

## Use of Drones in Farming



Drones aren't new technology by any means. Now, however, thanks to robust investments and a somewhat more relaxed regulatory environment, it appears their time has arrived—especially in agriculture.

### The Usages of Drones in Agriculture:

Drone technology will give the agriculture industry a high-technology makeover, with planning and strategy based on real-time data gathering and processing. Following are some usages of Drones in Agriculture.

1. Soil and field analysis: Drones can be instrumental at the start of the crop cycle. They produce precise 3-D maps for early soil analysis, useful in planning seed planting patterns.
2. Planting: Startups have created drone-planting systems that achieve an uptake rate of 75 percent and decrease planting costs by 85 percent.
3. Crop spraying: Distance-measuring equipment—ultrasonic echoing and lasers

such as those used in the light-detection and ranging, or LiDAR, method—enables a drone to adjust altitude as the topography and geography vary, and thus avoid collisions.

4. Crop monitoring: Vast fields and low efficiency in crop monitoring together create farming's largest obstacle. Monitoring challenges are exacerbated by increasingly unpredictable weather conditions, which drive risk and field maintenance costs.
5. Irrigation: Drones with hyperspectral, multi-spectral, or thermal sensors can identify which parts of a field are dry or need improvements.
6. Health assessment: It's essential to assess crop health and spot bacterial or fungal infections on trees. By scanning a crop using both visible and near-infrared light, drone-carried devices can

**Dr. F H Ansarey**  
Managing Director & CEO  
ACI Agribusiness



identify which plants reflect different amounts of green light and NIR light.  
**Fig:** Usage of Drone in Agriculture. (Source: <https://www.technologyreview.com>)

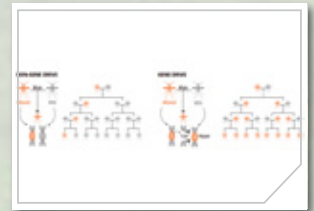
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### ACI at Fruit Tree Fair 2017



With the theme "স্বাস্থ্য পুষ্টি অর্থ চাই, দেশি ফলের গাছ লাগাই" a five-day long Fruit Tree Fair 2017 kicked off at Godagari, Rajshahi on 30 July 2017 arranged by Upazila Administration & Upazila Agricultural Extension Division (DAE), in assistance with ACI Agribusiness. The fair was inaugurated by Mr. Omor Faruk Chowdhury MP (Rajshahi-1), Chairman of the Parliamentary Standing Committee on the Ministry of Industry.

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### Study gives Insights on Shoot Growth Dynamics in Rice

Through combined high-resolution image-based phenotyping with functional mapping and genome prediction, a new research conducted at the Australia Plant Phenomics Facility (APPF) provides insights into the complex genetic architecture and molecular mechanisms underlying early shoot growth dynamics in rice.



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# Utilization of Gene Drives for Agricultural Pest Control

Insect pests have always been the main concern in agriculture. Agricultural scientists are continuously developing technology to tackle the problem based on pest behavior, chemical, mechanical and biological methods. At present either conventional synthetic chemicals are used or pest resistant transgenic crops are introduced. Even after all the measures taken 30-40% of staple crops are lost to various plant pathogens, while synthetic chemicals become a financial burden on farmers and environmental hazards due to requirements for repeated applications.

To address these economic & ecological concerns, scientists have turned towards genetic pest management in the hope of finding a non-chemical substitute for managing insect populations. The methods of popular debate now are Gene Drive coupled with gene editing by CRISPR. It utilizes the mechanism of genetic inheritance in sexually reproducing insects to contain the population. The Gene Drive method depends on the reproduction cycle and generation time period of the insect and the volume released in the population. Apart from insects, gene drives can also be used on plants which reproduce sexually, e.g. by making herbicide resistant weeds vulnerable to herbicide again.

Genetic manipulation had proven to be complicated and time consuming till the discovery and successful use of CRISPR. Many of the limitations may be addressed by cutting and modifying DNA based on a mechanism and protein for immunity in bacteria,

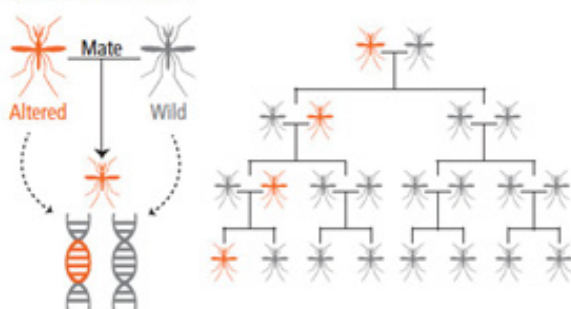
called CRISPR1/Cas. This mechanism can be used to alter genes in individuals or to construct a self-replicating gene drive system that may continue to be for multiple generations. In individual gene editing applications, the genetic changes are passed to succeeding generations via normal inheritance, without the CRISPR/Cas.

As with any emerging technology, the possibility of using engineered gene drives carries with it new concerns. The main concern is creating a new pest or of crossing over problems into other populations including that of mankind. Crossing over if at all possible would take centuries since each species has its own reproductive cycle and generation times. In regard to creating a new pest, studies can be carried out in control conditions away from their natural ecological conditions, so that even during accidental release the pest wouldn't be able to survive. For example a tropical pest being studied under controlled lab conditions in the temperate zone and vice versa.

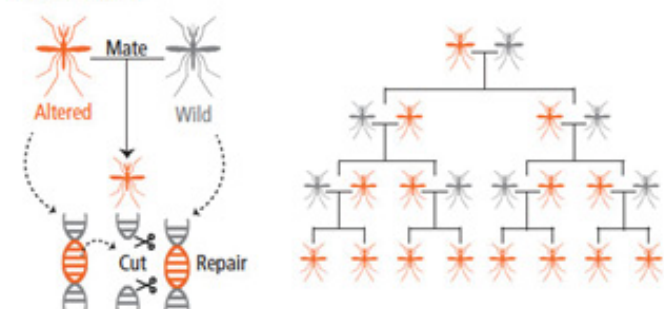
Gene Drives have become a topic of discussion among influential teams of scientists, since they have understood a mechanism which occurs naturally can now be expedited and become a powerful tool in sustainable management of ecology. *Extensive assistance of Adeeba Raihan, Senior Scientist, ASRBC, CI Ltd., is highly acknowledged.*

**Prof. Lutfur Rahman,**  
Advisor, Agribusinesses & Editor, Biolife

NON-GENE DRIVE



GENE DRIVE



## Events and Activities

### ACI at Tree Fair 2017

With the theme "স্বাস্থ্য পুষ্টি অর্থ চাই, দেশি ফলের গাছ লাগাই" a five-day long Fruit Tree Fair 2017 kicked off at Godagari, Rajshahi on 30 July 2017 arranged by Upazila Administration & Upazila Agricultural Extension Division (DAE), in assistance with ACI Agribusiness. The fair was inaugurated by Mr. Omor Faruk Chowdhury MP (Rajshahi-1), Chairman of the Parliamentary Standing Committee on the Ministry of Industry. ACI Agribusiness set a stall at the fair displaying the products and services of ACI Seed, ACI Fertilizer, Premiaflex Plastic, ACI Animal Health, and ACI Motors. Dr. F H Ansarey, MD and CEO, ACI Agribusiness along with Mr. Omor Faruk Chowdhury MP, Mr. Deb Dulal Dhali, DD, DAE Rajshahi, Mr. Taufiq Rahman, UAO and Isahaq Ali Biswas, Upazila Chairman, Godagari visited ACI stall and other stalls participating in the exhibition. Dr. Ansarey explained the motto of ACI Agribusiness to the audience and visitors as ACI provides a complete agricultural solution to the farmers. Dr. Ansarey also emphasized that if we plant fruit trees



surrounding our homestead we will get more profit from it and the society will be economically developed. Different local nurseries, Bayer Crop Science, Barind Multipurpose Development Authority (BMDA), Horticulture Centre of DAE, Agriculture Information Service (AIS) and different NGOs participated in the fair.



## Events and Activities

### Balanced Fertilizer Promo in July 2017



ACI Fertilizer participated in different Tree Fairs organized by Department of Agriculture Extension (DAE) throughout the country in July 2017. These Tree Fairs held at different places in Rajshahi, Chapai Nawabganj, Dinajpur, Comilla, Noakhali, Lakshmipur, and Habiganj. The aim of these fairs was to promote agriculture inputs and increase plantation among the farmers and other stakeholders. ACI Fertilizer participated promoted Organic Fertilizer, Micro Nutrients Fertilizer,

Compound Fertilizer and Hormone products which ensure the optimum production for farmers. The Tree Fair in Rajshahi started on 30 July 2017 in at Godaghari Upazilla Chattar. Mr. Khairul Islam, Sr. Regional Sales Manager; Mr. Abul Hasnat, Area Executive, Rajshahi; Mr. Jahidul Islam, Product Development Officer, Mr. Ashraful Alam, Project Coordinator and Local Officers of ACI Fertilizer were present in the fair.



## Events and Activities

Another 3 day-long Tree Fair was held at Sadar, Chapai Nawabgonj starting from 31 July 2017. Mr. Abdul Wadud Biswas MP inaugurated the fair. Mr. Md. Abul Hasnat, Executive Bulk, Rajshahi with his ACI Fertilizer team participated in the fair. Here, Fertilizer team promoted Organic, Compound Fertilizer specially. Besides, some special kind of products of ACI Fertilizer such as Gypsar, Bioferti, Heptazinc, Bumper Folon, Power, Sulphur 90%, Quickbor and Promoter were displayed for the clients and spectators.

Paddy, wheat, sugarcane, jute, potato, onion and vegetables are grown plenty in Dinajpur. Among fruits mango, litchi and banana are abound in the district. About 1.304 Million MT crops are produced yearly in the district. About 70% people of the district depends on agriculture for their livelihood. Keeping these in mind, a Tree Fair was arranged at Sadar, Dinajpur. The fair started on 23 July 2017 and continued for a week.



Mr. A K M Bahar Uddin Bahar MP, inaugurated the fair. Besides, Mr. Azizul Imam Chowdhury, DC of Dinajpur was present at the program. ACI Fertilizer took part in the fair and promote Organic Fertilizer, Micro Nutrients Fertilizer, Urea Saving Product - NEB and Bioferti. Mr. Rejaul Islam, Zonal Sales Manager, Rangpur, Mr. Sumon

Prodhhan, Area Executive, Dinajpur and Local Officers were present in the fair. NEB, a product of ACI Fertilizer, got special attention from the guests, as it can save 50% of the urea usage which would lead to a reduction of 25 to 30% in the total cost of urea. This means that the cost of production for farmers will decrease to a large extent.

## Events and Activities



A month-long Tree Fair started on 22 July 2017 in Comilla. Mr. Rezaul Ahsan, DC of Comilla inaugurated the fair. Md. Abdul Sobur Khan, ZSM of Comilla, Audoy Sankar Das, AE along with ACI Fertilizer team were present at the fair. There was a surprising response of Organic Fertilizer,

Bioferti and PGR Products there. Local people are highly motivated for planting trees at rooftop and in their garden.

ACI Fertilizer also participated in the tree fairs in Noakhali, Lakshmipur, Habiganj districts. The local team of ACI Fertilizer participated in these fairs.

## Organic, Gypsar & Bioferti Promotional Campaign at Rangpur

A promotional campaign on ACI Fertilizer's Organic, Gypsar and Bioferti product was arranged in Rangpur during the last week of July 2017. Mr. Md. Shahinul Islam, Sr. Area Manager, ACI Fertilizer (Rangpur) with MO, TMO and his team were present in the campaign. Through the campaign, dealers and customers were encouraged and motivated for the betterment of the business. The campaign included road show, spot farmers meeting, product prescription, and multimedia program.



## Events and Activities

### Sonalika tractor Network Partner Meeting & Demo Day

In July 2017, ACI Motors arranged Network Partner Meeting for its Sonalika Tractor stakeholders at 52 different places of the country. Through these meetings around 300 participants including commission agents, dealers, and reference customers took part in interactive sessions.

Through the events, ACI Motors collected service feedback, disseminated product information and motivated sales network for the upcoming season. ACI Motors also arranged Tractor Field Demonstration in different places throughout July 2017.





## Study gives Insights on Shoot Growth Dynamics in Rice

Through combined high-resolution image-based phenotyping with functional mapping and genome prediction, a new research conducted at the Australia Plant Phenomics Facility (APPF) provides insights into the complex genetic architecture and molecular mechanisms underlying early shoot growth dynamics in rice. The timing of developmental 'triggers' or switches that initiate tiller formation and rapid exponential growth in rice are a critical component of early vigor trait which is important in aerobic rice environments. However, the search for the switch that initiates this growth has proven challenging due to the complex genetic basis and large genotype-by-environment effect, and the difficulty in accurately measuring shoot growth for large populations.

The APPF team led by PhD student Malachy Campbell phenotyped a panel of ~360 diverse rice accessions throughout the vegetative stage (11-44 day old plants) at APPF. A mathematical equation was used to describe temporal growth trajectories of each accession. Regions of the genome that may regulate early vigor were inferred using genome-wide association (GWA) mapping. Many loci with



small effects on shoot growth trajectories were identified, indicating that many genes contribute to this trait. GWA, together with RNA sequencing identified a gibberellic acid (GA) catabolic gene, *OsGA2ox7*, which could be influencing GA levels to regulate vigor in the early tillering stage.

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

## Jackfruit seeds could potentially replace cocoa beans to make chocolates!

Chocolates are a delight for many people across the world. They play an important role in the lives of those who harbor a deep love for the yummy treats. Although enough to go around, cocoa beans which are the main source of chocolates are facing a shortage. Does that mean that chocolates won't even exist soon? Scientists say that jackfruit seeds can avoid that from happening. As per the scientists, jackfruit seeds produce chocolaty aromas and could be a potentially cheap, abundant substitute for making chocolates.

Researchers from University of Sao Paulo in Brazil found that compounds found in jackfruit seeds produce many of the same aromas as processed cocoa beans and are a potentially cheap, abundant substitute for use in chocolate manufacturing. Researchers made 27 different roasted jackfruit seed flours by acidifying or fermenting the seeds prior to drying. Using gas chromatography-mass spectrometry, the team identified several compounds from the jackfruit flours that are associated with chocolate aromas.

The chocolate aroma of groups of four flours were ranked by a sensory panel and response surface



Jackfruit flesh.

Photo Credit: : Wikipedia

methodology was used to identify optimum conditions. They asked volunteers to smell the jack fruit seed flours and describe the aromas. The team found that in contrast to the acidified flours, the fermented ones were described as having more positive attributes, such as caramel, hazelnut or fruity aromas, researchers said. Researchers concluded that jackfruit seeds are capable of producing chocolate aromas and are a potential replacement for the aroma of cocoa powder or chocolate.

(Source: Zee Media Bureau, [zeenews.india.com/health](http://zeenews.india.com/health))

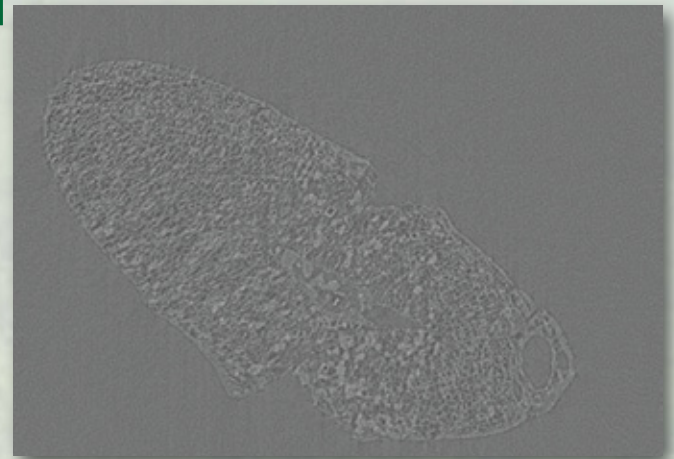
## Domestication of Seeds from 2000 BC



Scientists from UCL have used the UK's synchrotron facility, Diamond Light Source, to document for the first time the rate of evolution of seed coat thinning, a major marker of crop domestication, from archaeological remains. Writing in the journal *Scientific Reports*, the authors present evidence for seed coat thinning between 2,000 BC and 1,200 BC in the legume horse gram (*Macrotyloma uniflorum*), a bean commonly eaten in southern India.

By using the high-resolution X-ray computed tomography (HRXCT) technique on Diamond's I13-2 beam line, the researchers were able to measure for the first time the coat thickness throughout the entire seed. "Seed coat thickness is a great indicator of domestication, as thinner coats will mean faster germination of a seed when it is watered," explains Dorian Fuller, co-author on the paper. "But conventional methods of looking at the seed coat require breaking and destroying archaeological specimens."

"Being able to look at the seed coat thickness without breaking the sample is possible by other meth



This is a slice through image of horsegram seed.

ods, but you can only look at a spot on the seed," adds Charlene Murphy, co-author on the paper. "The beam line at Diamond has allowed us to look at the entire seed, and has shown considerable variation within individual specimen's seed coat thickness."

(Source: Agriculture and Food News, Science Daily, [www.sciencedaily.com](http://www.sciencedaily.com))

## Genetics at Heart of Crop Yield Limitation?



You might think that plants grow according to how much nutrition, water and sunlight they are exposed to, but new research by Dr Nick Pullen and a team from the John Innes Centre, UK shows that the plant's own genetics may be the real limiting factor. "This could have potentially big implications for the agricultural industry," says Dr Pullen, "Our model plant is in the same family as cabbages, so it's easy to imagine creating giant cabbages or growing them to the desired market size faster than at present."

It was previously assumed that plant growth was generally resource-limited, meaning that plants would only grow as large and fast as they could photosynthesise. However, Dr Pullen and his team present evidence that plant growth is actually "sink-limited," meaning that genetic regulation and cell division rates have a much bigger role in



Comparison of growth differences in wild-type (left) and growth-repressor mutant (right) Arabidopsis plants.

Photo Credit : Dr Nick Pullen

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controlling plant growth than previously thought: "We are proposing that plant growth is not physically limited by Net Primary Productivity (NPP) or the environment, but instead is limited genetically in response to these signals to ensure they do not become limiting."

By genetically altering the growth repressors in Arabidopsis, Dr Pullen and his team were able to create mutant strains. They identified the metabolic rates of the different plant strains by measuring

rates of photosynthesis and respiration, as well as comparing the size and weight of the plants to monitor differences in physical growth. Dr Pullen and the team also grew the mutant plant strains at different temperatures to see if this changed their results: "When grown at different temperatures we still find a difference in size of our plants between wildtype and the mutants. This suggests our results should be applicable in different climates."

(Source: Agriculture and Food News, Science Daily. [www.sciencedaily.com](http://www.sciencedaily.com))

## Use of Wastewater to Irrigate Agriculture Vast

Crops downstream is 50 percent more widespread than previously thought, according to a new study published this week in the journal Environmental Research Letters. The study relies on advanced modeling methods to provide the first truly comprehensive estimate of the global extent to which farmers use urban wastewater on irrigated cropland. Researchers analyzed data with geographic information systems (GIS) rather than depending on case study results, as in previous studies.

The researchers also assessed for the first time 'indirect reuse', which occurs when wastewater gets diluted but still remains a dominant component of surface water flows. Such situations account for the majority of agricultural water reuse worldwide, but have been difficult to quantify on a global level due to different views of what constitutes diluted wastewater versus polluted water. Considering consumer safety the foremost priority, study authors highlight the need to mitigate public health risks through measures taken along the entire food supply chain. This includes improved wastewater treatment, but also preventive steps on farms and in food handling,



Aerial view of sewage water treatment plant. (Stock image)  
Photo Credit: josefkubes / Fotolia

since capacity for water treatment is increasing only slowly in developing countries.

(Source: Agriculture and Daily. [www.sciencedaily.com](http://www.sciencedaily.com) Food News, Science)

## Promising Peas' Potential in Big Sky Country

Farmers in Montana, and other parts of the Northern Great Plains, are shifting from cereal monocropping to a cereal-dry pea cropping system. This transition is not without its share of unknowns, however. Yield and performance of pea crops depend on both their genetics and the environment. Environmental factors such as temperature and rainfall

can vary greatly. Farmers in different parts of the Plains need to know which varieties of pea will do well in the area they are farming.

Chengci Chen of Montana State University is working to generate that information. He has been studying how pea genetics interact with the environment

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to affect crop yields, and pea protein and starch content. "Ultimately, I hope to be able to recommend which pea varieties to cultivate to growers in various environments," says Chen. To do that, Chen and his colleagues tested how nine different varieties of pea performed when grown in five locations across Montana. These locations were spread across the state and had different soils and climatic conditions.

Chen examined yield and protein and starch content of the different pea varieties. "These are characteristics that are important to growers and end users," he says. Pea varieties that have higher yield can bring more profits to producers. Varieties that have higher protein or starch contents interest different end users. For example, "dry yellow peas are fractionated into protein, starch, and fiber. These components are widely used in food ingredients, especially by health-food businesses," Chen explains. "The market for pea protein is growing rapidly because it is non-dairy and allergen-friendly."

(Source: Agriculture and Daily. [www.sciencedaily.com](http://www.sciencedaily.com) Food News, Science)



Finding the best pea variety to grow, specific to the site, is part of Chen's mission.

Photo Credit : Agricultural Research Center Central

## Bangladesh Ag Leaders Keen to Adopt Biotech Cotton

Bangladesh, the first country to plant biotech eggplant, is ready to adopt biotech cotton. This was expressed by the research and development leaders of the country during the seminar launch of ISAAA's Global Status of Commercialized Biotech/GM Crops for 2016, held on July 9, 2017 at the Bangladesh Agricultural Research Council (BARC) in Dhaka.

Chief Guest Additional Secretary of Agriculture Ministry Fazley Wahid Khandoker and heads of various government institutions expressed their appreciation to ISAAA for the valuable information provided by Dr. Rhodora R. Aldemita and Mr. Bhagirath Choudhary on the status, impact, and prospects of agri-biotechnology in 2016. Reactions imparted by panelists focused on the country's success in Bt brinjal adoption in the past three years, developments on the Golden Rice and late blight potato projects and more notably, the immediate interest in adopting biotech cotton.

Executive Director Dr. Farid Uddin of the Cotton Development Board opined that Bangladesh has been importing up to 6 million bales of cotton



annually and planting biotech cotton in the country is the best solution to save the valuable monetary resources. He also added that logistical support for testing Bt cotton varieties will be put in place to expedite possible adoption. Consumers and farmers in Bangladesh are looking forward to the benefits of Bt cotton planting being experienced by neighboring Bt cotton countries, India and China.

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Around 75 heads and members of the government's agricultural R&D sector, regulators, and media attended the event. The seminar was organized by BARC with Executive Chairman Dr. Mohammad

Jalal Uddin and Dr. Mustafizur Rahman as chair and moderator, respectively.

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

## Heat Tolerant Lentils endure Increasing Global Temperatures

A global team of experts discovered the key traits in lentils that will enable the important grain legume to tolerate rising temperatures. Scientists from the University of Western Australia, Panjab University, Indian Council of Agriculture Research (ICAR) - Indian Institute of Pulse Research, Punjab Agricultural University, and International Center for Agricultural Research in the Dry Areas (ICARDA) screened a number of lentil genotypes in the field and lab to search for heat tolerant traits and the key mechanisms involved in the tolerance. They exposed the lentil genotypes to heat stress during the crucial stage of reproduction, which led them to five genotypes showing heat tolerance and another five with heat sensitivity. The heat tolerant genotypes showed significantly higher germination, pollen viability, stigma function, ovule viability, and pollen tube growth as well as higher sucrose production



compared with the heat sensitive genotypes.

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



### Believe it or not!



- The jackfruit tree originated from South Asia. Being a tropical plant, it thrives in areas where temperatures are warm and moisture is abundant.
- The number of seeds that can be found in a jackfruit range from 100 to 500.
- In a single year, the jackfruit tree can produce as many as two hundred fifty fruits.
- The jackfruit's flesh is very sweet and aromatic, having been described as having the flavor combination of mango, banana, melon and papaya.
- Jackfruit is made up 80% of water.



### Nutrition Chart

Jackfruit (100 grams)	
Calories	95
Sugar	19 g
Total Fat	0.6 g
Protein	1.7 g
Potassium	448 mg
Sodium	2 mg
Dietary fiber	1.5 g

Source: USDA

## Agro Tips

Jackfruit is a great source of nutrition:

- Jackfruit is one of the rare fruits that is rich in B-complex group of vitamins containing good amounts of vitamin B6 (pyridoxine), niacin, riboflavin, and folic acid.
- Jackfruit is also a good source of potassium, magnesium, manganese, and iron.
- Jackfruit contains calcium, which strengthens and promotes healthy bone.
- Jackfruit is a good source of antioxidant vitamin-C, which helps the body develop resistance against infectious agents and harmful free radicals produced due to oxidative stress in the body damaging the DNA of cell and initiating production of cancer cell.
- Jackfruit is rich in vitamins, Copper, Manganese and Magnesium that are required for blood formation.

### Sharing is caring!

The jackfruit has been traditionally used for various medicinal purposes. The ash of jackfruit leaves, burned with corn and coconut shells, is either used alone or mixed with coconut oil to heal ulcers. The dried latex when mixed with vinegar, also promotes healing of abscesses, snakebite and glandular swellings. The liquid extracted from boiling the root is said to control asthma and treat skin diseases. The root is sometimes roasted, ground, boiled and turned into a tonic to control diarrhoea. Heated leaves are placed on wounds to control swelling. It is also believed that the jackwood has a sedative property and that its pith can cause abortion.



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*Creating Wealth for Farmers*

ACI Agribusinesses, the leading agriculture integrator in Bangladesh, is dedicated to gaining prosperity of Bangladesh through food security. ACI Agribusinesses offers complete solutions to farmers and also educates them about the technical know-how.