COST Action FA1303
Food And Agriculture
Sustainable Control of Grapevine Trunk Diseases

WG4 Disease Management

THE PROTECTION OF PRUNING WOUNDS IN THE CONTROL OF GRAPEVINE TRUNK DISEASES

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Disease dispersion

Vineyard

- Multiple infections through wounds
  - Pruning
  - Thinning
  - Others (hail, wind, harvest, etc)

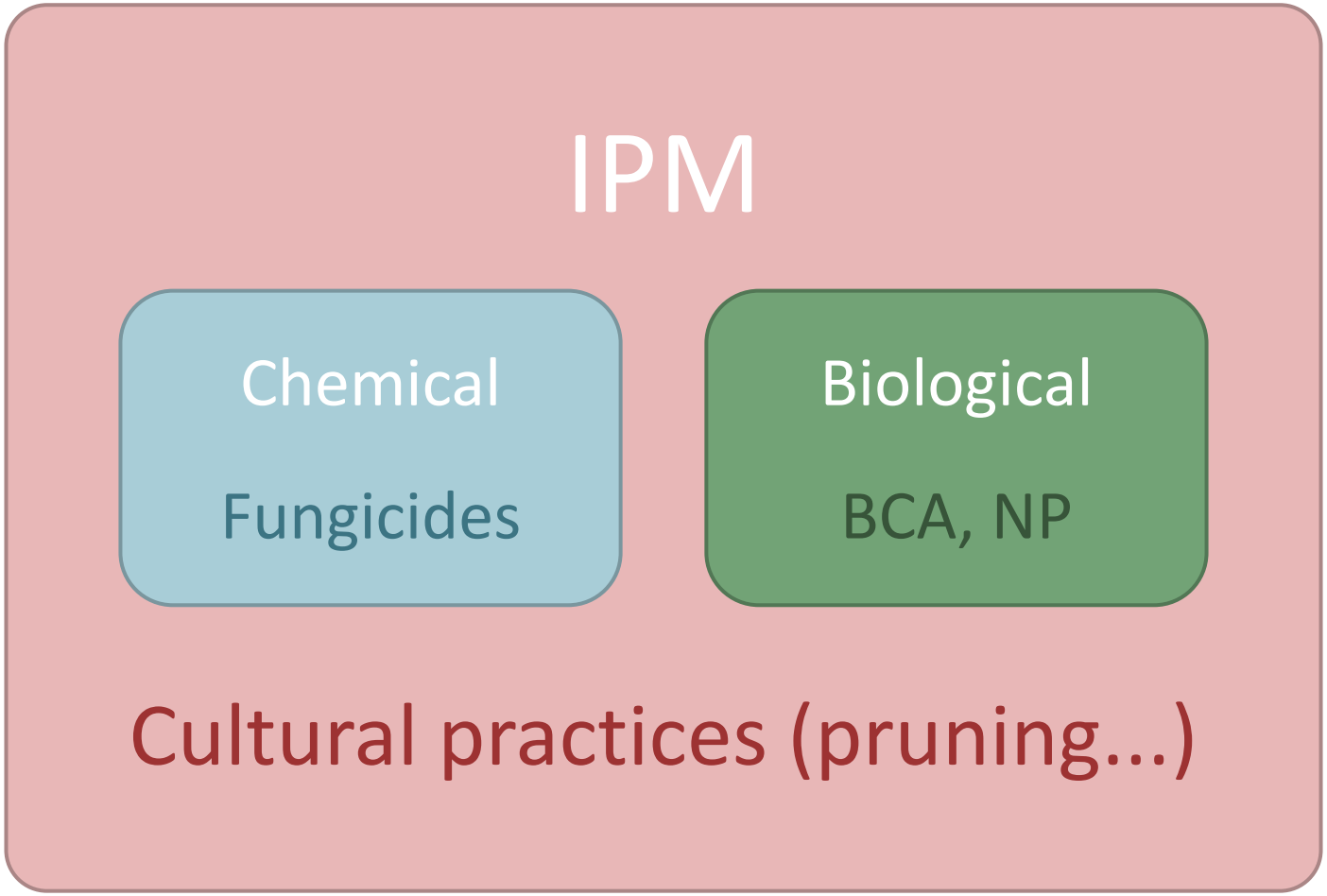
Nursery material

- Multiple infection risks along vine production
  - Infected mother vines
  - Hydration tanks
  - Bud removal
  - Grafting
  - Nursery field

Plant material for vine production is obtained yearly by pruning mother plants

Pruning wound protection can improve grapevine sanitary conditions at both levels (vineyard + nursery)

Wound protection



Wound protection

- Characteristics
  - Environment & human safety
  - Broad-spectrum products (extremely high pathogen diversity)
  - Preventive
  - Long lasting (wound susceptibility up to 3 months)
  - Easy application (time & money saver)

Wound protection trials

- Limitations (part I)
  - Symptoms of disease develop after long incubation periods
  - Some symptoms are erratic (chronic esca) whereas others are perennial (Eutypa and Botryosphaeria dieback) through years
  - Natural infections rates are unknown but probably low and different among pathogens, among seasons...

Is it working?

Efficacy assessment based on the visual examination of external symptoms may not be useful

Wound protection trials

- Solution
  - Efficacy assessment based on the mycelium recovery of pathogens after artificial inoculations or natural infections of pruned canes
  - Variables to be assessed
    - Percentage of infected canes (infection)
    - Percentage of fungal recovery from infected wood chips of a single cane (colonization)
    - Efficacy can be estimated through Abbott's formula (1925) which allow to compare mycelium recovery rates of treatments vs control

In a first stage, artificial inoculations are recommended

Wound protection trials

- Limitations (part II)
  - Recovery of pathogens
    - For slow-growing pathogens: growth masked by saprophytes
    - For trials with BCA: pathogens overgrown by BCA but still living?
  - Inoculum potential
    - Artificial inoculum: a minimum inoculum potential should be used to induce infection... but trying to mymic natural conditions as close as possible
  - Pathogen/BCA detection through molecular methods
    - The DNA may be there but the microorganism(s) may be dead

Wound protection trials

1. Pruning

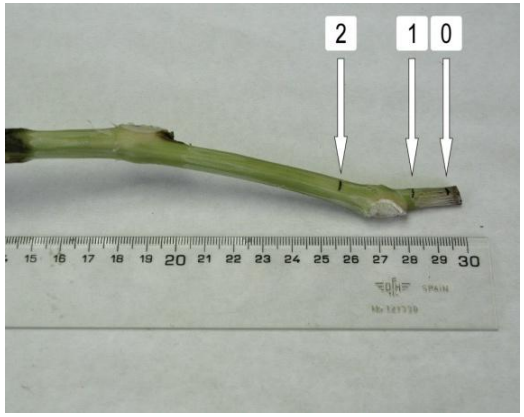
2. Fungicide treatment

3. Artificial inoculation

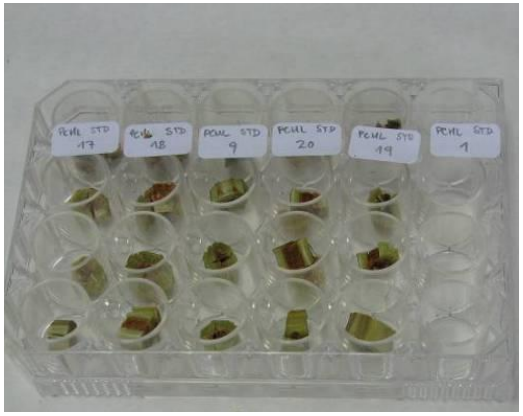
4. Temporary wound protection

Wound protection trials

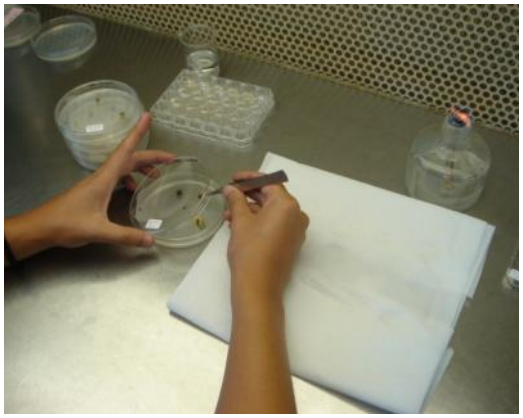
1. Bark removal



2. Isolation points marking

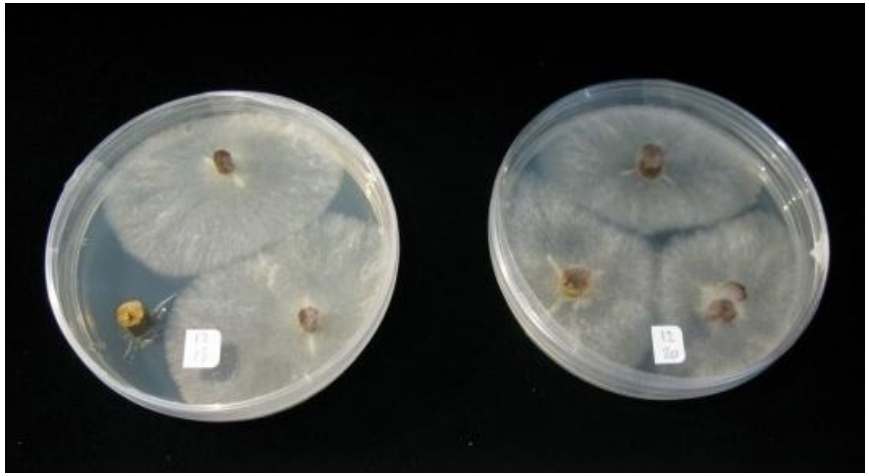


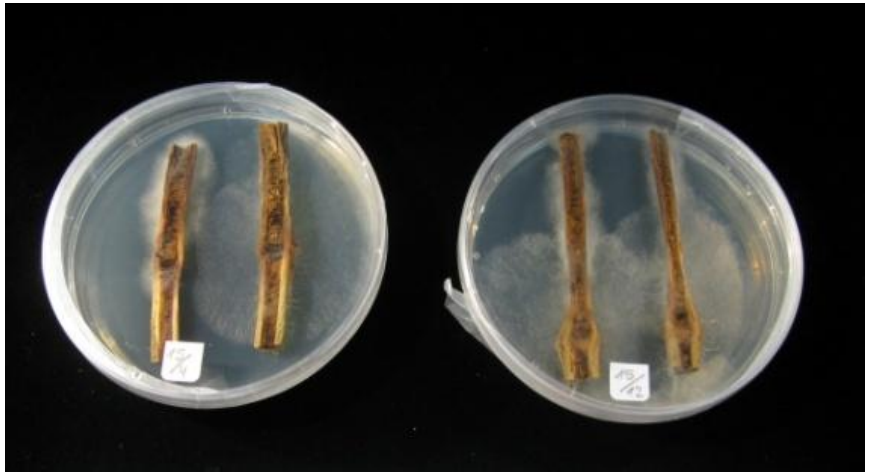
3. Wood chips sterilization



4. Plating

Wound protection trials





Chemical protection

- PROS
  - Stable performance under different conditions (weather, grapevine variety...)
  - Powerful R+D departments in agrochemical companies (development of innovative molecules)

- CONS
  - Possible toxic effects
  - Incompatible with organic viticulture

Biological protection

- PROS
  - Non-toxic effects for environment and human health
  - Fully compatible with organic viticulture

- CONS
  - Irregular performance under different variable conditions (depending on BCA strains, application methods, weather conditions...)
  - Antagonistic but not real fungicide effects in occasions
  - Assessment methods based on pathogen and BCA recovery