

ManaGTD – FA1303
Sustainable control of Grapevine Trunk Diseases

Working Group 3

Host-pathogen & fungus-fungus
competitive interactions

Colmar – June, 26th & 27th - 2014



COST is supported by the EU RTD
Framework programme



ESF Provides the COST Office through
an EC contract.

1. Plant defense and reaction

Florence Fontaine & Andreas Kortekamp

Relevant role of studying plant defence reactions

in understanding the disease

in helping in detection of resistance sources

in helping detecting control tools

1. More studies needed on this respect also related to single agents and single substances
2. Water stress: definitely ascertained not to be directly involved with esca symptoms
3. Compared drought stress markers /similar symptoms
4. **Lack of information on nutrition and lack of nutrients / esca symptoms**
5. **Early detection of the disease foliar symptoms expression**
6. Develop a **simplified model to continue to collect data in vineyard**
7. Role of hormones, role of Jasmonate
8. Commercial compounds: BABA, Bion, BTH.. to compare plant response?

1. Plant defense and reaction

Florence Fontaine & Andreas Kortekamp

SECOND STEP: “communication” between wood and leaf

Investigation of

-signalling among wood inhabiting microorganisms

-signalling mechanisms in plants (leaf, green stem, and trunk).

1. To detect presence of secondary metabolites produce by fungi in different tissues
2. Understand role of secondary metabolites produce by fungi in different tissues
3. Important: use the same cultivars
4. Important to use simplified models on the host side: field, in vitro, cutting?
5.but analyses in field conditions remain essential
6. Regulation of plant metabolism depends of several parameters in field – climatic stress + age of plants (young, older)
 1. - younger vines are subjected to lower number of interacting factors

1. Plant defense and reaction

Florence Fontaine & Andreas Kortekamp

Identify protein target of phytotoxins to fully understand their effect on the biological system.

1. Pathogens side: what we know, clear picture between plant-pathogens? During infection
2. Signals come from protein effectors and secondary metabolites (chitin receptor, carbohydrates,...): lots of signals
3. Phytotoxins: may be to modify targets
- 4. Metabolites produce by pathogens in the trunk? Their circulation in the trunk?**
5. According to organs tissues and pathogens and benefic micro-organisms: some kind of balance: soil, temperature could have influence on this balance, change balance? What we know on this part of the story.
6. Plant pathogen interactions: local difference, dependent of some areas,... focus of small set of pathogens? Could be complicated
7. Comparative genomics
8. Develop simple models – colonization, virulence measure
9. Choose pathogens – cultivars-model? For the GTD community

1. *Plant defense and reaction*

Florence Fontaine & Andreas Kortekamp

Investigation on the intra-Vinifera variability to identify resistance mechanisms or be combined with resistance genes identified in wild *Vitis* species for the development of cultivars with sustainable resistance.

- 1. Susceptibility of *Vitis vinifera* and other *Vitis*:** wood necrosis, artificial infection, results are different comparatively to symptom foliar expression
2. *Vitis sylvestris*, as a genetic resource
3. Missing information on rootstock? Influence by growth type of rootstock
4. Cultivars: different susceptibility
5. Accumulation of resveratrol in leaves according to the cultivars, where we have to see the resistance, leaves or/and trunk?
- 6. Link between wood necrosis and foliar symptoms?** If rootstock is free of necrosis, focus only on scion?
- 7. Improvement of resistance also refers to the rootstock?**

2. Pathogen Infection

Eliane Abou-Mansour & Marc-Henri Lebrun

1. Identify and understand phytotoxin activities
 1. **No more fungi still need to be investigated** , simplify to Pch, Pal and Botryosphaeriaceae
 2. Assessment of the role of phytotoxic metabolites and the disease progress *in vitro* then *in vivo* in order to better understand their role in GTD.
 3. **Important to create a page in a website to share the genomes**, proteins, transcriptoms, info on cultural conditions, blast,...(Berger, Lebrun?)
 4. **To investigate epigenetic factors: a relevant approach**
2. Give more attention on **polysaccharides and polypeptides toxins**
3. The synthesis of **mycoalexins, and metabolites involved in competitive fungus-fungus** confrontation zones need to be more investigated
4. To be more investigated:
 1. Iron and siderophores in fungal host-interactions
 2. Phosphate uptake deficiency
 3. Polyphenols target a large variety of cellular macromolecules, some of which are involved in the regulation of epigenetics process.

2. *Pathogen Infection*

Eliane Abou-Mansour & Marc-Henri Lebrun

- Beside phytotoxins,
 - **Transcriptomics of naturally infected trunks and grapevine leaves, look all the genes expressed in particular tissues.**
 - This should be done with the single compounds too
 - TO BE INVESTIGATED: other proteins , cell wall degrading enzymes, several effectors,
 - TO BE INVESTIGATED: enzymes or fungal proteins secreted in the vines or the vessels.
- FOR THE FUTURE: For groups interested in secondary metabolites, isolation and structural identification

3. Methodologies and applications

Eckhard Thines & Christophe Bertsch

1. Standardize and validate a simplified models
 2. Reference susceptible cultivars
 3. **To set up a new vision on Koch's postulates applied to a complex disease (check relationships with other complex disease models)**
 - NEW APPROACHES!
 - **Metabolomics**
 - **Technology to trace fungal colonization**
 - **Interaction with BCA**
 - **To be activated within the COST action**
 - **Training in secondary metabolites analysis techniques**
 - **Training on fungal molecular biology**
1. **To made available protocols on website**
 2. **To share information via a Newsletter**