

A survey on public perception on utilization of Black Soldier Fly Larvae (BSFL: *Hermetia illucens*) in waste management and poultry feeding in Ratnapura District

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Introduction

It has been predicted that global population will reach about 9 billion by 2050 where fulfilling nutrition requirement and solid waste management are challenging. Thus, the livestock sector plays a vital role in providing essential nutrition. Animal feed cost contribute to 80% cost of production of chicken. Thus less expensive protein supplement is necessary for every country including Sri Lanka. Therefore, it is recommended to replace existing expensive feed ingredients by less expensive and high quality alternatives may be a sustainable approach.

Global waste generation is predicted to be risen up to 3.4 billion tonnes by 2050, where more than half of the generated waste is disposed in the form of open landfills (Hoonweg *et al.*, 2012) posing a serious health hazards (FAO, 2009). BSFL is capable of converting large amounts of organic waste into a protein-rich source (42% crude protein and 29% crude fat) with a favorable amino acid profile (Wang *et al.*, 2017) and many environmental friendly benefits.

Even though previous studies have shown that the management of small and medium-sized solid waste management using aerobic treatment for open landfills would be an appropriate method for a country like Sri Lanka, there is a little literature available for BSFL based sustainable waste management and poultry feed production. Since more than 70% of the waste fraction is biodegradable, BSFL is an effective initiative for a sustainable solution (Menikpura *et al.*, 2012). Current study was conducted as a part of the World Bank funded project (2019-2022) that entitled “From waste to animal protein; Black Soldier Fly Larvae (BSFL; *Hermetia illucens*) production as a method of waste management and feed grade protein production”. The objective of the current study was to assess the public awareness on BSFL usage in waste management and the willingness to utilize BSFL in domestic waste management further incorporation into poultry feed production.

Hypothesis testing;

Ho: There is no significant relationship between the people's socio-economic characteristics and willingness to incorporate BSFL with poultry feeding.

Methodology

The study was carried out in Ratnapura district, Embilipitiya urban council area. The study adopted simple random sampling technique, making a total of 97 house hold respondents (Representing 10% of the urban council household units and time availability). Data collection was based on direct questionnaire administration containing both open and closed ended questions, during February, 2020. Socio-economic characteristics and waste handling status were also administrated. Data were analyzed by using descriptive statistics and hypothesis testing was done by using SPSS21 software to present research findings.

Results and Discussion

People's awareness over BSFL, usage and the possibility for livestock feed incorporation

Nineteen point six percent (19.6%) of the respondents were aware regarding BSFL based protein production for poultry feed, mainly through awareness programs (68.4%). 43.3% of the respondents were willing to produce BSFL based poultry feed while 37.1% of them were denied. 19.6% were under-aware over BSFL based poultry feed production. 33.3% of the respondents who denied BSFL production had indicated that they were scared of larvae breeding and beware of related health issues. 90.7 % of them were not known about BSFL live feeding into poultry and 37.1% (majority) were not willing to incorporate BSFL live feeding into poultry.

Considering the production of BSFL through Bio-degradable waste, 20% of them were aware on BSFL based composting through newspapers. From the majority (65%), 74.2% were willing to produce BSFL for composting and 55.5% were willing to sell 1kg of BSFL based compost for Rs.100.00 - Rs.200.00. 25.8% of participants did not like BSFL production due to religious concerns. 70.1% were willing to use and 58.8% were willing to purchase BSFL based compost bins. 29.9% who disliked using compost bins stated that they do not required and 38.7% had money scarcity to purchase such a bin. Even though 81.4% of them had no idea regarding bin price, 16.5% of them were indicated positive response to purchase the bin within Rs. 4000.00 to Rs.5000.00 price range.

Socio-economic characteristics

Table 01. Socio-economic characteristics of the selected people

Characteristics	Category	Frequency	Percentage (%)
Sex	Male	49	50.5
	Female	48	49.5
Age	16-30	2	2.1
	31-45	48	49.5
	46-60	28	28.9
	61-75	19	19.6
Marital status	Married	96	99.0
	Widow	1	1.0
No. of Family Members	1-3	27	27.8
	4-6	62	63.9
	7-9	6	6.2
	More than 9	2	2.1
Education Status	Primary	13	13.4
	Pre Secondary	55	56.7
	Post-Secondary	24	24.7
	Tertiary	5	5.2
Ethnicity	Sinhala	96	99.0
	Sri Lankan Tamil	1	1.0
Employability	Not mentioned	23	23.7
	Government	36	37.1
	Semi government	38	39.2

House hold and urban council waste collection and handling status

Daily Mean Bio degradable Waste (DMBDW) and Non-bio degradable Waste (DMNBDW) collection accounted 1.043 kg and 0.20 kg. DMBDW: DMNBDW indicated 5.18. Majority of the respondents had collected their own garbage into a bin (41.2%). 75% of the total waste was collected by the Urban Council (UC) waste collection service 78% of the respondents were satisfied with the UC waste collection service and the unsatisfied fraction (11.3%) revealed that they were practicing improper collection. 80.4% separated their waste thus 20.51% from them revealed the reason for waste separation as the easiness of post waste handing. Respondents (19.6%) who do not separate waste for disposal were not sufficiently aware on importance of waste separation (36.8%). Even though 69.1% were willing to separate waste, on the condition that a compost fertilizer manufacturing plant is established in the area.

Proper urban solid waste management is still a prevailing issue even on South Asian region municipalities where urban waste generation indicates 0.3-0.9 kg/cap/day. Also the composition (50–80% of organic matter of the generated waste) and factors; cultural, geographical, climate and living standards affecting the municipal solid waste generation are common in the region. Inadequacy of proper institutional, regulatory, financial, technical, and public participation issues

are highlighted (AIT, 2004). Therefore these research findings are much helpful in implementing urban solid waste management approaches using novel technologies.

Hypothesis testing

Gender of the respondents indicated P-value of -0.039 and R-value of 0.706, Education level of the respondents indicated that P-value of -0.051 and R-value of 0.621 and employability indicated that P-value of -0.028 and R-value of 0.078 with willingness to incorporate BSFL with poultry feeding. Correlation results indicated negative but weak correlations at $p \leq 0.05$ with respondent's perception with correlation values of 0.05 and there is no any significant relationship between socio economic characteristics and willingness to incorporate BSFL with poultry feeding.

Out of the results it is indicated that local community is less aware of BSFL and its utilization. BSFL and its utilization is still a novel concept to the country with first published literature of Dissanayake *et al.*, in 2016.

Conclusion

Based on the findings of this study, it could be stated that majority of the respondents were willing to BSFL farming for poultry feed production in the study area. Even though many of the respondents were not aware, majority were willing to process BSFL based compost fertilizer. Knowledge dissemination may helpful to popularize the concept of BSFL and its usage to an urban area where proper waste management is critical.

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