Grapevine diseases deadlocks

Vinelink 2014-2015 Topic

Powdery Mildew Working Group

Answers to the request
(Experts)

- **Answers:** 17/48 (35,5%)
- **Europe:**
  - Bulgaria: 1
  - France: 5
  - Germany: 2
  - Italy: 3
  - Switzerland: 3

- **International:**
  - Australia: 1
  - Israel: 1
  - USA: 1

There is research conducted on powdery mildew in all answering countries but also in other countries where questioned experts did not answer to the survey (i.e. Spain by ex.).

Powdery mildew research main axis

- **Fungus biology and life cycle:** *Germany, Italy and France*.
- **Host-pathogen relationship:** *France* (factors promoting or decreasing infection), *Switzerland* (biochemical studies on plant resistance factors) and *Germany*.
- **Epidemiology:** Resistance to fungicides (*Switzerland, Bulgaria, USA and different wine countries*), Pathogen variation and population genetic (*Italy, Germany*, *France*), early release of ascospores and bioindication (*USA*).
- **Control strategies:**
  - Disease forecast models (*Switzerland, Italy, France, Germany, USA*).
  - Spray schedules, molecules used, stimulation of plant defense mechanisms: *France, Bulgaria, Germany, Italy, Switzerland, Australia, USA* and use of biocontrol agents (*Italy, France, Germany and USA*).
- **Genetic and resistance:**
  - Resistant grapevine varieties: *France, Switzerland, Germany, USA.*
  - Resistance sustainability: *France (cooperation with UC Davis in progress*).

Problems encountered at grower's level

General:

- Early detection on leaves;
- Spray schedules with too long intervals between treatments (i.e.: flowering pollination period);
- Inadequate spraying quality;
- Inadequate leaf thinning;
- Control of severe epidemics.

Specific problems according countries or viticulture areas

- **France:** Difficulties to improve the actual strategy (decrease the treatment numbers) in south east (lack of model to characterize : 1) disease pressure, 2) the influence of the precedent epidemic, and lack of indicators for host vigor and susceptibility).
- **Switzerland:** absence of precise model to have a good warning information and to get growers to separate powdery control to downy one, according the year.
- **Italy:** encouraging results with sanitation treatment in late summer but difficulties to convince technicians to recommend this technique. Difficulty in South and central Italy to control the disease on table grape (repeated use of the same fungicide that gives less residues).
- **Bulgaria:** growers consider that veraison is the last stage of high susceptibility of fruit to pathogen and does not consider the flag shoot as the main source of inoculum.
- **USA:** use of Gubler - Thomas index is working well and reliable for spray timing and fungicide selection.
- **Australia:** problem with growers that are reluctant to protect the plant in the first 40 days after bud burst (early season spraying).

Problems encountered
Expert's level

- **Lack of reliable mechanistic model** based on pathogen biology.
- Obligate parasite which makes **difficult to experiment at lab level**.
- Fact that **some fungus developmental phases are not visible** at the beginning of the growing season.
- **Manage foliage status** (can be contaminated lately in the season and give cleistothecia to a reservoir for next season) in comparison with that of bunches (susceptibility decrease strongly and early in season).
- **High spray numbers and fungicide resistance**.
- **High disease pressure difficult to manage** with a control strategy.
- **Difficult to get growers to adopt new programs** (transfer technology difficult to get in practice).

Problems to be tackled

- **Improve knowledge on the overwintering phase of cleistothecia and their maturation process**.
- **Characterize primary inoculum sources (i.e.: ascospores versus overwintering in buds)**.
- **Determine time course of leaves and berries colonization's, conditions for the development of conidiophores and conidia.**
- **Determine conditions for the start and the course of epidemic.**
- **Improve efficient control of PM and pursue research on control strategies, associated risk occurrence, doses and spraying schedules.**
- **Develop research for a better understanding of fungicide resistance and prevent it.**
- **Appreciate well sustainability for grapevine genetic resistance.**
- **Develop research on pathogen adaptation potential to grapevine resistance mechanisms.**
- **France:** develop a national coordinated program to evaluate damaging thresholds according elaborated product (in collaboration with wine business).
- **Italy:** Develop a good control strategy for PM that can predispose to bunch rot other than grey mold and produce by ex. OTA.

Propositions and recommendations

- **International:**
  - **Engage a cooperation program on epidemiology to improve knowledge on epidemic or develop new disease forecast models or improve the existing one. Following aspects should be studied among others:**
    - Favor early detection: ascospores release (see UC Davis), bio-indicators, etc.
    - Characterize primary inoculum sources and improve knowledge on overwintering of cleistothecia and their maturation process.
    - Examine the influence of year to year epidemic on the severity of disease.
    - Develop a reliable mechanistic forecast model based pathogen biology.

- **In France:**
  - **Develop a national coordinated program to evaluate damaging thresholds for several diseases and for different elaborated products. Define the acceptable risk in term of economic and wine quality.**

- **For grapevine resistant varieties:**
  - **Develop a better understanding on resistance mechanisms in grapevine to be sure to integrate in grapevine genome different type of resistance See 2014 VineLink meeting recommendations on Grapevine improvement topic.**

Answers to the request
(Professionals)

- **Answering countries:**
  - **France:** Champagne, Bourgogne, Poitou-Charentes.
  - **Portugal:** Douro.

- **Farms and wineries characteristics:**
  - **France:**
    - **Small:** 12 to 25ha, organic farming partial or total with or without certification bodies.
    - **Large:** 50ha or more, with either organic farming approach or sustainable agriculture with environmental certification (Iso 14001).
  - **Portugal:** only large, 50ha or more, all in sustainable agriculture

Professionals request results
Powdery mildew extent

- **France:** all farms more or less concerned depending upon:
  - **Plots:** cold localization, top of the hill, close to woods, with an evening shade, with bad foliage ventilation.
  - **Viticulture areas in some wine regions:** ex Meursault , St Aubin in Burgundy.
  - **Cultivars:** ex Chardonnay compare to Pinot noir or Pinot meunier.
  - **Vintage:** 2012, 2014 in Champagne with late attacks or symptoms expression.
- **Portugal:** Endemic in Douro with the influence of :
  - **Cultivar.**
  - **Soil factors:** in favor of vigor.
  - **Specific climatic factors:** high humidity, low wind, low solar radiation.

Professionals request results

Control methods and encountered problems

- **Most frequent:** wettable sulphur micronized or not), powder sulphur (during flowering-pollination period), 8-9 treatments/year (until every 8-10 days according the vintage) 8-10kg/ha/treatment.
  - Problem: leaching.

- **Other chemicals:** QoIs (Quinone outside Inhibitors, ex: strobilurins) or other IBS (Sterol Biosynthesis Inhibitors).
  - Problems: resistant strains, water table or creek and river pollutions.

- **Alternative products in organic farming**:
  - AMICAB (De Sangosse), potassium bicarbonate + co-additives.
    - Problem: limited efficacy
  - Natural product: Stifania (with fenugreek).
    - Problem: non conclusive trials.

- **Problems with spraying products :**
  - to take well in account grapevine phenology (flowering being an important state).
  - Starting first treatments (i.e.: first contaminations determination).

- **Other techniques:** early leaf removing and good foliage management.

Professionals request results
How to improve disease control?

- Fine tuning and good knowledge of the spraying equipment.
- Need to well precise the schedule of spraying treatments.
- Need to develop alternative control methods (natural products and/or grapevine natural defense inducers) or biological control.
- Improve also knowledge on the disease:
  - Evaluation of first contaminations (non visible phase of the disease) and/or origin of contamination (sexual versus vegetative, i.e. cleistothecia or mycelium).
  - Quantify sporulations and associate them to an organ attack frequency.
  - Define factors responsible for disease propagation i.e. spores dissemination.
  - Good evaluation criteria to determine the more or less favorable influence of vintage, i.e. influence of one contamination vintage on the following others.
- Improve disease forecast models.
- Use improve cultivars or clones less sensitive to powdery mildew.

Professionals request results
New tested or applied control methods

- **Alternative control methods:**
  - Whey: lactoserum, partial efficacy.
  - Stifenia: fenugreek, non conclusive.
  - Amicarb: potassium bicarbonate, limited efficacy.
  - Sulphur from volcanic origin: non approved in France.
  - New products based on oil derivatives: paraffin (Total group), tested in Champagne with promising results.

- **Decreasing chemical doses (sulphur or fungicides):** see optidose program IFV.

- **Leaf removal:** efficient technique used and improved in some vine growing domains.

Professionals request results
Links with research and/or development

- **Main sources of information:**
  - Technical reviews: Vigne, Réussir vigne, Phytoma, Revue des Œnologues, etc.
  - Technical reports : National powdery control report, French agriculture chamber reports, Switzerland viticulture report, reports from advising private companies , ADVID technical report, etc.

- **Rare direct connections with researchers:**
  - Except personal interactions.
  - Except occasionally: vineyard include in a research trial, etc.

- **Main links:**
  - Technical commission of interprofessional organizations.
  - Agriculture chambers technical commissions .
  - Technical advising institutes national (IFV) or from private sector.
  - Specific associations: i.e. SEDARB in Burgundy for organic farming promotion.

Professionals request results
Conclusions

- **Powdery mildew is still a problem in viticulture.**
- **Control of the disease seems always problematic in some areas (soil or climatic/microclimatic conditions) and/ or with some cultivars.**
- **Late contaminations, time for first sprays, ignorance of first contaminations origin are still problematic in some vineyards.**
- **Sulphur is the main molecule used for powdery mildew control:**
  - Fungicides conduct often to resistant strains;
  - Others natural products have still a limited efficacy.
- **Decreasing sulphur doses (depending plant development stage) or treatment timing (depending climatic conditions) are often the main objectives**.
- **Quality of spraying is essential for control.**
- **For some viticulture region (i.e. Douro) there is a need to built specific equipments adapted to terrace cultivation.**
- **Expectations for:**
  - Genetically improved varieties resistant to powdery mildew and,
  - Disease knowledge improvement.