Proposal to aid in hunger eradication and improve food security in Ethiopia

Submitted by: 7th & 8th grades students from Midreshet Amit Kama, Yeruham, February 2020

Introduction

As an introduction, we found it appropriate to quote one of the students who worked on the project:

"The project helped me learn how to learn independently, developed my teamwork skills, opened me up to new horizons and directions that I had never thought of, and contributed a lot to me. I am delighted to be part of the ISDG project and enjoy every part of the process, and I thank you for all of that."

Summary

The goal of our project is to provide food to the growing population of the world in general, Ethiopia in particular and to the eastern part of Ethiopia. We chose to deal with the hunger issue because food is a source of life. We propose transforming locusts into daily and regular food, which will be the main protein source, as a substitute for sheep and cattle.

Our innovation is not in researching the adaptation of locust breeding to the hunger solution, because it already exists. We believe that this agricultural sector can be adapted to East African countries both as a private breeding system for one family and as an agricultural growth for sale and export, by developing a modular and relatively small **mobile growth cell**.

A private person who grows grasshoppers in two or three compartments for use in his home can eat them as they are or grind them into flour (which can be used as a base for food in a time when there is not enough mature locusts). As he gains skill in breeding the locusts, he can add more cells to take care of until he can cover his family's protein intake and will not have to buy it or rely on more expensive sources, such as cattle A large company or farm can maintain a large number of units, sell such units to small farms, and can produce more related products if added to a grinder plant and packaging system.

Locusts

The two common species of grasshoppers explored for food are the desert locust (Schistocerca gregaria) and the migratory locust (Locusta migratoria).

Nutritional values: Protein - Protein concentration of 70% vs. 20%-25% in fish and meat; Fat - Contain all the fatty acids needed for daily feeding. Fat composition is very low relative to cattle, at a level of 6%-10%. Contain omega 3 and omega 6 fatty acids, which are especially important in countries where there is limited access to fish and seafood; Minerals: Edible insects are a rich source of iron and zinc in equal or preferable proportion to cattle. It also contains copper, magnesium, manganese, phosphorus, selenium and sometimes folic acid; Nutritional fiber - exists in high concentrations.

Characteristics: The efficiency of converting food into biomass (the amount of mass of organic matter that can be used as an energy source) in insects is high, and they hardly harm the environment. To produce pounds of cow meat, thousands of gallons of water are needed, whereas grasshoppers receive their water only from the vegetables they eat, and there is no need to water them and no need to provide them with non-vegetable food. Unlike insects, cattle herds are responsible for the release of 14 percent of the methane greenhouse gas volume, and even cause extensive emissions of toxic ammonia gas.

The amount of food that insects consume is up to 80% lower than the food needed for cattle herds to produce the same amount of protein, and their growing areas are much smaller.

The grasshopper is resistant to a wide range of temperatures. 4-50 ° C. The amount of eggs produced depends on the environmental conditions, and when certain conditions allow, there may be an uptake of about 150 eggs per year compared to only 40. This phenomenon is domestic in Africa. We have found that this strengthens the correlation between Africa and this agricultural industry. Growing locust in Ethiopia's warm region may produce high production and rapid growth.

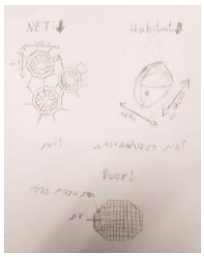
Why we chose Ethiopia

Firstly, we know a lot of people who came to Israel from Ethiopia so we know the culture and difficulties in Ethiopia. There were two major and severe droughts in Ethiopia in 2015-2017 and 1983-1835. Ethiopia has periods of hunger, an unemployment rate of about 18.5%.

Despite the growth of the industrial sector with China's help, agriculture still contributes one-third of Ethiopia's GDP (the major domestic product). The main industry is coffee, legumes, grains and sugar cane. Many farms are engaged in self-sustaining agriculture cattle and sheep farming.
12 million small agricultural households generate 95% of output and 85% of sector employment. Due to the fact that Ethiopia relies heavily on agriculture, if it does not rain (drought) then the fields dry and then both the crops and the cattle and animals used in agriculture suffer severely.

The warm, eastern region of Ethiopia, less than 1,900 meters high, is tropical or humid with temperatures ranging from 20 ° - 38 ° C, growing conditions suitable for insects.
Our project of developing portable and modular small unit cells, remains true to traditional agriculture and home-grown crops. On the other hand, an agricultural sector of insect breeding needs much less water than field or cattle crops and is less damaged in times of distress. Due to its size it is portable and in case of extreme conditions it can be relatively easily shielded or find a suitable local solution.

Cell structure



The idea is to produce a hexagonal unit cell (a cell shape that is widespread in nature and used for modular arrangement and to create a stable spatial structure, such as hives and insect eyes). At the bottom of the cell will be a 5-10 cm thick layer of soil that will be used to anchor the roots of the edible plants and a bedding for laying the locusts eggs. The cells will be made of recyclable fabric. The cells are ventilated so that there is gas exchange with the environment, the fabric will allow sunlight to penetrate the plants. The conditions are kept natural and very close to the natural breeding environment.

The cell unit can be folded to flat before the soil and seedlings are inserted, it is lightweight and therefore can be transported efficiently. The cell will be able to be sold and transported between different areas of Ethiopia, between villages or farms and even between one side of the yard and the other.

The benefits of using a mobile structure are that it allows finding optimal natural conditions or transferring breeding units between different sites. There is no need to build a massive infrastructure such as a large building that may prove to be retrospectively mistaken or misplaced. They can be manufactured in one place and effectively transported elsewhere.

Addressing the goals

The booth will improve home farm yield, increase the nutritional value of agricultural produce and increase drought resistance, in an effort to ensure safe, nutritious and satisfying food throughout the year.
Locust breeding is a worthwhile and stable investment because its breeding rate is high, its growth is cheap, and the amount of protein in it is higher than beef (relative to weight). The cell is suitable for farms serving one parent house and larger farms.

Our system is ecological. Insect breeding is characterized by a much lower level of greenhouse gas emissions relative to its demanding population, such as land and water consumption.

In the first 3-4 years of project implementation, a research team is needed. Its duties are:
- Consider adjusting the size of the optimal locust population relative to the unit cell volume.
- Examine the nutritional preferences of grasshoppers from the variety of local vegetation. Check fertilizer supplements for plants that feed the grasshoppers.
- Assist the households in treating the unit cells to make them yieldable and non-perishable.
- Check the correct timing when the grasshopper is recommended for eating. That means maximum nutritional mass versus minimum resource investment.

Budget
- 2 daily employees for a few dozen cells;
- A professional supervisor responsible for 5-6 farms, taking care of the locust development and health;
- 2 people for preparing locusts for food (or picking live grasshoppers or grinding for flour and packing, or making ready-made cells for sale);
- A marketing man;
- Research team, as mentioned above;
- Unit cell price estimation, relying on tent prices plus adjustments can cost about 6$.

The indicators for project success
- The local population would like to use it properly and succeed producing food themselves.
- The amount/percentage of locusts would be worth eating
- Financial success: cheap enough price so the residents would be able to buy unit-cells.
- Grasshopper will enter into the food market, as flour, as a food additive, and/or as an unprocessed food.
- Checking hunger rates before the establishment of the project and after.
- Health check will advise that insect-fed population is healthier than population feeding as it is today.

Challenges and Solution Suggestion
- Grasshoppers might escape from unit cells. Solution suggestion: You can lock the locust in two cages.
- If it turns out that locusts are unsatisfactory and not tasty or would not be likable. Solution suggestion: Find lots of options for food that can be produced with locusts and not just one food / product, in addition to what is produced from the locus some carbohydrate / or produce another satisfactory product: as a spice, mix with another flour, present as a fried, baked, cooked product. Advertising Campaign: Persuasion and explanation of the product, and the product can be advertised to make it a 'brand' that many want to eat.
- Will it prove that the solution is too expensive? Solution suggestion: Investment in fundraising, savings plans and investors.
- Do phenomena arising from the climate crisis disrupt the growth of the locust / the construction of the breeding structure. Solution suggestion: Prepare a plan for a wind-resistant structure. Prepare a solution for changing weather conditions such as storm, rain, heavy heat.

In Conclusion
Although traditionally this is "low-tech" farming, there is great potential for perfecting and introducing advanced methods to this industry. As we progressed through the project, we realized that there was still a long way to go. As we realized that the idea of growing insects for food already exists, we realized that there is a great distance between the developers today and the needy residents, and we were looking for a way to make a bridge between them.

We would thank Mr. Yoram Zvik, director of the Duchifat Association for Birding and Ecology.