Apricot susceptibility to blossom brown rot (*Monilinia* spp.) and leaf rust (*Tranzschelia* spp.) under low-input production system

CE Parveaud[1], JM Broquaire[2], V Mercier[3], C Gomez[1], L Brun[3], G Clauzel[3], A Guillermin[3], JM Audergon[4]

[1] GRAB ; [2] SICA Centrex, [3] INRA UERI Gotheron ; [4] INRA UGAFL Avignon ; FRANCE

introduction

Production regularity in organic apricot orchards is highly **constrained by blossom brow rot** caused by *Monilinia* spp. infections on flowers.

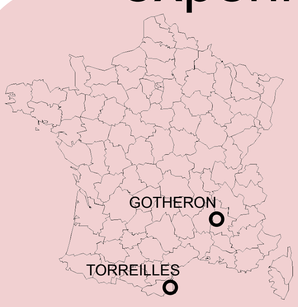
Leaf rust (*Tranzschelia spp.*) development can induce early **defoliation**, which is detrimental to tree vigour and yield.

Copper-based treatments are partially efficient against both diseases but their negative environmental impact should be considered.

The **choice of cultivars** according to disease susceptibility criterions is a **key-step towards low-input production systems**.

This poster presents the susceptibilities to blossom brow rot and leaf rust of 16 apricot cultivars observed during 5 years in two sites.

experimental design



2 experimental sites in France: Gotheron (South-East) and Torreilles (South)

Gotheron site: 16 cultivars; Torreilles site: 12 cultivars; 9 cultivars are planted in both sites

20 trees per cultivar; *Prunus* rootstock; 4x4m planting distances

Cultivars' choice: commercial cultivars expected to display a low-susceptibility

Cultivars were **randomly-located in each plot**


Leaf rust symptoms


GOTHERON experimental plot

No fungicide and insecticide were applied during the study period (2003-2011).

Fertilization and weed control were managed according to conventional agriculture practices.

The severity of *Monilinia* spp. and leaf rust symptoms were assessed at tree level.

Shoots infected by *Monilinia* spp. were pruned out after assessment each year.


Monilinia spp. symptoms on flowers

results & discussion

Diseases observed during the 2006-2011 period in Gotheron and Torreilles sites

Disease	Organ	Gotheron	Torreilles
Monilinia spp.	Flower		
Monilinia spp.	Fruit		
Rust *Tranzschelia spp.*	Leaf		
Scab *Venturia carpophila*	Leaf		
Scab *Venturia carpophila*	Fruit		
Powdery mildew *Podosphaera tridactyla*	Fruit		
Bacterial canker *Pseudomonas syringae*	Trunk, shoot		
ESFY	Flower, leaf		
Plum pox virus	Leaf, fruit		

Presence of the disease; susceptibility assessment possible

Episodic presence or low pressure of the disease; susceptibility assessment impossible

No disease; susceptibility assessment impossible

A **reliable assessment** of cultivar susceptibility requires the **presence of the disease for several years**.

The absence of fungicide treatments permitted the development of most apricot diseases.

Mean percentage of shoot necrosed by *Monilinia* spp. in Gotheron site during 2007-2011 period.

Cultivars	2007	2008	2009	2010	2011	Mean 2010-2011[(a)]	
Bakour (2137)	-	6	0	3	23	**13**	**A**
Goldrich (2184)	36	9	8	9	48	**28**	**B**
TomCot®Toyaco (2669)	22	12	11	19	40	**30**	**B**
Malice® Avikot (2241)	3	22	7	14	54	**33**	**B**
Polonais (1352)	48	18	2	33	65	**48**	**C**
Hargrand (1814)	4	18	9	31	72	**50**	**C**
A4034	-	15	4	45	72	**58**	**CD**
Early Blush®Rutbhart (2938)	-	25	16	40	83	**60**	**CD**
Canino (1343)	-	30	16	52	74	**63**	**CD**
Vertige (3845)	6	30	28	53	84	**68**	**D**
Orangered®Bhart (2892)	1	17	20	53	87	**70**	**D**
Bergeron (660)	2	32	7	68	70	**72**	**D**
Tardif deTain (2490)	1	31	16	65	78	**72**	**D**
Bergarouge®Avirine (2914)	15	28	40	85	89	**89**	**E**
Candide (4025)	-	21	19	93	95	**96**	**E**
Frisson (2821)	1	36	31	91	95	**100**	**E**

[(a)] adjusted mean after ANOVA ; Newman-Keuls test, $\alpha = 0.05$

No humectation during bloom: conditions not favourable to *Monilinia* spp. development

Humectation < 4 hours during bloom: intermediate conditions to *Monilinia* spp. development

Humectation > 4 hours during bloom: condition favourable to *Monilinia* spp. development

Genotype x Environment interactions are significant: the probability for cultivars to be exposed to *Monilinia* spp. infection during bloom varies according to years.

A **high variability** in *Monilinia* spp. susceptibility is expressed.

Bakour cultivar could be an interesting genitor in breeding programs.

Mean severity score of leaf rust damages observed during 2008-2009 in Gotheron site and 2008-2010 inTorreilles site.

Score scale: 0 = no symptom; 1 = 1-20% infected or fallen leaves 2 = 21-40%; 3 = 41-60%; 4 = 61-80% and 5 = 81-100%

Cultivars	Gotheron	Toreilles
Hargrand (1814)	**1.11 A**	**2.25 B**
Orangered® Bhart (2892)	**1.35 AB**	**1.43 A**
Early Blush® Ruthbart (2928)	**1.58 B**	**2.59 BC**
Vertige (3845)	**2.00 C**	**2.80 C**
Bergarouge® Avirine (2914)	**2.05 CD**	**2.48 BC**
Tom Cot® Toyaco (2669)	**2.75 FG**	**3.79 D**
Frisson (2821)	**3.06 GH**	**3.78 D**
Tardif de Tain (2490)	**3.47 I**	**4.52 E**
Bergeron (660)	**4.39 J**	**4.89 F**

Newman-Keuls test, $\alpha = 0.05$

No Genotype x Site interaction: the ranking of cultivars susceptibility to leaf rust is similar between both sites.

A **high variability** in leaf rust susceptibility is expressed.

Most of the common commercial cultivars assessed in this study have an intermediate to high susceptibility to both diseases (e.g. Bergeron).

There is a **need to further identify low disease-susceptible cultivars**:

- to **help growers in their choice** of apricot cultivars. Because cultivars rarely combine low susceptibilities to all diseases, the cultivar choice will be motivated according to the most severe diseases observed in their production area.

- to provide reliable scientific data for **breeding programs.**

The effect of the design and management of experimental plots on susceptibility assessment needs to be carefully considered.

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Corresponding author : Claude-Eric Parveaud ; GRAB ; claudeeric.parveaud@grab.fr ; www.grab.fr