PROTECTION OF GENETIC RESOURCES OF POMOLOGICAL PLANTS AND SELECTION OF GENITORS WITH TRAITS VALUABLE FOR SUSTAINABLE FRUIT PRODUCTION

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FIELD EVALUATION OF THE SUSCEPTIBILITY TO *Blumeriella jaapi* AND *Glomerella cingulata* AND SOME BIOLOGICAL PROPERTIES OF NEWLY SELECTED SOUR CHERRY GENOTYPES

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A B S T R A C T

From 2002 to 2003, a trial was conducted of over 107 sour cherry genotypes from the field collection of the Research Institute of Pomology and Floriculture in Skierniewice, Poland. All of the genotypes had good fruit quality. The genotypes were evaluated in terms of their resistance to leaf spot (*Blumeriella jaapi* Rehm.) and bitter rot (*Glomerella cingulata* Stonem). Twelve genotypes were resistant to both leaf spot and bitter rot. Seven were highly resistant to leaf spot: W 2/02, W 4/02, W 5/02, W 8/02, W 10/02, W 11/02 and W 12/02. Five were moderately resistant to leaf spot: W 1/02, W 6/02, W 7/02, W 9/02 and W 13/02. Seven were highly resistant to bitter rot: W 1/02, W 4/02, W 5/02, W 6/02, W 8/02, W 11/02 and W 13/02. Five were moderately resistant to bitter rot: W 2/02, W 7/02, W 9/02, W 10/02, and W 12/02. All twelve of these genotypes are promising candidates for ecologically friendly commercial integrated or organic fruit production. These genotypes are briefly described.

Key Words: *Prunus*, sour cherry genotypes, susceptibility to diseases, variety evaluation

INTRODUCTION

In Poland, the sour cherry cultivar most widely cultivated is ‘Schattenmorelle’, also locally known as ‘Łutówka’ (Grzyb, 1998; Rozpara and Grzyb, 1998). This cultivar is highly productive, but unfortunately highly susceptible to leaf spot. Leaf spot is caused by *Blumeriella jaapi* Rehm. and defoliates trees in the middle of the growing season. This adversely affects the general health of the trees and reduces winter hardiness (Bielenin, 2000;

Schuster, 2001). In some years, weather conditions and inadequate plant protection can bring about early defoliation. Leaf spot is effectively controlled or even eliminated by chemical spraying. However, there is a worldwide trend to protect the environment by reducing the use of chemicals in agriculture.

Another serious disease of sour cherries is bitter rot, caused by *Glomerella cingulata* Stonem). Diseases caused by *Monilia* spp. are also economically significant (Apostol, 2001; Fisher and Lieber, 1997). For ecologically friendly cherry production, it is vital to develop cultivars which are resistant to all these diseases (Rozpara, 2000; Warton et al., 2001).

The aim of this trial was to identify which genotypes in the field collection of the Research Institute of Pomology and Floriculture in Skierniewice, Poland, are resistant to leaf spot and bitter rot. Those genotypes which are resistant to both diseases and also have good fruit quality can be used in future breeding programs. In addition, they can be grown by home gardeners, who often do not have the knowledge or the means to carry out effective chemical protection. The genotypes identified would also be promising candidates for commercial integrated or organic fruit production.

MATERIAL AND METHODS

From 2002 to 2003, a trial was conducted of over 107 sour cherry genotypes from the field collection of the Research Institute of Pomology and Floriculture in Skierniewice, Poland (Grzyb and Hodun, 2001). All of the genotypes had good fruit quality.

In 1991, three trees of each genotype were planted 2.5 x 4.0 meters apart. Fungicides were sparingly applied usually only once a year after full bloom in accordance with the manufacturer's recommendations. Just before fruit ripening and picking, the trees were examined for signs of damage due to leaf spot and bitter rot. Resistance to leaf rot and bitter rot were estimated according to the following schemes:

Percentage of leaves damaged by leaf spot	Level of resistance to leaf spot
No damage	Highly resistant
1 to 15%	Moderately resistant
16 to 30%	Slightly resistant
31 to 50%	Slightly susceptible
51 to 75%	Moderately susceptible
76 to 100%	Highly susceptible
Percentage of fruits damaged by bitter rot	Level of resistance to bitter rot
No damage	Highly resistant
1 to 5%	Moderately resistant
6 to 15 %	Slightly resistant
16 to 30%	Slightly susceptible
31 to 50%	Moderately susceptible
51 to 100%	Highly susceptible

Special attention was paid to twelve genotypes which proved to be resistant to both leaf spot and bitter rot (Tab. 1). Several widely grown cultivars were also evaluated as controls, including 'Schattenmorelle', 'Stevensbaer', 'Vladimirskaja', 'Pamiati Vavilova' and 'Oblacinska'.

RESULTS AND DISCUSSION

The genotypes in the field collection exhibited varying degrees of resistance to leaf spot and bitter rot. Twelve genotypes were resistant to both leaf spot and bitter rot. Seven were highly resistant to leaf spot: W 2/02, W 4/02, W 5/02, W 8/02, W 10/02, W 11/02 and W 12/02. Five were moderately resistant to leaf spot: W 1/02, W 6/02, W 7/02, W 9/02 and W 13/02. All of the genotypes selected were significantly more resistant to leaf spot than 'Schattenmorelle' (Tab. 1). Seven of the genotypes were highly resistant to bitter rot: W 1/02, W 4/02, W 5/02, W 6/02, W 8/02, W 11/02 and W 13/02. Five were moderately resistant to bitter rot: W 2/02, W 7/02, W 9/02, W 10/02, and W 12/02. These results agree well with earlier studies (Fisher and Lieber, 1997; Hodun and Grzyb, 1999; Apostol, 2001; Warton et al., 2001).

Table 1. Resistance to leaf spot and bitter rot in twelve genotypes from the field collection of the Research Institute of Pomology and Floriculture in Skierniewice, Poland (2002-2003)

Specification	Resistance to leaf spot			Resistance to bitter rot	
	high	moderate	low	high	moderate
W ½		+		+	
W 2/02	+				+
W 4/02	+			+	
W 5/02	+			+	
W 6/02		+		+	
W 7/02		+			+
W 8/02	+			+	
W 9/02		+			+
W 10/02	+				+
W 11/02	+			+	
W 12/02	+				+
W 13/02		+		+	
'Schattenmorelle'			+	+	
'Stevensbaer'	+			+	
'Pomiati Vavilova'	+			+	
'Vladimirskaja'		+		+	
'Oblacińska'	+			+	

T a b l e 2 . Flowering, ripening and productivity in twelve genotypes resistant to leaf spot and bitter rot from the field collection of the Research Institute of Pomology and Floriculture in Skierniewice, Poland (2002-2003)

Specyfication	Flowering period			Ripening period			Productivity
	early	medium	late	early	medium	late	
W ½	+					+	high
W 2/02	+					+	high
W 4/02		+				+	high
W 5/02	+				+		medium
W 6/02			+			+	high
W 7/02			+			+	high
W 8/02		+				+	high
W 9/02		+		+			medium
W 10/02			+			+	high
W 11/02			+			+	high
W 12/02	+					+	high
W 13/02	+					+	medium
'Schattenmorelle'			+			+	high
'Stevensbaer'		+				+	high
'Pamiati Vavilova'	+			+			medium
'Vladimirskaja'		+		+			medium
'Oblacińska'			+		+		medium

All of these genotypes were highly productive. Fruit weight ranged from 2.9 g for W 10/02 to 6.2 g for W 13/02. All of the genotypes ripened late in the season, except for W 5/02 and W 9/02, which ripened significantly earlier (Tab. 2).

All twelve of the genotypes are promising candidates for ecologically friendly commercial integrated or organic fruit production. The genotypes are briefly described below:

W 1/02 – ripens about five days before 'Schattenmorelle'. Tree vigor is strong; spreading habit; high productivity. Fruits are medium (4.4 g) with deep red skin, flesh and juice, and satisfactory taste.

W 2/02 – ripens about five days before 'Schattenmorelle'. Tree vigor is semi-strong with pyramidal habit; high productivity. Fruits are small (3.3 g) with dark red skin and juice, tart taste and large stones.

W 4/02 – ripens at the some time as 'Schattenmorelle' or two to three days earlier. Tree vigor is semi-strong; spreading habit; medium productivity. Fruits are rather large (4.8 g) with long stems, deep, dark red flesh and juice, tart taste and long stems.

W 5/02 – ripens nine to ten days before ‘Schattenmorelle’. Tree vigor is strong; pyramidal habit; medium productivity. Fruits are small (3.2 g) with dark red skin, red flesh, dark red juice, tart taste, medium stems and medium stones.

W 6/02 – ripens about the same time as ‘Schattenmorelle’. Tree vigor is semi-strong; pyramidal habit; high productivity. Fruits are large (5.3 g) with dark red to black skin, dark red flesh, dark red juice, good taste, medium stems and medium stones.

W 7/02 – ripens almost at the same time as ‘Schattenmorelle’. Tree vigor is semi-strong; pyramidal habit; high productivity. Fruits are large (5.1 g) with dark red flesh and juice, good taste, medium stems and medium stones.

W 8/02 – ripens at the same time as ‘Schattenmorelle’ or two days earlier. Tree vigor is weak; compact type; spreading habit; high productivity. Fruits are large (5.0 g) with dark red to black skin, deep red flesh and juice, moderately good taste and small stones.

W 9/02 – ripens early, 11 to 15 days before ‘Schattenmorelle’. Tree vigor is medium; pyramidal habit. Fruits are small (3.1 g) with dark red skin, red flesh and juice, tart taste, long stems and small stones.

W 10/02 – ripens about five days before ‘Schattenmorelle’. Tree vigor is semi-weak; pyramidal habit; high productivity. Fruits are small (2.9 g) with dark red skin, flesh and juice, tart taste, long stems and small stones.

W 11/02 – ripens about three to five days before ‘Schattenmorelle’. Fruits are medium to large (4.8 g) with dark red skin, red flesh and juice, tart taste, medium stems and medium stones.

W 12/02 – ripens about three days before ‘Schattenmorelle’. Fruits are medium to large (4.9 g) with red, wine-colored skin and light red flesh and juice, pleasant, sweet taste, long stems and medium stones.

W 13/02 – ripens three to five days before ‘Schattenmorelle’. Tree vigor is rather strong; spreading habit; high productivity. Fruit is large (6.2 g) with rather soft flesh, red skin, light red flesh and juice, very pleasant tart taste, medium stems and large stones.

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PORÓWNANIE WRAŻLIWOŚCI WYBRANYCH Z KOLEKCJI TYPÓW WIŚNI LOKALNEJ NA DROBNĄ PLAMISTOŚĆ LIŚCI DRZEW PESTKOWYCH I GORZKĄ ZGNILIZNĘ WIŚNI ORAZ KRÓTKI ICH OPIS

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S T R E S Z C Z E N I E

Z kolekcji polowej liczącej ponad 170 różnych genotypów wiśni wybrano 12 charakteryzujących się niską wrażliwością na drobną plamistość liści drzew pestkowych. Oceniono także podatność ich owoców na gorzką zgnilizną wiśni. Badania i obserwacje prowadzono w latach 2002 i 2003. Drzewa genotypów oznaczonych symbolami: W 1/02, W 6/02, W 7/02, W 9/02, W 13/02 były średnio wrażliwe na opadzinę liści, a drzewa oznaczone symbolami: W 2/02, W 4/02, W 5/02, W 8/02, W 10/02, W 11/02, W 12/02 miały niską lub bardzo niską wrażliwość na tę chorobę. Występowanie gorzkiej zgnilizny wiśni stwierdzono w małym stopniu u czterech genotypów oznaczonych symbolami: W 2/02, W 7/02, W 9/02 i W 10/02. Dla porównania w tabelach zestawiono także wyniki obserwacji drzew znanych i ważnych gospodarczo odmian wiśni o różnym stopniu wrażliwości na te choroby. Wśród nich są między innymi takie odmiany, jak: ‘Łutówka’, ‘Stevensbaer’ i ‘Oblacińska’. Praca zawiera także krótki opis cech biologicznych wstępnie wyselekcjonowanych typów wiśni.

Słowa kluczowe: *Prunus*, selekcja, genotyp, odmiana wiśni, wrażliwość na choroby