



BLACK SOLDIER FLY FARM

Promoting Nutrition-Sensitive Value Chain through Black Soldier Fly Production and Farming in a Climate Change Vulnerable District- Satkhira

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SUMMARY REPORT

*Promoting Nutrition-Sensitive Value Chain
through Black Soldier Fly Production
and Farming in a Climate Change
Vulnerable District- Satkhira*

Reporting and Documentation

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1. BACKGROUND

❖ ABOUT PROBHA AURORA

Probha Aurora is a climate-sensitive and youth-focused social enterprise in Bangladesh. It envisions a world of transformed teenagers and young adults who are conscious of moral values and who demonstrate ethical behaviors in their daily lives including the response toward the environment and climate change. Its mission is to empower teenagers and young adults to be responsive to the environment and climate change in both local and global contexts. In doing so, we provide them sustainable life skills and career-building opportunities, we ensure their equitable access to digital technologies and resources, and importantly we connect them with local and global environment and climate change networks. We prioritize our action for the people and the community in climate change-vulnerable areas with social inequities, including low socio-economic conditions, unemployment etc. that requires consistent and special attention for upliftment.

❖ PROGRAM DESCRIPTION

Food waste makes up 'half' of global food system emissions and the UN Food and Agriculture Organization (FAO) reports that 'one-third' of the food produced in the world today is either wasted or lost each year before it reaches people's tables. These food wastes rot in landfills, releasing greenhouse gases, polluting the environment, and causing human suffering, including disease. Combined, this food waste would make it the world's third-highest emitter of greenhouse gases, behind the United States and China. Emissions from the food waste can be reduced using technology such as composting instead of disposing waste through landfills. Every year 10.62 million tonnes of food are wasted by households of Bangladesh and our country is struggling with waste management. Since, the black soldier fly's main diet is organic matter, Black Soldier Fly could be a unique solution to this.

The BSF is a harmless insect belonging to the Stratiomyidae family that has the potential to solve two of today's most pressing agricultural issues, namely, providing an alternative protein source for animal feed, judiciously managing organic wastes, and producing an abundance of byproducts and fertilizers.

According to Bangladesh Waste Database (2014), The total amount of waste generated every day in Bangladesh has been increasing annually since 1991. Whereas in 1991 the urban areas of Bangladesh were generating approximately 6,493 tons per day of municipal solid waste, by 2005 that figure had more than doubled to reach 13,330 tons per day. Most importantly, waste management becomes a big challenge for City Corporations/Municipalities/Households in the southern sites of Bangladesh.

Black Soldier Fly: Eco-Friendly Farming and Nutrition Solutions farm has already been established in Sathkhira (Kukhrali, Tabrardangi, Municipality Ward No. 6), a climate vulnerable region in the southern part of the country. At farm, a type of beneficial fly is cultivated from the organic waste collected from the garbage; especially from the municipality, with the intention of utilizing a portion of the area's accumulated waste, while the remainder will be used to produce high-quality fertilizer.

The fly is used as a high-protein feed for the poultry industry. There are native fish, native chickens, and native ducks being raised since this initiative encourages the cultivation of native species out of love for the nation. The farm reuses the organic manure they create through an equitable process to utilize it for indoor plant cultivation. As a result, no resources will be wasted during this endeavor indicating an illustration of zero waste. In accordance with the 5-year theory, this research also commences a procedure that results in an exemplary case of the circular economy.

Of the manyfold objectives of the farm, the primary focus is to reduce carbon emissions, decrease waste production, and improve human health and nutrition in order to create a more sustainable ecosystem. By prioritizing sustainable and healthy agricultural practices, eco-friendly and nutritious farms can help to address the environmental and health impacts of unsustainable agriculture. However, addressing this complex problem will require a combination of individual actions, corporate responsibility, and government regulations to ensure that sustainable practices are prioritized and implemented on a large scale.



Figure 1: Black Soldier Fly Farm from the outside

2. JUSTIFICATION OF LOCATION

Bangladesh has a humid, warm climate influenced by pre-monsoon, monsoon and post-monsoon circulations and frequently experiences heavy precipitation and tropical cyclones. Bangladesh's historical climate has experienced average temperatures around 26°C but range between 15°C and 34°C throughout the year. The average relative humidity in Bangladesh remains up to 80 percent from June to September. In some places, it varies from 60 percent to 70 percent. So, the climatic condition of Bangladesh is completely favorable for the cultivation, breeding and production of BSF larvae.

Besides, coastal areas are more vulnerable to climate change and natural disasters. Satkhira, located on the south west extremity of Bangladesh, is one of the climate-most vulnerable coastal districts in Bangladesh. Recognizing the urgency and significance of this issue, our program aims to provide substantial benefits to the vulnerable population in Satkhira by creating employment opportunities through the BSF Farm, which falls under our priority concerns.

Moreover, Satkhira city population is about 170,000 with around 17,000 in 47 slum communities, and the city generates **56 tonnes of waste generated daily**. Satkhira lack effective waste management. As a result, they face an increasing amount of household and fecal waste. Satkhira has huge problem regarding collecting and segregating of existing waste management whole scale. The black soldier fly's main diet is organic matter. And our country is struggling with waste management. Black Soldier Fly could be a unique solution to this. According to an estimate from 2018, 30 thousand metric tons per day in eight divisional cities waste is produced.

We can convert that waste into protein and fertilizer, which will play an effective role in meeting the protein requirements of our fish and poultry diets. Improving the quality of life of all farmers in an effort to make agriculture, poultry, fisheries and animal husbandry sustainable in our country- is the main goal of farming this BSF larva. The main objective is to help the country become self-sufficient by reducing the country's dependence on imports and producing high protein feed and organic fertilizer for fish, poultry and domestic animals through bio-conversion of household waste with the help of black soldier fly larvae.

3. PROGRAM RATIONALE

Waste management is not yet fully institutionalized in Satkhira, which is located in a highly climate-vulnerable southwest coastal region of Bangladesh. There needs to be an effective model for transforming waste into wealth through such initiatives in Bangladesh. BSFF in Satkhira aims to institutionalize an integrated waste management system through cultivating the BSF larve. The collected municipal organic waste, upon processing with BSF Larvae, will be

converted into protein and fertilizer, which will play an effective role in meeting the protein requirements of our fish and poultry diets.

On the contrary, overexploitation pressure on natural resources increases gradually to meet the protein demand for aquaculture, livestock, and pet animal feed production. Further, trusted feed availability is a problem, especially for poultry. The available feeds in the market are low in nutrients but costly to the average poultry farmer. Besides, the feed generates normal waste, which emits carbon.

To minimize the pressure sustainably, live feed, i.e., insects and their larvae, could be the most promising alternative source of protein. The most widely used insect as animal feed is Black Soldier Fly Larvae (BSFL) (*Hermetia illucens L.*), fed on organic waste voraciously while building their body composition of 40-48% protein, 30-38% fat and a range of essential minerals. The higher amount of protein content could be used either as the complete or partial replacement of highly expensive fishmeal, wherein the higher value of fat content of BSFL could be an essential source for biodiesel production.

Besides, the BSFL has higher organic waste conversion capability and reduces certain harmful bacteria and insect pests. The insect utilization is hindered due to limited information on BSF production strategies. However, the ever-increasing world population has catapulted the demand for animal proteins beyond supply and organic waste generation.

4. PROGRAM OBJECTIVES

- 1) **Integrated Waste management:** The black soldier fly program in Satkhira aims to implement integrated waste management practices. This involves the efficient and sustainable management of various types of waste, including organic waste, through the use of black soldier fly larvae. The larvae are fed with organic waste, helping to reduce its volume and prevent it from ending up in landfills or causing environmental pollution.
- 2) **Organic fertilizer production:** One of the objectives of the program is to produce organic fertilizer using the black soldier fly larvae. The larvae efficiently convert organic waste into nutrient-rich compost, which can be used as organic fertilizer for agricultural purposes. This promotes sustainable farming practices, reduces the reliance on chemical fertilizers, and improves soil health and fertility.
- 3) **Nutrient rich poultry and animal feed production:** The black soldier fly larvae are also utilized to produce nutrient-rich feed for poultry and animals. The larvae are an excellent source of protein, and their incorporation into animal feed enhances its nutritional value. By producing such feed, the program aims to support the local poultry and livestock industry, improve animal health and productivity, and reduce the dependence on conventional feed sources.

- 4) **Employment generation:** The black soldier fly program in Satkhira focuses on generating employment opportunities for the local community. The establishment and operation of facilities for waste management, organic fertilizer production, and feed production require a workforce. This initiative aims to create jobs, particularly for individuals living in low socio-economic conditions, thereby contributing to poverty reduction and economic upliftment.
- 5) **Increased awareness and a positive socio-environmental impact:** Another objective of the program is to raise awareness about the benefits of the black soldier fly program and its positive socio-environmental impact. By engaging with the local community, farmers, and stakeholders, the program aims to promote sustainable waste management practices, organic farming methods, and responsible resource utilization. This increased awareness can lead to broader adoption of environmentally friendly practices, contributing to the overall well-being of the community and the environment in Satkhira.

5. PROGRAM ACTIVITIES

❖ THE PROCESS

Black soldier fly farming has been started as a unique initiative for the first time in the country with integrated management in an environmentally friendly way, taking into consideration the climate change issue seriously. At one hand, waste management, and the process of converting waste into resources; on the other and thereby creating new employment opportunities in the climate vulnerable district- Satkhira.

The overall process consists of 2 broad steps as follows -

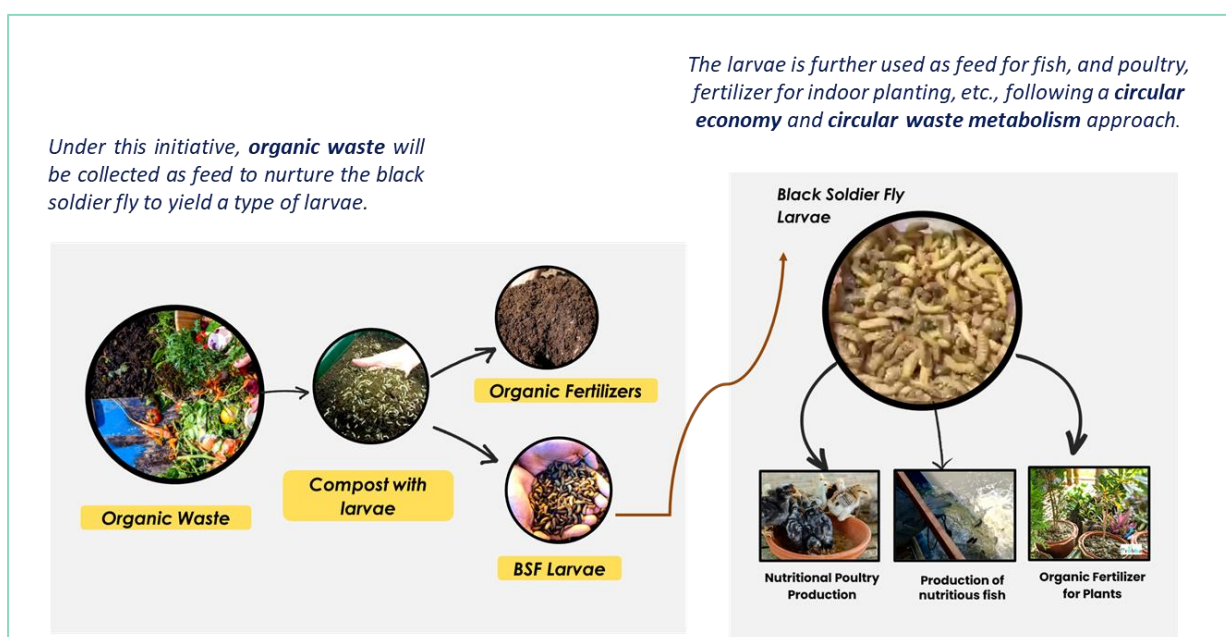


Figure 2: Turning waste into wealth using BSF Larvae

Throughout its life cycle, the BSF can tolerate extreme temperatures, with the exception of the oviposition period. There are five distinct stages in the BSF insect's life cycle: egg, larva, pre-pupae, pupae, and adult. BSF completes its life cycle in approximately 40 to 44 days. BSF larvae that have recently emerged are opaque-white and actively crawl towards the substrate, where they feed on whatever food is available during this life stage. It takes the larvae approximately two weeks to achieve maturity. During the larval and pupal stages, the BSF is able to convert organic refuse into high-quality protein and lipid biomass. In this bioconversion procedure, refuse is diminished. Furthermore, larvae can consume pathogens and reduce their detrimental effects. In their final stage, the larvae weigh approximately 0.2g and measure 25mm in length and 6mm in diameter. Despite their diminutive size, the larvae are resilient and can survive extreme oxygen deprivation if necessary.

The overall process will undergo the following systems –

1. Black Soldier Fly Organic Waste Processing System:

Waste Source: The farm collects organic waste primarily from source-separated Bazar, household, and hotel waste. The waste consists of agricultural farm byproducts, pre- and post-consumer food scraps, expired manufactured foods, industrial waste streams, market refuse, animal manure, and human faeces.

As transportation is a vital factor, we are introducing a minivan for agricultural waste collection. There would be a plastic free container for weighing organic waste. In addition, a weight machine will estimate the total quantity of waste collected and categorized by type.

The farm has started its operational scheme where comprehensive daily form has been introduced with cost analysis and medicinal records in details day to day or monthly.

2. Waste Preprocessing:

The BSF organic waste processing facility consists of waste pre-processing. The steps are;

- i. **Particle size reduction-** The size of organic waste is reduced as being devoured by BSFL.
- ii. **Dewatering-** Sludge water is being reduced from waste as the maximum waste is being devoured by the larvae.
- iii. **Inorganic waste removal-** Then the residual inorganic waste is being removed.

3. BSFL bio-waste treatment.

4. Separation of BSFL from the process residue.

5. Refining larvae and residue into marketable products (described below)

In addition, to manage every aspect of Sathkhira waste management setting, there are specific sections including the Poultry Farm, Fish Farm, Duck Farm, and Fertilizer/Indoor Plant Section.

⇒ POULTRY & DUCK FARM

The BSF larvae raised on organic waste or kitchen wastes work well as poultry chicks feed supplements. It can replace soybeans in broiler chicken feed by 10–20% and produce similar productivity, feed efficiency, mortality, and carcass features. Fifty percent or entire replacement of soybean meal with substantially de-oiled BSF larval meal in egg-laying chicken diets did not affect laying performance or feed efficacy.



Figure 3: BSF Larvae as Poultry (Duck, Chicken) Feed in the Farm

The BSF larval meal has high digestible energy and amino acid apparent optimum digestibility coefficients to make it a valuable ingredient in broiler diets. The BSF larvae also include a reasonable amount of minerals for domestic birds' diet.

⇒ FISH FARM

Fish can get protein from BSF larvae. Positive study has been done on this industry.

Channel catfish (*Ictalurus punctatus*), Nile tilapia (*Oreochromis aureus*), Hybrid tilapia (*Nile niloticus* crossed with *Sabaki tilapia*), Rainbow trout (*Oncorhynchus mykiss*), Walking catfish, and yellow catfish (*Tachysurus fulvidraco*) were used in the BSF meal-based research.

Bangladesh's fisheries are vast because it's riverine. The BSF larvae has been used as fish feed in Black Soldier Fly: Eco-Friendly Farming and Nutrition Solutions.



Figure 4: BSF Larvae as Fish Feed in the farm

⇒ INDOOR PLANTS

Since, Black Soldier Fly: Eco-Friendly Farming and Nutrition Solutions is now located in Sathkhira (Kukhrali, Tabrardangi, Municipality Ward No. 6) with the intention of utilizing a portion of the area's accumulated waste, while the remainder will be used to produce high-quality fertilizer.



Figure 5: Indoor Plants Cultivation using Organic Fertilizers generated from BSF Farm

In the farm, we are only introducing native fishes, native ducks, native poultry and native indoor plants as well.

❖ FARM VISIT PROTOCOLS

There are specific instructions to follow before entering this farm, as indicated by the posted signs: “No entry with plastic”, “No entry with food”, “Maintain a smoke-free environment”, “No littering in water”, “Use mask, and gloves before entering”, “Dispose mask and gloves in a designated place after exiting the farm”, etc.



Figure 6: Farm Visit Protocols and Instructions

This outlines that this farm solely focuses on the environment.

6. PROGRAM LAUNCH

On May 11, 2023, at the launching event of *Black Soldier Fly: Eco-Friendly Farming and Nutrition Solutions Farm*, the program delegates along with distinguished officials assembled in the Satkhira district's District Commissioner's auditorium after visiting the farm. As the chief guest, Additional Deputy Commissioner of Satkhira District, Sheikh Moinul Islam Moin made the announcement of the ceremonial opening of this farm.

A special delegation from Dhaka attended the ceremony led by Probha Aurora Advisory Board member, Dr. M. A. Sattar Mandal, Emeritus Professor, Department of Agricultural Economics, Faculty of Agricultural Economics and Rural Sociology, Bangladesh Agricultural University (BAU), Former Vice-Chancellor, (BAU), Former Member, Department of Agriculture and General Economics, Bangladesh Planning Commission. The other delegation members are Former Executive Chairman of Krishi Gobeshona Foundation (KGF) Professor Wais Kabir; Former Representative of John Hopkins, Yasmin Siddiqua; Ms Dalia Das and others. The event was presided over by Bidhan Chandra Pal, the founder and managing director of Probha Aurora. The senior officials from the Bank Alfalah attended the event virtually via Zoom.

At local level, the special guests were: Md Abul Kalam, Editor and Publisher, The Weekly Mukto Shadhin; Md Hadiuzzaman, Senior Assistant Director, District Fisheries Office, Satkhira and others. The entire inaugural event was conducted by Dr. Aftab Uddin, Policy-Strategy-Research Advisor of Probha Aurora and Chairperson, Public Health Foundation, Bangladesh and Former Officer, iccdr,b, the Ministry of Health and Family Welfare, and World Health Organization (WHO).

The chief guest, Additional Deputy Commissioner thanked Probha Aurora for this initiative at Satkhira District and stated that it is appropriate to choose Satkhira because waste management is yet to be fully institutionalized here. He also mentioned this initiative as a great move in a place like Satkhira, where the poultry sector is also growing. He requested academic institutions to be involved with this initiative and its research, and he added that the Satkhira district administration will always support the efforts of Probha Aurora. As a partner institution of this project, he advised setting up a separate conversation with the municipality.

Dr. M. A. Sattar Mandal gave a keynote speech. In his speech, he stated that this initiative is a commendable approach - Black Soldier Fly Farm, a new innovation in the production of healthy animal feed for environmentally friendly food production. He also advised that to move this forward, we need to work in public-private and public-public partnerships. For the successful conduct of the research aspect of this program, it is necessary to increase the collaboration with the concerned scientists at the university level.

Ms. Mahinoor Nazia Farah, Assistant Manager, Research and Special Initiatives, Probha Aurora; and Satkhira District Coordinator of Ecofriendly and Nutritious Farm, Probha Aurora, Mr. Khandokar Yeasir, gave a detailed presentation on the initiative. They mentioned in their

presentation that during the pilot program's initial phase, there is a plan to handle around 2.5 tons of organic garbage annually. But depending on patronage and collaboration, the amount will be adjusted in future. They added that the revenue that will be generated here will be utilized for integration of multi-faceted work on climate change conducted by Probha Aurora.

7. FUTURE DIRECTION (LONG TERM PLAN)

BSF piloting has opened up many future opportunism and scalable options to Probha Aurora subject to availability of required funding. Our future long-term plans include among others the followings:

1. **Poultry Farming:** As we are planning our project now, within six months, we expect to process approximately 300 kg of organic waste per day, which will yield 120 kg BSFL and 200 kg bio-fertilizer. With 120 kg BSFL, we expect to feed 250 ducks or chickens as a food supplement. If this plan is implemented, we will be able to increase our work by 50% annually.
2. **Waste Processing:** We are already collecting wastes from household, hotels, restaurants, markets etc. The primary objective of Probha Aurora is to process 300 kg of organic waste per day by this year, 450 kg per day in 2024, and 675 kg per day by 2025.
3. **Technology Integration:** One of our unique strengths is to harness the power of technology to maximize the benefit of innovation for the target beneficiaries. We are going to introduce waste-related equipment and machinery that will modify the farm. Such as non-plastic bowl, weight machine, robotic segregation machine etc.
4. **Aquaculture:** The depth of the pond will determine the three levels of fish aquaculture, which is one of our objectives. On the upper layer -Katla or Silver Carp, at the middle level – Rui, at the bottom level – Mrigal or Kalbaus (Catfishes). If we plan to market within six months then fish weighing 800g-1kg should be released in the pond.

The results of this calculation are merely an estimate of what can be accomplished with placing our own plan and money to work. Our work will advance more quickly if we receive additional funding as our next plan phase involves –

- I. **Scaled-up Waste Management:** Daily organic waste production by the Sathkhira union and municipality is 4000 kg (4 tonnes). We aim to process all of this organic waste because it will help us produce more BSFL.

- II. **Land Acquisition:** We want to acquire our own land and begin cattle farming, which can have positive results. 600 kg of desiccated BSFL can be used daily to feed 200 cattle.
- III. **Employment Generation:** Increased work opportunities for those living in climate-vulnerable regions of Bangladesh will be possible.
- IV. **Increased Awareness:** This initiative will include all types of individuals from every community. Annual trainings and volunteer opportunities will be conducted to raise awareness about climate change and nutritional value.
- V. **Green Key Accreditation:** The farm will be the first project of its kind in South Asia, and it will be accredited by the Green Key Initiative. [Green Key](#) is a leading international eco-label awarded establishments that commit to sustainable business practices, certified by the world's largest environmental education institution, Foundation for Environmental Education. We also want to include constructing an accommodation facility for guests and tourists.
- VI. **Handicraft SMEs:** Soon, we will introduce some crafting options by employing a small number of individuals who can turn leftovers from farming into handicrafts, thereby giving them new life.
- VII. **Research and Knowledge hub:** In addition to publishing pertinent papers in (highly referenced) journals, we will be able to do research on the nutritional content of the products, compare market feed to BSFL feed, and grow local indoor plants. We will also be able to compete for more grants and positions.

8. PROBHA AURORA'S AWARDS & ACHIEVEMENTS

Probha Aurora attended South Asian Climate Action Conference 2023 which is being held in Kathmandu Nepal organized by National Youth Council (NYC) & Youth Development Center (YDC). On, June 20, 2023, the Inauguration & Award Ceremony was held at the beginning of the first day of the conference. It is a remarkable experience for Probha Aurora, was awarded the **Everest Climate Action Award 2023** at the conference in recognition of its contribution to combating climate change. Probha Aurora's Policy-Strategy-Research Advisor Dr. Aftab Uddin and Assistant Manager, Research and special initiatives Ms. Mahinoor Nazia Farah accepted this award on behalf of Probha Aurora. Rt. Honorable Ram Sahaya Prasad Yadav, Vice President of Nepal Government; Program Chair Abhinav Kumar Chaudhary, Surendra Basnet, Vice-Chairperson of National Youth Council; Sunil Kumar Manandhar, Chairperson-Conference Organizing Committee and dignitaries were present at this time.



Figure 7: Everest Climate Action 2023 Awarding of Probha Aurora

Probha Aurora also provided a quick overview of Black Soldier Fly: Eco-Friendly Farming and Nutrition Solutions farm on a global scale. Probha Aurora has represented the entire procedure and outlining the significance of the BSF farm, which is one of our captivating and memorable accomplishments.



Figure 8: Presentation of BSF Farm Program Initiative of Probha Aurora in South Asian Climate Action Conference 2023

9. PARTNERSHIPS & COLLABORATIONS

Probha Aurora has already forged partnerships with over 25 national and international associations and consortiums. For the BSF Farm Program, a number of partnerships has been forged and some of them are presented in Figure 9.



Figure 9: Few partnerships of Probha Aurora for the BSF Farming Initiative

❖ SPECIAL ACKNOWLEDGEMENT:

Bank Alfalah has collaborated with the program since its inception. It has been contributing to each step of the success of Probha Aurora's Pilot Stage plan and we believe and hope it will continue to provide support for a successful end of the pilot phase and thereafter for the future expansion of the proposed program.

The establishment of Black Soldier Fly: Eco-Friendly Farming and Nutrition Solutions farm with the goal of combating climate change and waste management would undoubtedly not be able to proceed through the pilot stage and into the next stage without funding from Bank Alfalah.



Figure 10: Forging Partnerships with Bank Alfalah

Probha Aurora is very appreciative of this initiative, and Bank Alfalah CSR has committed to make such investments in the future.

Probha Aurora has already implemented the first initial responsibilities, which include training, designing, generating awareness, and other subsequent activities. Probha Aurora will keep collaborating with Bank Alfalah by offering a percentage of profits to investors, equity shares (upon mutual agreement), and acknowledgment for contributions to environmental protection and climate change mitigation.

The importance of establishing collaborative partnerships between research institutions, government bodies, and industry stakeholders was emphasized through this partnership. Both the parties recognized the need for knowledge sharing, joint research projects, and the development of best practices to drive innovation and maximize the potential of black soldier fly farming; and thereby agreed for a separate discussion in future about the partnership plan.

10. FINANCIAL REPORT

- Provided upon request -

11. CONCLUSION

Black Soldier Fly is a very beneficial insect, having negligible negative consequences on the environment. Bangladesh, being a poor country, can utilize this insect in order to disintegrate municipal solid organic wastes, poultry and animal feed substitute and biofertilizer, and if appropriately scaled can become a sustainable business approach for livelihood, save millions of foreign currencies for Bangladesh, and most importantly can help alter the dynamics between population, natural resources and climate change and its adaptation. The Black Soldier Fly Farm can be an excellent instrument for Sathkhira's waste management system, and it can also provide employment opportunities and empower women in the local community. Further funding can help us move forward with our plans and ideas regarding an appropriate waste management scheme and establishing the farm on a larger scale for multidimensional purposes related to a stable environment and climate.

ANNEX



উৎপাদিত হবে পুষ্টিমান সমৃদ্ধ হাঁস, মাছ, ডিম ইত্যাদি

ব্লাক সোলজার মাছির লাৰ্ভা
(BLACK SOLDIER FLY LARVAE)

পুষ্টিগন সম্পন্ন হাঁস - কুরাণি উৎপাদন
(Production of nutritious poultry)

পুষ্টিগন সম্পন্ন মাছ উৎপাদন
(Production of nutritious fish)

মাছি জৈব বৰ্জ্য হতে জৈব সার
(ORGANIC FERTILIZERS FROM FLIES ORGANIC WASTE)

অল্প পরিমাণ মাছির লাৰ্ভা থেকে পরবর্তীতে বেশি লাৰ্ভাৰ জন্ম হয়ে এবং যা হতে অবশিষ্ট জৈব বৰ্জ্য সার হিসেবে ব্যবহার করা যায়

A small amount of fly larvae later produces more larvae and the remaining organic waste can be used as fertilizer

জৈব আবর্জনা
(ORGANIC WASTE)

দৈনিক ফলসমূহ, সবজি ইত্যাদি খাবার এবং তার অবশিষ্ট বর্জ্য হিসেবে ফেল দেওয়া হয়

Daily fruits, vegetables etc. food and its leftovers are thrown away as waste

ব্লাক সোলজার ফ্লাই মাছির লাৰ্ভা
(BLACK SOLDIER FLY LARVAE)

আবর্জনা থেকে জৈব আবর্জনা পৃথকীকরণের পরবর্তীতে জৈব আবর্জনা হতে মাছির লাৰ্ভা জন্ম পরিমাণে স্থান

After separation of organic waste from debris, small amount of fly larvae are placed in organic waste.

মাছি জৈব বৰ্জ্য হতে জৈব সার
(ORGANIC FERTILIZERS FROM FLIES ORGANIC WASTE)

অল্প পরিমাণ মাছির লাৰ্ভা থেকে পরবর্তীতে বেশি লাৰ্ভাৰ জন্ম হয়ে এবং যা হতে অবশিষ্ট জৈব বৰ্জ্য সার হিসেবে ব্যবহার করা যায়

A small amount of fly larvae later produces more larvae and the remaining organic waste can be used as fertilizer



