

Way to Green Revolution

KRISHIKOLPO

IAAS BANGLADESH

**November
2020**



"Farming is a profession of hope." — Brett Brian



Think Globally Act Locally

LET'S LINK UP

Agriculture with Science



Dear MAJEST!

LINKUP comes from a combination of the two well-known words **LINK** (agriculture) and **UP** (Thought). Our dream is to activate **LINK**, **LINKUP** through agricultural revolution, we need to establish a common understanding among farmers, scientists as well as students of agriculture and allied sciences. Let's explore (Engage) Agriculture with **LINKUP**

Best regards,

Plabon Saha

Vice President of Communication

LAA&WORLD-2020/21

Special Thanks

To

Feroza Begum Yasmin

Vice President of Communication

LAA&WORLD

Editorial Team

Rifat Tasnia Ahmed

Tarjin Robin

Md. Faruk Hossain

Sujit Mondal

Editor in Chief

Plabon Saha

We are grateful to

LAA&WORLD ENR-2020/21

IAAS Bangladesh



Briefly we are presenting

1. No. of Connected University: 20
2. No. of Local Committee: 03
3. No. of ongoing Local Committee: 08
4. No. of Programs: (Oct'19-June'20): 26
5. No. of Connected University: 20
6. No. of Registered Members: 887
7. Facebook Group Members: 1800+
8. No. of Adviser: 08 (Good Academician, PhD and Post Doc holders and Good Researchers)
9. Future Projection (at the end'20): 10 Local Committee & 1000++ (AKI) Bangladesh Members all around the countries

IAAS Bangladesh: List of activities for 2019-2020

1. Expanding local committees into different universities
2. Established IAAS Agri School
3. IAAS Bangladesh Virtual Library Preparation
4. 21MM Communicating Science
5. Workshop "Hands on different Agricultural practices and Managements"
6. Agri-debate-Championship 2020
7. Biodiversity Conservation Campaigning: 2000 Tree-Plantation Program
8. Bioentrepreneur workshop
9. National Quiz Competition and Essay writing
10. Expanding local committees into different universities
11. A Seminar on sustainable development through Food security
12. Regional Agricultural Summit
13. IAAS Nutrition Program on schools
14. Workshop on Data collection and Agricultural Research Methodology
15. IAAS Bangladesh Summer/winter School
16. National Youth in Agricultural-Carnival (NYAC-2020)
17. IAAS Exchange program between different countries
18. Study tour, visit different fields and research organisation
19. IAAS Bangladesh 1st National Congress
20. Workshop on CV and Motivation Letter Writing
21. Workshop to Ameliorate practice on mushrooms cultivation

IAAS Bangladesh Executive Board 2024/2025



National Director

Nazma Akter, BSc.

Contact Number: 01711 001111

Email: nazma@iaasbangladesh.org

VP of Exchange

Muhammad Ali

Contact Number: 01711 001111

Email: muhammadali@iaasbangladesh.org



VP of Finance

Farah Farah

Contact Number: 01711 001111

Email: farah@iaasbangladesh.org

VP of Communication

Muhammad Ishaq

Contact Number: 01711 001111

Email: muhammadishaq@iaasbangladesh.org



VP of External Relations

Md. Anwarul Karim

Contact Number: 01711 001111

Email: anwarul@iaasbangladesh.org

IAAS Bangladesh Control Board

2023-2024



Head of Control Board

Prof. Momen Hossain

Contact Number: 011779812345

Email: momenhossain@bau.edu.bd



Membership Officer

Dr. Momen Hossain

Contact Number: 011779812345

Email: momenhossain@bau.edu.bd



Research and Program Development Officer

Dr. Momen Hossain

Contact Number: 011779812345

Email: momenhossain@bau.edu.bd





INTERNATIONAL ASSOCIATION OF STUDENTS IN AGRICULTURE & RELATED SCIENCES

2022-2023 Academic
Year

2022-2023 Academic
Year

2022-2023 Academic
Year

Year	2022-2023 Academic Year	2022-2023 Academic Year
2022-2023 Academic Year	2022-2023 Academic Year	2022-2023 Academic Year
2022-2023 Academic Year	2022-2023 Academic Year	2022-2023 Academic Year
2022-2023 Academic Year	2022-2023 Academic Year	2022-2023 Academic Year
2022-2023 Academic Year	2022-2023 Academic Year	2022-2023 Academic Year
2022-2023 Academic Year	2022-2023 Academic Year	2022-2023 Academic Year

ALTERNATIVE TO FORMALIN?

Faizul Kader Apon

B.Sc. in Food and Process Engineering

Level-3, Semester-3, HSTU

Food adulteration has been a major health issue in recent times due to harmful preservatives such as formalin. Extensive use of formalin in fish, fruits and other food products risks to public health. The chemicals that are commonly used for preservative decomposition of nutrients are now being used to make food items, artificial and preservatives. Unfortunately people are not aware of this and they are eating food mixed with formalin which is harming their health. Despite law enforcement initiatives, food is still being adulterated and people are facing loss of life and health.

Recently in Dinajpur, a team of researchers from Hajee Mohammad Danesh Science and Technology University (HSTU) has succeeded in using Chinese solution instead of toxic pesticides in fish production under the supervision of Prof. Dr. Masud Ahmed [1]. Likhi (Likhi shikam) is a popular fruit in Southern India. Dinajpur district in the north-west part of Bangladesh is the top in terms of fish production. This Chinese solution was used experimentally in fish for the very first time in fish production. Without using any fertilizers and pesticides or growth hormones, the use of Chinese has increased the yield, the size and the numbers also. After application on mango and pineapple, this time the use of Chinese solution in fish production has been successful. After the invention of this liquid which made from shrimp shell, Bangladeshi inventor Dr. Md. Masud Ahmed Khan [2] got success in crop production and food preservation.

The use of Chinese solutions in various applications is nothing new. However, the specialty of this liquid invented in Bangladesh is that it does not contain any harmful chemicals. Since it made from discarded shells of shrimp, the production cost is also minimal. Generally, it can be found 1 kg of Chinese from 1-1.5 kg of waste (discarded shells). Attempts are being made to use this locally invented liquid as an alternative to formalin in vegetable fruit fish preservation. Dr. Masud Ahmed, the supervising professor has said that, "Initially we had success using this solution on fish bones. Since Chinese is made from natural ingredients, it does not contain any harmful particle for the environment. That's environmentally that maintains the quality of the fruit and is cheaper than the pesticides available in the market. In addition, the attack of insects and pests can be said to be non-existent." According to him, the way in which the use of

productivity in food crops is increasing at present pace, agricultural is human life. He is trying to do something alternative from that thought. The initial success with the use of Chitosan is expected to lead to a new revolution in agriculture.

In this regard, Dr. Mahabul Hasan said, "The use of Chitosan has reduced production costs considerably. 'We have already reached the point.' Basically, it needs to extract from shrimp shells, which can be converted into Gamma radiation energy and used as a preservative. Research on a variety of fruits, vegetables, and fish on a small scale in the laboratory has already yielded very promising results. The laboratory is currently testing the effectiveness of a large-scale fermented natural food preservative. The fermented method is very cost-effective and may be used. If the fermented natural food preservative is used commercially, there will be no need to use toxic formalin any more. As a result, it will be possible to cross a milestone in ensuring safe food."



Figure 3: Chitosan powder extracted from shrimp shell

Chitosan uses in food: The Safety Issue

Chitosan is a natural ingredient in Bangladesh which is mainly extracted from shrimp shells. It can also be extracted from fungi, crabs and turtles. Its chemical structure is very similar to the structure of cellulose. According to the Australian New Zealand Food Standard, taking 3.0 grams of Chitosan daily does not cause any adverse reactions. On the other hand, if you consume 100g of orange juice containing Chitosan, it will take a maximum of 0.01 g of chitosan, which is much less than the safe acceptable level.



Figure 2: The chitin and chitosan chemical and biological processes.

How does chitosan work:

Chitosan does not work directly against insects. However, it prevents insects from being attracted to fruits and vegetables. Moreover, according to the researchers, its application significantly reduces the incidence of larvae from insect eggs. Many people have allergic side effects to shrimp, which can lead to severe conditions. But even though it is actually made from shrimp shell, the Chitosan solution produced as a result of processing which is completely different product that means it has no side effects.

Health risks of using radiation technology:

In this process, radiation technology has been used which has no problem. As a result, this radiation has prepared with radiation technology is completely safe for use in food. In the developed world, food is being preserved through the use of radiation technology and Chitosan. However, due to the high price of Chitosan in the developed world, it's use has not yet begun effectively. In Bangladesh, it is possible to produce it at low cost due to easy availability of raw material for production such as shrimp shell and use of indigenous technology. If produced commercially, only 0-2 BDT amount of Chitosan will be enough for store 1 kg of mango / kiwi. According to the Government Innovation Unit, the process of commercial production is underway. It is hoped that the Chitosan will be readily available in the market in a few days. However, if you want to use it experimentally you can contact the Bangladesh Atomic Energy Commission.

Links

[1] Prof. Dr. Masud Rana

Dean, Faculty of Engineering and

Chairman, Department of Food Processing and Preservation

Hajee Mohammad Danesh Science and Technology University (HSTU)

[2] Dr. Mahabubul Hasan Khan

Chief Scientific Officer and Director-General of Bangladesh Atomic Energy Commission.

Scientific Advisor of Bangladesh Jute Mills Corporation (BJMC), Ministry of Jute and Textiles,
Bangladesh

Sources:

1. Chitin and chitosan: Properties and applications. ScienceDirect (Progress in Polymer Science) Volume 21, Issue 7, July 2004, Pages 653-632 (<https://www.sciencedirect.com/science/article/pii/S0079670004000100>)
2. Article by Dr. Mahabubul Hasan Khan, <http://www.challenge.gov.bd/projects/123>
3. Newsby Channel 24 TV, <https://youtu.be/hw5MCT8T8ss>

BLACKBERRY PULP EXTRACTOR

Subrato Pandit

B.Tech. in Mechanical Process Engineering

Hajee Mohammad Danesh Science and Technology University, Chittagong

Blackberry fruit or Black pulp (*Spygium nigrum*) is native fruit to the southeast Asia. The annual production of Blackberry was approximately 5 L200 metric tons in Bangla desh from 286 acres land in year 2002-2014 (BBS, 2016). This fruit is so perishable that it is decomposed at 2 to 3 days after harvesting. So the big challenge is keep this fruit until it is or produce other product of Blackberry (like juice, jam, jelly) and so on.

As a food engineering student it's my duty to keep our foods safe and sound until our consumption. Innovation and modernize the food related instruments is also apart of it.

The Blackberry pulp extractor is a kind of machine that automatically separate the Blackberry pulp is used at home industrially. It is initially made for the industrial production. The capacity of the machine is 60 kg of fruits per hour (it can be increased) and output the desired yield more than 70-75%.

Final fabrication and final grading/development work is finished. Materials used grade - 300 material was used which makes it out of minimal health hazards during pulp extraction process. Safety measures is also determined for the workers.

Costing : The total costing of the full unit takes around \$1160 (seven hundred and fifty dollars)



IMPACTS OF COVID-19 ON AGRICULTURE

Tadisa Tadele

Level-II, semester-II

Faculty of Agriculture

Adigrift Agricultural University

Covid-19, originated in Wuhan, China, was declared as a pandemic by WHO. It is currently the biggest issue of the whole world. It is impossible to imagine that the whole world will be shut down just because of an invisible parasite in this advanced era. Covid-19 has severe impact on every sector. Impact of Covid-19 in agriculture has shown us some facts that we haven't experienced before. Some major impacts of Covid-19 are given below:

- Transportation problems due to lockdown is a serious issue. Agricultural goods are difficult to transfer from one region to another due to the unavailability of transport.

- Unavailability of migrant labor is also interrupting harvest activities. Moreover, transplantation of rice is also time are hampered because of this.

- Farmers aren't getting proper price for their goods. On the other hand, people have to buy products in more price than usual.

- Economic system is badly disturbed. People working in agriculture based companies are losing jobs. Serious unemployment problems and lack of workers have arisen at the same time.

- Young entrepreneurs in agricultural sector who started their business just before the lockdown are facing great threats. They don't have much savings for running their business, and on the other side their business are not running well.

- Most of the tea stalls and restaurants are closed. Tea depressing milk sales are going on this days.

- Cakes, shrimps, fishes are facing export issue.

- Minerals and chemicals as an input of Covid-19. Poultry farmers are in huge loss because of this.

■

These are the most crucial problems nowadays. But the best way to address these problems is to use social safety nets extensively to stabilize our lives with food and cash.

MONEY FROM HOME WASTE TO HOME

Ferdousi Akter Hishu

Department of Environmental Science and Resource Management
Mawlana Bhashani Science and Technology University

Entrepreneurship doesn't require any age restriction. It tends to be triggered by any aging or any professional people at any point of time. It's an gateway for sustainability. Give a man a fish, you feed him a meal; teach a man fishing, you feed the whole village. In Bangladesh, about 10% of the population is below the age of 30 with 100 thousand fresh graduates entering the market each year (Bangladesh ICT Industry Development Strategy - ICT). Where there are many unemployed entrepreneurs in our society where she is not only getting a profit but also for taking a time to change our society's underdeveloped rules and to a new revolution that suits for our people as well as our planet. Recently Bangladesh has launched the 'Startup' program to mentor the young entrepreneurs with their enthusiasm and innovative ideas that make an opportunity to attract large investors on funding their business. We always believe that young generations are the next rulers of our world. Besides, doing any development the developer should keep in mind for a sustainable development.

I am a university student in the Environmental Science department. Being an Environmental Science department student whenever any ideas related to entrepreneurship grow in my mind are regarding a change or development of our environment. A few days ago I work with my art professor about waste management. There I learned how to properly manage the kitchen waste and make them as a resource. After a while, another idea came into my mind with the best way of entrepreneurship to deal with these kitchen waste.

Science has managed to bring the large world in our hands through digitalization. Nowadays our businesses have been expanded with the internet world. A new world known e-commerce through Facebook, apps, websites have made a revolutionary change with an easy and less time expanding way. Covid-19 has taught us the virtual world in a very short time. Just think of a Covid-19 time without the internet! It would not be possible without the internet and the consequences might be so millions. Before COVID-19 some people used to think that e-commerce is not real or they somehow didn't want to use this for some legal or payment method or about the quality of products. But now the pandemic has pointed out that without e-commerce our

useful in difficult weather in an emergency. Millions of people around the world are now relying on e-commerce and finding their way through the change their behavior to opt for more time saving and convenience puts a considerable strain on e-commerce and online retailers. Today, U.S. retailers' online year-over-year (YoY) revenue growth is up 48% as of mid-April, surpassing an earlier peak of 49% in early January (Forbes). The new peak has been gotten by e-commerce for a month, but who knows about it in January. For my business, at first, I will start to work in my area. I will have a website work on. From every house or restaurant, my team will collect organic kitchen waste and take it to our storage place. We will process it to make organic fertilizer. After making fertilizer we will sell it to the people and also increase the awareness of using organic fertilizer as well as how to stop the use of chemical fertilizers with advertisements via the Internet, posters, etc. For my work the second thing, I need the help of the Internet. I will make an app. I will have my website condition for maintenance. Everything will be done by the app and this is the first part of my plan. A plan like the other of waste will continue as through the app and we will reach their place to collect the waste exchange of money. Then after a time, we will make more facilities in different areas we will continuously do it and will build the company larger and at a time I dream to reach a beautiful country without any waste of our waste, drains, and chemical fertilizer from agriculture that may be rooftop agriculture or land agriculture. My idea will spread the whole country.



Fig. The plan of money from house waste.

FARMERS' STORY

Anamika Deb

Faculty of Biotechnology and Genetic Engineering

Level-04, Semester-02

Hydrex Agricultural University

1. Introduction

Bangladesh is abundant with many rivers, fruitful trees and farms. Besides this, she is flowing with milk and honey. All of these blessings are achieved through the hard work of farmers who are the backbone of this nation because in agriculture sector, the contribution of farmers is indispensable. The persons who are occupied with agriculture and earn their livelihood from agriculture are known as farmers. Through the diligent activities of farmers, production in this sector is increasing day by day and agriculture has become the backbone of economy in Bangladesh. The performance of this sector has an overwhelming impact on major macroeconomic objectives like poverty alleviation, human resource development, food security etc. All of these achievements are possible to be gained by the sincere and graceful activities of farmers. Otherwise it would not be possible for this country to keep pace with economic development of the world.

2. Classification of farmer

The men who cultivate lands are known as farmers and they meet up the basic need of survival of human being. A National Agricultural Census report has said that about 14.8 million farmer families live in Bangladesh. The report also highlighted the fact that there were four million landless farmers, with near 4.8 million farmers cultivating other people's land. In our country, farmers are being categorized into three classes such as rich farmers, middle class farmers with small pieces of land and small holders or landless farmers. The rich farmers have enough lands and get sufficient amount of crops to fulfill their demands. But the landless farmers are worst off farmers. They don't have their own land properly and so they hardly can grow much food to earn on their livelihood.

3. Life style of farmers in Bangladesh

Farmers of our country mostly live in villages and farming is their main occupation. They work very hard to cultivate crops such as rice, jute, vegetables, fruits, etc. They work from morning to evening for their small earning. They work in the field from dawn to dusk. Sometimes they have to work under the burning sun and in the rain. The farmers who use to cultivate other people's land suffer most. Though they try hard and hard to give their best performance in the owner's field, in the end they don't get much benefits as most of the crops are taken by the landlords. For the farmers' growing and reaping (the harvest) are a hard work. By working hard in the field, they grow a bumper crop which helps develop our national economy. Farmers don't get enough time and chance for recreation purpose. In the evening after finishing their work, they gather in a tea stall and gossip with one another on various topics. Thus they pass their short leisure period.



Figure: Standing face of a farmer in his land filled with crops.

Source: <https://highlightofthechanginglandscapeofagricultureandagricultureinbangladesh>

Farmers always lead simple life. The living standard of them is very low. They also suffer from the lack of fundamental needs of life. On the other hand, most of the farmers are ignorant of the light of modern science. They don't get proper educational facilities and so they are reluctant of adopting a healthy lifestyle. As a result, they suffer from various types of diseases. Due to lack of money, they also can't get proper treatment. Besides, they follow traditional methods to cultivate crops. Most of the time they use bullocks and plough to prepare land, which is time consuming and troublesome too. They don't afford to hire tractor in this case. Moreover, farmers have to take loan from the landlords to buy seeds, fertilizers and other necessary things. After a specific period of time, they have to

pay the installments of debt. So if they fail to produce enough crops, then they have to face a greater loss. Both the pleasure and pain of farmers depend on the mercy of nature. If they get many crops, their joys know no bounds. On the other hand, if the crops are not good, their sorrows know no bounds too.

Bangladesh is known as the land of culture, tradition, festival and beauty. The people of this country celebrate different kinds of festivals all over the year. 'Makar Sankranti' is one of the popular cultural and traditional festivals in our country. This festival is also known as 'New Harvest Festival'. After cutting crops, farmers arrange this festival. The Bangali term, 'Makar Sankranti' means 'New Year' or 'New Crop'. Farmers celebrate this festival with joys and hopes. On this day, scores of farmers cook delicious foods such as different types of cakes, sweets and so on. They wear traditional dresses and enjoy this day with music and dance. Though being busy and stressed in life, farmers of Bangladesh find their livelihood.

4. Challenges faced by Bangladeshi farmers

Our farmers have to cope with some challenges in their job. Among them, some of the major problems are mentioned below:

- **Lack of fertile land:** Due to some factors such as urbanisation, human settlement, building of infrastructure, etc. massive cultivable lands of Bangladesh have been reduced. So farmers can't find out appropriate lands to produce more crops.

- **Demand of weather:** Flood, drought, cyclone, and salinity are common situations of our country. As a result soil fertility, crop productivity are being damaged seriously. Most of our farmers don't know proper techniques to cope with this problem.

- **Inappropriate use of fertiliser:** As most of the farmers hardly receive training on farming system, they don't know the ratio of fertiliser to be used in lands. So crop productivity is hampered.

- **Lack of quality seeds:** Farmers don't get qualitative seeds and seedlings with good results from the seeds.

- **Lack of education:** Most of the farmers of our country are illiterate and this is the largest cause of their sorrows. Being illiterate, they don't have proper knowledge to utilise better the methods of cultivation and thus they are lagging behind day by day.

- **Inadequate credit support for farmers:** About 80% farmers of Bangladesh are small and marginal. So they have to face financial problems and thus cannot afford high cost for all of the activities.

All of these above mentioned limitations can be mitigated by taking proper initiatives by government and NGOs. To ensure production sustainability and food security, solution of the challenges have to be found out.

3. Conclusion

Farmers form the pillar of economy of our country. Without farmers, it would not possible to fill up the basic need of human being. To keep economic condition of our country in a stable position, the contribution of a farmer is so essential. So it is the responsibility of whole nation to help farmers to make life without any sorrow and pain.

4. References

- ThakuramHimali. Tapen Kar. Archived from the original on 30 April 2024.
Hameed Huda et. al. 2024. National Seed Management. Agricultural Employees Conference and Technology Fair Ministry of Agriculture.
J. Karim. IFPRI. Accelerated Agricultural Growth in Bangladesh. Seminar on Agricultural Research and Development in Bangladesh. IARRC.



Mid Moinin Sarkar

Dean of Bangla Agricultural University

Newspapers or media are the mirror of the country. Journalists cover various issues, research, innovation, investigation news.

Better use of journalism, agricultural journalism is a little different thing. Experienced in agriculture can better understand the topics of agricultural research. Lack of adequate understanding in agriculture often leads to misinformation or misrepresentation of key issues and misinformation creates misconceptions among the public.

Journalists have to play a role in the expansion of agricultural technology in agriculture-dependent Bangladesh. We know that news spreads fast, so it affects people fast. The media can play an important role in encouraging the public on various issues including the use of new agricultural technologies and agri-entrepreneurs. In this case, to present the information properly in journalism, it is necessary to give priority to those who are experienced in agriculture, and to make quality agricultural journalists, we need to keep in mind there should be ability of course regarding agricultural journalism.



EARTHWORM: THE NEGLECTED ASSET

Md. Asaduzzaman Nur

**Asst. Station and Environment Discipline
Khulna University, Khulna-9202**

While nature works slowly to produce topsoil for centuries, human beings are depleting this valuable resource through poor agricultural practices within an individual lifetime. In absence of soil animals, it takes 500 to 1000 years to produce an inch of topsoil but under favourable condition, earthworms can speed up this process to only five years (Mikolaj, 1944; Hyman, 1952). Before the invention of agricultural implements, earthworms ploughed the soil, mixing, tilting and building topsoil as they moved through the earth. The importance of earthworms has been clearly recognized in the nearly 3000 years. In the fourth century B.C., Aristotle referred the earthworms as 'The tillers of the Earth'. But how much we know about these animals? The following discussion will help us in understanding earthworms, their benefits, life and uses.



Where are earthworms found?

Comparatively few people realize that the 'common' earthworms of which the land knows species, but not always the commonest, is called Lumbricus terrestris by biologists. Earthworms are most numerous in grassland and mud soils, relatively rare in arid soils, and intermediate and variable in numbers in arable lands. Other factors such as soil texture, moisture, temperature, food supply etc., whether a field has more earthworms than one on a neighbouring farm. Earthworms populations not only vary from one soil to another, but also throughout the year. There are many species of earthworms and each has different tolerance for soil conditions. Some species are only found within the topsoil layer, where others such as Lumbricus may be able to penetrate several feet in the subsoil horizon. Cultivation of the soil may enable earthworms to penetrate further into the soil.

How do earthworms influence soil fertility?

The earthworms were introduced accidentally to North America and it may be the best evidence of contact between the early settler and native peoples. The activity of earthworms is most easily observed by comparison with the situation in regions where they are absent; the decomposition of organic matter there is slow, such that the layers of litter accumulate on the soil surface as fast as they are incorporated into the soil. Here particularly the activity of earthworms is important if the agricultural is four respects as follows:

- Improve soil structure
- Mix and till the soil
- Aid in humus formation
- Increase the availability of plant nutrients

Basically earthworms play an important role in shaping soil structure, cycling nutrients and are considered as ecosystem engineers. Therefore, in addition to shaping soil structure, earthworms also have an important impact on soil organic matter dynamics and microorganisms in their gut, casts and rhizosphere, have capability to maintain the soil fertility and sustainability, also known as farmers' friend, ploughman of the field, indicators of the Earth and biological indicators. Secretion in earthworms facilitates around soil particles together into aggregates which aid in erosion control. Humans, through agricultural operations, such as cultivation, may temporarily improve soil structure but the earthworms has longer term effects in maintaining soil till.

Foraging through the earth, earthworms consume large quantities of soil and fresh or partially decomposed organic matter from the soil surface, deposit it as faeces, usually in the lower soil horizons. Likewise, soil from the subsoil horizons, is moved by these animals to the upper level where it is mixed with the surface soil, resulting in a more uniform distribution of plant nutrients. The famous naturalist Charles Darwin (1881) estimated that 25.4 tons of materials are brought to the soil surface of each acre by earthworms (or approximately 15 tons/ha).

From initial burial to the subsequent decomposition of organic matter, earthworms are important for their ingestion. If any soil organic matters may consumed by earthworms than all other soil animals together. This material is excreted as casts, concentrating nutrients and rendering them more water-soluble and available to plants in the long run. Researchers have found that, the worm casts are generally enriched in exchangeable calcium, potassium and phosphorus than the surrounding soils and also are valuable sources of nitrogen. The earthworms accelerated the efficiency of leaching by bringing soil nutrients to the upper horizons from the subsoil, whereby many nutrients are washed from the soil core and consequently performed as available to plants.

How do agricultural activities affect earthworms?

Earthworms are a measure of soil fertility and indicators of soil management practices. Therefore, for our benefit, the use of earthworms not only upon a knowledge of their activities but also upon an awareness of how our own activities, in particular agricultural practices may influence their distribution. Their population may be increased or decreased by the following agricultural practices:

- Cultivation
- Cropping
- Fertilisers
- Pesticides

As mentioned above, earthworms are more numerous in grasslands than in arable lands. Research indicates that earthworm populations do not decline from mechanical damage during tillage operations rather than reduction in the organic matter content of the soil. Liming generally increases earthworm populations and, in poor soils, nitrogen fertilisers may also benefit them indirectly. Most other mineral fertilisers have little effect on earthworm numbers, while organic matter such as manure, crop residues, or mulches favour earthworm multiplication by providing them with a source of food.

Many (though not all) of the insecticides, herbicides, and fungicides that are used in agricultural ponds are toxic to earthworms and may conflict with the natural biological control of pests. For example, to control apple scale caused by the fungus *Venturia longalis* which overwinters on fallen leaves and twigs, earthworms play an important role. Apple scale may be culturally controlled by burning these disease-carrying materials in the fall or it may be chemically prevented through the use of copper-sulphate, which is also toxic to earthworms. A less expensive, but equally effective method of controlling apple scale, however, is the introduction of earthworms, preferably *Lumbricus terrestris*, into orchard soils. Fallen leaves and twigs are taken by animals into their burrows where the vegetation naturally decomposes and serves to be a source of disease. The earthworms can remove up to 80% of leaf-fall in orchards (Rau, 1962). Some pesticides are lethal to earthworms include arsenic and its copper compounds, dithionates, methylmercuride, heptachlor, carbamate insecticides etc. (Richards and Laffy, 1972). These chemicals are concentrated in their bodies and may be lethal to birds and mammals when they are eaten.

How many earthworms be used to increase soil fertility?

Considering the use of earthworms to improve soil fertility, it is important to remember that these animals thrive only under certain conditions. Most of them are unable to survive in sandy, dry, acid soils and all need organic matter for food. Species that are the easiest to cultivate, i.e., those grown on compost or manure piles, are usually not suitable for introduction of arable lands.

Conclusions

Whether we're fully fledged farmers or back-patch gardeners, it must be remembered that earthworms are not the solution to infertile soils and poor management. If we want to improve soils through the use of earthworms, we must provide them with sufficient food and moisture. Only by this, we may profit from their activities as ploughmen and builders of the soils.

References

- Croft, G. B. 1969. Earthworms a profitable investment. *N.Z.J. Agric.* 12(2): 88-91.
- Darwin, C. 1881 (1941 reprint). Darwin on humus and the earthworms: the formation of vegetable mould through the action of worms with observations on their habits, 113 pp. Falmer & Falmer, London.
- Edwards, C. A. and J. R. Lofty. 1973. Biology of earthworms. 383 pp. Chapman and Hall Ltd, London.
- Gadden, R. E., Jr. and G. E. Douglas. 1978. Earthworms for ecology and profit. Vol. 1. Introduction to earthworm farming. Vol. II. Earthworms and the ecology. 180 pp. and 263 pp. Bioscience Publ., Ontario.
- Hume, E. 1962. Soil and civilization. 313 pp. Thomas and Flaherty, London.
- Mitchell, E. 1966. Soil and civilization. 143 pp. Longman and Robinson, London.
- Rau, F. 1962. Studies of earthworm populations in orchards. I. Leaf burial in apple orchards. *Res. app. Biol.* 6: 389-424.
- Widder, B. 1978. Vermiculture is good for you. *Hortusworld* 3(1): 47-62.

INCREASING IRON AND ZINC OF RICE WE ARE MOVING TOWARDS A BETTER LIFE

Mahima Hoque Uddin
Jahangirnagar University

Biochemistry and Genetic Engineering

"Hidden Hunger" or micronutrient deficiency is the common issue of 21st centuries. Micronutrient deficiency means lack of enough required micronutrient for optimal plant and animal health. Every year it affect about 38% of pregnant women and 62% preschool children worldwide and are most prevalent in developing countries. Among them more than 30% of the world's population is anemic. Global studies estimate that approximately half of this anemia is due to iron deficiency anemia which is estimated to cause 135000 perinatal deaths and 170000 maternal death globally.

Another is Zinc deficiency. Because of inadequate intakes billion of people are at risk for zinc deficiency. A survey showed that 17.3% of the global population is at highly risk for it. Estimated more is more than 600,000 children under the age of five die each year due to zinc deficiency.

Zinc is the most important micronutrient which is involved in more body function than any other mineral. It acts as a necessary component of more than 300 enzyme systems, normal growth and development, maintenance of body tissues, sexual function and the immune system. Randomized controlled trials showed that zinc supplementation can reduce the severity of morbidity from a number of common childhood infections including diarrhea, Pneumonia and possibly malaria (page 13). It is unfortunately there are several way for reducing iron deficiency anemia and Zinc deficiency. Such as supplementation, dietary diversification, crop biofortification. It is hard to measure to half required level of Fe and Zn through supplementation and dietary diversification because of its high cost low supply, and people are not aware about their nutrition risk. To solve this problem, scientist aim to develop low cost source.

In Bangladesh, India, China almost 80% of cultivated land is dedicated for rice. But more than half of children and 70% of women are Fe and Zn deficient. Cause polished Grains of popular rice varieties have concentration of approximately 2 microgram of iron and 14 microgram of zinc per gram. biofortified rice for the crop biofortification, a process of improving the nutritional quality of food crops. For example, iron biofortification for biofortified rice target 13 microgram Fe and 38 microgram Zn per gram normally approximately

A VISIT TO A NETTED MELON FIELD WHICH OVERLOOKED BY A CHINA INSTITUTE IN MYMENSINGH

Harisul Ahsan Sapon

Faculty of Agriculture

Hajee Mohammad Danesh Salimullah Technology University

Date: 11/01/2020

Source: BARI, CAZPUB

Two Honourable scientists from BARI (Bangladesh Agricultural Research Institute) recently had a short field visit in Shingkhora, Fulbari, Mymensingh. At first they went to the Upazila Agriculture Extension Office. Then along with the LMO Daniel McCrory went to the netted melon field. As the field was overlooked by a Chinese Institute, while observing the field the scientists had to communicate with them. But they didn't want to reveal their research methods. They only told us that, they traced around 30-acre of land and in order to examine the adaptability they cultivated netted melon.

OBSERVATION :

- In their restricted area the Chinese Institution they cultivated netted melon and water melon in various ways. like with or without polythene shade, using mulching papers at different times.
- At first sowed the seeds at 22.11.2019. But the growth of the seedlings were disrupted due to very low temperature in the winter season.
- ✚ As there fruit harvests at back of the field, the scientists advised them to use "Tension trap".
- ✚ Besides there were many vines and vines which attacked the plants. So the scientists also advised them to use insecticides daily.

Then they came back with some samples for further research in the laboratory.



AGRICULTURE ENTREPRENEURSHIP

Ankita Priyadarshani

Pabna University of Science and Technology University

As being an Agriculture Student in Bangladesh for 6 years, I've observed and studied the past and current agriculture scenario very closely and precisely. We all know that the gap between food demand and supply is widening every year. With limited fertile land, it is becoming more difficult to feed the growing population. Hence, numerous initiatives of agriculture has been proposed as a feasible option for narrowing down this gap and sustaining economic growth.

Now the question that strikes our mind is "Can the farmers of Bangladesh become entrepreneurs?" The answer is "Yes". Farmers all over the world including Bangladesh have shown a remarkable ability to become entrepreneurs.

Farmers, who are risk takers, love to dream big and are innovative, can easily be transformed into entrepreneurs. An epitome that perfectly fits here and shows the capability, determination and will power of a smallholder farmer to initiate farming and later run it as a commercial business. "Rahim Bosa", a resident of Bheraiganga village after completing his studies started growing his own fruits and vegetables in 2 high land in 2002 AD which has now increased to 200 high land area which has also created employment opportunity for more than 20 villagers. There he uses various innovative and modern technologies as recommended by extension agents to increase the yield. In his farm, variety of fruits are grown including dragon fruit, guava, orchard apple, papaya, banana, mango etc. which are later supplied to various agro based industries for further processing.

Another entrepreneur is someone who produces for the market and always looks for opportunities to improve and expand his business by taking calculated risks. Farmer-entrepreneurs see their farms as a business. Another instance that is currently striking my mind is the story of a young Entrepreneur "Farzana Ferdoushbanu", who has set a remarkable example for women farmers and the unemployed youths in Bangladesh. After completing his graduation from Dhaka University in Economics, he started his own company named "Ferdoush Bhabish (Pvt) Ltd" and later on "Digger Dairy" which now combine have a market value of Tk. 200 million. He bring innovative solutions to the farming sector and uses these culture to produce various agricultural products for local and foreign markets. Despite being an economist by academic background being called a farmer is something which he really loves and is extremely proud of (source: Interview 21 June).

Entrepreneurship, value chains and market linkages are being discussed more and more while talking about modern day agriculture. Farmers look for better ways to organize their farms after becoming entrepreneurs. They try new crops and cultivars, better animals, and alternative technologies to increase productivity, diversify production, reduce risk and increase profits. They become more market-oriented and will learn to take calculated risks to open or create new markets for their products. Young and educated farmers have many of the qualities of an entrepreneur. In order to assist them, extension workers can play a vital role by helping farmers identify, investigate and evaluate opportunities. Extension workers can also facilitate farmer-to-farmer and farmer-to-research partnerships to identify, develop and test new technologies.

entrepreneurship

with soil land use/land cover of the area. The software used for the study is IBM's ArcGIS 10.2 for multi-criteria analysis and QGIS 3.16.2 for performing image classification. By doing 5 steps, we complete the work. The five steps are: Study area map, Land use / cover classification image, Euclidean Distance, Slope model of the area, Weighted Overlay analysis.

Flora is a systematic account of plants of a defined geographical area and provides keys and descriptions of plants for identification. It is a valuable document for college and university teachers, students of Botany and Agriculture. It is used to identify the plants. It is useful in biodiversity assessment and management. Flora is useful in forest management, ecosystem and land management. It provides basic information of plants in the area. Flora may be made for particular uses as medicinal or drug plants for pharmaceutical and pharmacy companies, seed companies etc. Flora helps in planning a city, village or town. It is also useful in assessment of tree and mangrove species and vegetation study etc. Flora helps in evaluation of phytogeography patterns.

We have a land area of 14,100,000 ha. So, this area will be the best place for growing agricultural products. Ecologically, there are four types of forest which are abundant with a rich biodiversity not found in our country. They are: Sundarbans Mangrove forest (9,99,720.0 ha), Chittagong Hill Tracts (1,12,29,800 ha), Sal forest (1,20,200 ha), Natural Swamp forest.

From "Encyclopedia of Flora and Fauna of Bangladesh" by Jalsila Khatun provides an enumeration of the plant and animal resources of the country (Islam et al. 2008, 2009), we get that,

Kingdom	Number in Bangladesh	Number in Bangladesh
Algae	1000	1000
Fungi	-	270
Lichens	-	80
Microphytes	1000	200
Phanerogams	250	200
Gymnosperms	7	7
Angiosperms	19100	19100*

Table 1: Bousfield's Estimated number of Flora of Bangladesh

From this table we can say that we have a lot of algae & angiosperms in our country. But the others species amount is very low. Though we know this, but still we are not aware about this. And it is very harmful for our ecosystem. For lacking of aware, we are helping to deplete the biodiversity of flora in Bangladesh by over-mining & exploiting.

And from "Encyclopedia of Flora and Fauna of Bangladesh (2007-2009) Volumes 9-12, Islamabadi (2011)" we get that 103 vascular plants are threatened in Bangladesh. The table is:

Threatened plant groups	Total no. of species	Extremely Endangered (EE)	Endangered (EN)	Vulnerable (VU)	Number of threatened species (% of total species in a group)
Psittaciformes	175	0	0	00	00(0.0%)
Columbiformes	17	0	0	0	0(0.0%)
Cuculiformes	100.1	00	000	000	000(0.0%)
Strigiformes	100.1	0	00	000	000(0.0%)
Alcediniformes	100	00	00	000	000(0.0%)
Coraciiformes	100	00	00	000	000(0.0%)
Total	100.1	00	000	000	000(0.0%)

Fig 2: Threatened plant species of Bangladesh

Conclusion:

In every group, manually data collecting is very difficult for a researcher. That's why I will prefer the GIS system. In this system, we have to do the same work just one time. Obviously the work is some lengthy because of its data analyzing, data manipulating, error mapping, analyzing every condition separately. It is not an easy task & also for doing this job we need a need of excellent people who are actually good at in GIS system. But after completing the job for some time, we will get the result from mapping better than at any time by using other GIS software. By checking the result, we will guess the rate of depletion & will take the proper step for increasing the number of flora.

References:

- ¹ Ahmed, T.A., Begum, T.N.T, Hassan, M.A, Khondker, M, Kabir, I.M.H, Ahmed, M., Ahmed, A.T.A., Rahman, A.R.A. and Haque, E.M. (eds.). 2008. Encyclopedia of Flora and Fauna of Bangladesh vol. 8, 78-12. Islamic Society of Bangladesh, Dhaka.
- ² Jara H., Khan, R. and Siddiq, I.H. (eds.) 2013. Red Data Book of Vascular Plants of Bangladesh, Volume 2. Bangladesh National Herbarium, Dhaka, Bangladesh. 280 pp.
- ³ Islamulah, M.M. 2011. Conserving threatened plants of Bangladesh: Miles to go before we start? Bangladesh J. Plant Taxon., 38(1): 83-91.
- ⁴ Khan M.U., Rahman, M.M. and Ali, M.M. (eds.) 2001. Red Data Book of Vascular Plants of Bangladesh. Bangladesh National Herbarium, pp/178.
- ⁵ Siddiqui, K.H., Islam, M.A., Ahmed, T.A., Begum, T.N.T, Hassan, M.A, Khondker, M.M., Rahman, M.M, Kabir, I.M.H, Ahmed, M., Ahmed, A.T.A., Rahman, A.R.A. and Haque, E.M. (eds.). 2011. Encyclopedia of Flora and Fauna of Bangladesh. 11. Angiosperms (Monocotyledonae). Islamic Society of Bangladesh, Dhaka.

AGRICULTURE OR JOURNALISM?

Harneen Nahar Ananya

"I have edited/checked/seen demand to be a great journalist. But somehow she is now working as a student of agriculture. Then what? Will Bhaskar leave her position for journalism? On the contrary, she can't also leave behind her journalism; to become a successful agriculturalist!" – This is not the story of a single 'Choudh' but there are such lots of Bhaskars in our surroundings. So what is the solution have been prepared for them? Well, there came to the point 'Agriculture Journalism' where they may find the solution of their dilemma.

Agriculture is a special field of social activity which is closely related to important issues like ensuring food and nutrition of people, ensuring scope of income and poverty alleviation for various sections. Hence about this important sector and in this case we may be admirably helped by agriculture journalism.

Agriculture journalism is a specialized branch of journalism which deals with the techniques of receiving, writing, editing and reporting from information through the media like newspapers, periodicals, radio, TV, advertising etc. and the management processes connected with such production. An agriculture journalist report and write features that are relevant for those involved in agriculture, but stories may also interest by non-agriculture readers. Agriculture journalists plan and produce both oral and print articles that report current trends in agriculture, and research and verify the data and sources in the story. Topics agriculture journalism may cover include: agriculture news; agriculture market; disease or foodborne pathogens outbreaks; fairs and expos; new technologies in seed, equipment, chemistry or farming practices; weather; labor; governmental regulations; training and further education opportunities.

We have known about the news. Then, why this sector is so important? In this case, let's recall some memories. Last year we have seen the prices of onion have risen abnormally from ₹1.20 to ₹1.200 though the country had abundant reserves of onions. But why the prices were abnormal? It seemed the massive scarcity of Indian onion; others said that it was an artificial price made by the manipulation activities; for many it was shortage of the onion, etc. But in reality, it was not only the scarcity of Indian onion or shortage of the onion; there was a lack of information about the onion reserves in the country. Afterwards, we have seen in the newspapers that hundreds of records of onion had written on them.

aged in boarding in different places of the country. The aims of these boarders were to gain more franchising information about storage and reserves of onion in the country for the reason of shortage of onion was spread. Then again we heard about the shortage of salt which was also a huge news. We came to know about these factors only by agricultural journalists for we may assume now that how important this is for us!

So now the question comes, what is the situation of this segment in Bangladesh? There is an agricultural marketing department and agricultural information service in Dhaka and there is a list of agricultural and agro-related products and its supply-demand management. But the role of agricultural information service is limited, not widely circulated and its news is not easily available to the common people and remote areas of the country. For this reason, people could not get actual and updated information about demand-supply, production, reserves of the commodities and so on. So, agricultural journalism is the crying need of the hour to inform the consumers, farmers and producers about the latest and day-to-day update of the agricultural news, the shortages, reservations, prices of the products and services.

Agriculture journalism is a modern type of journalism. It is expanding from few decades. This type of journalism has recently become popular among youngsters, because many colleges are offering courses for agricultural journalism and demand for this course is increasing. There are multiple scopes and fields like socio-economic welfare, food industry, animal industry, conservation issues, on which news can be made and shared.

In many countries, there are separate news channels and newspapers are designated to share information related to agriculture. In Bangladesh, the BTV (Bangladesh Television) and Channel 1 (a private TV channel), some other private TV channels, Radio, Bangladesh are conducting separate agriculture program named *Maat O Monash* and *Bolpo Maat O Monash*. *Deshar Maat* in their regular broadcasting program. This type of news casting has a positive effect on our farmers, producers, consumers in the country. Their educational and motivational works about agriculture and agro-related reports have encouraged many youths, young entrepreneurs to be self-employed in the urban and rural areas. They made and considered many agro-farms, poultry, fisheries, animal husbandry and dairy in their native areas.

So let's immortalise the achievement of such great field. Finally we can rectify the name of Shadi's farm, the age-related news presenter of Channel 5, has been awarded several internationally and internationally for his contribution in this field. Then, 'JBP Agricultural Journalism Awards' – these awards recognise the best in British agricultural journalism. Sponsored by one of Europe's leading food processors, the JBP Agricultural Journalism Awards are divided into three categories: Reader, Channel and Livestock, and Environment and Affairs. Then, IFJA awards recognise the world's best agricultural journalism. So these awards are provided to the journalists for their outstanding contribution.

Finally, we can see our Shadi's happiness of becoming both agricultural and journalist at a time when Shadi is agriculture journalism to provide the happiness to all of them along with agricultural security to the common people. And we may hope that this sector will be a great achievement and more by all of us, just think yourself.



STUDY TOUR

Arumika Deb

Faculty of Biotechnology and Genetic Engineering

Level-24 Semester-02

Sylhet Agricultural University

A study tour is a unique travel experience that combines learning with travelling. It can relieve us from the monotony of life. A study tour can also increase our knowledge on different things. It is a part and parcel of our educational life. Seeing things with our own eyes fulfils our practical knowledge. Study tour gives a better knowledge of different places of the world. It widens the horizon of our mind and broadens our outlook as it enables us to see the unseen, to know the unknown and to explore the unexplored. Through a study tour, we can get ideas and concepts by the examples. In a word, a study tour is always very much with culture and education.

About one year ago, I got a chance to visit Bangladesh Agricultural University (BAU) as a part of our study tour. I am a student of Biotechnology and Genetic Engineering faculty of Sylhet Agricultural University. We went there under the guidance of our honorable teachers. We started our journey from our university by bus at 10 pm on 13th May, 2018. We reached Graduate Training Institute (GTI) of BAU at 3 am on the next day. After that we took our breakfast and got ready to visit BAU. We stayed at the dormitory building of GTI for two days.

BAU was established in 1961. It occupies an area of 1300 acres of land and situated at the western side of Dhaka metropolitan. The campus is surrounded with academic, administrative and residential buildings and experimental farms, gardens and other related facilities. Two national research institutes, Bangladesh Institute of Nuclear Agriculture (BINA) and Bangladesh Fisheries Research Institute (BFRI) are also housed in this campus. Moreover, we also visited BINA for some hours. On 14th May at 10 am, we at first visited Plant Biotechnology laboratory of Biotechnology department. Honorable Professor of this department, Dr. Sabina Haque, welcomed us cordially at the laboratory. Different kinds of projects were being performed in this laboratory e.g. extraction of salinity and drought tolerant genes in potato, *in vitro* micropropagation of banana and so on. This laboratory has a special part known as tissue culture laboratory which is strictly prohibited for general people who are not working in this lab. After that, we also visited different laboratories of Animal Breeding and Genetics department. This department was established in 1962.

In this department, students and teachers were found to work on different ongoing projects such as impact of community based breeding program for the sustainable genetic improvement of Black Bengal goat, characterization, conservation and improvement of indigenous landraces of Bangladesh, molecular detection and utilization of candidate gene polymorphisms associated with meat and prolificacy in indigenous sheep of Bangladesh.



Figure: Bangladesh Agricultural University

After visiting the laboratories of Animal Breeding and Genetics department, we took a break. We took our lunch at a canteen of BAU. At that moment all of us bonded our bond together through a lot of gossip. We enjoyed that moment from the corner of our heart because all of our friends shared many types of interesting incidents at that time. After finishing our lunch, we again went to the campus of BAU. There we visited the laboratories of microbiology and hygiene department. This department was established in 1961. At first it was conjugated with fishery department. But now it is a unique and independent department. In this department different kinds of experiments on food safety, foodborne diseases, public health measures, vaccine improvement and production and many other works are going on. We visited the laboratories of this department under the guidance of honorable professor Dr. K.H.M Nazmul Hossain Nabin.

After this visit, we started to take a look of whole campus. This campus was too much real and urban. There was a mango garden in this campus and many people of surroundings came here to share up their mind in the gentle breeze of evening.

Then we went to enjoy the natural beauty of Bhadrakapora river. The inside charming scenario of the surroundings of this river seems to be far long mind till now. On the river side, groups of students were found. Some of them were sleeping, some were playing football and others were studying on different topics. We hired a boat for enjoying the beauty of all sides of river. After boating, we ate different types of snacks which were too much delicious and cheap. At 7pm, we returned to the dormitory and took rest for some time. We finished our dinner with 1000 gm.

On the next day, we went to take a visit at Bangladesh Institute of Nuclear Agriculture (BINA). It is a research organization in the National Agricultural Research System under the Ministry of Agriculture, Government of Bangladesh. Among different divisions, we visited laboratories of Microbiology division under the guidance of Dr. Mohammad Hanon. Dr. Rashid Bibi has produced different kinds of antibiotic strains to control rice varieties as fallow and rice varieties for home use, Salween green fallow rice varieties, Premium quality rice variety. After visiting different laboratories of BINA, we started for Sylhet at 1pm and reached home at about 2 am.

Study tour is always too much effective and informative for students. From this type of tour, it is possible to be familiar with culture and social systems of different areas along with academic things. The above mentioned study tour provided gave me the opportunity to get practical experience on different things. Thus this tour has widened sphere of my knowledge.

COVID-19: A CURSE OR BLESSING ON ENVIRONMENT

Tarjila Farsha Raha

Faculty of Agriculture
Sylhet Agricultural University

China's first covid-19 patient was traced back in November 11,2019. Till now many people have been affected by this virus and died .And also many of them have survived through this all over the world. The most effective way to decrease the rate of affected people was to lockdown the countries' airport for both international and domestic flights. Governments of every country locked down each and every area just to ensure the less rate of affected people their countries.

As people started to lock themselves in their house, many institutions, factories, mills, industrial units, manufacturing plants got closed as well as the vehicles for the level of Carbon-dioxide and other harmful gases have been decreased from the surface of air and also some statistics show that even the ozone layers has started to heal!

So what do you say? Nature begins to heal after the Covid-19 outbreak? Is it really a blessing for nature? For many years, humans have harmed the mother nature for their own houses but is this the time when nature is getting a chance to heal itself?

Okay! I personally think it's not that what we are thinking! yes it is true that mother nature got a chance to take a small breath. The trees and plants got a chance for some days, more before going into the destroying mills and also there is a reduction in the daily carbon emission rate in a global basis. Even the vehicles got a chance to move freely as the fueling was closed for some days, as well as the harmful fueling too.

These things are positive for mother nature but this Covid-19 has also created a bad impact on nature too! Now the question is how? If the human beings not disturbing the mother nature, then who is disturbing it?

The facts somehow are managed to give a chance to take a breath from destroying natural resources but actually not enough! We all know for Covid-19 outbreak, people started to wear masks and doctors started to wear personal protection equipment. This masks and other personal protection materials carry a huge amount of plastic particles which are ending up in sea day by day and a year should upstream days ago that there are more masks in sea than jellyfish!

It is really a matter of danger for the environment and sea water. The sea resources are endangered for this new breed plastic pollution! On a report of international resource (20 Journal) published that every month this world needs 87 million medical masks, 76 million gloves and 3.6 million protection goggles. Is it is frightening to think about the total plastic level of this nature?

So when Covid-19 gave a chance to reduce the pollution level of environment, this also gave a big danger risk for the soil and sea. Then what should we do now?

The human being is always the favorite and creation part of the whole World. So we have to think how can we reduce our plastic use in every spheres of life as well as in our masks. We cannot throw layered cotton masks and wash it again after it loses off use and then it can be harmful for you and harmful for nature too! Also we can adopt some good habits to make our physical health sound and keeping ourselves away to pollute the nature.

Covid-19 has created a pandemic situation in all over the world. And also it has a great saying for us that we have to be careful for our forest resources and some animals and mammals and birds are just for enhancing the beauty of nature not for the human race to meeting their hunger.

Now, I can go back to my topic title that is the blessing or curse? It can mean for a blessing too though this pandemic has taught us many things that we can take care of our nature if we have better plans for us and nature too. We don't need any pandemic situation or virus for better care of our nature or to heal the Climate layer or to reduce the carbon emission range. We just need some good and perfect wishes to make these things up! We just need to be more cautious about destroying this environment unconsciously and also we need to use more eco-friendly elements to make a better world for our future generation. We always should think about our historical nature and how can we destroy it lesser than any time. We need to be careful about that. We need to think about that and still there is a hope to save the world from plastic which is the most dangerous enemy of the earth and the young people need to take care of this matter day by day.

A REPORT ON IDENTIFICATION OF PROBLEM AND FINDING ITS SOLUTION ABOUT AN UNKNOWN DISEASE AT TOMATO FIELD IN KAZIPUR, SIRAJGANJ

Anupama Anjum

Faculty of Agriculture

Hajee Mohammad Danesh Science and Technology University, Dinajpur

"A report on identification of problem and finding its solution about an unknown disease at tomato field in Kazipur, Sirajganj."

From a very reliable source, a daily Bangladesh newspaper named "THE DAILY STAR" the scientist's name is known about a news.

The news was titled "WILT DISEASE IN TOMATO" (an unidentified disease named gangrene in tomato field). It was published on 21st December, 2019. The field was located at Kazipur, Sirajganj.

In order to investigate the matter IARI (Bangladesh Agricultural Research Institute) committee created a team with the following scientists:

1. Dr. Md. Mahbubur Rahman/Senior

2. Dr. Md. Jamal Hossain

3. Jaber Mohammad

4. Mohammad Mahbubur Rahman

The committee members visited the farmers field at 26th December, 2019. In order to identify the problem and give their consultancy about the matter they visited the fields of "Sheer masallanga" and "Bajirahat" of Kazipur upazila, Sirajganj. The scientists discuss the whole situation with the LMO (Upazila Agriculture Officer) and the farmer in the field. Then they gave consultancy and took data in the farmers.

Observation: The committee members visited the fields with the LMO Md. Rajaul Karim, LMO (Upazila Agriculture Extension Officer) Mr. Prokashjit Talukder and LMO (Sub Assistant Agriculture Officer) and observe the total Gangrene problems. The LMO informed that this year almost 150hectar area were used for harvesting tomato.

According to the information of the farmer of "Sheer masallanga" area:

Seeding time: during July

Implantation of seedlings during August

Harvesting season was December..

But a storm named "Nisfal" caused a continuous heavy rain for 3-days (8.11.19 to 11.11.19). Due to the rain the humidity of the soil increased and a small seedlings dropped. When the committee reached in field, it was observed that, due to heavy rain the seedlings root's respiratory system was disrupted. For this reason the seedlings could not survive. It also caused the gurgles in the soil and a secondary infection Late Blight caused.

It was also noticed that the problems were more extreme at the low lying areas where the drainage system was insufficient. On the other hand in upper lands the drainage system was better than the lower lands. So the problem was much more less than the low lying areas.

According to the information of the farmers of "Trijugal" area:

They were cultivating a variety of tomato named "Nisfal". It was an advanced variety of "Spergula Company".

The LMO informed us that after the transplantation of the seedlings the LMO had a road accident. Due to some injuries he could not pay a visit to the fields of farmers. But he was connected with them via mobile phone and gave the necessary suggestions also.

About the manures and fertilizers the farmers informed that:

They used not only Dize and Baran but also Urea, TSP, MCP and Oppoments. And it is also noted that while the committee was observing, there was no lacking of fertilizers. With the other fertilizers a farmer specifically used an extra amount of it in his field. As a result the humidity of the plants increased and it caused the blights.

Suggestions and steps should be taken:

1. The problem was mainly caused by the rough weather specially "Nisfal's" effect and lack of proper drainage.
2. An advanced variety of tomato was cultivate, the preparation of the field should be different than normal tomato fields. The farmers have to make the drip line and also need to ensure the proper drainage system.
3. They should use also and Baran as per the need. The amount of used fertilizers in the lower should be fixed. And they should be sprayed carefully. However, the amount will be decided by the moisture of the soil.
4. During the investigation the weather was damp, the sky was gloomy. Moreover the temperature was low. As a result Late Blight hited the tomatoes. So the committee suggested to use Agri Ethane 900 and Agri Bural/line man. They have to use the mixture 3 times.

- 1. In order to avoid the risk of disease, milking system should be provided. To prevent the infection, Caustic or "Teckoff" should be sprayed after every 10-15 days.
- 2. The condition collected the samples of affected plants and send them to the laboratory for further research.

Source: Horticulture division, BARI



DR. SENJUTI SAHA-LIFE STORY OF AN INSPIRATIONAL BANGLADESHI SCIENTIST

Manoshi Bhuiyan, Marula Akbar, Sampa Islam
Department of Environmental Science and Resource Management
MawlanaBhashani Science and Technology University

Nowadays, in Bangladesh, if we ask a student, "What is your aim?" his or her answer is, "Doctor, engineer, police officer, magistrate" etc. Usually we don't hear that he or she wants to be a scientist. This might be because of that they do not find it as a viable career option. But in reality not so sure that in our very country, Bangladesh, there are scientists who are working throughout the world and are having a wonderful career paths as scientists. One of them is Dr.Senjuti Saha, a young scientist of the ChildHealth Research Foundation in Bangladesh. She has recently been appointed as a member of the Policy Transition Independent Monitoring Board (TIMB) of World Health Organization (WHO). Dr.Senjuti Saha is mainly known for leading her team in decoding Genome of SARS-CoV2 in Bangladesh.

Dr.Senjuti Saha was born and brought up in Dhaka and she is the daughter of renowned microbiologist Dr.Lamin Kumar Saha, and Dr.Bekaromahar who is also an microbiologist. Dr.Senjuti Saha finished her high schooling in Bangladesh. After completing A level, she decided to complete her higher study in other country. It was not an easy task for a Bangladeshi girl to go to other country for higher studies alone. But her courage made it possible. She went for higher studies and completed her bachelor of Science with Biochemistry major and received her PhD from University of Toronto. Her scientific career fields has been Genetics and Microbiology.

In her family, as with her parents are microbiologists, she had spend most of her childhood with her parents or in the laboratory. She began to understand from her early times, how science works and how it could be used for betterment of the mankind. As the saying goes, morning shows the day. This saying can be well aligned with the life of Senjuti Saha. When this wonder girl was in class three, she dragged into the world of science by making a project to determine blood group for her school science fair, with the help of her parents. She determined the blood group of some of her teachers then, this amazed everyone. In a society where a girl child is a considerable burden, a girl has to face many restrictions and suffer a lot in her every steps to go ahead, from that very society now Senjuti Saha, make many hardships, faced everything and has, them as a brightest star in the sky in the world of inter

national science world. Even the billionaire, Barack as business magnet and philanthropist Bill Gates has written about her in his journal. Her path was definitely not easy. When she decided that she would go to Canada typical problems arrived from her family as her family was worried to send her abroad alone just amidst of all difficulties she left her home, family, language and culture at the age of 18. From her profile of University of Toronto (2016), it can be known that she had been diagnosed with thyroid cancer during her graduate schooling. It can be said that in her journey she has gone through a lot, but nothing could stop her, her patience, struggle, determination, devotion towards her work has brought success for her. From her very profile of University of Toronto (2016), she has said that, "I am embarking on an arena, that bridge as the gap between molecular biology and its implementation in resource poor countries. In collaboration with the Child Health Research Foundation of Bangladesh, I am beginning work to determine the infectious agents that cause meningitis in children under five in Bangladesh." This shows the determination, dream to contribute for the benefit of mankind. Her study can play a vital role as policy decisions for the treatment and prevention of meningitis in Bangladesh and the Region.

Young scientist, Banjuti Laha, is a role model for not only Bangladeshi students but also students of the other countries. She is an inspiration to every girl who has dreams to touch the moon.



RECENT INVENTION OF FOOD PROTEIN POWDER FROM CO₂

Mir Meshadi Hasan

Agro Product Processing Technology

July 2024, 2nd semester

Jadavpur University of Science and Technology

History

The concept of carbon recycling was first explored by NASA in the 1980s to feed astronauts on the longest distance missions. It wasn't considered as a serious alternative to agriculture at the time, however, because there was no commercial or environmental imperative. Chemical fertilizers had just been invented, intensive farming was flourishing, and "climate change" was just a speck on the horizon. People didn't see the need. Half a century later, NASA research has inspired physicists and biotech entrepreneurs. Like Eposin Inc or Aerial Air Protein, a startup in Berkeley, California, that's commercializing Solar Foods. Solar Foods is currently testing sale in its various food applications, including meat and ice cream. It plans to enter the market in 2024.

What Is Air Protein?

Finnish startup Solar Foods has created a protein derived from the air. More specifically, gas-based fermentation (a reaction between enzymes and carbon dioxide in the atmosphere) combined with water, nutrients, and electricity. This new air-based form of protein, dubbed "Solein," will be sold in powder form and used like wheat flour. The NASA-inspired concept will contain 50% protein content, 1-10% fat, and 20% carbohydrates.

The Process

Solar Foods has developed a process that uses renewable energy and the carbon dioxide is pulled by air throughout to create an alternative protein. It calls Solein. Solein is made by extracting CO₂ from the air using carbon capture technology and combining it with water, nutrients, and vitamins. The ingredients go through a similar process to brewing beer. Living microorganisms from the soil are liquid and fed with carbon dioxide, hydrogen sulfide, and other nutrients such as potassium, sodium, and phosphorus. The

hydrogen bubbles are created through electrolysis, which splits water cells in a bioreactor using electricity. The microbes produce a protein, which is then dried (heat-treated) to make the powder. The company operates 100% renewable solar energy from partner Fortum to promote a natural fermentation process similar to producing yeast and lactic acid bacteria.



The end product could be consumed in three ways:

- as a protein supplement to existing foods, such as bread or drinks,
- as an ingredient in plant-based meat alternatives, such as veggie burgers,
- as a sustainable source of amino acids, needed to create lab-grown meat products.

How effective protein powder during covid or other disasters situation

We all know that in covid-19 the whole world faced significant economic problems also there people who have in many poor countries, they can't import or export food. Protein powder is an effective process to make innovation in food technology. The manufacturing of labella is a carbon-neutral process, and with an excess amount of CO2 in the atmosphere, it's a highly sustainable food source. In any time it will be highly recommended food in the whole world. Besides, labella is completely "free from agricultural limitations," and can be sustainably produced. The company is currently working with the European Space Agency to deliver foods for off-planet production and consumption. Solar Foods sees the potential to produce labella in areas where conventional agriculture is impossible.

Future of protein powder from carbon-dioxide

From lab-grown meat to synthetic coffee, companies have been coming up with all kinds of technological ways to make food in labs: the ever-growing burden of agricultural land uses on the planet. A Finnish startup called Solar Foods has developed a way to produce edible protein from CO_2 , water, and electricity. It plans to bring the ingredient to the market as soon as 2021. Solaire, as it is called, is a high-protein, flour-like ingredient that contains 60% protein content, 9–10% fat, and 20–25% carbs. It is said to look and taste like wheat flour. It will likely make its first appearance on grocery shelves as a powder supplement in protein shakes and yogurt. After its initial launch, it could become an ingredient in a wide variety of food products. Recently a company says this process makes Solaire 100 times more climate friendly than other sources of proteins, more than obtained from plants. If it proves available, the technique could address both the devastating environmental impact of current agricultural methods and the need for protein food in places where those techniques aren't available.

Solaire offers other benefits, too. For starters, the manufacturing process uses 260 times less water and ten times less land than soy. It takes just 30 liters of water to produce one kilogram of Solaire. Beef requires 11,000 liters of water, and soy requires 2,000 liters of water. Also mentions some of the points that:

- Food from electricity and carbon dioxide is a breakthrough that could help solve world hunger.
- Food is created using merely energy from solar panels and freely available CO_2 .
- Protein-rich powder could one day be used to feed long-haul spaceflights.
- Powdered food could also help to alleviate famine in some parts of the world.

Space Food!

The Solar Foods production process arose from research conducted by the VTT Technical Research Centre of Finland and the Lappeenranta University of Technology (LUT). The company partnered with the European Space Agency (ESA) to work on food production for future space flights. The idea is for their food to supply astronauts on a mission to Mars.

Last words

It may not taste great, but scientists have managed to create raw protein meals using carbon dioxide and electricity. Researchers hope that the protein-rich food could one day be used aboard long-haul spaceflights or alleviate famine in some parts of the world. The powdered food, which is created using energy from solar panels and freely available CO_2 ,

could also be further leveraged to free up more farming land. Solar Foods is currently testing Soltis in various food applications, including meat and ice cream. It plans to enter the market with food-producing partners and is slated to launch in 2021.

References:

<https://food.mil.com/food-drinks/gro>

Is it from this air-like green? Scientists grow off-dairy protein from carbon dioxide

<https://www.springer.com/food/article/10.1007/s12385-020-09538-7> Food drink innovations 2020

<https://www.lelilgourmetliving.com/food-meat-off-and-water-ethically/>



STORY OF DISCOVERING THE "HARI DHAN"

Haripada Kapali, an illiterate and poor farmer who discovered a high yielding variety of rice.
The rice was named after him as "Hari Dhan"

Monirul Akbar Shanon

Faculty of Agriculture

Hajee Mohammad Danesh Science and Technology University, Chittagong

Jamnapur village is 50 km away from Dharmadish district headquarters. Most of the people of this village are engaged in agriculture and paddy cultivation. Haripada is a veteran experienced farmer of the village. One day in 1952, Haripada went to the land to take care of the paddy. At that time, a different species of rice came to his notice. The rice plants tall in so many lands, so many varieties of paddy. Haripada looked with interest, wanted to understand why the stranger of a different species? The rice did not look like its seeds. Lean, take care. A few days later it was found that the rice had grown more and thicker and had become fresh till (In the regional language a bunch of rice is called till). A few days later the rice matures. Haripada noticed that the three varieties of the new variety have much more paddy than the other varieties. Haripada liked them so much that he took them. Take good care. The researchers make the rice as seeds. Experimentally, he sowed them separately in one corner of his farmland. After a certain period of time, new varieties of paddy came into the family. It is quite high in length, high yield, low disease and even low cost. Seeing this, Haripada cultivated a large quantity of seeds, cultivated and produced this unusual new rice.

Many may be wondering, how strange till! Where did this rice plant come from? How did it come about? Needless to say, it didn't come miraculously. It came through the process of natural selection. Haripada provided another testimony of natural selection. Nothing in nature comes or does not happen, but is transformed. Evolved from one species to another. For those of you who have read about Charles Darwin's Theory of Evolution by Natural Selection, the subject may not seem ordinary. Maybe Haripada could not give any explanation of the new species due to his ignorance but we know today how it came about. More interestingly, when Haripada makes this rice seed and sows it again, Unbeknownst to him, he then applied Darwin's method of "artificial selection" or "selective breeding / artificial selection". It is through this method that the new variety is able to spread later.

In 1992, this paddy spread beyond Ibaanagar village to some other villages. Since Haripur is near the border of Kapil, the villagers named it Haripur. When a local journalist named Kajal published a report in the daily Lok Samaj published from Jammu in 1992, it came to the notice of the local Department of Agricultural Extension. An official of the department collected seeds from the Haripur and sent them to Garipur BH (BHR) and Choudhary Seed Research Centre for testing. He also started farming income exhibitions. At the same time, cultivation of this paddy started on the main land of Choudhary Research Centre. After various experiments, the Agricultural Research Centre came to the conclusion that Haripur is a high yielding (which is about 8 tonnes more per hectare than the more common BR-11 Land Seema) of low cost, and disease free rice. It was later named in the name of Haripur Department of Agricultural Extension.

Reference and paragraph / Village





LIFE ON LAND

Maria Tabassum Shamsi

2nd year, 2nd semester

Agri/Food/Food Processing Technology
Jahangirnagar University of Science and Technology



Human life depends on the earth as much as the ocean for our sustenance and livelihoods. **Plants** provides 80% of the human diet, and we rely on agriculture as critical economic resources. **Forests** cover 30% of the earth's surface, provide vital habitats for millions of species, and important sources of clean air and water, and are crucial for countering climate change. **Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss.**

Today, we are experiencing **land degradation** and the loss of arable land at 30 to 35 times the historical rate. Land degradation is caused by multiple factors, including extreme weather conditions, particularly drought and human activities that pollute or degrade the quality of soils and land utility, negatively affecting food production, livelihoods, and the production and provision of other ecosystem goods and services. Drought and desertification are also on the rise each year, amounting to the loss of 12 million hectares and affects poor communities globally. Of the 8,300 national biodiversity areas, 8 percent are intact, and 22 percent are at risk of extinction. The SDGs aim to conserve and restore terrestrial ecosystems, such as forests, wetlands, drylands, and mountains by 2030.

- Halting desertification is also vital to mitigating the impact of climate change.
- Urgent action must be taken to reduce the loss of natural habitats and biodiversity, which are part of our shared heritage and support global food and water security, climate change mitigation and adaptation, and peace and security.

There are many types of land uses:

- Recreational - fun, non-monetary, like parks.
- Transport - roads, railways, and airports.
- Agricultural - farmland.
- Commercial - businesses and factories.

Land-use change is the foundation for our life on this planet. We are all part of the planet's ecosystems, and we have caused severe damage to it through deforestation, loss of natural habitats, and land degradation. Promoting sustainable use of our ecosystems and preserving biodiversity is not a luxury. It is the key to our survival.

Data and Statistics:

- Around 1.6 billion people depend on forests for their livelihood.
- Forests are home to more than 80 percent of all terrestrial species of animals, plants, and insects.
- Seventy-four percent of the poor are directly affected by land degradation globally.
- Of the 8,300 animal breeds known, 8 percent are extinct, and 20 percent are at risk of extinction.
- Over 80 percent of the human diet is provided by plants. Only three cereal crops – rice, maize, and wheat provide 60 percent of energy intake.
- As many as 80 percent of people living in rural areas in developing countries rely on traditional plant-based medicines for basic healthcare.

Deforestation and desertification – caused by human activities and climate change – pose major challenges to sustainable development and have affected the lives and livelihoods of millions of people in the fight against poverty. Efforts are being made to manage forests and combat desertification.

There are some targets linked to the environment:

- Target 15 By 2030, ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements.
- Target 15 By 2030, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.
- Target 15 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land degradation-neutral world.

Here are a few reasons why it's so important:

- Promote public procurement practices that are sustainable in accordance with national policies and priorities.

- Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

- By 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature. Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption.

The basic functions of land in supporting humans and other terrestrial ecosystems can be summarized as follows: a store of wealth for individuals, groups, or a community. Production of food, fiber, fuel, or other biotic materials for human use. Provision of biological habitats for plants, animals, and micro-organisms. One of the most important reasons why clearing land is needed is because it makes the land being cleared safer. Often before land clearing, the land is filled with shrubs, tall grass, and any type of garbage that may be found on the property.

Land conservation benefits:

- Protection of water resources.

- Providing open spaces and parks for our urban communities.

- It is creating and enhancing outdoor recreation opportunities statewide.

- Preserving working farms and forests.

- Protecting wildlife habitat.

Life on land is extraordinary. Yet through deforestation, global warming, and mass production, we're slowly killing our earth and its inhabitants. Before we panic, it's worth reminding ourselves we can fix this. And US is all about working together to protect, restore, and promote our planet's plants, forests, and animals. By focusing on the changes we can make now to help our future, we can sustainably manage forests, combat desertification, reverse land degradation, and put us on the path to a more resilient, sustainable future. As a part of through our government, we can make choices that either affirm diversity or threaten it. We must also be respectful toward wildlife and only take part in outdoor opportunities that are responsibly and ethically run in order to protect wildlife sanctuaries.

References:

- <https://www.unep.org/landrest/landpolicy/home/land-availability-and-symptom-globalgoals/10-10-for-our-land.html?cid=land-restoration-policy-publications-10-10-for-our-land-2018-2020>
- <https://www.globalgoals.org/10-10-for-our-land/What-is-the-10-10-by-2020-goal-for-land-restoration/>

CRISPR GENE EDITING TECHNOLOGY FOR CURING SKIN DISEASE

Saklayeen Mahfuz

Faculty of Biotechnology and Genetic Engineering
Sylhet Agricultural University

We know about the CRISPR gene editing technology. It is a unique combination of science. But it was beyond people's knowledge that this technology can be used to cure skin diseases. First of all let's get acquainted about the technology.

CRISPR is the short form of Clustered Regularly Interspaced Short Palindromic Repeats. Every foreign or harmful microorganism gets into the body. CRISPR/Cas9 system (CRISPR associated protein endonuclease) causes mutation in the sequence of the DNA of the microorganism. For that, the microorganism dies or becomes inactive. There is also an advantage of this system. For entering the system, the body builds its own immunity against the mutated microorganism.

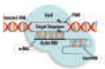


Figure: CRISPR/Cas9 Complex

There are some components of CRISPR/Cas9 complex. The system generally targets a specific sequence of DNA. The target region is specified by gRNA (guide RNA) which is a component of CRISPR/Cas9 complex. gRNA consists of two parts, crRNA (CRISPR RNA) i.e. the RNA which is used in CRISPR RNA. Another part is tracrRNA (trans-activating crRNA). Target DNA sequence is recognized by PAM (Protospacer Adjacent Motif) which is located and either 3 or 4 base pairs off target sequence. Therefore crRNA binds complementary with the target sequence and initiation occurs.

Now let's discuss about how the technology is used to cure sickle cell disease. Generally in tropical region there is found a disease named Sickle cell anemia. This sickle disease is caused by Leishmania donovani transmitted by Sand fly.



Figure: Sand fly is the intermediate host of the causative agent of Leishmaniasis

Leishmaniasis causes infection in skin. After entering the cell, Leishmania parasites attack the immune cells and they begin to replicate without any control. 1.1 million people get affected by Leishmaniasis per year. The countries in which the effects of global warming are visible have the chance to spread the disease. 32 million people are now affected all over the world.



Figure: Leishmaniasis affected people

At first, scientists took initiative to destroy gene normally to control the disease. *Ceritin*, which is responsible for making the physical structure of the parasite was destroyed and also antileishmanial nuclear gene was incorporated. But it was noticed that the parasite can find a way to enter the body and replicate itself also in the absence of *Ceritin*. So these initiatives were facing problems.

At last, a group of scientists of Ohio University found CRISPR/Cas9 useful to control the disease. The gene of parasite gets mutated after entering the system in the body. As a result the parasites can't replicate itself and die at a phase. But the unmutated parasites get attached to the body for eight or nine months. As a result, body builds up lifetime immunity against the parasite.

There may arise a question, if the mutated parasite cause disease? The answer is, studies show that mutated parasite can't cause disease. Scientists however succeeded to make immunity in the body of mice after vaccinate the system. At present, scientists are looking forward for human trial. Scientists of USA, Japan, Canada and India are trying to make vaccine with the CRISPR/Cas9 system. According to the researchers of Ohio University, it will cost only \$1 Dollars per dose of the vaccine. That means, at very low cost we can get lifetime immunity against this skin disease.

References:

1. <https://www.nytimes.com/2019/06/06/health/crispr-leishmaniasis.html> (Accessed: 10/02/2021) (Editor: *Editor* - CRISPR gene editing technology for Phase I vaccine trials in humans, *nytimes*, 06/06/2019)

2. Tetsushi Nakano and Tetsuki Kanamori 2019. Targeted Genome Editing Using Site-Specific Nucleases, *ISBN 95-56037478-4-433-88227-2_2*

3. <https://www.nih.gov/parasites/leishmaniasis/index.html>

A GREAT SCIENTIST

The interview was recorded by

DR. Saigimol Islam (Former National Director),
Salma Khanam (Former National Director) &
Pallavi Kulkarni (PhD. Professor of Communication
2020/21)



1. Would You Please Share Some Memories of Your Childhood? Which Fields/Subjects Charmed You Most in School Life?

I come from a very big family. I have seven brothers and sisters who are older to me. I'm the eighth in the family and I'm another younger brother. So, this is a big family that right now we do not hear anymore. But being the eighth member in the family, I was quite pampered. Despite that, I had to lead a very strict life such as very regular in studies. This was more because my brothers, all were studying a lot and they would be enrolled in their studies and this helped us. The younger ones in the family were in a good way. So, childhood memories are all very nice. I mean, those days as we say 'golden days' are always nice and I remember, my brothers helping me understanding science in a way that, even at that age, I was like classmate to them. It made a big impression on me that science has a big role in our lives. We did not have, even the television

was not there. We did not have mobile telephones at that time. But we had just brought a refrigerator and we all were excited and my brothers said to me, "Look, this is science. This is how science is helping us." Then we had a telephone in the house and they again told me that how we discuss the collectivity system, that telephone, and how the refrigerator came. So that made a very big impression and those memories are so sweet, and I'm so happy that, from those memories in my early life. So, later in my life I could move on and do something for science.

2. What Inspired You to Study Biochemistry and Molecular Biology? How Was the Journey Ahead After Admissions?

Again one of my brothers had a big influence on my choosing the discipline of Biochemistry. First, I knew this, Biochemistry and then Molecular Biology was brought much later. So one of my brothers used to live in the USA. He came back in early 1976, that was the time when I was getting for my HSC examination and I was trying to decide what I want to study. I wanted to study science, that was certain. But my father wanted me to study Medicine. But that was something, I mean I did not like at all. When this brother came back from the USA in early 1976, he had a friend who used to work in Biochemistry. He talked with my brother about the interesting science that biochemists try others to understand. So when my brother came back, I was discussing I don't know what I want to study. I didn't want to study medicine. Hearing that, he told me about Biochemistry and he told me about his friend's work and that was something which had a big influence on me. I thought this is something I want to know. I want to know about life. I was always interested in how the flowers bloom, how the flowers get beautiful colors, how the birds fly. So then I thought Biochemistry was the subject which would give me the answers to all these questions. The fantastic journey began in December 1976. My entry in the Department of Biochemistry & Molecular Biology and I mean, I still now, even now, after so many years when I study something new in the development of Biochemistry & Molecular Biology I get goosebumps and so excited to know and there's so much still happening now.

2. Would You Please Tell Us About Your Ph.D. Life in The UK? How Will You Differentiate the Research Systems There and in Bangladesh?

I went for the Ph.D. program right after joining as a lecturer in the Biochemistry & Molecular Biology Department at Dhaka University. I joined the department in January 1982 and I went to do my Ph.D. in October 1982. Molecular Biology is an area of research that requires a lot of expensive apparatus. So even in England at that time, Molecular Biology was not very common in all laboratories. Only a few laboratories could afford all the expensive enzymes, all the expensive instruments only in research Molecular Biology. So my laboratory was in the 'Agricultural Research Council' and this Agricultural Research Council of the UK, they give lots of money for researching agriculture. My work was on the nitrogen-fixing genes. Can you imagine I went there without much knowledge about Molecular Biology, without much hands-on training in Molecular Biology. *Klebsiella pneumoniae* is a free-living nitrogen-fixing bacteria and it was easy to study the nitrogen-fixing genes in bacteria. So getting the genome out of *Klebsiella*, cutting it with restriction enzymes, and then making mutations in the DNA, to find out what does the mutations do in the nitrogen-fixing genes and to find out where the mutation was by doing sequencing (winged), not the capillary system that is now used. So that was exciting but I was to find out, I was learning all these and thinking how can I go back and work on this area. That is a frustration. I had right on the beginning. I knew knowledge back in Bangladesh with all this training but I was wondering how would I be able to do all this research. We do not have the infrastructure, we do not have much money for research to buy equipment. So what would I do? That is something which I thought back home. My mind was full of that and that is how I will have conducted it in the department of Biochemistry & Molecular Biology at Dhaka University. It was a very exciting journey. But it has many ups and downs. There were times when I would be motivated but I would not get to work. This was the Commonwealth scholarship. The Commonwealth Commission will always keep reminding you, "You only have three years to complete, only have three years to complete!" Under that pressure, starting from scratch, learning it within and under that pressure, I would have to complete within the short time was this pressure that I always felt. But Allah is almighty, when you have the determination, that is what I want to share. When you have the determination then you have to do this. You have to prove, having come from a country like Bangladesh, you are capable of doing this. I must admit, even after so many years, when I went to England, at the beginning my level of experience was they are

kind of racism. They will look down upon you, coming from a third world country. Even I didn't have much experience, but they will look upon you thinking about how they can do good work with such a poor background. But that is what makes achievement when you have the determination. So that's something I want to express.

4. Please Tell Us the Story Behind the Beginning of the Jute Genome Sequencing Project. How Was Your Experience & What Are Your Aspirations for Future Jute Research in Bangladesh?

When I came back, I was working on different jobs. After my PhD I did several post-doctoral programs. After that, I came back in 1998 after my last position and I decided that I would do everything that I love and want. I wanted to work in Bangladesh. What I want to work on? You know, my father wanted me to be a physician, and I disappointed him by not studying medicine. But I remembered my father's dream. He was passed by the time I started work on jute. But I remembered his dream. You know, I have told you I have many brothers and sisters, they were all in science. But one of my brother, the second brother, he studied to become but my father wanted him to study on jute. This was in the early 1960s, there wasn't any institute in Bangladesh to study jute. But now in Calcutta there is Jute Technology Institute. It is still there where everything I taught about jute. My brother went there. He did his Master's thesis in Jute Technology Institute. I remember my father wanted him to study jute because he knew jute was a crop that would take the country much forward. So when he came back from all my positions in 1998 and I wanted to work on something that would benefit Bangladesh and used all my knowledge that I gathered, I decided to work on jute. First, because jute is the national tree of Bangladesh, also because my father loved jute so much. So that's how my journey began. But when I began my journey in jute molecular biology, I was very disappointed to see that, there was the Bangladesh Jute Research Institute (BJRI), they carried out many good works on molecular aspects, on different aspects on jute but not on molecular biology. But had to start again from scratch realizing that if I want to work on jute, I need to find out the D.N.A of its genome but we were very lucky to have a big gene bank of jute and other fiber-producing crops, which grows all over the world. A collection of those seeds had been made in Bangladesh in the Jute Research Institute by the International Organization of Jute. This organization is not there anymore but they had their head office in Dhaka. They made this gene bank collecting all the jute seeds around the world. Jute seeds are grown in Indonesia, Thailand, and China, in Africa and many north African countries, grow Jute, and

of course, in India. So jute seeds were collected from there. Many researchers in the Jute Research Institute had studied those jute seeds and found that some seeds could germinate at 14°C. You know, 14°C is a low temperature. Jute can grow in that humid condition. But some jute seeds were germinating at 16°C. This information I gathered and I wanted to find out what difference there was at the DNA level because of which a jute seed could germinate at 14°C and other seeds could not. So this was a tough call how do you find out the difference when you do not have the jute sequence code. If you have the jute sequence code, you can make the primers, use different markers. You know the markers, such as RAPD markers, those are markers which allow you to find differences within individuals, within crops. So there was no such information available. So I started from scratch using very rudimentary PCR, primers to find out the difference. I was very lucky, those RAPD primers which are Rapidly-Amplified Polymorphic DNA markers. Those markers are like only 10 base pairs. PCR primers, you know, are quite big, 20-25 base long. But RAPD is only 10 randomly designed markers. What it does, 10 nucleotides are not very long, so randomly a sequence of those 10 nucleotides can be found in a big genome. So you take a chance to see if this primer, randomly designed primer will go and amplify the jute genome. So I was very lucky using the RAPD primers. I found a very nice difference between the one which was germinating at 14°C and the one which did not germinate at 14°C. So that was the first big moment I had, and the difference I was finding in the PCR, on that was in the gel, found the different band, not it not the sequence. That was the first jute sequence found in early 1998 and then, that's how the journey started, and I didn't look back. I said I need to move on, I need to find the jute genome sequence. So that's how my journey goes on.

5. Jute is known as the golden fiber of Bangladesh. But it is gradually losing its esteem in our country. What should be our approach to take the advantages of genome sequencing to the former level?

Thank you I think this was the question of the previous. The jute genome sequence becomes available with the sequencing. What I was able to do is to find them. You know jute can need to add and what addition is very necessary in the jute fiber that we get. How do we add value addition to the Jute fiber? We use traditional use of peeling and peeling that's a traditional use, but there are many other uses. I want you to know in Malaysia and they used to grow a lot of tobacco and here was of the health issues associated with tobacco. They wanted to remove tobacco and give something to the farmers which would be

very beneficial to them and they realized that jute is enough similar to jute could be a good substitute for tobacco. You know they only introduced jute like three many years ago about 150 years to 160 years ago and since then they have many packaging industries based on jute they make carboards made out of jute and they have arm-vent. You know the army's hand baggage of vent. Jute has many wonderful value addition possibilities, but we are not doing much in that. So, when we finished the jute genome sequence, they informed you another thing jute has a lot of lignin. Lignin is something which all plants help the plant to stand upright which helps the plant to keep it protected from insect attacks. So, lignin is good, but too much of lignin in jute makes the fiber very coarse. We can't identify with cotton, we can't use it as a textile fiber like cotton because it has so much lignin and because of so much lignin we cannot use in the packaging industry. But we have to treat it with a lot of harsh chemicals to remove the lignin and another option that we have is that attacks huge biomass in just four months. It becomes a biogranule of biomass and you know biomass can have converted into bioethanol or bioethanol. So there are many areas where jute could be benefited we could use it to get the benefit but lignin comes in the way. So, what I decided when we found the genome sequence, we found the lignin biosynthetic pathway from the genome. What are the genes involved from starting a lot producing lignin? There are 100 genes involved which make from the starting material to lignin, I targeted four of those enzymes' genes of those enzymes and I used RNA interference, you know RNAi this is a technology by which you can silence the gene. I silenced four genes individually and all four together and each four and I found the lignin to be lowered by 50%. In 2016, and that we have done all testing that strength has not been reduced. The tensile strength of lignin is still good of them good even reduce too much of the lignin and the plant is not having other bad more benefit because lignin is less. All these things we have now established and we are now this is a generally modified crop, we are now writing up to apply for patents clearance because you cannot release it in the environment genetically modified organisms and we hope this will add value to the textile fiber industry.

Q. What is the impact of endophytic bacteria on jute production?

When we started the jute genome sequencing, we are very surprised that many bacterial sequences in the jute sequence. You know you can do the sequencing and blast the sequence and something matches with bacteria sequence and I was always like I told my students you did something. You contaminated the two DNA with bacteria DNA, but later we found these are bacterial organisms which live with all other plants they live with these same organisms. Living in a close association with jute and that is when I learned about this.

realized by my interest group in my laboratory. *Blaesobryopsis phaeodonta* is a pathogen for some ICCs/plants. As this bacterium from jute has been shown to have something in it, which controls this. It has been identified for the growth of a metropolis. We are now identifying the component which gives this antifungal activity to bacteria and I have found many bacteria that promote the growth of jute. As there are preliminary findings. We have made publications but we have not taken it to the field which we will need to do in the future.

7. Please tell us about your recent project on decoding the genome sequence of *Hibiscus*? What inspired you to initiate this great work?

Proudly speaking, I did not want to start work on this because you lose your credibility. You work on one or I mean on one aspect like I was working on this all your life suddenly you work on something which you have very little idea. I have not and did not have much idea about *Hibiscus* not about any other field also, so I have hesitated, but you may have heard the story of one of our Biochemistry graduates who are now in the USA. He is Dr. Heng Kuan Marmu, who works in QIAGEN, which is a company that makes many molecular biology reagents. He was working on the aspect of QIAGEN, where they develop new techniques for genome sequencing. As he was working in genome sequencing and one of his friends from Bamenda or Ndapa (I cannot clearly remember who had a company sequencing large genomes. As they both together want to do something, and Dr. Marmu the Bangladeshi. He likes *Hibiscus* and he thought he could say he could like to work with him. So then he approached me and I was looking at the email in the beginning email communication with Dr. Marmu where I was. He told him I do not have much experience on this, I do not want to work on this. But he was so persistent that I yielded at the end and inside this team I used *Hibiscus* expert from the dept. Of zoology at Dhaka University. I took by telecommunication expert from Bangladesh working now in New Zealand, took his help and then he formed at that time in Australia. Then I started out the team and the work was very interesting because this was our national achievement to find the sequence of that national fish to identify that and publish it for the first time was a big achievement for me and now I am working on its transcripts and its proteins in that and what happens on *Hibiscus*. I am using the transcript of fish from the Mangrove river and the deep sea. To find out what are the genes that help it in the migration. It moves into the stress metabolism, then it comes back in the freshwater. What happens in CYPs does not change, but what triggers the different gene expression pattern that allows it to grow in freshwater.

them migrate and grow in salinized. In those things that we are trying to learn, I am happy now that I worked in the Hibiya group and that has inspired me to do further work on the brown pigment and proteins to do something exciting so that we know more about the evolution of our country.

B. As A Female Scientist, What Kind of Challenges You Have Faced During Research and How Did You Solve It?

Thank you. That's an important question. But let me tell you that I have been lucky because I didn't face as many challenges as other women faces, I know. Because the biggest challenge comes from the family. You have to have a very supportive family who allows you to go early morning to the laboratories and as early you're come back late from the lab. What's happening for me because I have a supportive family and again, in the workplace, that supportive colleagues. That was not that much difficult for me and I must admit that I have been beneficial in many ways because of being a female. Because there are many things, like "Oh! We want to give this grant to a female researcher", or "We want to hire for a female applicant". I use to take advantage of this. Being a female helps me in many ways. But of course, there were some limitations. You know everywhere there is a glass ceiling that prevents female. The limitation for me wasn't in terms of the recognition of my work but in terms of getting things done. Like we had a little bit problem initially, many things that we use in our molecular biology have to import them from outside. But if the customs don't release them as soon as it arrives at the airport, it starts to decay. I use to call the custom department to release those items as soon as possible. But being a female, they would never give me any importance. I would say I am Dr. Hasina Khan and they used to say "Oh! Misses. Khan." They never recognize me as Dr. Hasina Khan and this is something that disappointed me, annoyed me. But I didn't give up. I started to live with it and started to accept what they are doing but I kept fighting in my way. Like I kept pushing them so that they would release my chemicals as soon as it arrives at the airport so that I get them in liquid form. When I kept on pushing them, they realized that they can't ignore me either than releasing my chemicals soon. So, there are some issues that I have to face. But frankly speaking, I didn't have many problems for being a woman. I was very much fortunate in this aspect.

8. What is your perspective on women in science in our country? How can they step ahead and lead us to a prosperous nation?

I have been researching for a long time now and I have many cases like boys have so many distractions in life than girls. That's why in most of the institutions, the results of the girls are better than the boys. That's why I used to get a lot of the best female students in my lab. Besides female students, there were male students also. So, I got the opportunity to observe both male and female students closely. And I found that the boys were smarter in thinking and everything. I am not saying that girls are not smarter, the boys are smarter. Girls are also smart but boys have a little edge. But what I found in the girls that they are smarter in their research. They could do multitasking, they could arrange many things at a time, they are very much focused on their work. But the boys aren't that much focused on their work, they can't handle many tasks at a time. In that way, I found that girls doing are much better in research as they can do multitasking. Nature has made us in that way. Women are born multitaskers. We can work at home, manage many things at a time, take care of children, again look after the family, do the cooking, almost everything single-handedly. So, we are born multitaskers. This thing also reflects in the lab, that they can perform any research much better than the boys. For this reason, I found girls are better researchers than boys. Boys, they think very well, they are logical in their thinking, they come up with great ideas. So, I am happy with that. But the girls I found that they can execute the idea so well that I get the result through the girls much more than the boys.

10. In the Era of the Fourth Industrial revolution, what role you think Agricultural biotechnology will play?

That's a nice question. I have seen a project in Bangladesh because I am in the Bangladesh Academy of Sciences and many projects are funded that have far-reaching. One of the projects was based on soil, about finding out the soil condition at a particular time of the year. That time suitable is the condition of the soil for cultivation for certain crops and it was based on soil. Finding the project, I was pleasantly surprised. Using all the soil parameters from across the field and they are such that much focused on their work, they can't handle many tasks at a time. The optimum condition to grow the crops in that period of the year is something. So, that was an aspect. But apart from that, the fourth industrial revolution also talks about metabolic engineering. That something we can do as molecular biologists. Metabolism is engineering is like – suppose we need to produce any product artificially, that we get from plants. What we can do is include the whole metabolic pathway of that product from

the plants and put this an organism that grows faster and easier to handle and from which we can easily extract the product. So, there are some metabolic engineering which is already practical now that soon is going to come in a big way. A lot of industries will be set up based on metabolic engineering. Still, we are producing insulin from bacteria but putting the whole pathway into a bacterium and getting the product is a new trend. So, there is also one aspect that the fourth industrial revolution is coming.

11. What is your observation regarding the research system and its limitations in our country through the last three decades? Which issues should be addressed for better scopes and sustainable development in the research area?

In the last 30 years as you mentioned, the improvement that we have been seen is the increase of the research funds that we have been getting from the government. That has been very good. It was little in the beginning but we are getting much more right now. But again, what we are getting is not much enough. Yes, we are getting much more than the previous but it is not sufficient. So, this is a big issue which needs to be addressed soon. There are many applications for a certain fund from science and technology and what that the government thinks which is perhaps good in some aspects that they fund almost everyone who applies for the fund and the idea behind this is to build a research base so everyone can get interested in doing research and to build a research culture. But the problem is when you are funding everyone, you are giving everyone a standard amount which is not sufficient. Like someone is demanding for 20 but you are giving him only 10 and the rest to the others... as a result of which we can fund everyone but couldn't get the maximum result out of it due to insufficient funding. So, instead of funding everyone the government should firstly find the places where we need development and should fund those areas firstly by funding them with the proper amount. So, that we can extract maximum outcome from those projects. The government should's hang this thing quickly and apart from this what should be changed quickly I think is the Ph.D. culture in our country, most of the students are looking to go abroad for Ph.D. I am not blaming them. It's not that, they don't love their country. The thing is, that I know there are not many good jobs in our country which is one of the reasons that our students are going abroad and also, if you get a Ph.D. from Bangladesh you know for sure that your degree is going to be valued undervalued. If you compete for a job and there is another applicant who has done his/her Ph.D. from abroad then, you will be not considered for the job for having your Ph.D. from Bangladesh, even if you have good publications. It is the publication

which should be the parameter for the judgment. But it is a matter of concern that in our country, students with good publications are not evaluated properly because of doing it from Bangladesh. Applicants who perform their Ph.D. from abroad it may be of any country that doesn't matter except Bangladesh gets more privileges. Everybody knows that while doing Ph.D. students give their best and it's the Ph.D. which leads the science in every country. It's the Ph.D. students who produce the best results in research. Everywhere in the world Ph.D. students have carried the science forward for their country. But unfortunately for not having the correct policies every year, we are losing our best students to foreign countries. So, I think the government should look into this matter more seriously. The government should take necessary steps so that students doing Ph.D. from our country should not be underprivileged in any job sector. Sorry, I get more emotional when I talk about this matter.

12. What is Your Message to Our Young Scientist? Is There Any Opportunity to Work On Your Current and Upcoming Research Projects?

Of course, I welcomed many students from all over Bangladesh, many from Shahjalal University of Science and Technology and Chittagong University. But my laboratory can take only one or two students every year. I want to tell you that, there are many other laboratories where you can go and work. Most important thing is to have passion. If you have passion, something happens but you can fulfill your dreams. So, keep the determination, keep the passion burning and you will find a way and getting the dreams come true. So, what I am saying you have the determination to do good work and I am sure you will find many laboratories and you can come to my lab and have many labs in my department for doing good work. I am sure you will be welcomed there. We take a lot of Ph.D. from outside of our department so you will also be welcomed there. Just don't be frustrated, you have to keep your dreams burning that you can do it and just take to it and you will be able to do it. If you go abroad please come back, thinking the country needs you. So, come back thinking about what you can do for the country, come back prepared to face all the odds. It may not be a very conducive atmosphere when you come back but be prepared to face all the odds and I am sure you will get success.

13. Where Do You Want to See Our Country in The Next 50 Years? What Achievements Should We Make in The Farthest Future?

From my teaching experience, I know our students are the best. It's comparable to any other students all over the world. If they get a very conducive atmosphere, they can do

workers. So, we need to give them the right opportunities continuously in the right step regarding research. IT sector has enjoyed a lot of opportunities but Biotechnology is an expansive area to work as I said so many consumables, peripherals that we need to import. There are no many infrastructures that we need. We gradually going with the world bank project, I think you may be aware of the 'Higher Education Quality Enhancement Project (HEQEP)' by the world bank. Many departments have good infrastructure facilities. So, the research is going in the right direction, which is not happening much in the companies, the industries not coming in collaboration with the academy. Until that happens, we cannot take interest in the people. So that we have to start. I don't know I can only wish for start cases. Hopefully, by ten more years there will be something realization, even Bangladesh scientists can deliver. Our industrialists will come forward and I am hopeful. There's no way that the critical machine will be able to make in the next 10 years can't be ignored and the companies will come forward and in the meantime, I am sure there are many biotechnologists will have their own startup companies. From that, the other industrialist will realize that the graduate has something in them which they can utilize. So, with that, I am sure in the next ten years something good will come out and the country will be benefited from all your experience that you will be having in the future.



"Let there not be an inch of land left without farming"

- Prime Minister Sheikh Hasina