



Benin project 2018

Investigations of insect-based farming in Benin: Black Soldier Fly (*Hermetia illucens*) farming for livestock feed in Tanguieta, north Benin

Laura Riggi, Marthe Seater Jacobsen, Mariangela Veronesi, Melissa Lennartz-Walker

As a charitable organisation, a key focus of Bugs for Life (BFL) is understanding and promoting sustainable ways to adopt and integrate insect-based nutrition into our food production system. This can be in the form of rearing insects directly for human consumption, or for livestock feed. BFL is particularly interested in exploring how entomophagy can contribute towards food security in developing countries, where the availability of high-quality nutrition is of increasing concern.

Since 2012, BFL has been collaborating with partners in Benin and the UK, the latter to help generate funding to support project development and research. Our case study area is the Tanguieta commune, in the Atakora region of northern Benin. BFL, thanks to the support of many funders including the Royal Entomological Society, has over the years completed research into how

traditional forms of entomophagy can play a key role in providing nutritional support in the region.

Building on these results, in 2018 we developed, in collaboration with local partners, a project plan that aimed to build a prototype farm for black soldier flies (BSF), with the intention of recycling organic waste to produce chicken feed and organic fertiliser for small rural communities in a manner that would be easily adaptable and affordable for local people.

The pilot project consisted of three phases:

1. To design, build and test a prototype BSF in Cotonou, the capital of Benin, in collaboration with Dr Djouaka from the International Institute of Tropical Agriculture (IITA);
2. To train BFL staff to farm and present prototype methods to Kosso villagers; and

3. To recruit local volunteers to complete further workshops in Cotonou, for further farm development in the target regions.

Stage 1

BFL collaborators at IITA previously obtained BSF cultures from Tanguieta (northern Benin) and tested farming methods used in Nigeria. These methods included the use of a large outdoor netting design, containing small cages of various sizes for each life-stage of BSF. During the testing, chickens were fed with the larvae for examination of nutritional improvement and fecundity (Figure 1). Our objective was to optimize the existing model of breeding to facilitate collection of pupae.

During the first week of the project in November 2018, we built the new BFL design, focused on simplifying the IITA set-up in order to reduce costs and



Figure 1. BSF farm at the IITA centre in Cotonou: (a) adult BSF cage; (b) chicken feed experiment; (c) large outdoor cage where the BSF farm is set up; (d) team working on BSF farming at the IITA sorting out larvae from substrate manually; and (e) BSF larvae in their substrate.



Figure 2. Building and setting up of the optimized BSF farm. The aim here was to improve collection from manual harvesting to self-harvesting of the BSF larvae: (a) bucket prototype farm workshop with the IITA team; (b) adult egg laying cage for BSF; (c) profile view of the bucket self-harvesting method; (d) front view of the bucket self-harvesting method; and (e) prototype number 2 as an alternative to the bucket method.

improve adaptability for use in different small-scale rural communities. The design encompasses a simple, modified BSF bucket set-up for the larval stage, along with a mesh cage for the breeding adults (Figure 2). Once the farms were constructed, BFL tested the set-up over a 4-day period. This ensured that the BFL pilot project would support a full development cycle. The design worked, and the test was completed (Figure 2).

Stage 2

As the test unit contained only a small BSF sample from Tanguieta, more were collected in the north. Several target areas in Tanguieta were visited to locate BSF, e.g., butchers, abattoirs and market waste areas (Figure 3). BSF typically occur around organic waste produce.

Stage 3

On visiting the neighbouring village of Kosso, the Waama ethnic group was interested in BSF farming. BFL held a workshop in Kosso, to highlight the practicalities of the method, in addition to discussing design and maintenance of units over the long-term (Figure 3). Such community workshops resulted in significant interest and enthusiasm for the method. After building and testing the prototype farm, the prototype was delivered to our main base in the north of Benin, in the Attakora region.



Figure 3. Collection of larvae and community workshop in Tanguieta: (a) Laura collecting BSF adults near rubbish heaps; (b) meeting with delegates Ouro and Yatto from Kosso to discuss feasibility of integrating BSF farming in the Kosso community; (c) community workshop with all the village in Kosso; (d) collection of adult flies in Tanguieta; and (e) BSF pupae collected near the abattoir in Tanguieta.

After the workshop in Kosso two volunteers were asked to join us for a further, more advanced workshop at IITA, Cotonou; the delegates from Kosso, Ouro (administrative chief) and Yatto (a teacher and translator from Kosso), joined the workshop (Figure 4). The workshop lasted three days, and proved very successful. It was agreed with BFL that the Waama community would take the prototype farms up to Kosso to test in Tanguieta. It was also agreed that Kosso would test the method over a six-month period.

Acknowledgements

Thanks to our main collaborator at IITA, Dr Rousseau Djouaka. Dr Djouaka also works on the Aquaponics-based Insect Network (ABiNet) project. For further details please visit: <http://bulletin.iita.org/index.php/2018/06/09/iita-hosts-launch-abinet-proposal-insect-driven-aquaponics-system/>

Further reading

Riggi, L., Veronesi, M., Verspoor, R., Macfarlane, C. and Tchibozo, S. (2013). Exploring edible insects in Northern Benin, available at: www.bugsforlife.com



Figure 4. Cotonou work shop. From left to right: Yatto (Kosso teacher), Melissa (BFL), Claude (IITA technician), Mariangela (BFL), Ouro (Kosso delegate).