

Resistance of St. Jean-Morden and St. Jean series apple rootstocks to *Erwinia amylovora*.

V. Toussaint, A. Levasseur, Y. Groleau, M. Cadieux, M. Ciotola, and S. Khanizadeh

Horticultural Research and Development Centre, Agriculture and Agri-Food Canada, 430 Gouin Boulevard, St-Jean-sur-Richelieu, QC J3B 3E6, Canada

Introduction

Newly released apple rootstocks including SJM (St-Jean Morden), SJP84 (ST-Jean 1984), SJP91 (ST-Jean 1991) series and O3AME (a new O3 clone with better efficiency) have been evaluated for their agronomic qualities since 1970, 1975, and 1982 respectively. As a result of the evaluation, seven SJM and nine SJP84 were selected and released (http://www.cyberfruit.info/partners/apple_rootstock). The rootstocks from series SJP91 are at an advanced stage of evaluation.

In order to provide additional information to the industry, these rootstocks were also evaluated for their resistance to important rootstock diseases. A first study has been previously conducted by Carisse and Khanizadeh (2006) to evaluate their relative resistance to *Phytophthora cactorum*. The aim of the present study was to evaluate the rootstock susceptibility to fire blight.

Objective

To evaluate the resistance of the rootstocks from the series SJM, SJP84 and SJP91 against fire blight.

Materials & Methods

Bacterial strains and inoculum. *Erwinia amylovora* strains used in this study were chosen among strains kindly provided from the "Laboratoire de diagnostic en phytoprotection de Québec, MAPAQ". Strains were tested for their pathogenicity on tobacco cv. Xanthi (Fig. 1A) and their aggressiveness on rootstock M26 (Fig. 1B). Four days after rootstocks inoculation, symptoms were evaluated and the 2 most aggressive strains, #998 (#433 in our strains database) and 1585 (#435 in our strains database), were chosen for our trials.

Inoculum consisted of a 24 h-old culture grown on 10% tryptic soy agar. Bacteria were suspended in 0.05 M potassium phosphate buffer, pH 6.5. Bacterial suspension was adjusted to an $A_{620}=0.2$. The actual concentration of the bacterial suspension was determined using dilution-plating method (10-fold on TSA-10%).

Rootstock inoculation. Rootstocks tested in this study are listed in Figure 2. The method used to test the resistance of the rootstocks was mostly based on Norelli et al. (2003). Stool-bed-propagated liners were potted in 4 L pots containing a peat moss and vermiculite soil mix during spring 2005 and trained to single shoots. Plants having at least a 15 cm vigorous shoot in length were selected for inoculation. Actively growing shoots were inoculated with two strains of *E. amylovora*. In general, 6 plants of each rootstock were inoculated with each bacterial strain.

Shoots were inoculated by transversally bisecting the two youngest actively growing leaves with scissors dipped in a suspension of a single strain of *E. amylovora*. Current season shoots length and the lengths of the necrotic lesions were measured three weeks after inoculation. The necrotic lesion length was expressed as a percentage of the current season's length and used as the measure of host resistance. Individual plants were the unit of replication. GLM of SAS (SAS Institute Inc., Cary, NC) was used to analyse treatment effects. Differences among rootstocks resistance were determined using LSD test.

Figure 1

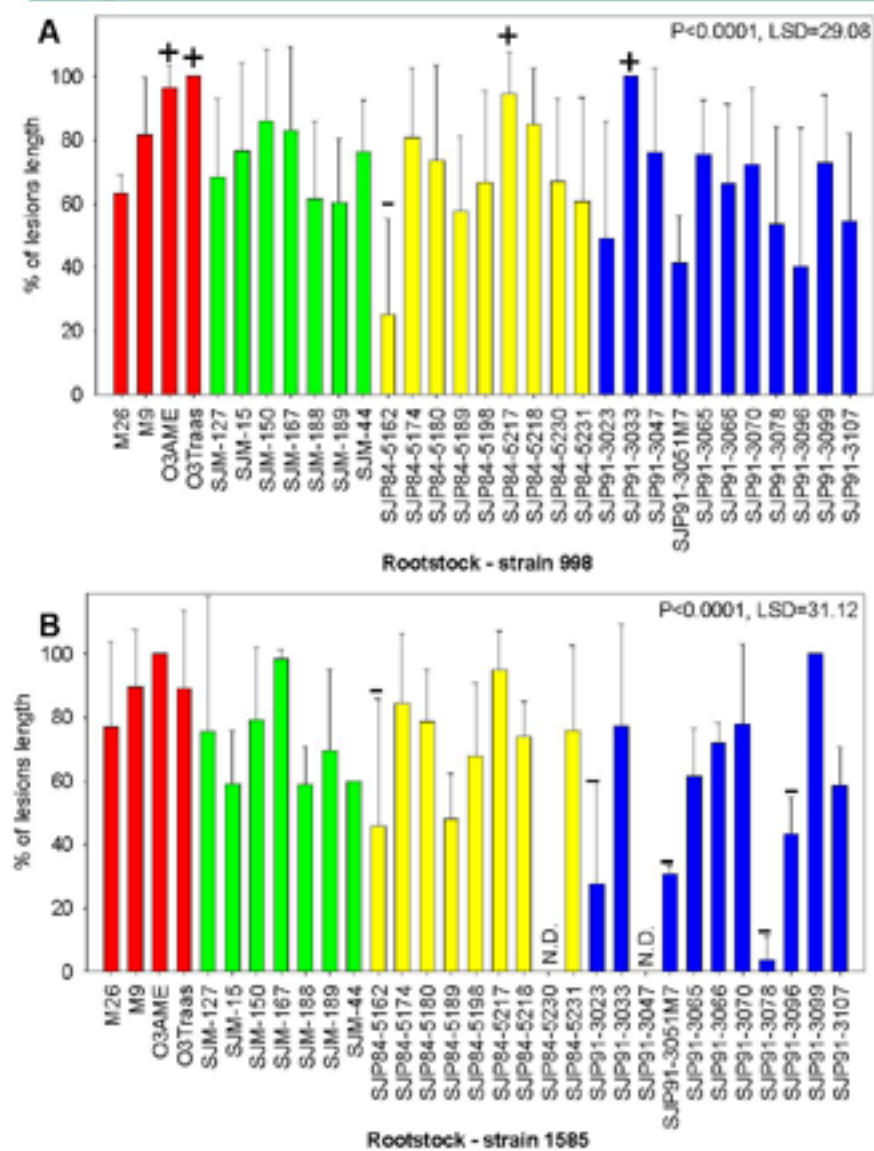


Figure 1 A. Positive hypersensitive reaction on tobacco cv. Xanthi for the strain 998 B. Symptoms of fire blight 4 days after inoculation with scissors C. Bisecting inoculation of apple rootstocks.

Results

We observed a significant rootstock*strain interaction ($P=0.0072$), therefore data were presented for each strain separately. M26, considered as a very susceptible rootstock by the apple growing industry, was chosen as a standard to compare SJM, SJP84 and SJP91 rootstock series. For rootstocks inoculated with strain 998, rootstocks O3AME, O3Traas, SJP84-5217 and SJP91-3033 were significantly more affected by fire blight than M26. However, SJP84-5162 was significantly more resistant to fire blight than M26. For strain 1585, no rootstock was significantly more affected by fire blight than M26. Rootstocks SJP84-5162 and 3023, 3051M7, 3078, 3096 from SJP91 series were significantly more resistant to fire blight than M26.

Figure 2



Discussion

•Similarly to Norelli et al. (2003) results obtained for M26, Ottawa 3 (O3AME and O3Traas) and M9 showed that these rootstocks were highly susceptible to fire blight.

•The significant interaction between strain and cultivar has been previously reported (Norelli et al., 2003), which underlines that any testing for fire blight resistance should include more than a single strain.

•For the rootstocks tested, the SJP84-5162 seemed to have a very interesting potential for its resistance to fire blight.

•SJP84-5162 tolerance to fireblight will be compared to other tolerant rootstocks such as the Geneva series.

•Additional information on agronomic characteristics of SJM and SJP series are available at www.cyberfruit.info.

Figure 2. Necrotic lesion length expressed as a percentage of the current season's length for rootstocks inoculated with strain 998 (A) and 1585 (B)

References

- Carisse, O., and S. Khanizadeh. 2006. Relative resistance of newly released apple rootstocks to *Phytophthora cactorum*. Can. J. Plant. Sci. 86:199-204.
- Norelli, J.L., H.T. Holleran, W.C. Johnson, T.L. Robinson, and H.S. Aldwinckle. 2003. Resistance of Geneva and other apple rootstocks to *Erwinia amylovora*. Plant Dis. 87:26-32.

Acknowledgements

We kindly thank Ms. Lise Vézina from the "Laboratoire de diagnostic en phytoprotection de Québec, MAPAQ" for providing us strains of *Erwinia amylovora*.