



## EU-project CO-FREE - an update

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### INTRODUCTION

The aim of CO-FREE is to develop potent strategies to replace copper in organic, integrated and conventional farming. The project is constructed as a modular system (Figure 5). The 4 main topics: alternative test products, decision support systems, varieties / innovative breeding goals and cropping systems will be integrated into management strategies. A brief overview on results from 2012 and 2013 is given below.

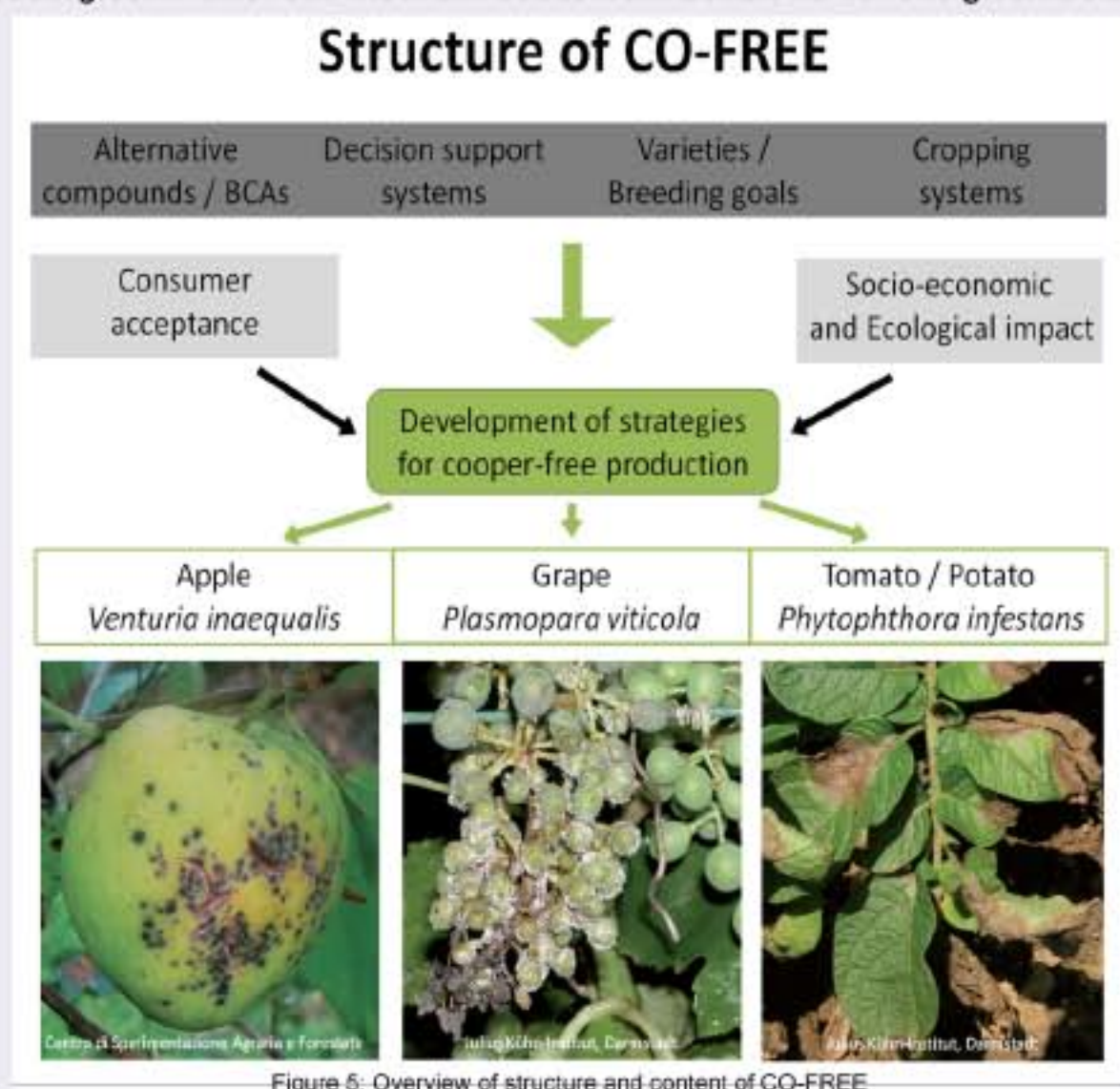


Table 1: Overview of results with CO-FREE test products (CTPs) as stand-alone treatment (field trials 2012/2013)

Effects of CTPs	Disease reduction on infected leaf	Yield	Side effects
Apple / <i>V. inaequalis</i>	promising results as stop treatment	agroforestry: > 50% disease reduction on apple; higher yield than local organic	decrease of leaf fall caused by <i>Marssonina coronaria</i>
Grape / <i>P. viticola</i>	up to 40%	40% disease reduction on bunch area	higher abundance of predatory mites
Tomato / <i>P. infestans</i>	up to 44%	no yield decrease when frequently applied	
Potato / <i>P. infestans</i>	retarded development; cultivar more important	10% increase	enhanced firmness of tubers

### Decision support systems (DSS):

In CO-FREE DSS for grape and potato are adapted with respect to cultivars and to timing of application of CTPs. Development of a plant growth model for organic potato production and determination of the necessity of sprays depending on development of plants is in progress.

→ Grape: Adaptation of DSS RIMpro  
[http://www.biofruitadvies.nl/rimpro/rimpro\\_e.htm](http://www.biofruitadvies.nl/rimpro/rimpro_e.htm)

→ Potato: Integration into DSS Oeko-SIMPHYT  
<http://www.zepp.info/ackerbau/75-kartoffel/61-oeko-simphyt>

### RESULTS

#### CO-FREE test products (CTPs):

In CO-FREE alternative test products (CTPs) (*Trichoderma atroviride* SC1 and protein extract SCNB, *Lysobacter* spp., yeast-based derivatives, *Cladosporium cladosporioides* H39, oligosaccharidic complex COS-OGA, *Aneurinibacillus migulanus* and *Xenorhabdus bovienii*, sage extract, liquorice extract, PLEX and seaweed extract) are tested and their modes of action are further characterized.

- Trichoderma-induced resistance is strongly affected by grapevine genotype and by exposure of plants to abiotic stresses
- Active ingredients of several CTPs were identified

#### Field trials

The aim of CO-FREE is the development of strategies to replace copper by combined use of CTPs, DSS, varieties and cropping systems. In 2012 and 2013 single CTPs were tested in field trials (table 1).

- Promising results of CTPs (stand-alone treatment) on disease reduction and yield increase despite of extreme and diverse weather conditions
- Positive side effects
- Crucial factors to be further optimized: rain fastness and UV stability



Figure 1: Agroforestry field site (The Organic Research Centre, Elm Farm, United Kingdom)



Figure 2: Leaf fall caused by *Marssonina coronaria* (Centro di Sperimentazione Agraria e Forestale Laimburg Azienda, Italy)



Figure 3: Trial site tomato (Benaki Phytopathological Institute, Greece)



Figure 4: Trial site grapevine (Fondazione Edmund Mach, Italy)

#### OUTLOOK field trials 2014

- In 2014 improvement CTPs currently are tested in field trials
- Application strategies are progressing
- First management strategies (combination of improved CTPs with DSS and tolerant varieties etc.) are applied



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Deputy coordinator is Dr. Lucius Tamm (Forschungsinstitut für Biologischen Landbau).

