Grapevine diseases deadlocks

Vinelink 2014-2015 Topic

Powdery Mildew Working Group

Expert request (Professional in progress)

- 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 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.