



EU-project: Innovative strategies for copper-free low input and organic farming systems

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Introduction

Up to date in organic and low-input farming systems copper is still indispensable for control of important diseases caused by oomycetes (e.g. late blight of potato/tomato or downy mildew of grapevine) and diseases caused by ascomycete fungi (e.g. apple scab). Since copper has negative side effects on earthworms, soil microbial activity and aquatic organisms, its replacement is strongly desired. In January 2012 the EU-project CO-FREE, consisting of a multidisciplinary consortium of 21 partners from eleven European countries, was launched. CO-FREE focuses on the development of innovative strategies to replace copper in major crops highly depending on copper use in European organic and low input production systems.

Table 1: Alternative compounds and bicontrol agents investigated in CO-FREE

Control agents	Research aspects
Microbial origin	
<i>Trichoderma atroviride</i> SC1 and protein extract SCNB	• Development of stable formulation for improvement of efficacy under field conditions
Yeast-based derivatives	
<i>Cladosporium cladosporioides</i> H39	• Optimization / up-scaling of production
Oligosaccharidic complex COS-OGA	• Extended elucidation of the mode(s) of action
<i>Aneurinibacillus migulanus</i> and <i>Xenorhabdus bovienii</i>	
Plant origin	
Sage extract	• Identification of key components and interactions / synergies between active compounds
Liquorice extract	
Saponine extracts <i>Teawet</i> TQ Liquid and <i>Quiponin</i> BS Liquid	• Improvement of application timing
PLEX	
Seaweed extract	



Figure 2: Tomato crop

Table 2: Management tools investigated in CO-FREE

Management tools	Research aspects
Application strategies	• Maximization of activity of alternative agents considering weather, plant and pathogen
Application equipment	• Optimization of application techniques
Anti-resistance management of oomycete fungicides	• Potential use of alternative agents for management of fungicide-resistant pathogen populations
Decision Support System (DSS) in grape	• Validation in susceptible and tolerant varieties • Optimization for alternative agents • DSS for secondary diseases
Decision Support System (DSS) in potato	• Integration of canopy growth model • Optimization for alternative agents
Cultivar ideotypes (example potato)	• Conceptual frame of ideotype design and validation • Performance and acceptability of ideotype concept
Consumer acceptance of new varieties	• Strategies to foster supply chain and consumer acceptance • Proposals for adaptation to apple, grapevine and vegetable crops



Figure 3: Agro-forestry field site

Structure of CO-FREE

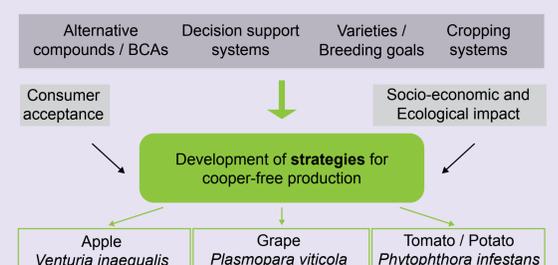


Figure 1: Overview of structure and content of CO-FREE

Starting points and concept

CO-FREE builds on promising outcomes from former research projects (e.g. REPCO, BlightMop, EN-DURE etc., and national projects), which however, are not fully developed yet for implementation. The project will (i) fill knowledge gaps that hindered effective use / implementation, (ii) develop alternative compounds with different modes of action towards marketability and (iii) improve management tools.

As in a construction kit system (Figure 1), the components (i) alternative agents (Table 1), (ii) decision support systems (Table 2), (iii) susceptible and disease-tolerant varieties and innovative breeding goals (ideotypes), and (iv) diverse cropping systems (traditional high yield; advanced high productivity; highly diversified low input agro-forestry) will be integrated into management strategies. Furthermore, their added ecological value and socio-economic impact will be assessed. In addition, secondary diseases, so far controlled by copper will be monitored. Strategies will be evaluated to foster acceptance of new tools by retailers / consumers. Moreover, available knowledge generated outside of CO-FREE will be monitored regularly and taken into account. Experimental results will be communicated to advisors, farmers, researchers and other stakeholders for rapid implementation of the techniques into farming practice. More information is available at www.co-free.eu.

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