

Black Soldier Fly Based Circular Waste Management for Climate-Smart Livestock Systems: From Agricultural Waste to Protein, Fertilizer and Sustainable Livestock Production

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Problem statement

Agriculture generates large quantities of organic waste

- Livestock manure
- Crop residues and agricultural by-products
- Agro-processing waste
- Organic municipal waste

Poor management of these resources leads to

- Environmental pollution
- Methane emissions and climate change
- Nutrient loss and inefficient resource use

At the same time, livestock production faces

- Rising feed protein costs
- Dependence on imported soybean meal
- Increasing pressure to reduce greenhouse gas emissions

These challenges highlight the need for innovative circular solutions for livestock systems.

The solution/Innovation

This initiative applies Black Soldier Fly larvae (BSFL) bioconversion to transform organic waste into valuable agricultural resources

Core components

- Bioconversion of organic waste using BSF larvae
- Production of high-protein insect biomass
- Recovery of frass as organic fertilizer
- Integration with crop–livestock farming systems

Scientific mechanism

BSF larvae rapidly convert organic waste into biomass, reducing the amount of degradable organic matter that would otherwise produce methane during decomposition.

... BSF therefore plays a key role in circular agriculture and climate-smart livestock production

Key results/impacts

Environmental impacts

- Significant reduction of organic waste volume
- Lower methane emission potential from manure
- Reduced odor and environmental pollution

Economic impacts

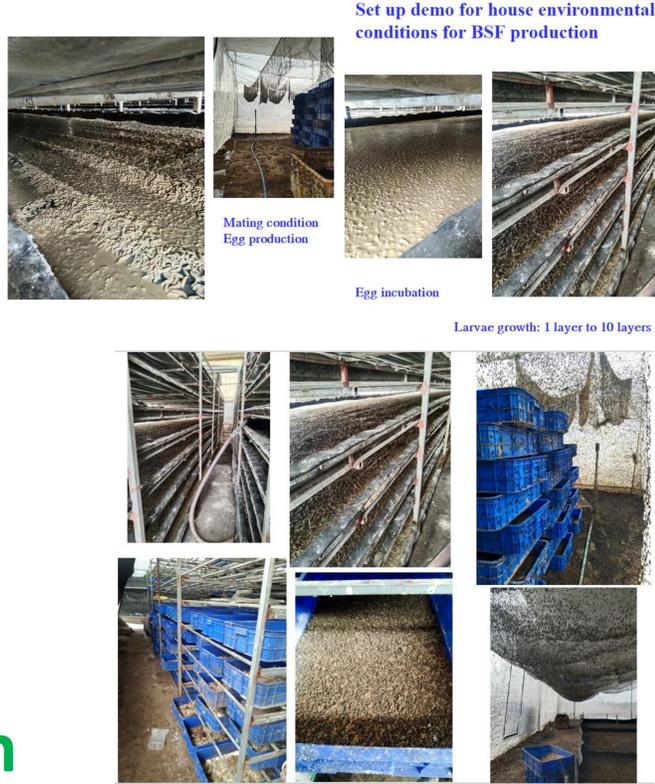
- Production of alternative protein for animal feed
- Reduced dependence on imported soybean meal
- New income opportunities for farmers

Agricultural system impacts

- Recycling nutrients within farm systems
- Improving soil fertility through organic fertilizer
- Supporting circular bioeconomy in agriculture

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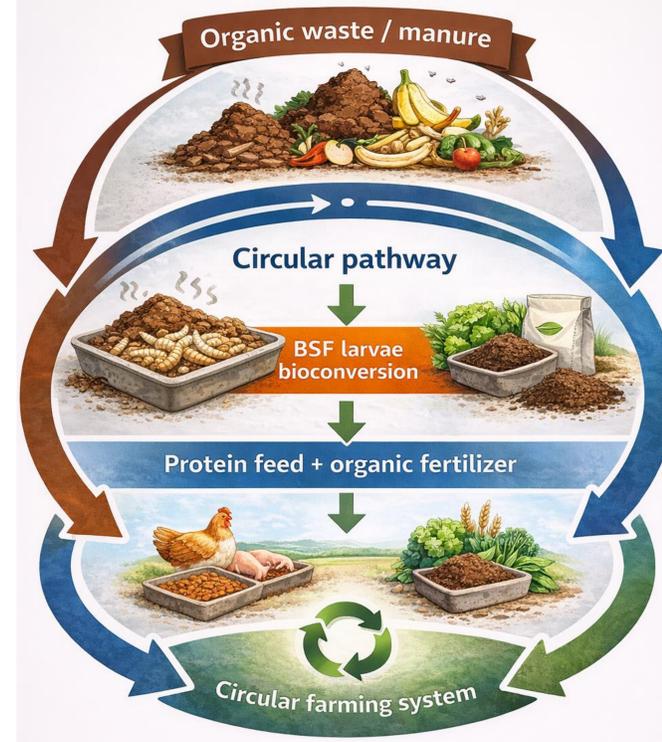
Scalability and regional relevance

The BSF circular model has strong potential for scaling because it is

- Low-cost and simple to implement
- Adapted to tropical climates
- Suitable for smallholder livestock farms
- Compatible with circular agriculture systems

Regional relevance

- Applicable across Southeast Asia
- Supports climate-smart livestock transformation
- Contributes to sustainable food systems in the Asia-Pacific region.



Partners and donors involved

Research and Technology Transfer Center, Nong Lam University – Ho Chi Minh City

Collaborations with:

- Local livestock farms
- Research institutions: Department of Science and Technology of Ba Ria - Vung tau province, Ho Chi Minh City, Vietnam
- International partners in sustainable agriculture and livestock systems: AgriFoSe2030, Sida, Sweden; Lancang–Mekong Cooperation Special Fund, China

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