteomic tools in boosting crop growth and development. Their role in the genetic engineering of crops to achieve agricultural sustainability was also examined.

Nanoparticles have distinct physical and chemical properties that allow them to have many applications in different fields. However, it has limited usage in agriculture due to safety concerns. Because of this, the potential of nanoparticles is not heavily explored.

Researchers from different institutions in South Africa reviewed the effects of using nanoparticles and proteomic tools in agriculture. Their findings showed that nanoparticles significantly affect the plants' growth and development, which boosts their tolerance to drought and salinity stress. When nanotechnology was used in genetic engineering of crops, it boosted the expression of specific genes and traits.
Read the article in the Journal of Crops Science and Biotechnology for more information.

OTHER THAN CROP BIOTECH NEWS:

Study Gives Details on Arabica Coffee's Complex Genome:

Researchers in Italy have shed light on arabica coffee's large and complex genome, which could help in the development of desirable traits in coffee, such as disease resistance.
Arabica coffee represents 60 percent of the world's total coffee production and is generally known for its higher quality than the other dominant commercial coffee species, robusta. The study notes that genetic diversity in arabica coffee is lacking and this is especially troubling because arabica has greater susceptibility to disease and climate change. However, the study also notes that this lack of diversity may be because arabica is a relatively young species formed from a "super parent" combination of robusta and another, non-commercial species, Eugenioides, within the past 50,000 years.
The research team, led by Michele Morgante, Gabriele Di Gaspero, and colleagues, used the latest genome sequencing technologies to coffee samples, finding yet again a notable lack of genetic diversity in arabica. They found some changes at the chromosomal level that might explain why different characteristics are associated with different coffee cultivars, including flavor, disease susceptibility, or caffeine level. The study found evidence of significant chromosomal "rearrangements," and even chromosome deletions. These were observed in the arabica line known as Bourbon. The researchers found additional genetic diversity in arabica in cultivars tracing back to the Timor hybrid.
For more details, read the article in Daily Coffee News.

Uruguay Considers Gene Drives to Combat Screwworms:

Uruguay has been battling with the New World screwworm infestations for several decades. Screwworm fly larvae, hatched from eggs laid by the female, burrow into cattle flesh, causing fatal wounds if left untreated. Thus, the pest poses a risk to agriculture and the economy.
To address this concern, National Institute of Agricultural Research (INIA) experts designed a gene drive to boost the spread of a gene or group of genes in a population. This method is based on CRISPR gene editing and enables the control and eradication of pest species by hijacking the genes that impact their fertility and survival. Uruguay plans to use this technique to eradicate screwworm populations. MIT Technology Review reports that the research team from INIA has been granted permission by the government in 2020 to conduct efficacy trials.
Other control methods for screwworms include the Sterile Insect Technique (SIT), which involves the release of sterile males to impact breeding and decrease population. However, this method is costly and must be repeated endlessly. Compared to SIT, gene drives are more sustainable and cheaper.
Read more from Interesting Engineering and MIT Technology Review.

ISAAA Inc. and BCP Boost Youth's Appreciation for Gene Editing of Livestock and Aquaculture:

Gene editing is a breakthrough innovation that can be used in different industries around the world. In the Philippines, this method is mostly used to benefit the agriculture, livestock, and aquaculture industries. The general public, especially the younger generation, should be made aware of the advantages of using this technology.

Gene Genies: Gene Editing by Filipino Scientists (Applications in Livestock and Aquaculture) is a webinar organized by ISAAA Inc., in collaboration with the Biotechnology Coalition of the Philippines (BCP), held on February 26, 2024. The webinar aimed to raise awareness and appreciation of gene editing applications to livestock and aquaculture. The webinar was attended by 35 participants, mostly high school and college students, from different schools and colleges.

Dr. Rhodora Romero-Aldemita, Executive Director of ISAAA Inc., welcomed the attendees and explained that the webinar is a series meant to engage the minds of budding scientists. She mentioned that “We hope that through this webinar, we can contribute to a science culture among our young participants and build confidence to pursue science careers.”

Dr. Marvin Villanueva, Chief of the Livestock Biotechnology Center, discussed the applications of livestock biotechnology and gave examples of gene-edited animals in other countries. Dr. Villanueva also emphasized that “there are exciting opportunities for the use of modern biotechnology in addressing pressing problems of the livestock industry in the Philippines.”

Dr. Rhoda Mae Simora, Associate Professor at UP Visayas, shared about the benefits of gene editing in aquaculture and provided examples of gene-edited fish. According to Dr. Simora, “Gene editing can improve fish species with impacts for sustainable and efficient aquaculture.” Their presentations were followed by survey questions to gauge the participants' appreciation of gene editing. The results showed a favorable outlook of the attendees towards gene editing.

For inquiries about the webinar, send an email to meetings@isaaa.org.