

Black Soldier Fly Larvae Show Potential as Sustainable Protein Source, Adelaide University Study Finds

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The research examines how feeding black soldier fly larvae different agricultural waste streams can influence the nutritional composition of the harvested biomass



Researchers at Adelaide University are investigating the potential of black soldier fly larvae as a sustainable, protein-rich ingredient that could help address rising global protein demand while converting agricultural waste into valuable biomass.

The research is being conducted in partnership with the Australian Superintendence Company (ASC) and growers Mobius Farms and Fly Farm Australia. The commercial partners have supplied larvae produced under controlled conditions using agricultural waste streams for the early-stage research. The larvae are not being produced for human consumption as part of the study, which requires separate and more stringent production standards.

The research examines how feeding black soldier fly larvae various agricultural waste streams affects the nutritional composition of the harvested biomass. Early analysis indicates that the larvae contain protein levels comparable with conventional meat sources, alongside a fatty acid profile that includes omega-3 and omega-6 fatty acids.

The project addresses two challenges facing the food system: growing demand for sustainable protein and the increasing volume of agricultural by-products requiring productive end uses.

Global protein demand is expected to rise by up to 70 per cent by 2050, increasing pressure to develop alternative and resource-efficient protein production systems.

According to PhD researcher Sam Mallard, black soldier fly larvae could offer an alternative protein production pathway while contributing to agricultural waste reduction.

“Compared to traditional livestock, black soldier fly larvae are a highly sustainable protein source with a low environmental footprint,” Mallard said. The larvae require limited space, do not produce methane like cattle and can be farmed using agricultural by-products as feed.

The study is assessing a range of agricultural waste streams, including olive and grape pomace, fermented banana skins and other agricultural by-products. By converting these materials into larval biomass, the research aims to capture nutrients that could otherwise be lost or sent to landfill.

While the nutritional potential of insect-derived protein is being explored, researchers say food safety will be critical to any future application for human consumption.

Principal investigator Dr Permal Deo said the project is examining how potential contaminants can move from feed substrates into the larvae biomass. The researchers are monitoring heavy metals, pesticide residues and naturally occurring toxins to assess the safety of the resulting biomass.

“Insects produced specifically for human consumption are subject to stringent safety and production standards, which this research is helping to inform,” Dr Deo said.

The distinction is important as the larvae supplied by the commercial partners are being produced under controlled conditions for research purposes, rather than within a dedicated human-food production system.

The research team believes that future applications are more likely to involve processed insect ingredients rather than whole insects. Larvae could potentially be processed into protein powders or other ingredients incorporated into existing food products.

Mallard said the research could provide data to support the development of national testing standards and industry guidelines, potentially helping facilitate regulatory approval and market acceptance of insect-based proteins in Australia.

By combining agricultural waste valorisation with alternative protein production, the research could contribute to the development of more circular food systems while providing insights into the nutritional and safety requirements associated with insect-derived ingredients.

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