Waste to value: the use of black soldier fly frass for sustainable soil health and food production

Sun Kumar Gurung[1], Bede S. Mickan[1,2], Jen Middleton[1], Sasha N. Jenkins[1], Zed Rengel[1], Kadambot H.M. Siddique[1,2] and Zakaria M. Solaiman[1,2]

[1]UWA School of Agriculture and Environment, and

[2] The UWA Institute of Agriculture, The University of Western Australia, Perth, WA 6009, Australia

Introduction

Issue?

Waste management

Solution?

- **Black soldier fly (BSF)** is an option for re-purposing waste to promote circular economy (Klammsteiner et al. 2020, Fig.1)

Research objective

- This experiment was performed to find a viable solution to high BSF production in the preparedness of high volumes of frass to manage large scale BSF protein production.

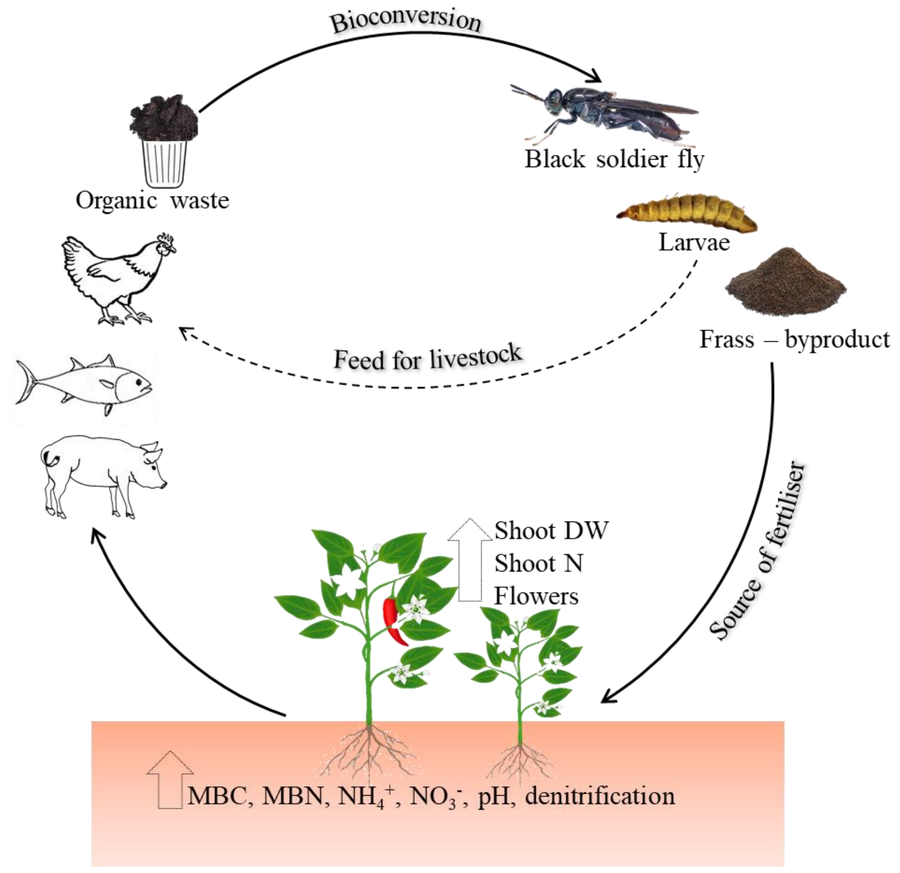

Figure 1 Role of black soldier fly in circular economy.

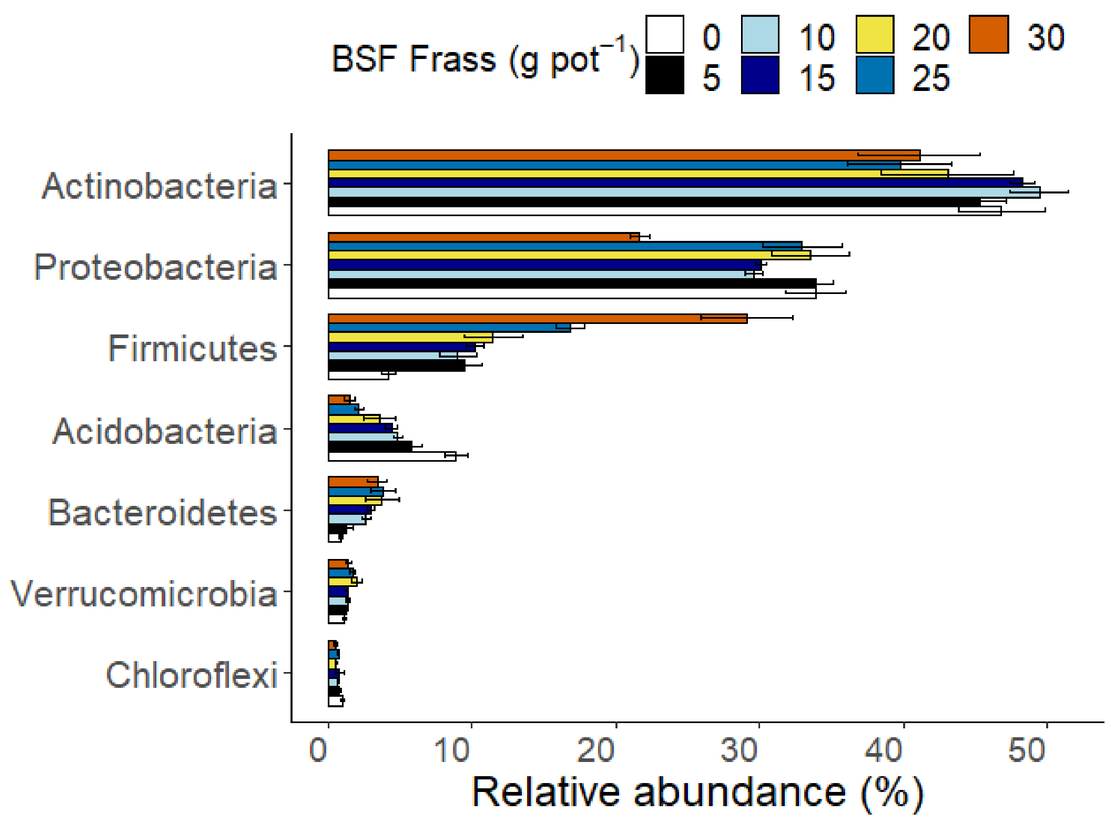

Figure 2 Impact of various rates of black soldier fly frass on the relative abundance of rhizosphere bacterial phyla.

Results

- Shoot dry weight, root dry weight, shoot N concentration and Shoot N content were significantly increased with increasing BSF frass rate.
- Soil pH, NH_4^+, NO_3^- , microbial biomass carbon (MBC) and microbial biomass nitrogen (MBN) were increased with the application of BSF frass.
- BSF frass amendment significantly altered the relative abundance of Acidobacteria ($P< 0.001$), Firmicutes ($P< 0.001$), Proteobacteria ($P< 0.01$) and Bacteroidetes ($P= 0.02$) (Fig. 2).
- The relative abundance of putative denitrification genes (*nirK* and *nosZ*) increases, representing N loss as N_2O and N_2.
- Soil bacterial community composition by PERMANOVA indicated significant community separation due to BSF frass treatment ($P< 0.001$). (Fig. 3).

Conclusion

- The results indicate that soils amended with BSF frass is highly beneficial for enhancing soil fertility and potentially maintaining agricultural production sustainability.

Reference

- Klammsteiner T, Turan V, Fernandez-Delgado Juarez M, Oberegger S, Insam H (2020) Suitability of black soldier fly frass as soil amendment and implication for organic waste hygienization. Agronomy 10 (10):1578

Acknowledgment

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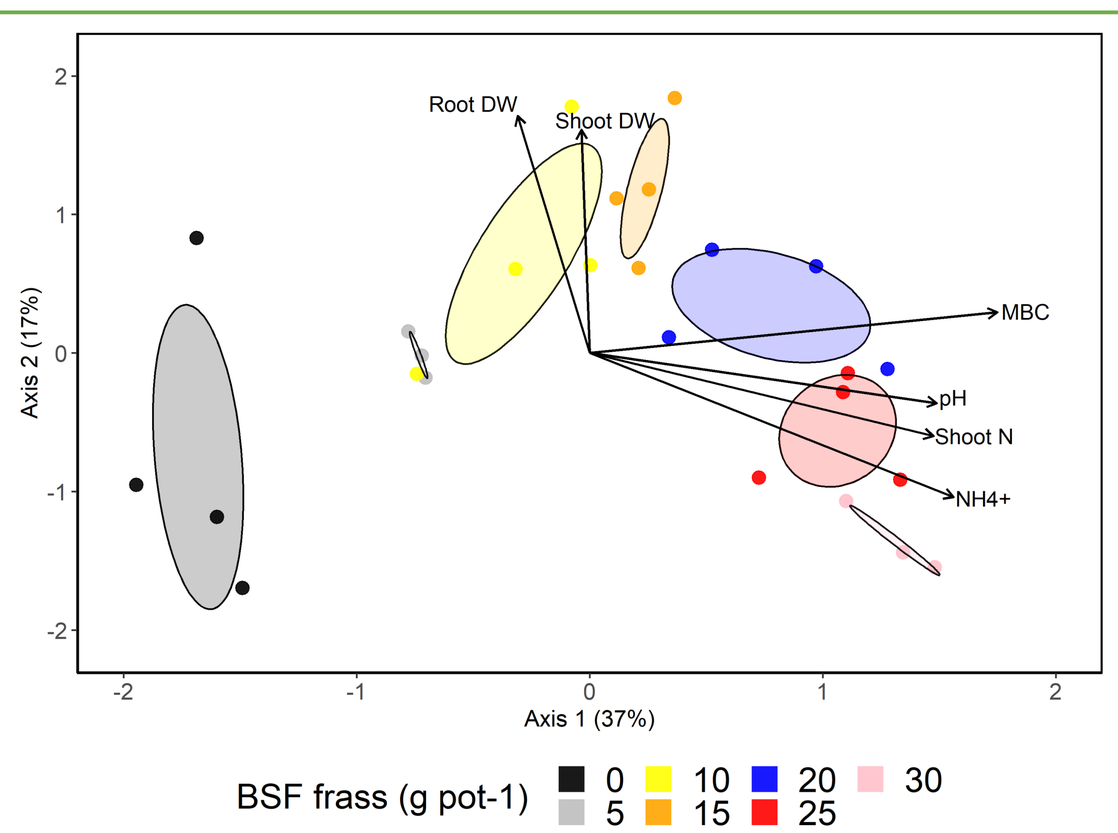

Figure 3 Canonical correspondence analysis (CCA) biplot showing the relationship between soil amendments and measured plant and soil variables. Coloured ellipses separate the samples by frass rate.

Sun Kumar Gurung
Sunkumar.gurung@research.uwa.edu.au