

Scaling Up Bioremediation Using Black Soldier Fly Larvae (*Hermetia illucens*)



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Introduction



Bioremediation Using Black Soldier Fly Larvae

Around 1/3 of the food produced for human consumption is lost and wasted annually throughout the entire supply chain*.



Increase in global population



Increase in food production



More food waste

Black soldier fly larvae (*Hermetia illucens*) can rise as a possible tool to remediate these residues



Main methods of managing residues

Expensive and time-consuming
Release odors that attract parasites
Releases GHG



Improve substrate

Environmental impact

Reduction of pathogens

Organic fertilizer

Larval biomass



We need to proof feasibility of the process, for that there is a need to scale up





Bioremediation trial



Methods

228 boxes

114 control (C)

Gainsville and
water

114 catering (T)

Catering (90%)
and Wheat bran



Catering residues
collected from local
restaurants



Measurements – 32
sample boxes per
treatment at trial days 3,
6, 8, 10, 13

Substrate
temperature

Box weight

Weigh of the larvae
(samples of 25 larvae
per unit)



At day 13 of trial the
boxes were sieved

Frass weight per box

Larval biomass per
box

Weigh of the larvae
(samples of 25 larvae
per unit)



Bioremediation trial



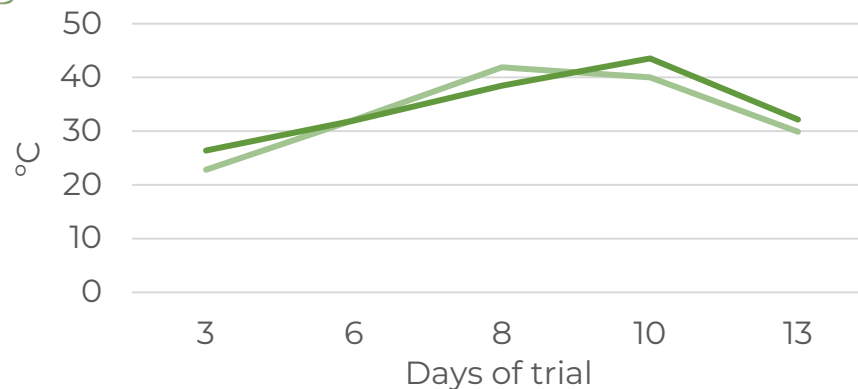
Results and discussion



Day 0



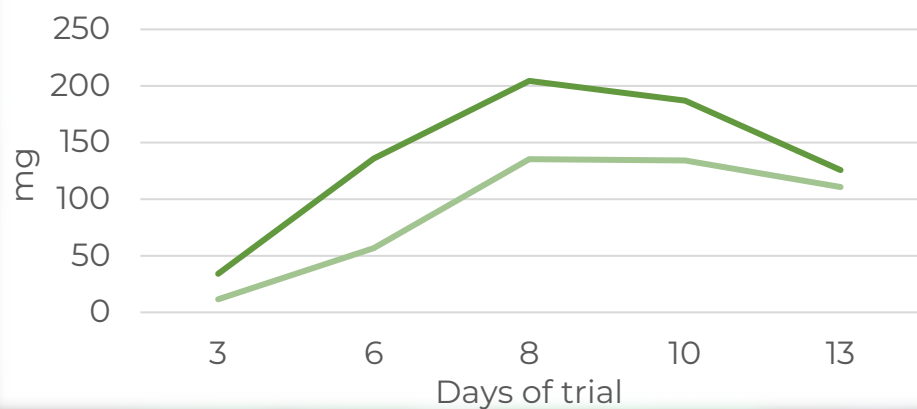
Evolution of substrate temperature during trial



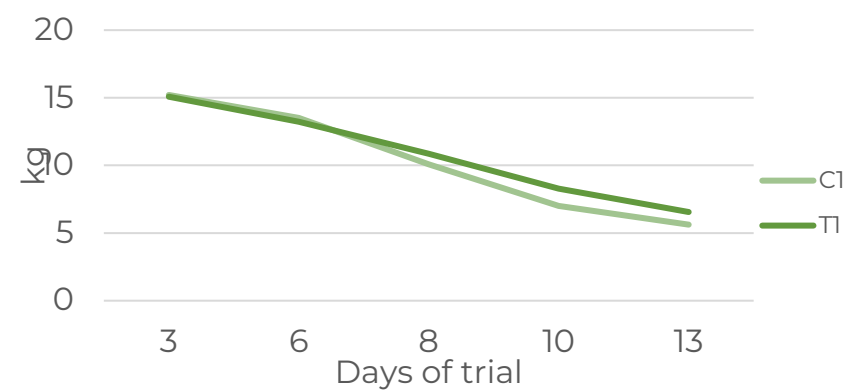
Day 8



Evolution of the weight of larvae during trial



Evolution of crate weight during trial



Bioconversion parameters

Bioconversion parameters	C	T
Larvae weight (mg)	104.78 ± 12.59	129.75 ± 18.98
Frass per crate (kg)	2.74 ± 0.09	2.46 ± 0.20
Larval biomass per crate (kg)	1.49 ± 0.06	2.48 ± 0.17
Average growth (g)	88.0 ± 1.3	90.2 ± 1.4
Mortality rate (%)	48.7 ± 5.5	30.8 ± 8.6
ECI (%)	11.0 ± 0.5	18.3 ± 1.3





Total production

	C	T
Substrate (kg)	1539	1539
Total of frass (kg)	342.6	282.5
Total of fresh larvae (kg)	209.2	273.5
Total of dehydrated larvae (kg)	43.5	66.4





Bioremediation trial



Conclusion

Scaling up the bioremediation process with black soldier fly is possible

Sustainable alternative for waste treatment

Converts organic waste into valuable biomass and organic fertilizer

Future work should focus on enhancing its efficiency and test different substrates

Aligns with environmental goals by reducing waste related environmental impacts





Thank you for your attention



Scope

FCT PhD scholarship UI/BD/154566/2023
Safe Insects project: LWV20.102.
InsectERA Agenda

