Food and Agriculture Organization of the United Nations

Zimbabwe Idai Recovery Project

Black Soldier Fly PILOT UPDATE

Buhera District, Zimbabwe

1.0 Background

FAO in partnership with LEAD is implementing the Zimbabwe Idai Recovery Project (ZIRP) in Buhera district. One of the project activities is piloting the production of Black Soldier Fly (BSF) as a source of protein for livestock feed targeting 500 selected beneficiaries. The project is leveraging on the lessons learnt and good practices from Livelihood and Food Security Programme (LFSP) which undertook a similar intervention.

Given that the production of BSF is a relatively new concept, a knowledge gap existed among farmers as well as among service providers. Through the ZIRP, FAO undertook a comprehensive capacity building and training of farmers on BSF to ensure viable production and adoption of BSF to reduce feed cost and therefore improve livestock production and productivity. A total of 22 sites in Buhera have already been selected as farmer field school or demonstration sites and more than 500 farmers have been registered as cluster farmers around the 22 sites.

2.0Key activities and achievements

2.1 Organize and train farmers in groups on Black Soldier Fly Production

The project organized registered beneficiaries into clusters as soon as registration was completed in April of 2022 and a total of 22 groups were formed with farmers clustered around producers. Each producer had an average of 23 farmers subtending the production site. The idea in clustering the farmers was to enable registered farmers to be able to go and learn about BSF at production sites that were at most 3km away from their homesteads. Consequently, this resulted in production sites that were dispersed to serve the interests of farmers who could then utilize the production sites as demos. The project trained farmers at 3 levels, the first was at farmer level where trainings were extended to individuals during home visits. This type of training targeted mostly producers and early adopters of the project who had structures and had to be

trained and mentored at the household level. The second model involved training at group level where the cluster which comprised the producer and the subtending farmers were trained together. Such kind of trainings were very practical and encouraged experiential trainings which were the farmers favorite as they were able to practical do the trainings. Thirdly, farmers were trained as a mixture of groups and had the opportunity to share experiences and compare notes. In such mixed group settings, groups were able to learn from each other good practices that would increase production of the BSF fly.

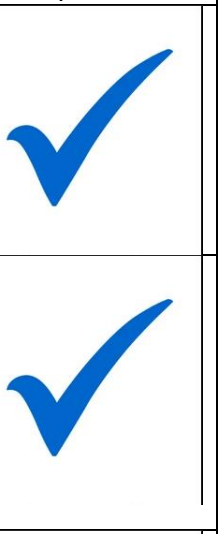
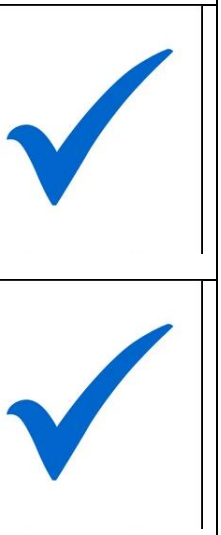
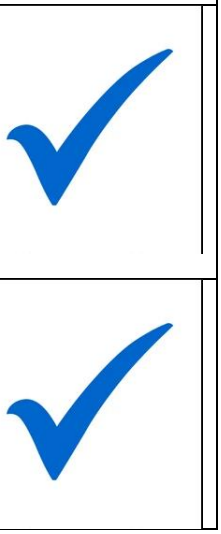
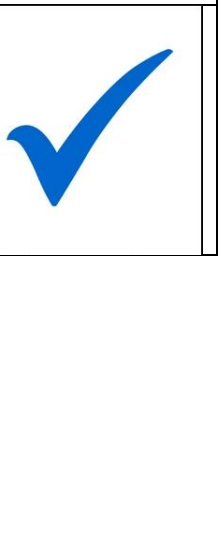
Farmers attending cluster level training in Chatikobo village

2.2 Mobilize farmers for the implementation of ESMP

The ZIRP project had 10 ESS that were made aware to the farmers during the life of the project, and these were systematically trained to farmers during trainings. Although World Bank specifically has 10 the intervention focused on 8 only that were relevant and excluded the one on Financial Intermediaries as well as the one on Indigenous People. Trainings on ESS were audited twice through monitoring visits by UNOPS who interrogated farmers on how they grasped the concept and application in everyday activities.

During screening the project identified key areas of mitigation which needed to be addressed for the smooth flow of the project. This was not limited to BSF intervention only, but some aspects

were identified for Community Gardens as well. The table below summarizes the interventions that were conducted for ESMP in the Black Soldier Fly intervention.

E&S Risk and impact	Mitigation Measures	Timing of Mitigation	Status (X) for not completed and tick for completed
Recurring Droughts	Sustainable water use managed through borehole committees and setting a maintenance fund for repair	During program implementation and just before the lean season	
Introduction of BSF as an alien species	Set up traps to establish the presence of BSF flies in the wards of operation	Trapping was done in all 22 producer locations, and it was established that BSF occurs naturally in the wards of operation	
Deforestation for purposes of harvesting trees to be used as poles in greenhouse construction	Procure and use treated poles from registered reputable suppliers	Poles were procured from a registered timber supplier in Murambinda	
Contamination of ground and surface water through improper handling of animal manure	Training farmers in correct handling of manure with emphasis on avoiding leakages to water bodies	Manure was used either in small, enclosed containers or production tanks where leakages was minimized.	
Social Conflict as producers may selectively give BSF larvae	Signing a commitment document that is ratified by both community and leadership	Model was changed for producers not to give anything to communities but only to act as demo plots.	

COVID 19 risk	Train beneficiaries and community on WHO guidelines	All farmers were exposed to awareness campaigns on COVID 19 on each meeting encounter	
Unfair labor practices	Raise awareness to both builders and carpenters who will construct production tanks and greenhouses on project labor practices.		
Child abuse, GBV and PSEA	Raise awareness and provide referral pathway on child protection, victim rehabilitation as well as awareness on PSEA	Trainings were conducted at ward level level on Child Abuse, GBV and PSEA	

2.3 Setting up BSF production sites.

In line with project requirements and in conjunction with community stakeholders and government departments the project identified 24 farmers who would become BSF producers. After identification, these farmers were screened using the criteria developed by UNOPS which involved an audit of ES requirements and developing the ESMP. Farmers were then sent for training for a week at Chinhoyi University of Technology led by line ministry representatives from Agritex, DVS and Buhera Rural District Council. The Chinhoyi trainings were further reinforced by frequent technical backstopping from LEAD staff and Agritex. In consultation with FAO, the idea of a breeder was abandoned, and the project was left with only 22 producers. At first the project supplied producers with material to build a love cage and a production tank only. It was then observed that without proper shelter from weather elements the BSF fly would succumb to extreme weather elements which at the time was very low temperatures. Of which the lowest recorded in the month of July 2022 was a low of 5^0C that resulted in high mortalities, all the producers lost their flies. In response, FAO then availed material to build 22 greenhouses and driers for the producers. Building was done and completed in the first month of August 2022 resulting in production improving drastically

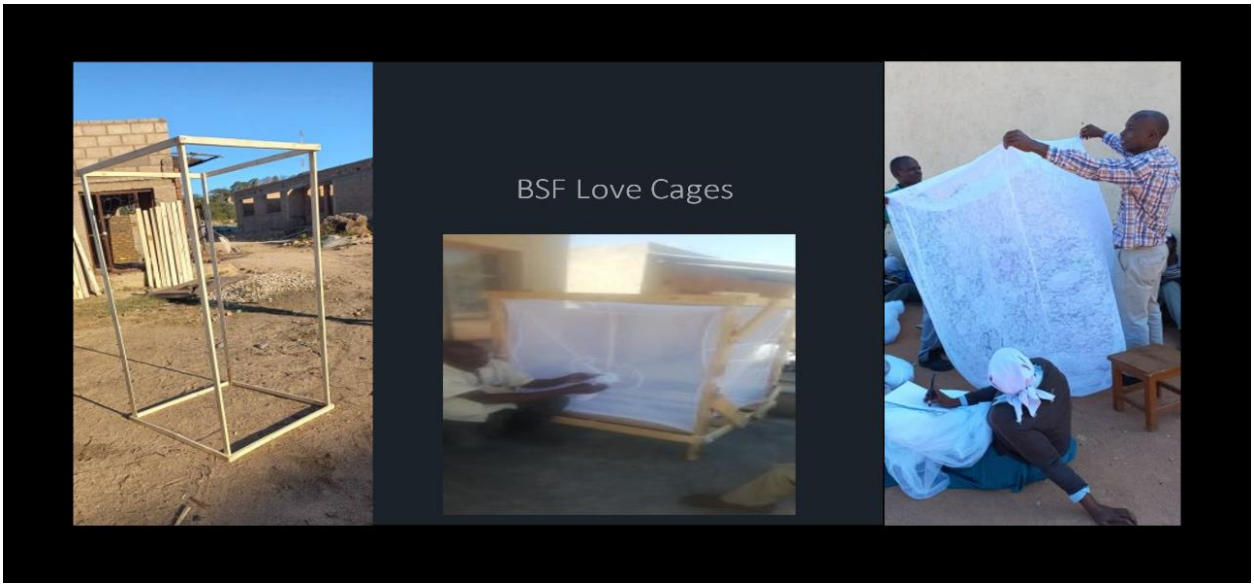
2.4 Establishment of 22 green houses for temperature control.

The establishment of green houses as shown below was to improve the optimal conditions for BSF production

Establishment of greenhouses at one of the lead farmers in ward 27

The project also provided love cages for the farmers which were made of wood planks and shade net which measured 1mX1mX2m. Shade nets were white in color and were sewn to fit the love

cage by local tailors who charged about $3 USD to do the whole job including putting an opening which in most cases was a zipper sourced by the farmers.



BSF love cages construction demonstration.

In addition to the love cage farmers also managed to receive 22 dryers for processing of the BSF components into various uses. Dryers enabled farmers to remove moisture from the instar 5/6 larvae and be able to process it into feed.

In addition, the project provided thermometers to 22 lead farmers and encouraged the other BSF cluster farmers to mobilize their resources to purchase scales, thermometers and where one could afford, hygrometers as well. Thermometers assist in temperature monitoring in greenhouses in order to take corrective action which in this case could be opening the side plastic curtains or increasing the humidity inside the greenhouse to regulate the temperatures to optimum levels.

2.5 Providing technical backstopping on BSF production/breeding

The project provided extension assistance to farmers at three levels. First level technical backstopping was at ward level where all farmers and producers would meet at certain agreed centers of the ward. In this case the centre for ward 27 was Mutiusinazita B/Centre and for ward 28 it was Jori B/center. Normally, ward centres were used when farmers took stock of input deliveries and were taught there and then how to utilize the inputs. This would benefit those farmers who are introverts and have no capacity to generate and ask questions on their own. Secondly, technical backstopping was implemented at group level. Each producer had an average of 25 cluster farmers who are mentored on all aspects of BSF production. At this level, farmers were taught practically the production aspects using the resources, equipment and infrastructure at that particular producer's homestead. Such trainings and workshops were conducted by the producer under the watchful eyes and guidance of LEAD staff and government extension workers from Agritex and DVS.

Farmers undergoing training at Loveness Bayisai's Homestead in Chitsiku village, ward 27 Buhera

The third type of technical backstopping was farmer to farmer which was mostly done by producers who would go around visiting farmers who under them and share knowledge on best practices as well as mentor them. Every fortnight LEAD would meet with the producers where they would report on progress of their farmers.

2.6 Organize and conduct Field Days to improve adoption of BSF production, processing, packaging, and utilization.

Two field days were conducted by the project, one in October for ward 28 and the other in November for ward 27. The first field day was supported by stakeholders from most government departments which included Agritex, DVS, Health, Police, Social Welfare, DDC's office, Mechanization and Buhera Rural District Council. At the local level the project was supported by village heads, headmen, representatives from the MPs office, Barura Primary School, Mutiusinazita Secondary School, Janhi Private College, councilors, VIDCO and WADCO chairmen.

Field day held at Chimbwa homestead where farmers were taught from trapping to packaging of BSF feed components and the business aspect of BSF was discussed.

2.7 Monitor E&S compliance on BSF production

Monitoring of E&S compliance was conducted once every fortnight by LEAD Project Coordinator, twice a fortnight by the Field Officer and once every month by FAO. UNOPS would also come in the company of government officials particularly Civil Protection Department and Ministry of Finance. LEAD was particular in monitoring that the project was being implemented according to

the set standards of World Bank. Any incidents were reported to FAO within a period of 12 hours. Farmers were also encouraged to raise grievances through the toll-free number that was provided. The project utilized frameworks to guide its operation, such as the sand abstraction framework which was used during the construction of production tanks and greenhouses. LEAD monitored sand and stone abstraction in conjunction with EMA village committees who are mandated by the parent department of EMA to safeguard the environment. In collaboration with Agritex, DVS and the DDC's office the project conducted monitoring and evaluation exercises to ascertain if there are any deviations from the agreed parameters of extraction and use. DVS also kept a close eye on the project and provided the expertise needed to monitor if indeed there was impact on the project. In order to follow government directives, monitoring reports were also sent to the district stakeholders outlining what the issues were on the ground and mitigation measures put in place by the project.

3.0 Challenges/gaps

The following were the main challenges encountered during BSF piloting

1. Limited access to low-cost technologies for crushing and feed processing.
2. Extremely high temperatures in the district causing the BSF to lay eggs that do not hatch and cause flies not to mate.
3. Very bad road network which makes service providers reluctant to come and showcase their products or interact with farmers for example ATA etc.
4. Water challenges leading farmers to travel long distances to fetch water for domestic use thereby reducing time devoted to BSF production
5. Domestic animals such as chickens hampering utilization of production tanks if not fenced off . Pigs also damaging greenhouse plastic in order to access the BSF

4.0 Costs for establishment of one bsf breeding unit

Material	Quantity	Cost
Greenhouse Costs		
Transport of Poles	@$250	$250
Poles	Base X6 @$4.50	$27
	Roof X8 @$3.00	$24
	Door X2 @$4.50	$9
Nails	4-inch nails 2kgs @$4.00	$8
	5-inch nails 1kg @$4.00	$4
	1 inch 0.5kg @$2.00	$2
Plastic	100m @$2.20	$220
Cement	4 bags @$11.50	$46
¾ stones	FreeX3 wheelbarrows	0
Pit sand	Free X2 wheelbarrows	0
Bricks	100 bricks @$0.04	$4

Builder	$80 per structure	$80
Hygrometer (wet and dry bulb)	@$45.00	$45
Insect net	@$1.50 per meter X12metres	$18
Total Cost		$737
Production Tank Costing		
Bricks	1000 @$40	$40
Cement	5 bags @$11.50	$57.50
Pit sand	6 wheelbarrows	0
¾ stones	1 wheelbarrow	0
Labor-Builder	@$60	$60
Brick force 115mm	2X115 @$2.50	$5
Black plastic 100m	1X100m @$70	$70
Total		$232.50
Drier Construction Costing		
Brandering	10X3.3 @$5.50	$33
Nails	1 Inch 500g @	$2.00
Nails	3 inches 1kg@	$4.50
Shade cloth	1.5X3m @$2.70/m	$5.40
Greenhouse plastic	2X3m (already bought)	$0
Hasps and Staple	1X	$3
Butt hinges	2X	$2
Labor	$15/per drier	$15
		$64.90
Love cage Construction Costing		
Brandering	3X6m Brandering @$5.50	$16.50
Nails	2 inches X500g @$2.00	$2.00
Insect net	4m @$2.70/m	$10.80
Labor	Sewing net ($3), plus Carpenter ($8)	$11
		$40.30

Total costing for materials per site $1074.70

5.0 Lessons learnt

A number of lessons were learnt during the implementation of the pilot project.

(i) The BSF is not alien to the communities as this was evidenced by farmers who managed to trap and get the eggs locally.

(ii) It was observed that the flies are easily attracted to the smelly substrate which has kitchen waste mostly mixed with onion and rotten eggs. Shady and quiet places particularly under trees and bushes are most ideal to find the flies and set traps.

(iii) Weather conditions has a heavy bearing on BSF movement and production. During cold winter months of May, June and July flies do not lay eggs and sometimes those laid do not hatch. Flies can stay docile/dormant for more than 2 months before pupating during this cold season if warmth is not provided.

(iv) Larvae fed from a mixture of pearl millet bran and kitchen waste were healthy compared to that fed from chicken waste alone.

(v) Buhera has vast sources of waste to feed BSF which includes wild fruits like nyii, brewers waste, pearl millet bran, mashamba and other animal wastes which makes production easier and affordable to farmers.

(vi) Egg colonies collected from traps outside the greenhouse had more eggs compared to those from the greenhouse. Flies in the wild laid more eggs than those housed in the love cage, and this may be attributed to acclimatization.

(vii) The use of rabbit manure as a substrate for trapping BSF from the wild is more effective and produce quality larvae, which can be used directly in the production tank, and thereby shortening the production cycle.

LESSONS LEARNED – impediments/constraints

i) High mortality rates -Greenhouse temperature must be properly checked and regulated otherwise the flies and larvae die due to excessive heat or cold. Thermometers or hygrometers were later purchased, and this was effective as farmers would ascertain the temperature and humidity in the greenhouse. Rolling-up of side curtains and spreading wet sand under the love cage to cool down temperature proves very effective.

ii) Small sized larvae-Chicken waste alone is not ideal for larvae feeding as larvae do not feed or move freely. The wet chicken waste becomes sticky which makes the larvae unable to move hence may die. It is best mixed with other waste such as brewers waste or wild fruits.

iii) High temperatures in greenhouses-water can be poured in sand placed beneath love cages as the water evaporates it cools the greenhouse and creates a conducive environment for BSF proliferation and breeding

iv) Chickens eating BSF in production tanks-there is need to equip tanks with porous lids that allows air and pockets of light whilst keeping chickens and dogs out.

v) The project learnt through Chiedza Mashangana and Vongai Bindu that it's easier to trap using open smelly substrate that is in larger containers where BSF would like to lay its eggs; small containers are not very good at attracting BSF. Chiedza has managed to amass more eggs through using an open bucket system with eggs placed on top of the feed rather than on top of shade cloth as was the practice.

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