Chestnut blight disease: Priorities for research and development

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Chestnut: an old culture

Le châtaignier de l'Etna.
Âge attribué : 3600 ans !

Plantation et greffage des châtaigniers au XIV^{ème} siècle

Récolte des châtaignes au XIV^{ème} siècle

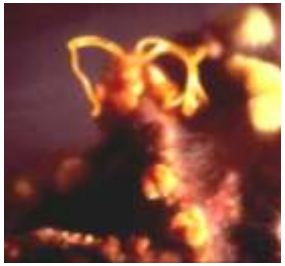
But a strong decline in the last century

- **Partly explained by diseases and pests**

Characterized by:

- **Exotic parasites: from Asia**
  - Biological invasions >>> loss of biodiversity
  - High impact, at the beginning of the epidemics
- **Multiple introductions and drivers**
  - Chestnut plants and timber
  - Quarantine measures
- **Control: back to the origins**
  - Biological control: natural ennemies
  - Genetic control: genetic resistance

Chestnut blight disease caused by *Cryphonectria parasitica*



which is infected by CryphonectriaHypovirus

- CHV1 causes the hypovirulence in *C. parasitica*

>>> recovery of cankers

>>>development of biological control method in the 70ies

Non infected isolates (V)

Infected isolates (HV)

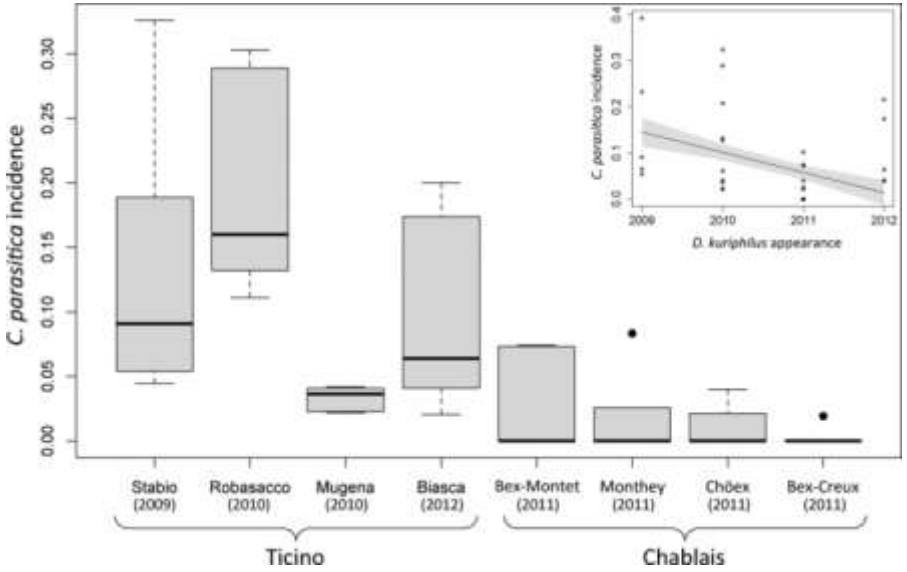
Impact of chestnut blight in Europe

- **Very high disease incidence**
- **but low impact** in chestnut populations **where CHV is established** and in orchards where CHV is used as **biocontrol agent**

Impact of chestnut blight in Europe

However

- CHV is not yet established everywhere
- problems and failures in grafting…
- interactions with other stresses: gall wasp, ink disease, drought???



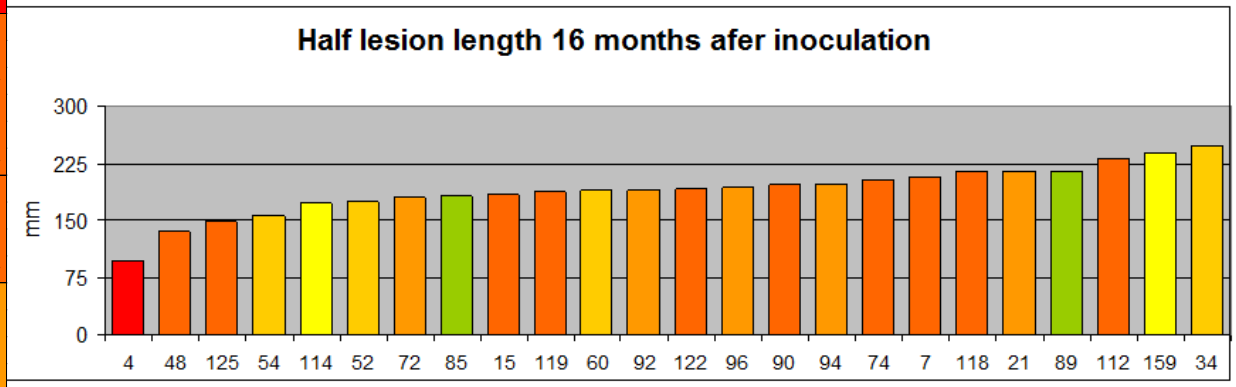
Meyer et al. 2015

Impact of chestnut blight in Europe

- **Some resistance exist, in *C. crenata* and in hybrids**

Clone Code	Clone Name	Genotype	Use
114	Belle Epine	*C. sativa*	Fruit variety
159			Rootstock
4		*C. crenata*	Rootstock
7	Marsol	*C. crenata x C. sativa*	Rootstock
15	Marigoule		Rootstock
48	Précoce Migoule		Fruit variety
74	Maraval		Rootstock
90	Ferosacre		Rootstock
112	Bournette		Fruit variety
118	Marlhac	*C. sativa x 4*	Rootstock
119			Rootstock
122	Marissard		Rootstock
125	Bouche de Betizac		Fruit variety
21		*C. sativa x hyb.*	Rootstock
72			Rootstock
92			Rootstock
94			Rootstock
34		*(C.crenata x C.sativa) x hyb*	Rootstock
52			Rootstock
54			Rootstock
60			Rootstock
85		*C.mollissima x C.sativa*	Rootstock
89			Rootstock

Test on adult trees in situ



Robin et al. 2011

Needs to improve chestnut blight control

Biological control:

- Registration of CHV as a biocontrol agent
- European data base on *C. parasitica* and CHV diversity in Europe
- Selection of virus x fungus associations
- Strategies to apply biological control in forests and orchards

Actors:

development, stakeholders, research,

Approaches:

Experimental, modeling

Needs to improve chestnut blight control

To protect the grafted plants

- Local treatments with chemicals?

To use genetic resistance

- Characterize available genetic ressources for resistance to *C. parasitica*
- Conservation of genetic ressources

Actors:

development, stakeholders, research

Approaches:

Experimental

Needs to improve chestnut blight control

Chestnut blight in the context of climate change

- Integrated protection of chestnut , in a multi-risk context

>>> interaction with biotic risks (gall wasp, ink disease...) and abiotic (drought and high temperature)

- Effect of climate change on *C. parasitica*

>>>disease dynamics as a function of climatic parameters and adaptation of *C. parasitica*

Actors:

development, stakeholders, research,

Approaches:

Experimental, modeling