Going in circles?
Assessing edible insects for bioconversion of crop residues

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COSMOS
ADDING VALUE TO CAMELINA AND CRAMBE OIL

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Aim of project
The COSMOS project aims to develop sustainable European alternatives to tropical imported seed oils [1]. In order to improve the sustainability of the production chain compared to current practices (Fig. 1), insects are used to achieve zero waste.

Edible insects
Black Soldier fly larvae can convert a range of organic waste types into protein and lipids suitable for animal feed [2,3]. Depending on the diet, they contain 39-63% protein and 6-39% fat on dry matter basis [2].

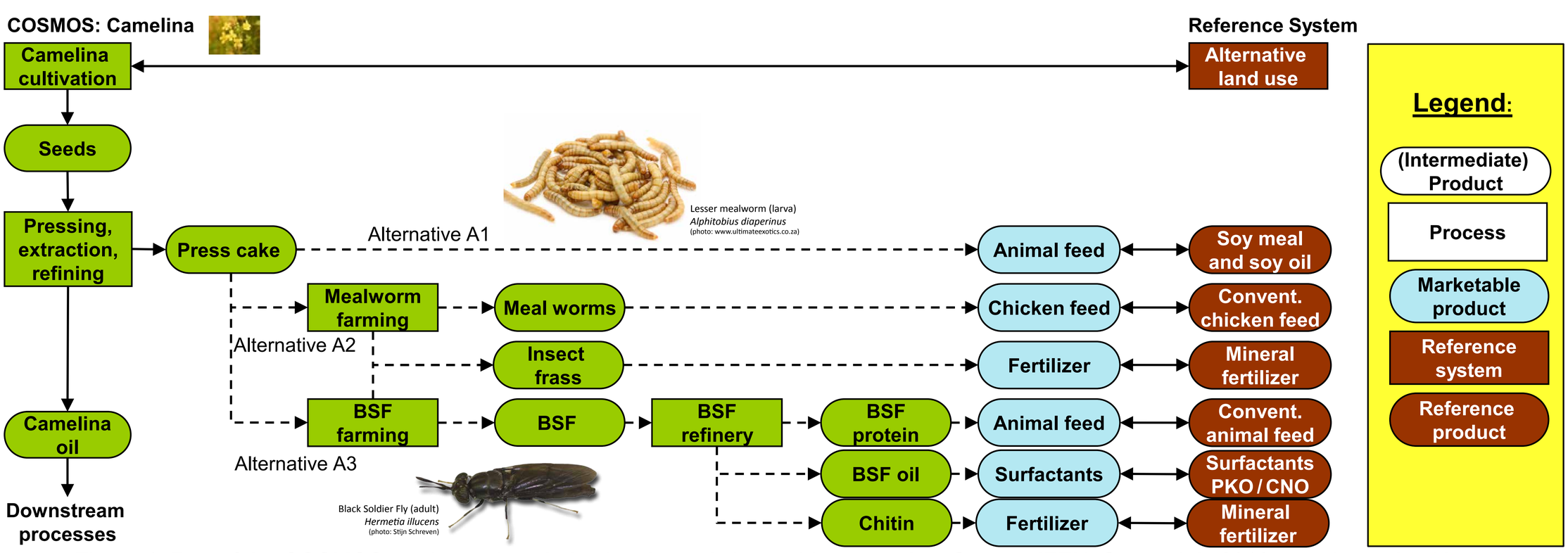


Figure 1. Part of the COSMOS product value chain showing only insect bioconversion. Source: IFEU, Status July 2018, may be revised later.

Oilseed crop residues

Camelina sativa
(False flax)

Crop plot Detail: siliques

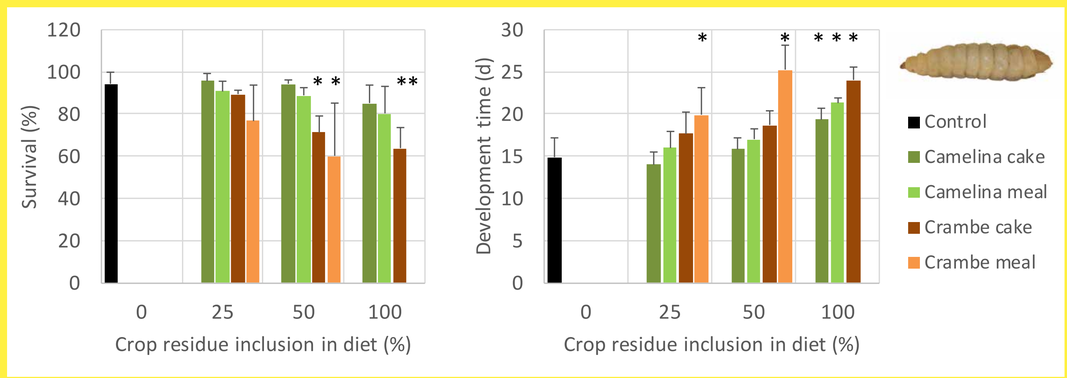
Crambe abyssinica
(Abyssinian kale)

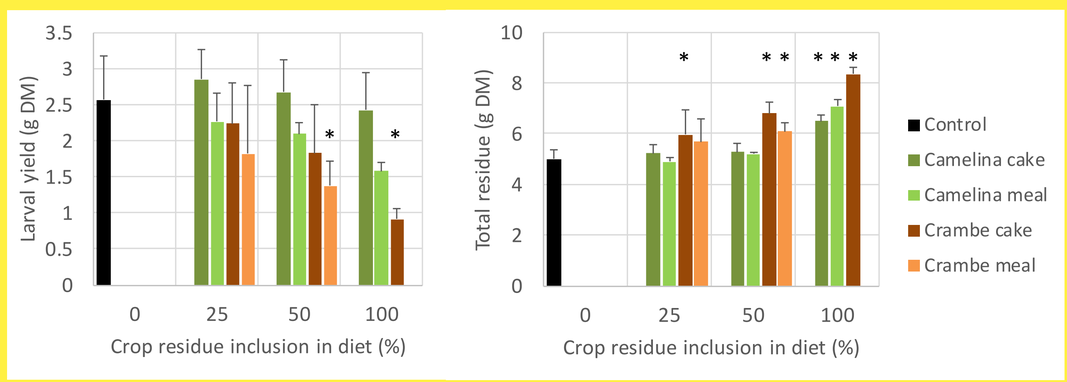
Crop plot Detail: siliques

Press cake
(mechanical extraction)

Seed meal
(chemical solvent extraction)

Performance of Black Soldier Fly larvae





* = mean is significantly different from control (P < 0.05, Tukey posthoc, Bonferroni-adjusted).
No larvae survived in the diet of 100% Crambe meal.

Conclusion

Crop residues of Camelina can be included in the diet up to 50%, of Crambe up to 25%, without a significant loss of performance of Black Soldier Fly larvae.

Further research will focus on the oil content and fatty acid composition of the larvae.

Relevant issues to be discussed during the SDG conference

1. Connecting insect production systems to other agricultural systems within a circular economy;
2. Improving sustainability of insect production systems, e.g. embedded in greenhouses or livestock farms to reduce energy use (using residual heat);
3. Harnessing microbiological and chemical safety across the insect production chain, in terms of technology and legislation;
4. Involving smallholder farmers in developing countries to make them independent of rising prices of soy and fish meal.

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References: [1] Righini et al. 2016, *Oilseeds and fats, Crops and Lipids* 23(5) D504; [2] Barragan-Fonseca et al. 2017, *Journal of Insects as Food and Feed* 3(2) 105-120; [3] Oonincx et al. 2015, *PLoS ONE* 10(12) e0144601.