

RESISTANCE STABILITY TO LEAF DISEASES OF SOUR CHERRY VARIETIES IN LITHUANIA

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A B S T R A C T

From 2001 to 2003, thirty-two sour cherry cultivars were evaluated by the Department of Orchard Plant Genetics and Biotechnology of the Lithuanian Institute of Horticulture. The cultivars were evaluated in terms of their resistance to leaf spot (*Blumeriella jaapi* (Rehm.) v. Arx) and shot-hole (*Clasterosporium carpophilum* (Lèv.) Aderh.). Weather conditions varied throughout the study and affected the development and spread of the pathogens. Resistance to leaf spot and shot-hole was weather dependent in some cultivars, but not in others.

The cultivars consistently resistant to leaf spot were 'Big starking', 'Griot ukrainskij', 'Maraska', 'Samsonovka', 'Oblacinska', 'Vytėnų žvaigždė', 'Recta' and 'M323'.

The cultivars consistently resistant to shot-hole were 'Recta', 'Big starking', 'Vietinė rūgščioji', 'Turgenevka', 'Majak', 'Lucyna', 'Rovesnica', 'Vielein', 'Maraska', 'Loznica', 'Ostheimer Weichsel', 'Samsonovka', 'Kati', 'Griot mestnyj', 'Minister von Podbelski', 'Oblacinska', 'Köröser', 'Aleksejevka', 'Vytėnų žvaigždė' and 'Shirpotreb chiornaya'.

The cultivars consistently resistant to leaf spot and shot-hole were 'Big starking', 'Maraska', 'Samsonovka', 'Oblacinska', 'Recta' and 'Vytėnų žvaigždė'.

Resistance to leaf spot and shot hole is presumably determined by genetic factors.

Key words: leaf spot, resistance, shot hole, sour cherry, stability, varieties

INTRODUCTION

Sour cherries (*Cerasus vulgaris* Mill., syn. *Prunus cerasus*) are one of the most widely grown stone-fruits in eastern and central Europe. According to

the results of the NORBAGREEN Project (2002), a large part of the Lithuanian population consumes less fruits and vegetables than suggested by health and nutrition experts.

Stone-fruits are an important component of the Lithuanian diet. Sour cherry consumption is higher in Lithuania and Latvia than in the other countries on the Baltic Sea.

Diseases affect yield and fruit quality in sour cherries. **Leaf spot** is caused by *Blumeriella jaapi* (Rehm.) v. Arx. **Shot-hole** is caused by *Clasterosporium carpophilum* (Lév.) Aderh. (Bielenin et al., 1991). **Brown rot** is caused by *Monilinia fructicola* (G. Wint.) Honey (Edson et al., 1997; Hodun and Grzyb, 2000). Leaf spot is the most destructive disease of cherries in North America and Europe (Sjulin et al., 1989; Bielenin et al., 1991; Apostol, 2000; Jānes and Kahu, 2000; Raudonis and Valiuškaitė, 2003).

In the 1950s, an outbreak of leaf spot destroyed sour cherry orchards in Lithuania, especially those planted with 'Žagarvyšnė' and 'Vietinė rūgščioji', cultivars which had adapted to the local climate (Lukoševičius, 2002). As a result, many foreign sour cherry cultivars of varying levels of disease resistance were introduced. Disease resistance is determined not only by genetics, but also by changing ecological factors which affect plant immunity and pathogen populations. The most valuable cultivars are those which are consistently and reliably resistant to virulent strains of diseases under different and changing agroclimatic conditions. This expands the range in which the cultivar can be profitably grown.

The aim of the trial was to evaluate resistance to leaf spot and shot-hole in thirty-two sour cherry cultivars under the agroclimatic conditions prevailing in Lithuania.

MATERIAL AND METHODS

From 2001 to 2003, thirty-two sour cherry cultivars were evaluated by the Department of Orchard Plant Genetics and Biotechnology of the Lithuanian Institute of Horticulture. The cultivars were evaluated in terms of their resistance to leaf spot (*Blumeriella jaapi* (Rehm.) v. Arx) and shot-hole (*Clasterosporium carpophilum* (Lév.) Aderh.).

Weather conditions varied throughout the study and affected the development and spread of the pathogens. In 2001, weather conditions favored the development and spread of the pathogens, especially in June and July. In 2002, wet weather in the spring favored the development of pathogenic fungi, which continued during June, which was warm and very humid. In July and August, hot, dry weather in July and August eventually slowed down the spread of fungal diseases. In 2003, weather conditions in spring and early summer were favorable to the development of the fungi, and warm, humid weather in June and July meant that fungal diseases could spread with ease.

Each year, during the first ten days of July, five trees of each cultivar were examined for leaf damage due to leaf spot and shot-hole. Damage was evaluate on a scale from 0 to 5, where 0 equals no damage, and 5 equals more than 75% of the leaf surface damaged (Lobanov, 1980). Cultivars which consistently suffered less damage were presumed to be more resistant, and cultivars which consistently suffered more damage were presumed to be more susceptible.

RESULTS AND DISCUSSION

Under the agroclimatic conditions prevailing in Lithuania, all of the cultivars investigated were infected by leaf spot and shot-hole (Figs 1 and 2). Leaf spot caused more damage than shot-hole. Damage was particularly extensive in 2003, when weather conditions were especially favorable to the development and spread of fungal diseases.

'Griot ukrainskij' suffered extensive damage from shot-hole, and 'Maraska' suffered extensive damage from leaf spot and shot-hole only in 2002, a year which was not favorable to fungal diseases. Presumably, the strains of the fungi which developed and spread under adverse conditions were more virulent than usual, which accounts for the amount of damage suffered by 'Griot ukrainskij' and 'Maraska'.

'Big starking' and 'Griot ukrainskij' were very resistant to leaf spot (Fig. 1). The cultivars which were consistently and reliably resistant to leaf spot were 'Big starking', 'Griot ukrainskij', 'Maraska', 'Samsonovka', 'Oblacinska', 'Vytenų žvaigždė', 'Recta' and 'M323'. The cultivars in which resistance to leaf spot depended on the infectivity of the pathogen were 'Griot mestnyj', 'Ostheimer Weichsel', 'Minister von Podbelski' and 'Turgenevka'. The cultivars which were consistently susceptible to leaf spit were 'Majak', 'Sysmadinka', 'Vielein' and 'Meteor'.

Patterns of resistance to shot-hole were very different (Fig. 2). 'Minister von Podbelski', 'Oblacinska', 'Kirska', 'Ankstyvoji vyšnia' and 'Meteor' were damaged by shot-hole every year. 'Recta', 'Big starking', 'Vietinė rūgščioji', 'Turgenevka' 'Majak', 'Lucyna', 'Rovesnica', 'Köröser' and 'Pandy' were infected only in 2003, when weather conditions were especially favorable to the development and spread of fungal diseases.

'Griot ukrainskij' and 'Maraska' suffered extensive damage from shot-hole only in 2002, a year which was not favorable to fungal diseases. 'Kirska' suffered slight damage in 2001 and 2002, but only negligible damage in 2003.

The cultivar most resistant to shot-hole was 'Recta'. Other cultivars which were consistently and reliably resistant to shot-hole were 'Big starking', 'Vietinė rūgščioji', 'Turgenevka', 'Majak', and 'Lucyna'. Cultivars which were inconsistently resistant were 'Biruliovskaya', 'Stvenbaer viki', 'Kellerris 16' and 'Pandy'. The cultivar which was the most susceptible to shot-hole was 'Meteor'.

R_{0.05} – 0.89

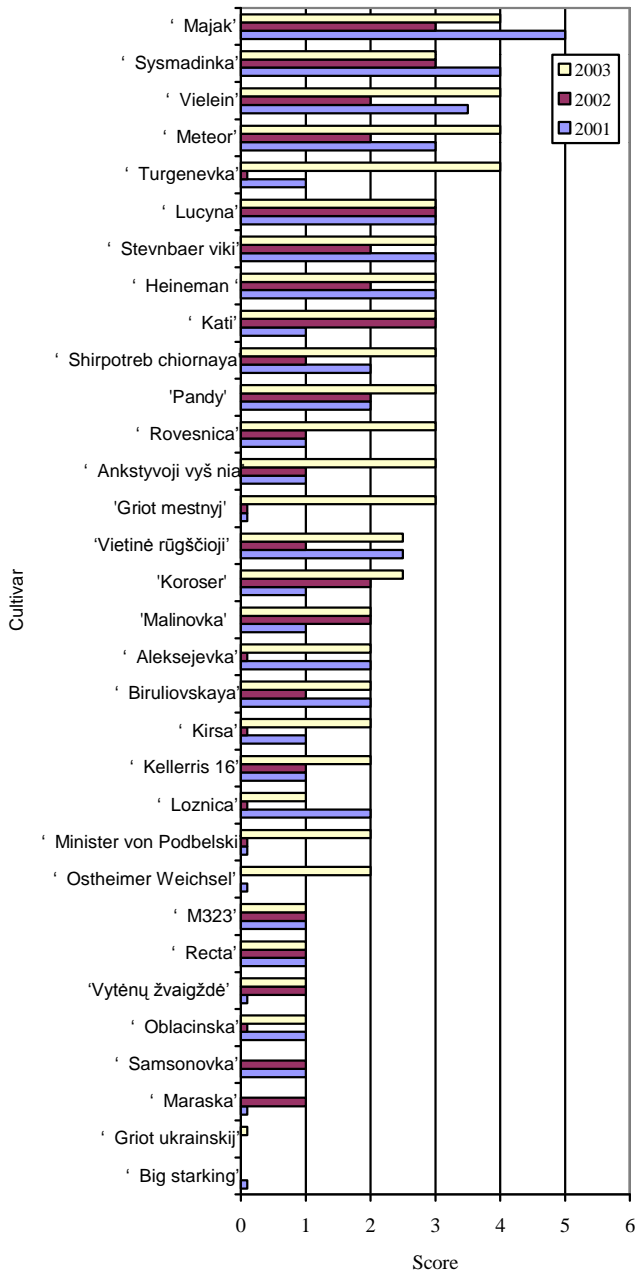


Figure 1. Damage to sour cherry leaves caused by leaf spot (2001-2003)

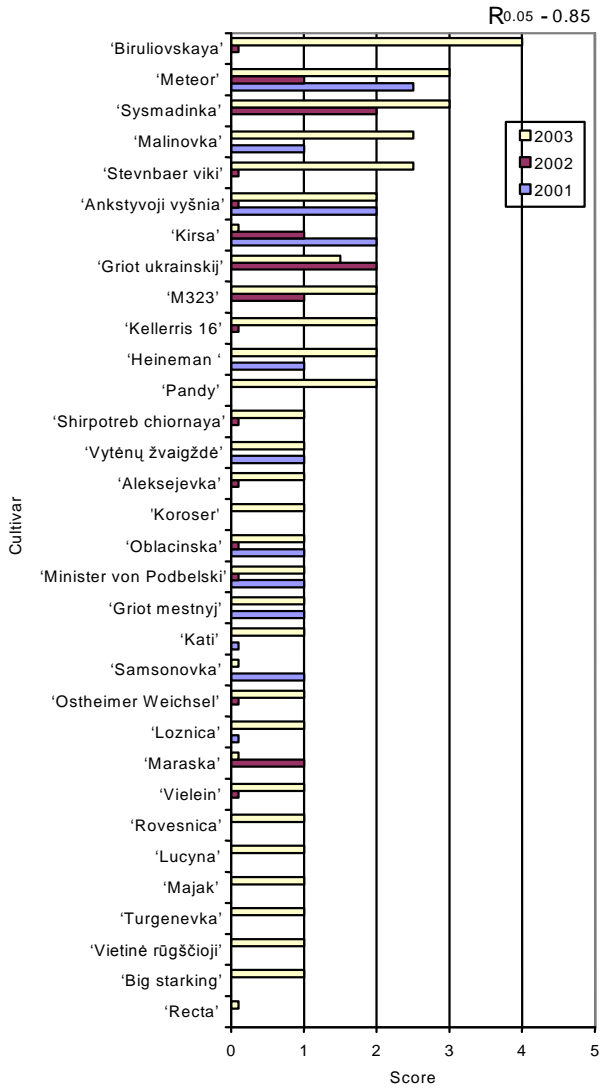


Figure 2. Damage to sour cherry leaves caused by shot-hole (2001-2003)

The difference in resistance patterns from year to year suggest that different cultivars are resistant to different strains of the fungus which developed and spread under different weather conditions.

Cultivars which were resistant to leaf spot could be susceptible to shot-hole, and vice versa. For example, 'Turgenevka', 'Vielein', 'Majak' suffered heavy damage due to leaf spot, but only slight damage due to shot-hole. 'Big starring', 'Maraska', 'Samsonovka', 'Oblacinska', 'Recta' and 'Vytėnų žvaigždė' were consistently and reliably resistant to both leaf spot and shot-hole, and will probably be resistant even in years when weather conditions are especially favorable to the development and spread of fungal diseases.

CONCLUSIONS

Under the agroclimatic conditions prevailing in Lithuania, resistance to leaf-spot is more common than resistance to shot-hole. Most of the cultivars were damaged by shot-hole in 2003, weather conditions were especially favorable to the development and spread of fungal diseases.

The cultivars consistently resistant to leaf spot were 'Big starring', 'Griot ukrainskij', 'Maraska', 'Samsonovka', 'Oblacinska', 'Vytėnų žvaigždė', 'Recta' and 'M323'.

The cultivars consistently resistant to shot-hole were 'Recta', 'Big starring', 'Vietinė rūgščioji', 'Turgenevka', 'Majak', 'Lucyna', 'Rovesnica', 'Vielein', 'Maraska', 'Loznica', 'Ostheimer Weichsel', 'Samsonovka', 'Kati', 'Griot mestnyj', 'Minister von Podbelski', 'Oblacinska', 'Köröser', 'Aleksejevka', 'Vytėnų žvaigždė' and 'Shirpotreb chiornaya'.

The cultivars consistently resistant to leaf spot and shot-hole were 'Big starring', 'Maraska', 'Samsonovka', 'Oblacinska', 'Recta' and 'Vytėnų žvaigždė'. These cultivars are especially promising for cultivation in Lithuania.

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WRAŻLIWOŚĆ ODMIAN WIŚNI NA CHOROBY LIŚCI W WARUNKACH LITEWSKIEGO KLIMATU

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

W latach 2001-2003 badano 32 odmiany wiśni pod kątem odporności drzew na drobną plamistość liści drzew pestkowych (*Blumeriella jaapi* (Rehm.) v. Arx), i dziurkowatość liści drzew (*Clasterosporium carpophilum* (Lèv.) Aderh.). Drzewa rosły w sadzie należącym do Zakładu Genetyki i Biotechnologii Litewskiego Instytutu Ogrodnictwa. Warunki klimatyczne panujące w okresie badań sprzyjały rozwojowi tych chorób. Stopień odporności odmian oceniano według stopnia uszkodzenia liści. Pogoda miała na to duży wpływ, ale wiele zależało od genetycznych właściwości odmiany wiśni. Odmiany 'Big starking', 'Griot ukraiński', 'Maraska', 'Samsonovka', 'Oblacińska', 'Vytėnu žvaigžde', 'Recta' i 'M323' były odporne na drobną plamistość liści drzew pestkowych. Odmiany 'Recta', 'Big starking', 'Vietinė rūgščioji', 'Turgenevka', 'Majak', 'Lucyna', 'Rovesnica', 'Vielein', 'Maraska', 'Loznica', 'Ostheimer Weichsel', 'Samsonovka', 'Kati', 'Griot mestnyj', 'Minister von Podbelski', 'Oblacińska', 'Köröser', 'Aleksiejvka', 'Vytėnu žvaigžde' i 'Shirpotreb chiornava' były odporne lub mało podatne na dziurkowatość liści. Odporne na te choroby w warunkach klimatu litewskiego były: 'Big starking', 'Maraska', 'Samsonovka', 'Oblacińska', 'Recta', 'Vytėnu žvaigžde'. Przypuszcza się, że odporność na drobną plamistość liści drzew pestkowych i dziurkowatość liści tych odmian jest uwarunkowana genetycznie.

Słowa kluczowe: opadziina liści, odporność, dziurkowatość liści, wiśnia, stabilność, odmiana