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## **SUBMISSION**

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### **Pathways to phase-out contentious inputs from organic agriculture in Europe (Organic-PLUS)**

Type of submission: Working paper for poster session

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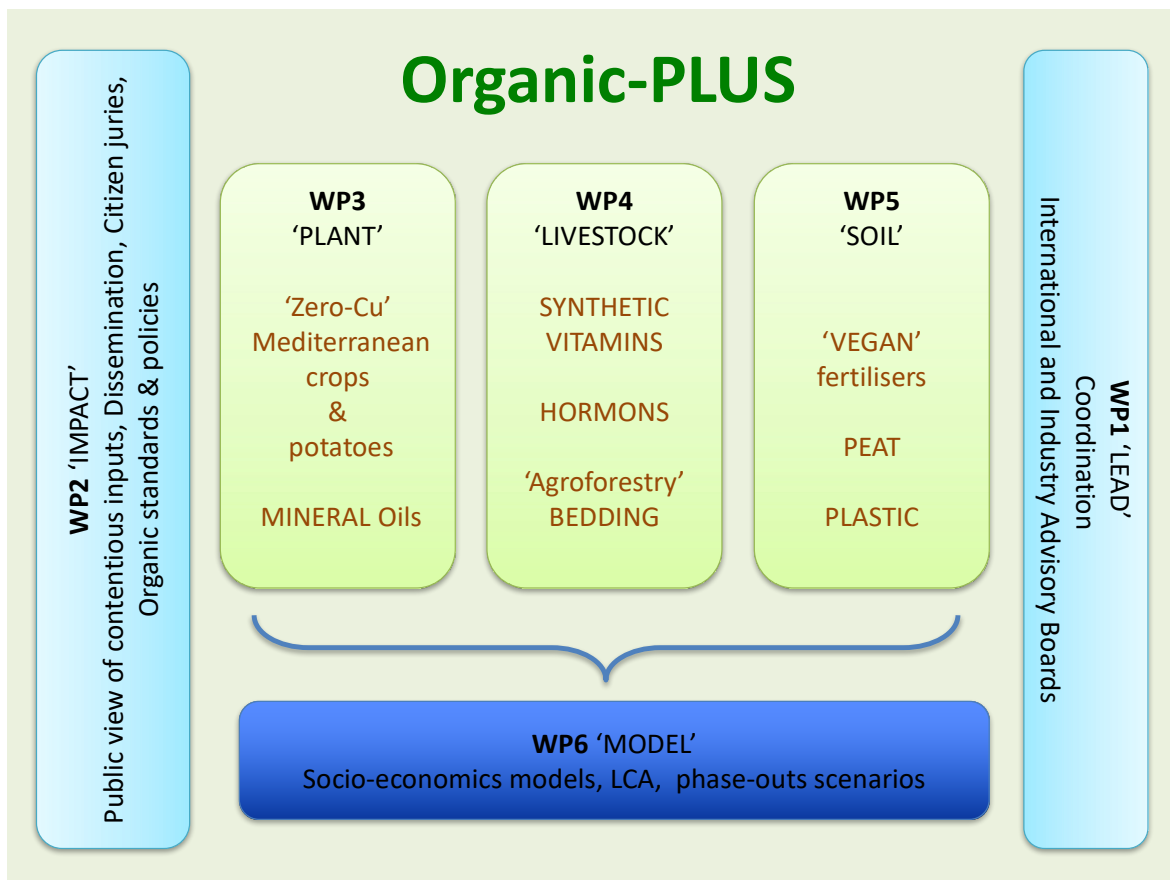
**Title: Pathways to phase-out contentious inputs from organic agriculture in Europe (Organic-PLUS)**

**Abstract to appear in conference program**

A recent Horizon 2020-call asked for research to phase out contentious inputs from organic agriculture. During 2018-2021, Organic-PLUS, led by Coventry University, UK will identify and evaluate such inputs, provide technical solutions to phase them out, and assess economic, environmental and social effects of such changes.

**Extended abstract**

The project “Pathways to phase-out contentious inputs from organic agriculture in Europe” (Organic-PLUS) is funded as a Research and Innovation Action under Horizon 2020-SFS-08-2017. Organic-PLUS has three ‘topical’ work packages, PLANT, LIVESTOCK and SOIL, supported by IMPACT, MODEL and LEAD (Fig. 1).



**Figure 1. Project overview of the Organic-PLUS with workpackages (WP) and key activities.**

WP PLANT studies alternatives to copper and mineral oils, WP LIVESTOCK utilizes natural sources of feed additives and novel bedding materials, and WP SOIL studies alternatives to peat, plastic mulch and animal-derived fertility inputs, all in collaboration with product manufactures and commercial growers. WP IMPACT collects information on consumer conceptions, WP MODEL integrates all results in phasing out-scenarios and evaluates sustainability, and WP LEAD ensures good communication and coordinates the project.

Despite its unfavourable eco-toxicological profile (Flemming and Trevors, 1989), Cu is still tolerated in organic horticulture as a wide-spectrum fungicide and bactericide. In a survey of French organic potato growers, total Cu applications were 3.4 kg per ha in seasons with low potato blight (*Phytophthora infestans*) incidence, and 8 kg in seasons with heavy disease pressure (Bruyere, 2010). Stricter limits have been set over time, and some private standards (e.g. Demeter) do not permit the use of Cu. Mineral oils are effective against powdery mildews (Northover and Timmer, 2002). Agents with a potential to phase out Cu may also replace use of mineral oil. Alternatives such as resistant cultivars, biocontrol methods and system changes have been proposed, but seldom tested under real farming conditions. WP PLANT will work with biocontrol agents (bacteria *Bacillus amyloquefaciens*, oomycetes *Pythium oligandrum*), plant defence stimulators (e.g. extracts of *Platanus orientalis* leaves for treatment of olives) as well as ozone (O<sub>3</sub>), zeolite and kaolinite, in potatoes, aubergine, tomato, olives and/or citrus. Landraces of aubergine will be screened for resistance to *Alternaria solani*.

Research activities in WP LIVESTOCK comprise the major animal production systems: dairy cows, beef cattle, pigs and poultry. Livestock diseases can derive from rearing conditions, nutritional imbalances and deficiencies, or metabolic or infectious diseases. Natural plant sources of vitamins may be further utilized on organic farms (Surjushe et al., 2008) but specific recommendations and knowledge about absorption and transfer of natural vitamins to animal products is lacking. Concern about use of antibiotics and increasing problems with resistant bacteria has inspired studies on a wide range of natural feed additives for ruminants (Calsamiglia et al., 2007). Natural anti-infective and immune-stimulating molecules will be studied to replace antibiotics and anthelmintics. The effect of novel bedding materials from agroforestry on animal performance, health traits and product quality (milk and meat) will be studied. Finally, we will develop practical application guidelines for proposed alternatives.

WP SOIL develops alternatives to animal-derived and non-organic fertilizers, peat based growing media, and plastic derived mulch. Non-organic manure weakens the integrity of organic agriculture, and targets have been set to phase it out (Oelofse et al., 2013). Horn, blood and bone meal, commonly used in organic growing, are unacceptable to vegan consumers (Hickmann, 2011). Many alternatives exist, e.g. based on legumes, but information is lacking on how to match crop demand in practice (Benke et al., 2017). Marine derived fertilisers, (organic) fish pond sediments and struvite will be tested, and horticultural cuttings and forest residues explored as alternatives to peat. In biodegradable plastics used for mulching, we will explore effects of integrated nutrients and/or carbon (e.g. as biochar).

Consumer studies regarding contentious input in organic food is the topic of WP IMPACT. Former studies mainly compared organic versus conventional consumption, and opinions on contentious inputs have not been significantly studied. Current organic consumption will be compared with a future situation where contentious inputs are phased out. A survey covering 7 countries and 70% of EU consumers will be followed by in-depth studies with citizen juries. Detailed understanding of organic consumers in countries with different food cultures is vital for the design of phase-out scenarios and to support policy discussion.

In WP MODEL, operational and economics consequences of different phasing out-pathways are assessed, and selected system changes preventing the use of contentious inputs evaluated. Cost-benefit, feasibility, and operational management options will be assessed for different pathways by means of model systems. An extraction of involved stakeholder's requirements and perceptions will be carefully utilized in this WP, to ensure engagement about proposed best management practices.

This poster will be presented at the GRAB-IT conference 2018 to communicate the kick-off of the Organic-PLUS project. We want to get in touch with other scientists working in related fields, and welcome your comments and responses. We like to add you to the stakeholder database of the project if you are interested in any of the topics being researched in Organic-PLUS.

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