BIOLIFE

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IRRI and ACI partner to develop improved rice varieties for rice growers in Bangladesh

The International Rice Research Institute (IRRI) and Advanced Chemical Industries Ltd. (ACI) announced a partnership to build a state-of-the-art rice breeding program in Bangladesh on 22 February 2016. The partnership will aim to improve the lives of rice farmers through supporting better rice varieties and agricultural technologies. The collaboration will support a wide range of projects aimed to accelerate genetic research and advance breeding and product development for the Bangladesh rice ecosystem.

This agreement builds on the successful partnership developed between the two organizations through the Hybrid Rice Development Consortium (HRDC), started in 2014, which is a public private partnership that enhances the dissemination of hybrid rice technology. HRDC, of which ACI has been a member since May 2014, was established at IRRI in 2008.

IRRI's unique expertise and technology platform will be available to ACI in the form of an intensive technology-transfer program, partially financed by the U.S. Agency for International Development (USAID). In addition, ACI will deploy specific elite varieties developed by IRRI that are suitable for Bangladesh agro-climatic conditions. A strong screening program, developed by ACI with the help of IRRI specialists, will yield a robust pipeline of new elite varieties. ACI will be responsible for market introduction of the best varieties.

"Through this partnership with IRRI, ACI is building on its commitment to develop a strong rice breeding program and to introduce new elite varieties in Bangladesh," said IRRI Director General Matthew Morell. "Along with our existing relationships with the public sector and civil society, partnerships with the private sector that expedite the flow of IRRI germplasm and know-how to the market for the benefit of rice farmers and food security in Bangladesh are in line with IRRI's vision and mission. The objective of this collaboration with ACI is to facilitate higher rice yields, better quality, climate-change–tolerant varieties, and improved sustainability of rice production in Bangladesh."

IRRI is the world's premier nonprofit international institute on rice research, headquartered in the Philippines. ACI is a leading brand in Bangladesh with activities in pharmaceuticals, consumer brands including agriculture value addition, logistics including agriculture retailing and complete agriculture solution covering seed, fertilizer, crop care, agriculture machineries, animal health and integrated poultry and farmer's forward and backward linkage.

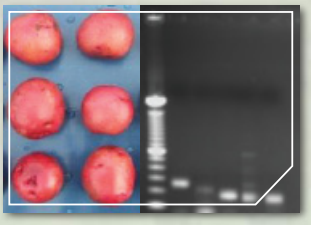
BIOLIFE

Contents

3

Indigenous Potato Variety Improvement program of Advanced Seed Research and Biotech Centre, ACI Ltd.

The major problems with commercial modern variety potatoes in Bangladesh is that, they are all sown and harvested at close time distance and thus also enter the market at the same time.



4

Acigold-WS: Water Soluble Multivitamin

On 16 February 2016, ACI Animal Health launched Acigold-WS, a water soluble multivitamin for poultry.

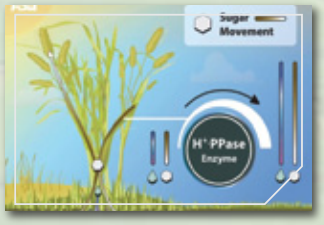
6

ACI Agribusiness wins Top Prize at Int'l Agri-Tech Expo 2016

ACI Agribusiness achieved 1st prize in recognition of its extraordinary performance in the 6th International Agricultural Technology Fair 2016.

10

Researcher Improves Crop Performance with New Biotechnology



In addition, crop production is now affected by stressors such as drought, climate change and the salinization of fields -- presenting obstacles to our future food supply. Researchers with Arizona State University's School of Life Sciences,

Indigenous Potato Variety Improvement program of Advanced Seed Research and Biotech Centre, ACI Ltd.

The major problems with commercial modern variety potatoes in Bangladesh is that, they are all sown and harvested at close time distance and thus also enter the market at the same time. This leads to market glut and thus low prices to the producers. Potato is considered as a cash crop and is highly perishables unless well preserved in cold storages, but due to lack of cold storage facilities after bumper harvests, the farmers end up being the losers.

Bangladesh has Indigenous Potato Varieties (IPV) such as Lal Pakri, Jaam Aloo, Shil Bilati, Ausha, etc. which is mostly grown from farmers' saved seeds in the northern parts of the country. Due to low quality seeds and archaic agricultural practices, the crop yield performance has eventually diminished. But the choice of the consumers and quality are high.

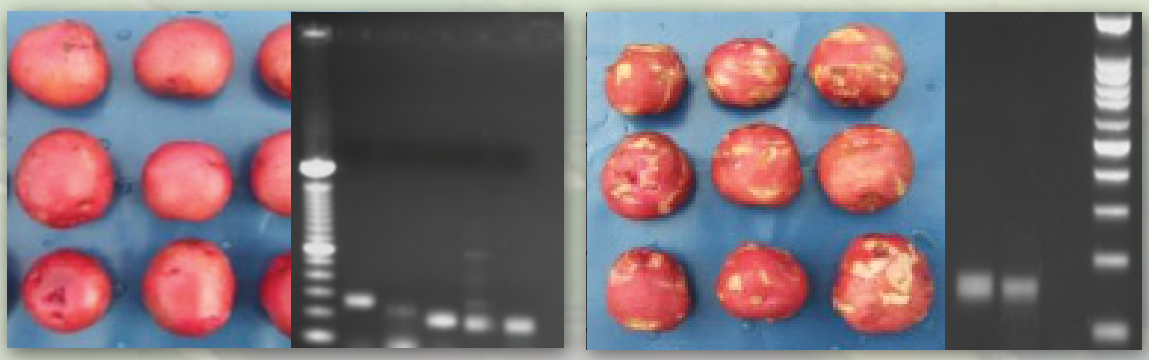
The Advanced Seed Research and Biotech Centre (ASRBC, ACI) understanding the potential of these varieties has been improving the yield and quality of the seeds for sustained high yield for past four years. The varieties are Lal-Pakri 1 and Lal Pakri-2 (Fata Pakri) has been purified through various techniques and agriculture management to the point where it is less virus affected, has 3 times higher yield than national average of the same type and storage capacity of up to 3-4 months after harvest without any loss of quality but rather gets higher market price.

The yield of Lal Pakri-1 at 36 tons per hectare is slightly higher than Lal Pakri-2 whose yield is 34.6 tons per hectare. But Lal Pakri-2 is preferred more by the farmers even after its low yield since it can be stored a month longer in natural conditions and has higher market value. Since cold storage is not required for these two varieties, farmers can keep them in a cool dark place (usually below their beds) up to 3-5 months. In fact, unlike Lal Pakri-1 in LalPakri 2 it takes 5 months for sprouting to be visible. A study to examine loss of weight after 120 days was seen to be 7.4% for Lal Pakri-2 in comparison to 14.45% for Lal Pakri-1. The most important trait of Lal Pakri-2 is that the higher dry matter contact of 21.3%. Hence from the nutritional perspective, more carbohydrate is incorporated in the diet of consumers.

Both the potato varieties have been registered for ACI as ACI Lal Pakri-1 and ACI Lal Pakri-2. Production and marketing for Lal Pakri-1 has been ongoing for the past two years, each year the demand is increasing by more than two folds. In 2016 after positive clonal selection, quality determination and molecular analysis by the ASRBC team of ACI Agribusiness, the high quality seeds of Lal Pakri-2 variety will get introduced in the production system of the country including the coastal belt.

The support of Ms Adeeba Raihan, Ms. Momena Khandaker, and Prof. M Abdus Siddique is highly acknowledged.

Prof. Lutfur Rahman
Advisor, ACI Agribusiness & Head of Advanced Seed Research & Biotech Centre



Figures: Clear phenotypic and molecular differences can be seen between the two varieties Lal Pakri-1 and Lal Pakri-2 (Fata Pakri)

Acigold-WS: Water Soluble Multivitamin

On 16 February 2016, ACI Animal Health launched Acigold-WS, a water soluble multivitamin for poultry. Each 10 g of Acigold-WS contain Vitamin A 10,00,000 IU, Vitamin D3 2,50,000 IU, Vitamin E 200 mg, Vitamin B1 120 mg, Vitamin B2 320 mg, Vitamin B6 120 mg, Vitamin B12 0.2 mg, Vitamin C 3,000 mg, Vitamin K, 160 mg, Nicotinamide 200 mg, Pantothenic Acid 184 mg, D-Biotin 1 mg, Folic Acid 10 mg. It helps to relieve stress caused by vaccination, extreme cold or heat, transportation, debeaking, use of anthelmintics and other treatment of infectious cause. Acigold-WS can be used to increase egg in layer and meat in broiler and also fertility of breeder. It improves flock uniformity. Acigold-WS is available as 100 gm & 20 gm packs.

Star Yeast Powder

Star yeast is a natural fermentation product made of 100% Saccharomyces cerevisiae cells which is a rich source of protein, soluble fiber and some minerals. Star Yeast contains nine types of B Vitamins as well as minerals like Calcium, Phosphorus, Potassium, Magnesium, sulfur, Sodium, Zinc, Selenium, Copper, Iron, Manganese, Lead, Chromium, Arsenic. There are also eighteen types of Amino acids as well as Crude Protein, Crude Fibre, and Carbohydrate. It is manufactured by ICC (Brazil). ACI Animal Health launched Star Yeast Powder on 15 March 2016. It is available as 100 gm pack.

Dried Molasses Powder

On 15 March 2016, ACI Animal health launched Dried Molasses Powder which is used as an ingredient in feeds or in forages. The palatability yield of 1kg of dried molasses is equivalent to the yield obtained when using 3 kg of liquid molasses. Dried molasses is also enriched with micro and macro minerals and it does not offer any risk of fermentation. Advantages of dried molasses are - it helps in rumen microbial growth and nutrient metabolism, increases the ratio of protein & fat in milk, improves the water quality and controls the luminescent bacteria in shrimp ponds. Each kg of Dried Molasses Powder contains Protein 30 gm, Carbohydrate 150 gm, Sucrose 400 gm, Calcium 70 gm, Phosphorus 1.0 gm, and Iron 1.0 gm. It is manufactured by ICC (Brazil). It is available as 100 gm pack.

Bumper Calmag

Dolomite is widely used in crop cultivation and aquaculture in our country. It is used in crop cultivation as a soil conditioner to balance the pH level of the soil for better crop production. It also supplies Calcium and Magnesium for healthy plant growth. Dolomite increases the nutrient uptake ability of the plant. Dolomite is also used in aquaculture to control the pH of the water, minimize the bad odor from the water; help to grow phytoplankton in water and to improve the water quality for a better environment for fish & shrimp culture. Considering the immense potentiality, ACI Fertilizer has launched Dolomite under the brand name “Bumper Calmag”. It has been imported from Bhutan and pack size is 50 kg.

Bumper Quick Potash

Potassium is one of the most used fertilizers in our country and it is used as soil application. Plants need potassium at different stages to complete the life cycle. After a certain time especially at the time of flowering and fruiting, plants can’t uptake nutrients from the soil. So there is a need for the foliar application to fulfill the nutrient deficiency. Considering these facts, ACI Fertilizer has launched soluble potash under the brand name “Bumper Quick Potash” for foliar application. Quick Potash contains 50% Potassium and 17% Sulphur. It can be applied at any stage of the plants as a foliar application or mixing with other fertilizers. The plant can uptake the nutrient (Potassium) rapidly after application. It ensures more crop production as well as the color & quality.

ACI Agribusiness wins Top Prize at Int'l Agri-Tech Expo 2016

ACI Agribusiness achieved 1st prize in recognition of its extraordinary performance in the 6th International Agricultural Technology Fair 2016. The country's largest three-day long agriculture technology expo titled the 6th Agro Tech Bangladesh 2016 was held at the International Convention City Bashundhara (ICCB) in the capital on 17 March 2016. The aim of the expo was to introduce the latest agriculture technology to the local farmers, visitors, and stakeholder. State Minister for Local Government, Rural Development and Cooperatives Md. Moshiur Rahman Ranga inaugurated the event as chief guest. Rural Development Academy, Bogra and Limra Trade Fairs and Exhibition jointly organized the expo.

Engineer M A Matin, Rural Development Academy and M S Siddiqui, President of Bangladesh Indenting Agents were present, among others, on the occasion. M A Kader Sarkar, Secretary, Ministry of Local Government Rural Development (LGRD) presided over the event. A total of 217 stalls had been set up at the fair that showcased various agriculture, food and milk processing machinery, agricultural commodities, renewable energy, horticultural crops and seed-production technology, livestock and birds' feed and nutrition-generating technology. A total of 37 countries including USA, Canada, China, Germany, and Turkey participated in the fair.

Ceva Vaccinology Summit 2016 at Barcelona

ACI Agribusiness participated in Ceva Poultry Vaccinology Summit 2016 at Barcelona, Spain. Ceva promotes healthier flocks for healthier food by organizing Ceva Poultry Vaccinology Summit on Antibiotic – Free Megatrends in Poultry Production and Added Value of New Innovative Vaccine Solutions. The event was held at the W Hotel on Barcelona's seafront during 14 – 16 March 2016, attended by 380 participants like veterinarians, poultry producers, key opinion leaders and Ceva personnel from across the globe including Bangladesh. Dr. F H Ansarey, Executive Director, ACI Agribusiness represented the country's leading agricultural integrator in the summit.

This summit provided the first scientific evidence that vaccination in the hatchery, using new technology vaccines can create a step towards moving from disease protection to disease prevention by minimizing the spread and therefore circulation of field viruses. Speakers from international organizations, large retailers, and global production companies shared their outlook and experiences on adoption of Antibiotic-Free (ABF) production across continents. The summit also aimed at new dimensions of vaccines and vaccinations like maximum homogeneity and virus shedding reduction for better overall health management of flocks. Ceva's commitment to responsible antibiotic use is evidenced in programmes that focus on protection as well as reduction of disease spreading.

Exclusive Retailer Training by ACI Fertilizer

ACI Fertilizer has organized Retailer Training Program and Farmers Training Program collaborating with LEILI (Producer of Promoter) in Kushtia and Rangpur area in March 2016. Promoter is a sticky agent which maximizes the function of agrichemicals and foliar fertilizers in order to increase the spreading speed, wetting speed and adhesion of field crops. It is widely used in many countries such as China, Japan, Sri Lanka, Indonesia and South Africa, and the demand of Promoter in our country is also increasing. The main objective of the training program was to encourage the farmers and retailers to learn about the product and its applications. The training took place in two different places. The first one held at Hotel Pritom, Kushtia dated on 13 March, 2016 and the participants were Mr. Kevin, Deputy Director of LEILI, China, Mr. Masum Kamal representative of LEILI, Product Executive of Fertilizer Mr. Asadur Rahman, RSM Jessore Zillur Rahman, and ZSM Abdus Sabur Khan along with 40 potential Retailers of Kushtia area. The second one held at Nil Sadar, Nilphamari, Rangpur dated on 15 March 2016 and the participants were Mr. Kevin, Mr. Masum Kamal, Product Executive of Fertilizer Mr. Asadur Rahman, and RSM Rangpur Firoz Hossain with potential Retailers.

Community-based Fertilizer Promotional Campaign

Community-based fertilizer promotion campaign was launched at Dinajpur in March 2016 by ACI Fertilizer. Compared to the repetitive Farmers & Retailers Training ProgramS, this a new and innovative approach taken by the Area Manager of Dinajpur from the SBU. The campaign took place on 4 March 2016 at Sheikhpura, besides Dinajpur Depot in Dinajpur Sadar, where 26 farmers from the community participated. They have directly communicated with the Area Manager about various fertilizers and their further queries. Area manager was able to gather information about farmers land capacity and provide knowledge about various products of ACI Fertilizer. The main products under this campaign program ware NEB, Quick Potash, Fertimix and Bioferti for Rice crop. After successful completion of the promotional campaign, the farmers were inspired and urged to continue this kind of program.

ACI Motors Actively participates at Food and Agro Bangladesh Int'l Expo 2016

ACI Motors showcased their products & actively participated in one of the largest international expositions of agro and food processing sector of Bangladesh titled "Food and Agro Bangladesh International Expo 2016" which began on 23 March 2016 in Dhaka. The four-day exposition continued till 26 March 2016. Food Minister Qamrul Islam was the chief guest at the inaugural program of the international exposition. The minister said, "The exhibition is targeted to the food sector of the country and it will play an important role to develop food and agro industry." Conference and Exhibition Management Services (CEMS)-Global in association with CEMS-Bangladesh organized the four-day event at the Bangabandhu International Conference Centre. The international expo focused on and devoted to the development of food and agro industries in Bangladesh, placed modern technologies, showcased modern food processing equipment and machinery. ACI Motors along with a total of 150 manufacturers and suppliers from Bangladesh, India, China, Jordan, Malaysia, Germany, Japan, USA and Taiwan exhibited products. ACI Motors showcased the complete farm mechanization solution to the visitors of the expo.

Creating a Better Tractor Driving Experience

ACI Motors arranged two training workshops for tractor drivers in Comilla and Jamalpur. These training programs are part of ACI Motor's initiative to inform tractor drivers about both basic and specific information which are essential while driving or operating a tractor. Tractor drivers got the opportunity to have a better understanding of maintenance along with driving from ACI Motors' experts. The training program took place in Jamalpur on 10 March 2016. In Comilla, it took place on 14 March 2016 at Daudkandi. About 100 tractor drivers benefited from these two training workshops.

FAEC 2015: The Quest for Next Agri Entrepreneur ended

ACI Agribusiness, as the largest integrator in agriculture, livestock and fisheries, started the search for the next agri entrepreneur through the Future Agri Entrepreneur Contest 2015 (FAEC 2015). On 6 March 2016, the Grand Finale of FAEC 2015 was held where groups presented their business plan in front of the judges' panel. Finally, the winner of FAEC 2015 contest was group 'Golden Seed' of Bangladesh Agricultural University with their presentation on "Business plan on : Fish Oil, Biodiesel, Fish Amino Acid Fertilizer(FAAF) by Fish Waste Processing". The 1st runner up group was 'Swapno Buzz', also from Bangladesh Agricultural University and 2nd runner up group was 'Green Agri Dreamer' from Sher-e-Bangla Agricultural University - (SAU).

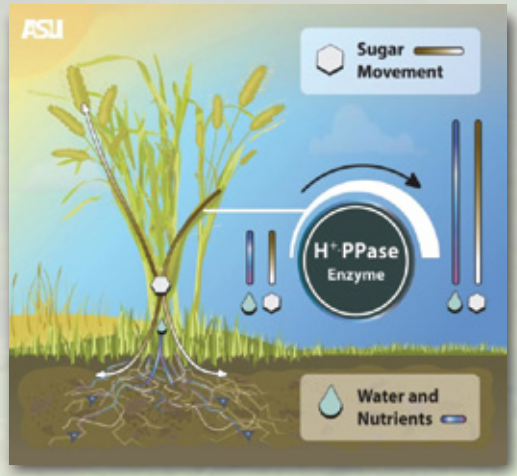
Researcher Improves Crop Performance with New Biotechnology

In addition, crop production is now affected by stressors such as drought, climate change and the salinization of fields -- presenting obstacles to our future food supply. Researchers with Arizona State University's School of Life Sciences, University of Arizona, University of North Texas and with the USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine, have discovered a way to enhance a plant's tolerance to stress, which in turn improves how it uses water and nutrients from the soil. These improvements increase plant biomass and yield. The study's findings are published in the scientific journal Trends in Biotechnology.

Associate professor Roberto Gaxiola with ASU School of Life Sciences said this discovery could be instrumental in agriculture and food security by improving crop sustainability and performance. "'We have learned how to modify the expression of a gene that codes for a plant proton pump," said Gaxiola, lead author of the study. "This gene helps to move photosynthates -- or molecules made by photosynthesis in the leaves -- to the places plants need them in order to grow better roots, fruits, young leaves and seeds. This gene is called type 1 H+-PPase and is found naturally in all plants."

Current agricultural methods often overuse fertilizer, causing environmental problems by polluting water with phosphates and creating dead zones in oceans downstream. Over-fertilization can also cause plants to have small roots -- something that was not anticipated when fertilizers were developed in the early 1900s. By changing how effectively a plant uses water and nutrients, farmers would be able to use fewer resources to grow their crops.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily.com)



Researchers with ASU School of Life Sciences discovered a way to enhance a plant's tolerance to stress, which in turn improves how it uses water and nutrients from the soil

Photo credit: David Kiersh

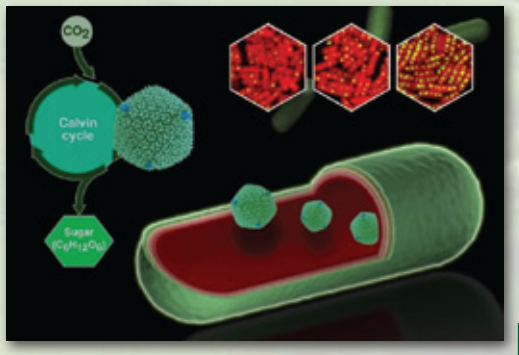
Inner 'Machines' Give Bacteria an Energy Boost

Scientists at the University of Liverpool have tracked how microscopic organisms called cyanobacteria make use of internal protein 'machines' to boost their ability to convert carbon dioxide into sugar during photosynthesis. With global food and energy security one of the greatest challenges of the 21st century, the new findings could help inform the design and engineering of new nanotechnologies to improve crop yields and biomass production.

Cyanobacteria, often known as blue-green algae, are among the most abundant organisms in oceans and fresh water. They are similar to green plants because they can use the energy from sunlight to make their own food through photosynthesis. However, unique to cyanobacteria are intracellular structures called carboxysomes that allow them to convert carbon dioxide to sugar -- a process known as carbon fixation -- significantly more efficiently than many crops can. Carboxysomes are made of polyhedral protein shells and contain the enzymes required for the bacteria to fix carbon during the Calvin cycle stage of photosynthesis. Little is known about how these nano-scale 'machines' are produced or how they are regulated to adjust to environmental changes, such as light intensity.

In a new study, published in Plant Physiology, researchers from the University's Institute of Integrative Biology attached fluorescent tags to carboxysomes and then used a fluorescence microscope to watch them in action within individual cells.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily.com)



Fluorescently tagged carboxysomes as viewed under a microscope (top right) and an illustration of carboxysomes within a cyanobacterial cell.

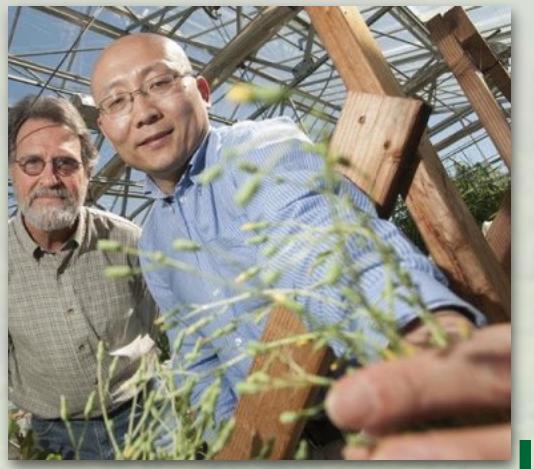
Photo credit: Dr. Luning Liu, University of LiverpoolClose

Lettuce: Gene for Germination and Flowering

Like most annuals, lettuce plants live out their lives in quiet, three-act dramas that follow the seasons. Seed dormancy gives way to germination; the young plant emerges and grows; and finally in the climax of flowering, a new generation of seeds is produced. It's remarkably predictable, but the genetics that coordinates these changes with environmental cues has not been well understood. In a recent study of lettuce and the model plant Arabidopsis, researchers at the UC Davis Seed Biotechnology Center and in China show for the first time that a gene known to direct the depth of seed dormancy and the timing of germination also influences flowering. The study further suggests that the gene does this by influencing production of certain microRNAs -- tiny snippets of genetic material that govern transition from one phase of the plant's life cycle to another.

The findings, which have important implications for the $1.9 billion annual U.S. lettuce crop, will be reported during the week of 28 March 2016 in the Proceedings of the National Academy of Sciences. "It appears that the 'Delay of Germination 1,' or DOG1, gene is an environmental sensor, detecting environmental changes and enabling the plant to not only keep the seed dormant but to also delay flowering," said study co-author Kent Bradford, a plant scientist and director of the Seed Biotechnology Center. "This gene could be a particularly valuable tool as climate change shifts our growing seasons and we are forced to develop plants that can adapt to those environmental changes," Bradford said.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily.com)



Kent Bradford, left, and Alfred Huo, seen here with a flowering lettuce plant, found that lettuce could be prevented from flowering by increasing the expression of a specific microRNA in the plants.

Photo credit: Gregory Urquiaga/UC Davis

USAID Supports Cornell's Feed the Future South Asia Eggplant Improvement Partnership

The United States Agency for International Development (USAID) has awarded Cornell University a US$4.8 million, three-year grant to strengthen capacity to develop and disseminate Bt eggplant in Bangladesh and the Philippines. The award supports USAID's work under the Feed the Future, the US government's global initiative to fight hunger and improve food security using agricultural science and technology.

Dr. Anthony Shelton, and international professor of entomology in the College of Agriculture and Life Sciences at Cornell will direct the project. According to Dr. Shelton, because of infestation by the fruit and shoot borer, or FSB, as much as 70 percent of the eggplant crop in South Asia never makes it to market. Bt brinjal (eggplant) has been developed over the last 11 years and uses a gene from a naturally occurring soil bacterium to produce a protein that causes borers to stop feeding. "Bangladesh faces food shortages, increasing population, and decreasing amounts of arable land," said Dr. Md. Rafiqul Islam Mondal, director general of BARI. "Genetically engineered crops developed under the Feed the Future South Asia Eggplant Improvement Partnership will enhance the quality of life for Bangladeshis by increasing income, improving nutrition and health, and fostering a safer environment." The Feed the Future South Asia Eggplant Improvement Partnership addresses and integrates all elements of the commercialization process — including technology development, regulation, marketing, seed distribution, and product stewardship. It also provides strong platforms for policy development, capacity building, gender equality, outreach and communication.

(Source: Crop Biotech Update, International Service for Acquisition of Agri-Biotech Applications. www.isaaa.org)

Photo credit: Arif Hossain/Cornell

Study Shows Plants Forget Unused Memories

A team of researchers from the Australian National University Canberra, has found that plants can reset a memory that has not been useful, and in essence, forgetting things that they have stored. Previous studies have shown that plants remember events such as droughts, so that they know how to survive if similar events occur in the future. In the new study, the team reports learning not only more about how such memory processing occurs, but also how plants are able to reset if conditions change such that a memory that has been learned that is no longer useful can be eliminated.

The researchers found that for a plant to create a memory, it has to create a protein that will have an impact on its own DNA, which allows for impacting future generations. It is all part of a process called RNA decay, where DNA strands are transcribed into RNA, before they are translated into proteins. The RNA decay process controls the amount of RNA molecules that are to be tuned into proteins, and any disruption to that process prevents a memory from being formed, suggesting the means by which previous memories may be eliminated. The process is important because holding onto memories uses plant resources. The team notes that some plants also appear to have short-term memory that is not related to either DNA or RNA, but it still remains to be studied.

(Source: Crop Biotech Update, International Service for Acquisition of Agri-Biotech Applications. www.isaaa.org)

Growing both food and fuel in a desert

The world's first research facility to grow both food and fuel using desert lands irrigated by seawater has been opened on a two hectare site in Abu Dhabi, UAE. The facility, operated by Masdar Institute of Science and Technology is funded by the Sustainable Bioenergy Research Consortium (SBRC). UAE minister of climate change and environment, HE Dr. Thani Ahmed Al Zeyoudi said, "This project will not only sustainably produce bioenergy, but also offer a pathway to grow our aquaculture industry, which supports food independence."

Aquaculture systems can reduce a nation's dependence on foreign food and improve security, but they also pose environmental challenges due to the impact of nutrient-rich effluents flowing into the ocean. The SBRC tackles these concerns and is seeking to minimize the footprint of commercial farming practices.

Professor of environmental science at the University of Arizona Dr. Kevin Fitzsimmons said, "As the planet's population approaches nine billion people, we must advance technologies that enable sustainable and manageable food production. The innovative facility in Abu Dhabi is a showcase of how cross-sector cooperation can lead to breakthrough research with the potential to deliver both food and aviation fuel – and do so in a sustainable, scalable way." The research facility uses coastal seawater to raise fish and shrimp for food, whose nutrient-rich wastewater then fertilizes plants rich in oils that can be harvested for aviation biofuel production. The salt-tolerant halophyte plants – whose commercial potential is relatively unexplored – thrive in arid, desert conditions and don't require fresh water or arable land to grow. In the last step of the system, wastewater is diverted into a cultivated mangrove forest, further removing nutrients and providing valuable carbon storage, before the naturally filtered and treated effluent is discharged back into the sea.

(Source: Far Eastern Agriculture, www.fareasternagriculture.com)

The goal of the research facility is to demonstrate the viability of an integrated bioenergy production system.

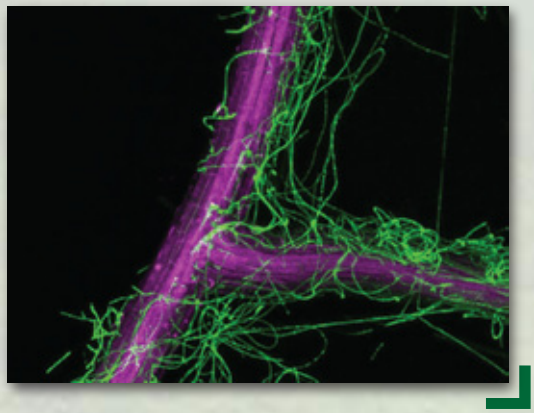
Photo Credit: Novartis AG/Flickr

Plants Found to Host Beneficial Fungi When Required

Scientists have believed for a long time that the role of plant immune system was only to distinguish between friend and foe and to fend off pathogens, but it is also involved in accommodating beneficial microorganisms in the plant when required. Researchers from the Max Planck Institute for Plant Breeding Research in Cologne, Germany in collaboration with an international consortium of other laboratories discovered this relationship between the model plant Arabidopsis thaliana and the fungus Colletotrichum tofieldiae. The plant tolerates the fungus when it needs help in obtaining soluble phosphate from the soil and rejects the microbe if it can accomplish this task on its own.

Plant growth is possible when plants have access to soluble phosphate in the soil. Most plants maintain a mycorrhiza, the fungal mesh around their roots that supplies them with vital soil-derived nutrients. Arabidopsis is one of the few plants without a mycorrhiza. Instead, it engages in a beneficial relationship with the soil fungus C. tofieldiae which converts insoluble phosphate in the soil into soluble phosphate and releases the nutrient via the fungal mesh to its plant host. The research team discovered that an intact innate immune system is needed for the symbiosis and allows the fungus to take up residence in the plant's roots only if the plant is not able to obtain enough soil phosphate on its own. However, if phosphate is plentiful, the plant launches a massive immune response.

(Source: Crop Biotech Update, International Service for Acquisition of Agri-Biotech Applications. www.isaaa.org)



Bees Have Sophisticated 'Alarm' Systems

Bees can use sophisticated signals to warn their nestmates about the level of danger from predators attacking foragers or the nest, according to a new study. Biologists at UC San Diego and in China found that an Asian species of honey bee can produce different types of vibrational "stop signals" when attacked by giant Asian hornets. These signals have different effects depending upon type of danger and the context. A bee delivers a stop signal by giving another bee a brief, vibrational pulse, usually through a head-butt.

"Surprisingly, this signal encodes the level of danger in its vibrational frequency, its pitch, and the danger context through the duration of each pulse," said James Nieh, a professor of biology at UC San Diego who headed the research team., which was also led by Ken Tan, a professor at Xishuangbanna Tropical Botanical Garden, Chinese Academy of Science. The scientists report their discovery, which they say is the most sophisticated form of alarm signaling found in a social insect, in a paper published in last week of March 2016 in the open-access journal PLOS Biology.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily.com)

A giant Asian hornet attacks an Asian honey bee forager in China.

Photo Credit: James Nieh/UC San Diego

Believe it or not!

A hive of bees flies over 55,000 miles to bring you one pound of **honey**.

Honey bees must tap two million flowers to make one pound of honey.

Each worker **honey bee** makes 1/12th teaspoon of honey in its lifetime.

Honey bees visit 50-100 flowers during one honey collecting trip.

In one day a **honey bee** can fly 12 miles and pollinate up to 10,000 flowers.

Calorie Chart

Fresh Fruits

Food Type	Quantity	Calories (Kcals.)
Cow Milk	1 Cup	157
Beef	Approx 42 g	142
Full cook boiled eggs	One, big	79
Lamb shoulder, cooked with fat	63 g	220
Chicken leg (hip), with skin, grilled	85 g	223

Source: http://www.moh.gov.sa

Agro Tips

If you are planning to use Calcium and Sulfur Fertilizer for farming you may like to know a few things. This type of fertilizers provides necessary Calcium & Sulfur for the crops. They neutralize soil acid. As a result, other nutrients become more effective. You may apply 15-20 kg fertilizer per acre which may vary slightly based on type of soil & crops produced. You can apply it to the soil while preparing for farming or in between the growth phase of crops.

Sharing is caring!

Recycling plastic saves twice as much energy as burning it in an incinerator. But only around 27% of plastic bottles are recycled. Moreover, as plastic water bottles are shielded from sunlight in landfills, they will not decompose for thousands of years. We can hardly imagine the impact of a plastic bottle on our environment when we just randomly throw it away. Plastic bottles can become beautiful, reusable items if we can modify it smartly. Besides, it has been estimated that recycling, re-use, and composting create six to ten times as many jobs as waste incineration and landfills. Here you can see such an example of reuse in the following picture.

Try it yourself!

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