Plan Overview

A Data Management Plan created using DMPonline

Title: Bioconversion of waste streams with Hermetia illucens larvae: how can a novel frass recirculation method improve process performance and products quality?

Creator: Ivã Guidini Lopes

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Project Administrator: Ivã Guidini Lopes, Jean Wan Hong Yong

Contributor: Jean Wan Hong Yong, Viktoria Wiklicky, Cecilia Lalander

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Funder: Swedish Research Council

Template: SLU-General

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Project abstract:

The treatment of organic waste streams with black soldier fly larvae (*Hermetia illucens*, BSFL) is a fast-growing technology spread worldwide. Two products are obtained when treating waste: a larval biomass that can be used for feeding animals and an organic fertilizer (*frass*), ensuring the return of waste-derived nutrients back into the food production loop. Due to the very rapid waste conversion process (10-12 days), frass ends up being phytotoxic, due to the presence of ammonia and other compounds, thus it is advocated that post-treatments (*e.g.* composting) must be applied to ensure its safety for cultivating plants. In this proposal, we aim to validate a novel method for improving frass quality that was recently proposed, which is recirculating frass back into the bioconversion process. This has demonstrated a great improvement of the process itself by yielding higher larval biomass per unit of waste input as well as the larval quality (protein accumulation and fat reduction) and subsequent frass quality (concentration of nutrients and higher stability, maturity and safety). This method was tested with a single waste stream (food waste) and in small scale. Thus, its validation is herein proposed for other waste streams, mimicking a large-scale setting.

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Copyright information:

Bioconversion of waste streams with Hermetia illucens larvae: how can a novel frass recirculation method improve process performance and products quality?

1. General Information

1.1 DMP - DMP Title

Data Management Plan - Frass Project

1.2 DMP - Date of Creation

2024-05-10

1.3 DMP - Date of Modification

Question not answered.

1.4 DMP - Version

V1.0

1.5 DMP - Contact Person

Ivã Guidini Lopes, iva.guidini.lopes@slu.se; Department of Biosystems and Technology, SLU Alnarp; https://orcid.org/0000-0003-0381-7537

1.6 Project - Project Title

Bioconversion of waste streams with Hermetia illucens larvae: how can a novel frass recirculation method improve process performance and products quality?

1.7 Project - Project Description

The treatment of organic waste streams with black soldier fly larvae (*Hermetia illucens*, BSFL) is a fast-growing technology spread worldwide. Two products are obtained when treating waste: a larval biomass that can be used for feeding animals and an organic fertilizer (*frass*), ensuring the return of waste-derived nutrients back into the food production loop. Due to the very rapid waste conversion process (10-12 days), frass ends up being phytotoxic, due to the presence of ammonia and other compounds, thus it is advocated that post-treatments (*e.g.* composting) must be applied to ensure its safety for cultivating plants. In this proposal, we aim to validate a novel method for improving frass quality that was recently proposed, which is recirculating frass back into the bioconversion process. This has demonstrated a great improvement of the process itself by yielding higher larval biomass per unit of waste input as well as the larval quality (protein accumulation and fat reduction) and subsequent frass quality (concentration of nutrients and higher stability, maturity and safety). This method was tested with a single waste stream (food waste) and in small scale. Thus, its validation is herein proposed for other waste streams, mimicking a large-scale setting.

1.8 Project - Project ID

1.9 Project - Project Leader

Ivã Guidini Lopes, iva.guidini.lopes@slu.se; Department of Biosystems and Technology, SLU Alnarp; https://orcid.org/0000-0003-0381-7537

1.10 Project - SLU Focus Area

- SLU Research

1.11 Project - Start Date

2024-08-01

1.12 Project - End Date

2025-07-30

13. Project - Funding

- Yes

Funding was applied to the Carl Tryggers Foundation on May 15th, 2024. However, part of the expected costs of the project will be placed in the applicant's FORMAS project.

1.14 Project - Funder Name

- Other

Carl Tryggers Foundation

1.15 Project - Funder Grant ID

Question not answered.

1.16 Project - Contributor

Cecilia Lalander; cecilia.lalander@slu.se
Jean Yong; jean.yong@slu.se

2. Data Description and Collection or Reuse of Existing Data

2.1 Will newly collected/produced data, already existing data, both, or neither be used in the project? (multiple answers are allowed)

- Collecting/producing new data

Two sets of experiments are predicted to happen in this project, which will generate new data. In addition, several samples are planned to be collected for microbial abundance characterization, phytohormones profiling and others.

2.2 What type of data will be newly collected/produced and/or reused and how will new data be collected/produced and/or already existing data reused?

- Process parameters data from the bioconversion of waste streams with BSFL: data will be collected throughout the two experimental periods predicted for the first 5 months of project;
- Composition of the larval biomass and frass fertilizers: samples will be collected from every experimental unit and analyzed for several traits. Before analyses, samples will be stored in plastic bags inside freezers.

2.3 What kind of data will be collected/produced and/or reused? (multiple answers are allowed)

- Descriptive data
- Numerical data
- Experimental data
- Observational data
- Quantitative data
- Qualitative data

2.4 In what format will the data collected/produced and/or reused come in?

Data will be collected in paper sheets and immediately transferred to the cloud, in the applicant group's Dropbox

2.5 What volume of data will be collected/produced and/or reused throughout the project's lifetime?

- 1-100 GB

3. Documentation and Data Quality

3.1 What metadata (i.e., contextual information describing the data) and documentation will accompany the data?

None

3.2 How will the data be organised during the project? (multiple answers are allowed)

- By use of file version control
- By use of file/folder naming convention

Paper sheets to be stored in the applicant's office and also in the Dropbox folders belonging to the research group

3.3 How will the data be managed during the project? Will data be managed with the help of technical equipment/systems?

- Yes

Dropbox

3.4 What data quality control measures will be used?

Data will be compared to previous studies (controls) in the research group

4. Storage and Backup during the Research Process

4.1 How will data, metadata, and other documentation be stored and backed up during the project?

Data will be initially stored in paper sheets, and immediately put on the cloud (Dropbox folders). A backup will be saved in the applicant's computer

4.2 How will data be secured/protected during the project?

4.3 Have SLU's IT department (support@slu.se) or your institution's IT support, Data Management Support (DMS; dms@slu.se), Data Protection Unit (dataskydd@slu.se), and/or Security (sakerhet@slu.se) Unit been contacted with regard to data storage and backup as well as protection? (multiple answers are allowed)

No

5. Legal and Ethical Requirements, Codes of Conduct

5.1 Do you intend to process sensitive data (e.g., personal information, politically sensitive information, trade secrets, etc)?

- No

5.2 How will compliance with legislation on personal data and on security be ensured? (multiple answers are allowed)

Not valid

5.3 How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?

The data generated in this research project will be handled and controlled by the applicant Ivã Guidini Lopes. Data will be used for writing one or two scientific manuscripts, which will be published in Open Access format by journals, which will then have the copyrights of the published data

5.4 What ethical issues and codes of conduct are there, and how will they be taken into account?

Not valid

6. Data Sharing and Long-Term Preservation

6.1 How and when will data (or metadata) be shared (i.e., made publicly available)? Are there possible restrictions to data sharing and embargo reasons?

We will share selected data in open access databases, such as Mendeley, after revising the data and agreeing with all the participants of the project

6.2 How will data for preservation be selected, and where will data be preserved long-term (e.g., a data repository or archive)?

In case all project participants agree with sharing some of the data generated in this research project, these will be shared in a data repository, such as Mendeley

6.3 What methods/systems, software tools, source code or other types of services are needed to understand, access, and use the data?

Data will simply be saved as .csv; therefore, it will be possible to access it in Excel

6.4 Will a unique and persistent identifier (such as a Digital Object Identifier [DOI]) to each data set be pursued?

  * Yes

7. Data Management Responsibilities and Resources

7.1 Who (e.g., role, position, and institution) will be responsible for data management?

Ivã Guidini Lopes, postdoctoral researcher at SLU

7.2 Do agreements/contracts exist?

  * Yes

7.3 What resources (e.g., costs and time) will be dedicated to data management?

Data management is included in the timetable of the project. It was foreseen that 2h will be dedicated to data management every time an experiment is concluded

7.4 What resources (e.g., costs and time) will be dedicated to ensuring that data will be FAIR (Findable, Accessible, Interoperable, Reusable)?

Data management is included in the timetable of the project. It was foreseen that 2h will be dedicated to data management every time an experiment is concluded

Planned Research Outputs

Dataset - "Phytohormone composition"
Samples will be sent to a credited laboratory in the United States for quantifying phytohormones in frass

Dataset - "Microbial Abundance Data"
Microbial abundance data will be generated and then shared with a bioinformatician to work on it.

Dataset - "Process Efficiency Data"
We expect to gather the first dataset that will refer to the process parameters of waste bioconversion with frass as part of the larvae's diet. This will be composed by growth data, material reduction, bioconversion efficiency and survival data.

Planned research output details

Title	Type	Anticipated release date	Initial access level	Intended repository(ies)	Anticipated file size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
Phytohormone composition	Dataset	2025-12-01	Closed	None specified	100 MB	Creative Commons Attribution 4.0 International	None specified	No	No
Microbial Abundance Data	Dataset	2025-07-01	Restricted	None specified	100 MB	Creative Commons Attribution 4.0 International	None specified	No	No
Process Efficiency Data	Dataset	2025-03-01	Restricted	None specified	10 MB	Creative Commons Attribution 4.0 International	None specified	No	No