SHOOT AND BLOSSOM SUSCEPTIBILITY TO FIREBLIGHT OF APPLE CULTIVARS

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Abstract

The fireblight susceptibility of 75 named cv. of apple and of two *Malus* species has been evaluated through artificial inoculation, during 3 or 4 consecutive years for shoots inoculation and 2 consecutive years for flowers inoculation.

The results of shoot inoculations are assessed in 5 classes of a varietal index of susceptibility (V.I.S.) :

$$V.I.S. : \frac{\text{length of necrosis}}{\text{length of inoculated shoot}} \times 100,$$

which takes into account the proportion of blighted shoots, and the progression of the disease after inoculation (LE LEZEC and PAULIN, 1984).

The results of flower inoculations are assessed in 5 classes (same limits as above) which are the actual percentages of infected blossoms after inoculation (=Varietal Receptivity).

A table shows the rating of the cv. and sp. according to these two assessments. The correlation between the two indexes is usually poor ($0.48 < r < 0.25$).

Nevertheless it appears that this classification fits with the rating of field susceptibility as previously assessed in the same conditions, with few exceptions.

The relations between different ratings are discussed.

Introduction

The fireblight susceptibility of 75 named cultivars of apple and of two *Malus* species has been evaluated through artificial inoculation ; during 3 or 4 consecutive years for shoots inoculation and 2 consecutive years for flowers inoculation.

Material and methods

Varieties have been grafted on MM 106 or M 26 rootstocks and planted in 4 repetitions of 3 trees.

Actively growing shoots (30 - 40 cm length) are inoculated by infecting with a syringe a bacterial suspension (CFBP 2045 adjusted to 3.10^8 c.f.u./ml) ; 36 shoots per cultivar have been inoculated each year.

The results of shoot inoculations are assessed in 5 classes :
 1 : [0-20[; 2 : [20-40[; 3 [40-60[; 4 [60-80[; 5 [80-100]
 (LE LEZEC and PAULIN, 1984) of a varietal index of susceptibility (V.I.S.).

$$V.I.S. : \frac{\text{Length of necrosis}}{\text{Length of all inoculated shoots}} \times 100$$

$$\text{Infectivity : } \frac{\text{Number of blighted shoots}}{\text{Number of inoculated shoots}} \times 100$$

(I)

$$\text{Severity : } \frac{\text{Length of the symptoms}}{\text{Length of inoculated shoots showing symptoms}} \times 100$$

(S)

Blossoms are inoculated at full bloom by spraying a 3.10^8 c.f.u./ml suspension of 2045 with a load sprayer (10 X 10 blossoms per variety).

Results

Table 1 shows the scoring of the varieties and *Malus* species according to these two indexes.

- 7 varieties are highly susceptible either on shoots or on flowers,
- 22 varieties are susceptible,
- 2 varieties and 2 *Malus* species are resistant,
- The others 44 varieties are intermediate (moderately susceptible or moderately resistant).

Scab resistant varieties and *Malus* species are confirmed as weakly susceptible to fireblight.

Discussion

Shoots and blossoms susceptibility :

The correlation between the infectivity on shoots and flowers for all the varieties is poor (table 2). If we consider only the varieties included in classes 1 and 2 (resistant and moderately resistant) a correlation between shoots and flowers infectivity could be found.

Relation between experimental rating and orchard behaviour :

The behaviour of the same trees have been assessed, under natural infections during two years. The rating according to VAN DER ZWET

and BELL (1984) usually fits our experimental scoring, as shown on table 1 for the 3 classes : resistant, susceptible and highly susceptible.

Conclusion

Although blossom susceptibility may provide useful information, it is likely that shoot susceptibility is of greater importance to determine field behaviour toward fireblight of apple varieties.

According to our results U.S. varieties are generally less susceptible than European ones (i.e. = 19 european varieties out of a total number of 29 varieties in classes 4 and 5), which probably reflects the fact that apple breeding in the United States took into account fireblight susceptibility, at least indirectly.

Scab resistant varieties and sp. are shoot resistant to fireblight, and could be recommended for new plantations in contaminated area.

The good correspondance between experimental and field behaviours for fireblight shows accuracy of the selected indexes for disease rating.

References

- LE LEZEC, M. and PAULIN J.P., 1984. Shoot susceptibility to fireblight of some apple cultivars. *Acta Horticulturae* 151 : 277-281.
- VAN DER ZWET, T. and BELL, R.L., 1984. Comparative evaluation of the degree of fireblight resistance in various pear cultivars and selections. *Acta Horticulturae* 151 : 267-275.

Table 1 - Results of the apple cultivars and Malus Sp.
According to their classes of I.V.S. (shoots)
and receptivity (blossoms)

			ABONDANCE (H)	JAMES GRIEVE (H)	
5					
4	REINETTE CLOCHARD	INGRID MARIE BERLEPSCH (H) GAVIN * (S) COX'S ORANGE PIPPIN (S) GRANNY SMITH SPUR VERDE DONCELLA REINETTE du MANS (S) ROME BEAUTY	WINTER BANANA HOLSTEINER COX'S (H) JUBILEE (H) DELCOURT COX'S ORANGE PIPPIN (S) JONATHAN (S) ROME BEAUTY IMPERATORE (S)	IDARED (H) REINE DES REINETTES TYDEMAN'S EARLY WORCESTER (H) TRANSPARENT BLANCHE	
3		ANNURCA ALUMENE (S) REINETTE d'ARMORIQUE	JERSEYMAC (S)	BELCHARD (H) CHANTECLER MEUROSE HILON (H) JONNET (S) DELBARESTIVALE DELCOURT	GLOSTER (H)
2		AKANE MAGGOLD GOLCHARD (H) CLOCHARD GRANNY SMITH POMME CLOCHE	HORNERBURGER Mc INTOSH REINETTE GRISE du CANADA GALA GRAVENSTEIN PRIMA * (I) PERLEBERG SUMMERRED JONAGOLD Mc SPUR		
1	PRISCILLA * (I) PERPETUE (H) EVEREST * (I) GOLDEN DEM * (I) NOVA EASYGO * (I)	CHARDEN (H) (I) BELLE DE BOSKOOP GOLDEN AYLIE SPUR (I) BELCOURT (H) LYSGOLDEN (H) (I) WINEAPPLE IMPERIAL (I) JUDCUNE * (I) STARCRIMSON (I) SPARTAN PRIMA * (I) LIBERTY * WINEAPPLE SPUR (I) DELICIOUS ROUGE COOPER 7 STARKING DELICIOUS (I)	GLORINA (H) FLORINA * (I) GOLDEN DELICIOUS (I) REINETTE BLANCHE du CANADA DELBUS BLAXSTAYMAN IMPROVED (I) STAYMAN NEPLING TOPRED DELICIOUS OZARK GOLD RED FREE * (I) Mc FREE * (I) SMOOTHER (H) TOPRED - DELICIOUS DELICIOUS H EARLY	ROYAL GALA (H) TENROY MUTSU BLUSHING GOLDEN (H) GRIFER	
Shoots Blossoms	1	2	3	4	5

1 : resistant
2 : moderately resistant
3 : moderately susceptible
4 : susceptible
5 : highly susceptible

* Scab resistant
(r) patented
(H) highly field susceptible
(S) field susceptible
(I) field immune

Artificial inoculation

(intermediate classes not represented)

Table 2 : Infectivity on shoots and flowers

● tested varieties and sp.

▲ scab resistant varieties