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## Grapevine trunk diseases : a true economical difficulty

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## Grapevine Trunk Diseases: a true economical difficulty

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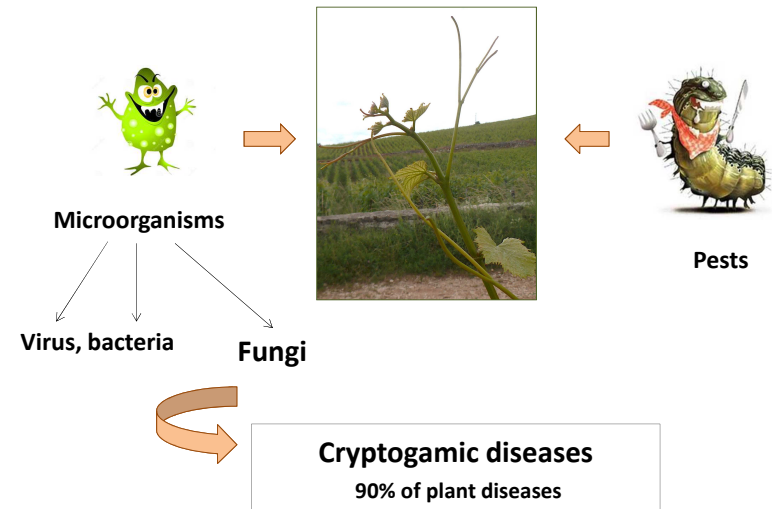
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## Susceptibility to pathogens



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## Grapevine cryptogamic diseases

Downy mildew



Powdery mildew



Black-rot



Gray mold



...and grapevine trunk  
diseases (GTD):

Eutypa dieback, Esca and  
Botryosphaeria dieback

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## Eutypa dieback



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**Esca**



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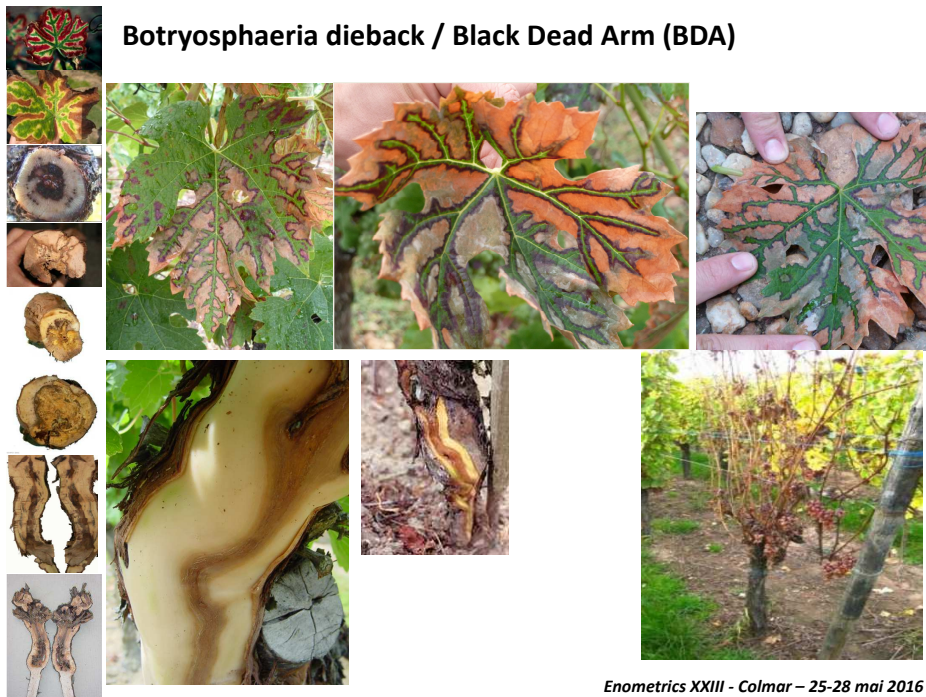


**Apoplexy**



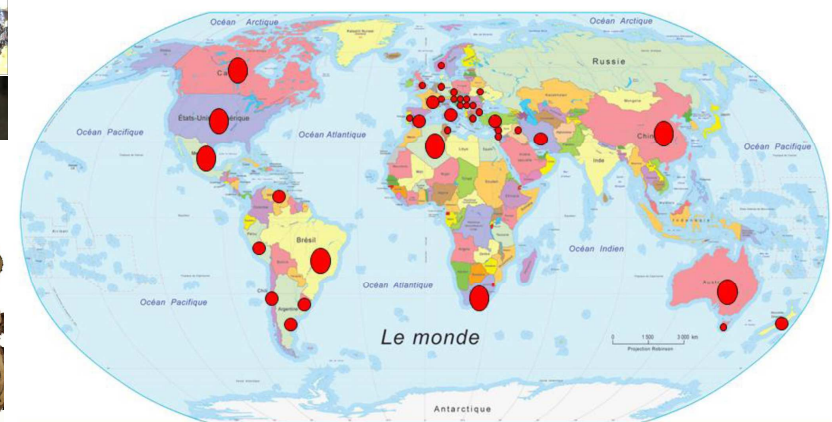
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**Botryosphaeria dieback / Black Dead Arm (BDA)**



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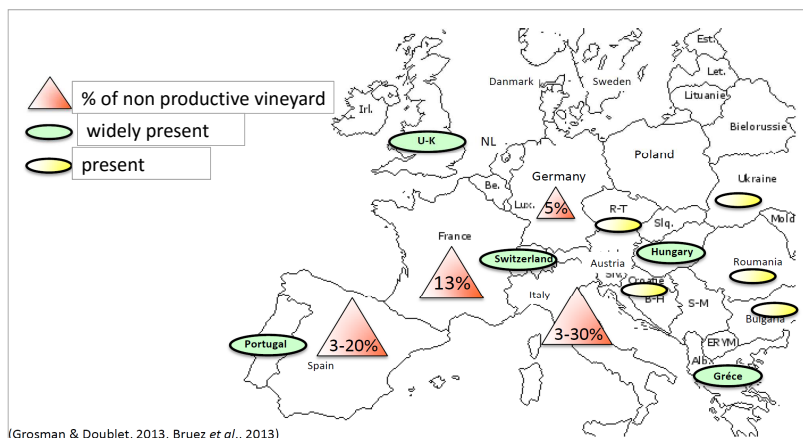
**A worldwide problem**



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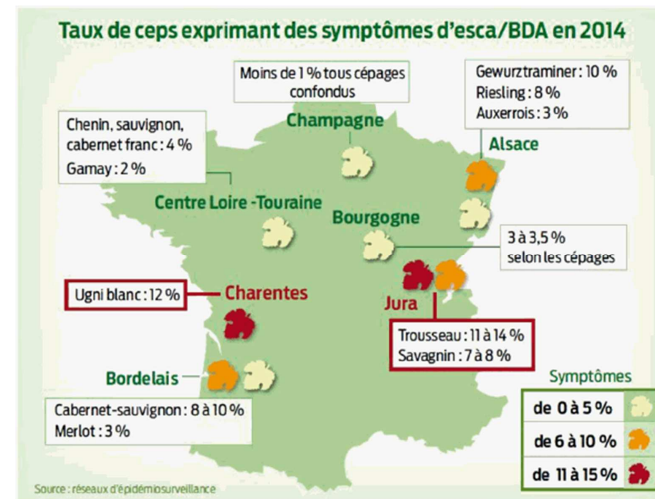
## Impact in Europe



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## Vineyards differentially affected in France

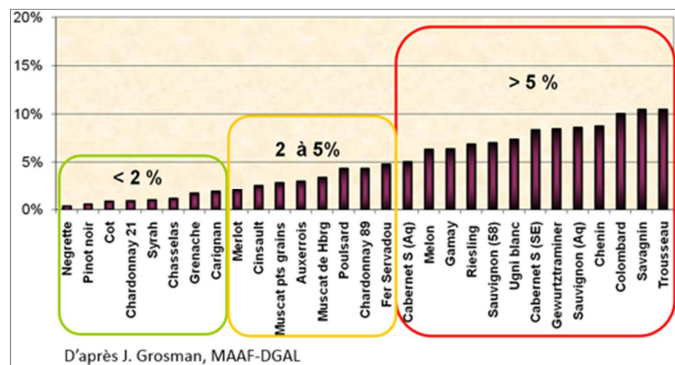


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## Variety-dependent symptom expression

Mean percentage of Esca symptom expression

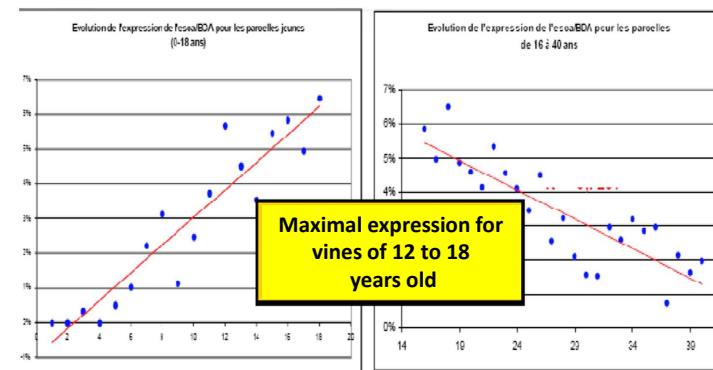


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## Age-dependent symptom expression...

... a problem for « old vines » vineyards



(J. Grosman, DGAL)

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## A common issue: premature grapevine death



Photo F Dal - Sicavac

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## Consequences:

- Decreased vineyard longevity
- Yield losses
- Heterogeneity in the vineyard



Affected vineyard productivity and increasing production costs

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## Economic impact: an estimation

### Yield losses:

2014: 4.6 hl / ha : 900 millions to 1 billion euros

**9 hl / ha in 2020 !**

(BIPE, [http://www.franceagrimer.fr/fam/content/download/40019/371598/file/CNIV\\_HS%20N3\\_v1.pdf](http://www.franceagrimer.fr/fam/content/download/40019/371598/file/CNIV_HS%20N3_v1.pdf))

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## Complantation: replacement of dead grapevines

**In Burgundy: at least 2 millions € / year for replacements**

(G. Morvan, <http://www.yonne.chambagri.fr/gerer-mon-exploitation/l experimentation/maladies-du-bois-de-la-vigne.html>)



Photo F Dal - Sicavac

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## Strategy of protection: a deadlock situation...



- sodium arsenite: banned in 2001
- no alternative fungicide available



## Alternative solutions under investigation ...

- at different scales: laboratories, vine nurseries, vineyards
- chemical and biological solutions (biological control)
- curative technical practices: regrafting and “curetage”



## Regrafting



Photo F Dal - Sicavac

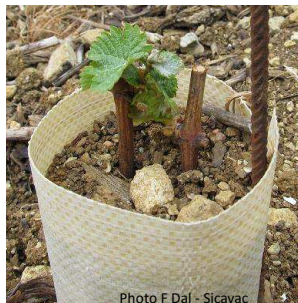


Photo F Dal - Sicavac



Photo F Dal - Sicavac

## Curetage



Photo F Dal - Sicavac



« dead wood » removal



## Comparative costs

For one plant	Complantation	Regrafting	Curetage
Removal of the dead vine	0,52 €	0,52 €	
Hole digging	0,96 €		
plantation	0,52 €		
Grafting		1,05 €	
curetage			2,5 €
cost of the vine plant	1,2 - 1,8 €	0	
protection	0,4 - 0,7 €	0,4 - 0,7 €	
fertilization	0,3 - 0,5 €	0	
1st year plant care	0,8 €	0,2 €	
Total	4,7 - 5,8 €	2,17 - 2,47 €	2,5 €

F. Dal SICAVAC  
CENTRE-LOIRE

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A global awareness

International Wine Office (OIV)

« the most destructive diseases of grapevine of the past three decades and are of rapidly growing concern in all wine producing countries».

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## International research on GTD

### European projects:



Toward a sustainable viticulture: Improved grapevine productivity and tolerance to abiotic and biotic stresses by combining resistant cultivars and beneficial microorganisms (VitiSmart)

9 countries (BG, CH, FR, GR, IT, NL, PL, SP, UK)



Sustainable control of grapevine trunk diseases, projet FA 1303

21 countries (AT, BG, CH, CZ, DE, GR, ES, FR, HR, HU, IL, IT, MT, NL, PL, PT, RO, SE, SI, TR, UK)



Winetwork : Network for the exchange and transfer of innovative knowledge between European wine-growing regions to increase the productivity and sustainability of the sector

7 countries (CR, ES, FR, GR, HR, IT, PT)



Programme Interreg IV Bacchus : Réseau transfrontalier de recherche et de transfert des connaissances pour une viticulture durable

3 countries (FR, GR, UK)



Mycorray Project - Preventing fungal trunk diseases for the vine grower

6 countries (ES, FR, HU, IT, NL, UK)

**Hennessy: allocation of 600 000 euros to fund an international research project focused on GTD.**

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## The research network in France



### Acteurs français de la R&D sur les maladies du bois

(coordination par IFV)



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## Several ongoing projects in France

- 3 Casdar projects - 3,7 millions euros  
Agricultural Ministry + CNIV
- FAM - Agricultural Ministry
- Regional councils (Burgundy, Val de Loire)
- BIVB, CIVB



- Study of the complex of pathogens and their interaction with grapevine
- Study of pathogen aggressiveness
- Understanding the tolerance of some varieties
- Impact of environmental factors and practices
- Understanding the mode of action of sodium arsenite
- Identification of new active molecules
- Biological control
- Curative practices
- ...

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The CNIV (with the technical support of IFV) and FranceAgriMer have gathered an exceptional budget of about 600 000 € to launch an action plan against vine decline.

BIPE: consulting for strategic analysis

**CNIV: 1.5 millions € for research**

French National Assembly report

**French Agricultural Ministry: 1,5 million €**

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## In conclusion

- A serious problem
- Collective mobilization
- Needs for multidisciplinary skills
- center of interest for economists...

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## Acknowledgements



C. Bertsch



S. Trouvelot



P. Larignon



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**Thanks for your attention!**

