



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



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## Aim of project

The COSMOS project aims to develop sustainable European alternatives to tropical imported seed oils<sup>1</sup>. 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<sup>2,3</sup>. Depending on the diet, they contain 39-63% protein and 6-39% fat on dry matter basis<sup>2</sup>.

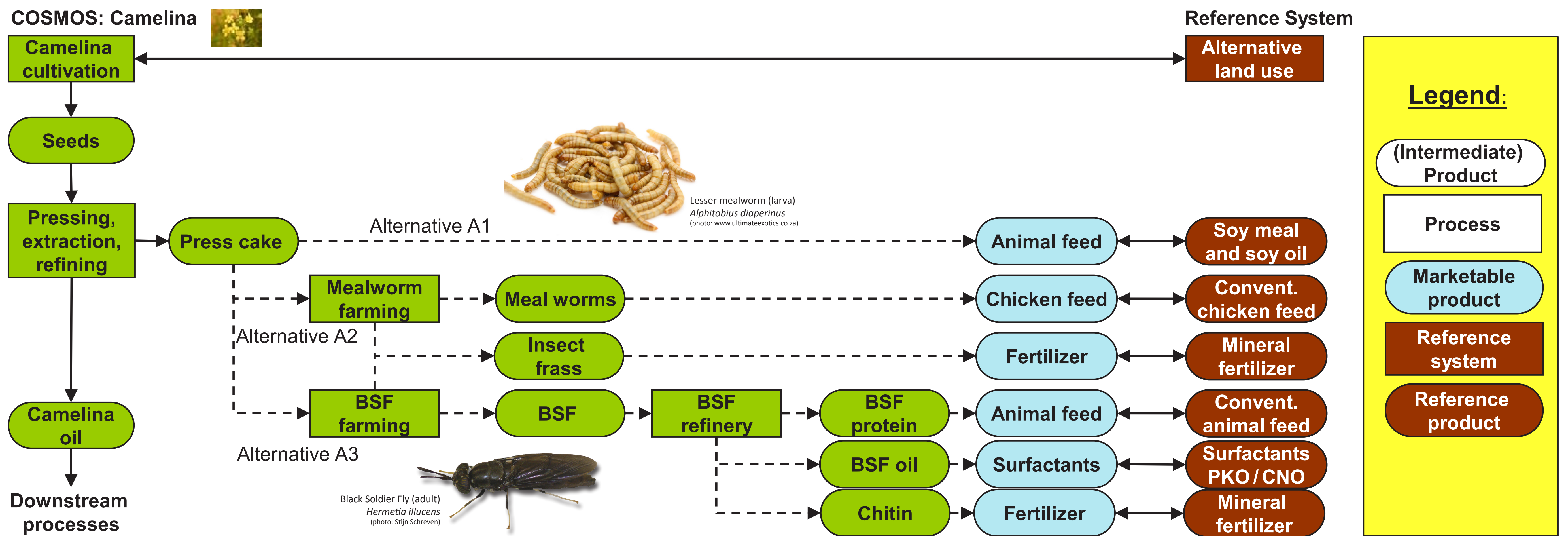


Figure 1. Part of the COSMOS product value chain showing only insect bioconversion. Source: IFEU, Status July 2018, may be revised later.

## Oilseed crop residues

*Camelina sativa*  
(False flax)



Crop plot Detail: siliques

*Crambe abyssinica*  
(Abyssinian kale)



Crop plot Detail: siliques

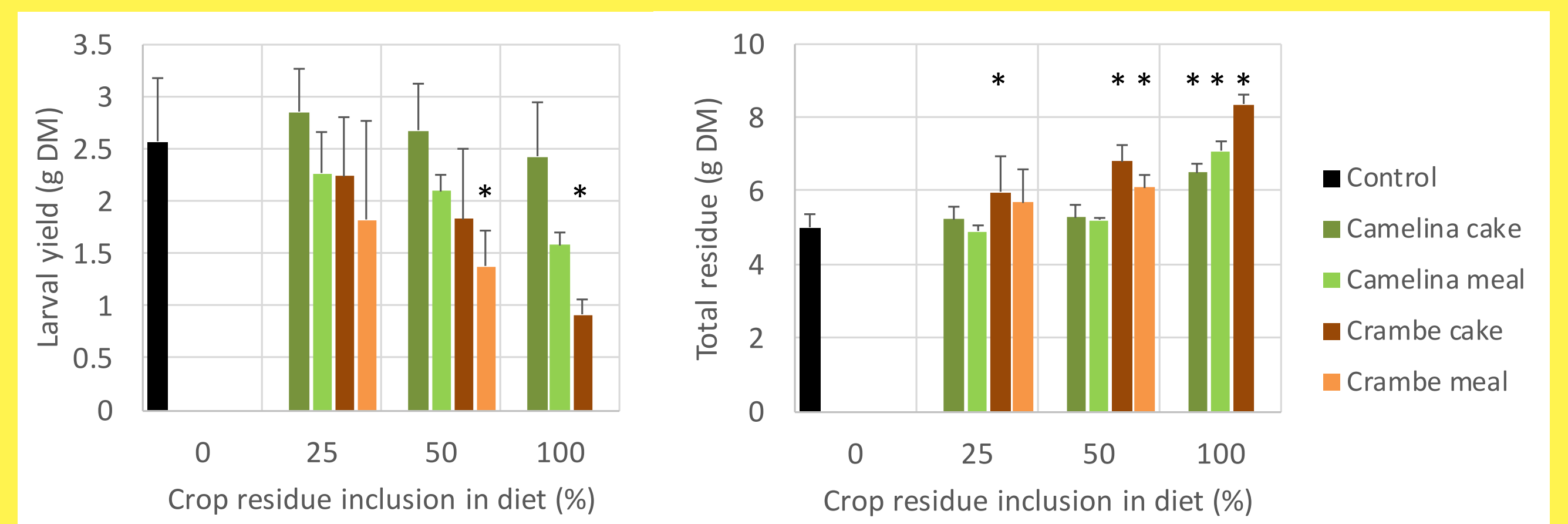
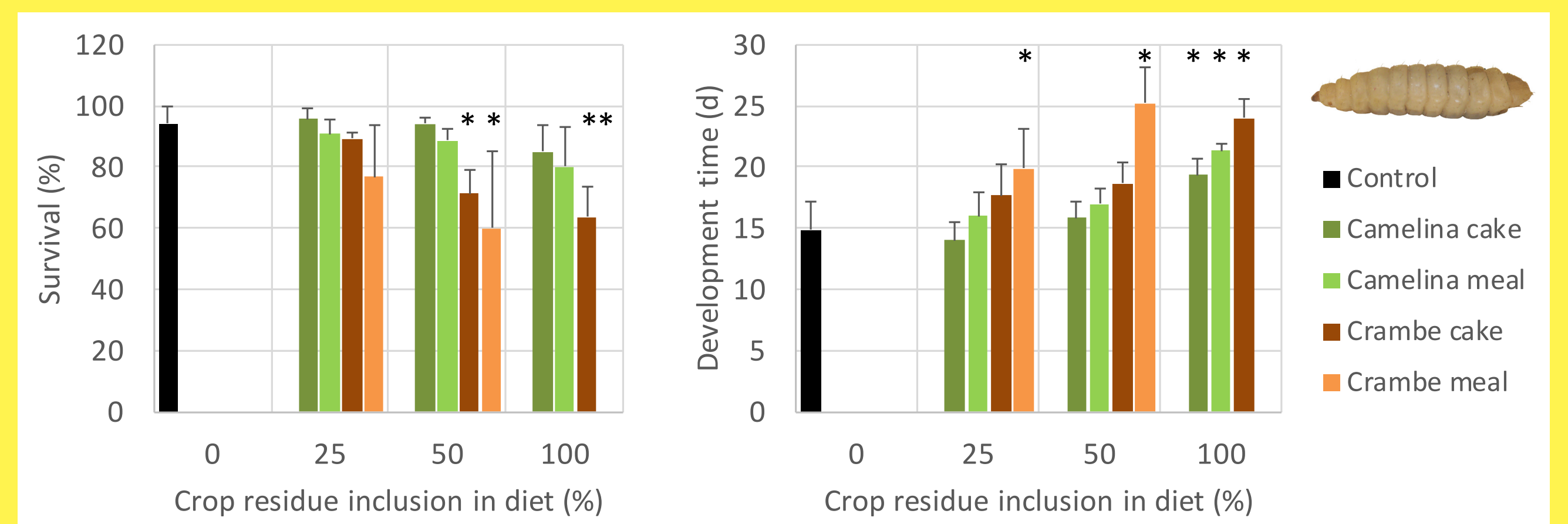
Press cake  
(mechanical extraction)



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