



Black Flies Can Be A Good Thing

Eric Katz, with project partner Professor Charles Ngugi



Black soldier fly larvae

GLOBAL IMPACT ARTICLE SERIES

Between 30-40% of fish removed from the world’s fisheries become food for livestock, like fish, chickens, or pigs. This despite the fact that over 90% of fisheries are overexploited, unable to sustain rising demands. The removal of the forage fish used as feed in the aquaculture industry harms aquatic ecosystems and, as fish are an essential part of the diets and economies of many cultures, failing fisheries also result in economic and food security crises.

As long as fish are being used as feed, and meat is increasingly in demand as living standards around the world rise, simply cutting back on Friday fish fry dinners isn’t enough to alleviate the problem. Aside from veganism, finding another source of protein for our food supply is a good first step. One potential source, that might be living it up in your backyard compost, are black soldier flies.

Black soldier flies are an innocuous insect with the ability to consume twice their weight in a day during the larval stage, thus transforming large quantities of most organic material like food waste, into fat and protein. This fact has caught the attention of scientists, farmers, and composters all looking for a better way to both feed an increasing population and recycle the growing amount of organic waste produced by that population.

With a \$5,000 seed grant from the Dow Distinguished Awards competition, a U-M student team conducted a study to determine the demand for a black soldier fly feed production facility, and how this might contribute to an emerging agriculture and waste management industry. Students found evidence of demand for a feed facility and successfully pitched a plan to continue fostering a new business called Kulisha. After completing its initial work successfully, the team was awarded \$35,000 of additional support from the Dow Distinguished Awards competition to continue their efforts.

AN IDEA

Vraj Sikand, a co-founder of Kulisha, started the team thinking about sustainable animal feed. Sikand is from Kenya, and he noted the difficulty Kenyan aquaculture farmers had in getting good quality feed and the environmental damage the use of forage fish as feed was doing in the region. This issue got the student team considering how to make a better feed, and eventually stumbled on the nascent black soldier fly industry.

Eric Katz, now a U-M alumnus and a member of the original student team, is working with a new team to redirect organic waste products from the Washtenaw County landfill and turn it into high-protein animal feed. Although the idea was based on a conversation about Kenyan aquaculture, Katz and his primary

partners, Sikand and Maya Faulstich-Hon, have decided to establish their business in Ann Arbor. Kulisha will address the dual challenge of food security and waste management, working in partnership with local businesses in the Ann Arbor area. Launched with support from the Dow Distinguished Awards program, the team is also identifying other funding sources.

THE BUSINESS PLAN

Kulisha’s first partner is Ann Arbor Distilling Company. The distillery sources all of its ingredients locally and aims “to just to have a great product, but also be as neutral [environmental impact] as possible,” says Rob Cleveland, a company co-owner. While both marketing and environmental concerns influence this decision, it largely “boils down to dollars and cents,” he says—reducing energy and waste reduces costs. The company creates approximately one ton of spent grain with every batch of spirits distilled, and finding a way to dispose of that grain is “a persistent problem,” says Cleveland. So far, they’ve been giving the spent grain to local farmers for use as high-protein animal feed. But the amount of the company’s waste is much higher than the demand of a single farmer. So the distillery



requires as many waste-management partners as possible. This is what makes Kulisha an attractive partner. The flies always need to eat, and they can eat a lot. “Ultimately we [Kulisha and the distillery] can be partners that scale up together,” says Cleveland.

Ann Arbor Distilling Company is a great partner, says Katz, because they are “conscious of the impact they are making and very open to ways to improve.” It was Katz’s pitch about the use of 40% of fish stocks as animal feed that got Cleveland’s attention — he couldn’t believe animal feed was cleaning out the Pacific Ocean. “We absolutely want to help,” he comments.

TREATS AND FEED

Kulisha will set up a portable black soldier fly facility — created from recycled shipping containers — at the U-M Botanical Gardens. While they work on refining their methods and better understanding fly lifecycles, Kulisha plans to focus on creating high-protein treats for non-commercially-raised chickens. Currently, black soldier flies are only allowed to be used as commercial feed for salmonids (e.g., salmon, trout, whitefish), says Katz.

Products sold as “treats,” rather than feed, fall under different regulatory structures. The plan is to focus on producing the treats and eventually increase the scale of their facilities to be able to create a protein base that can be used in commercial animal feed, as a more sustainable alternative to the common fish protein. Current efforts to change legislation regulating feed may change soon, helping pave the way to use black soldier fly protein in all types of commercial animal feed.

THE BLACK SOLDIER FLY

Of all fly species, the black soldier fly (*Hermetia illucens*) is the one fly you’ve probably never noticed. They do not bite, or carry diseases. In fact, their behavior tends to inhibit the growth of other fly species that carry disease and pathogenic bacteria. Black soldier flies are quite innocuous as flies go, and they have hidden depths.

In their larval state, the flies can go through huge quantities of organic waste at a rapid pace. Each fly grows around 5,000 times in two weeks, and during that time period, it consumes two times its body weight each day, according to EnviroFlight. Kulisha’s goal is to use the flies to process one ton of food waste per day in their initial pilot facility.

Katz, and other members of the student team, discovered the flies will eat just about anything but they work very well as part of a composting or food recycling system. As long as fly larvae are provided food waste at their normal rate of consumption there is little to no noticeable smell of rotting food. Once the larvae are ready to turn into pupae (like a butterfly’s chrysalis), they leave their food source in search of open ground in which to burrow. Their migration is easily guided, as the larvae crawl along any path available out of the waste. They do not hesitate to crawl out of a hole in the ground and free-fall into a receptacle out of which they can be collected and cooked. Essentially, the bugs self-harvest.

OVERCOMING CHALLENGES

Currently, Katz is working at Kulisha full-time, but getting to this point hasn’t been easy and there have been a multitude of challenges, he says. Figuring out how to create a business, breed the flies, create a viable set up, and market their ideas has required the expertise of engineers, biologists, business experts, and communications specialists. “It was hard. Everyone thinks a different way,” he says. But having all those different perspectives was, and still is extremely important.

For others thinking about launching a product, or business, Katz advises that, “if you have an idea, find a way to rapidly test it and prove or disprove your hypothesis.” Kulisha started off with a small colony of flies Katz bought off the internet and grew in his room. With some additional funding, the business shows promise to be a profitable venture with the potential to positively impact food systems and waste management processes.



DOW DISTINGUISHED AWARD TEAM MEMBERS

- Mohammad Azimi, Ross School of Business (RSB) and the College of Engineering (COE)
- Eric Katz, RSB
- Katie Matton, COE
- Jonathan Luthy, COE

COLLABORATORS

- Viraj Sikand
- Maya Faulstich-Hon
- Lunalo Cletus Lunalo
- Arjun Paunrana
- Catherine Hebson

FACULTY ADVISORS

- James Diana, Professor of Fisheries and Aquaculture, School for Environment and Sustainability

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