

Field evaluations of 14 sweet cherry cultivars as pollinators for cv. Regina (*Prunus avium*, L.)

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Summary: In this study, the pollen of 14 sweet cherry cultivars ('Anella', 'Durońi 3', 'Badacsony', 'Cristalina', 'Ferbolus', 'Ferrovia', 'Georgia', 'Hudson', 'Kordia', 'Sam', 'Schneiders Späte Knorpelkirsche', 'Skeena', 'Summit', 'Sylvia') was used to fertilize the emasculated flowers of sweet cherry cv. 'Regina'. Fruit set was assessed three times during fruit development: 14 May, 30 May and 27 May 2007. We observed full incompatibility among the 14 cultivars for cv. 'Cristalina', which is in the same S-allele group as cv. 'Regina'. After analysis of our data, we have results about fertilization efficiency of the cultivars. Most of the evaluated cultivars are inadequate to fertilize cv. 'Regina' to a sufficient degree. There were two exceptions, cv. 'Sam' and cv. 'Skeena', where percentage of ripened fruits was above 20%. These two cultivars can guarantee such a pollination, which ensures ample quantity of ripened fruits. Results of this study have proved three other cultivars to be quite good pollinators for cv. 'Regina'. In conclusion, ideal pollinators for cv. 'Regina' could be – apart from above-mentioned two cultivars, 'Sam' and 'Skeena' – cvs. 'Sylvia' and 'Bianca', which was suggested by more literature sources.

Key words: drying process, dried fruits, stone fruits, sour cherries, European plums, quality parameters, sensory test.

Introduction

In the last years sweet cherry became one of the most important fruit species in the world fruit production, mainly due to its high-value, premium quality fruit. Premium quality means also high price on the world fruit market. To achieve it, producers have to grow such cultivars, whose fruit is large (over 28 mm diameter), with excellent taste, resistance to cracking and good transport features. German sweet cherry cultivar 'Regina' has all these qualities (Thurzó et al., 2007), so more and more producers all over the world have been planting it as a main cultivar of their orchard. The biggest problem of cv. 'Regina' is its low yield, resulting from its bad fructification rate (Long et al., 2004, Lichev et al., 2004). According to former results, the following cultivars are ideal pollinators for cv. 'Regina' (in connection with its S₁S₃ allele incompatibility group): cvs. 'Sam', 'Sylvia', 'Bianca', 'Durońi 3', 'Annabella', 'Schneiders Späte Knorpelkirsche' and 'Alma'. (Anonymus, 2001, 2007; Balmer, 2004; Békéfi, 2005; Nyéki, 1989; Ollig, 2006).

Materials and methods

Experiments were performed in the experimental orchard of Università di Bologna, Dipartimento di Colture Arboree, Vignola, Italy in March 2007. The orchard was planted in 1999 on Colt rootstock with 4.85 m between-row and 1.9 m within-row distance. In the experiment, pollen of 14 sweet cherry cultivars ('Anella', 'Durońi 3', 'Badacsony', 'Cristalina', 'Ferbolus', 'Ferrovia', 'Georgia', 'Hudson', 'Kordia', 'Sam', 'Schneiders Späte Knorpelkirsche', 'Skeena', 'Summit', 'Sylvia') was used to fertilize the emasculated flowers of sweet cherry cv. 'Regina' on five branches per each treatment. Before the treatment, a viability test was performed for all used pollens, according to the results, all pollens were eligible for pollination. One week before pollination a parchment-sack was placed on each designated branch to avoid fertilization by other cultivars (Figure 1). After pollination, the same method was applied. Fruit set was assessed three times during fruit development: 14 May, 30 May and 27 May 2007. All important data about the used cultivars are included in Table 1.

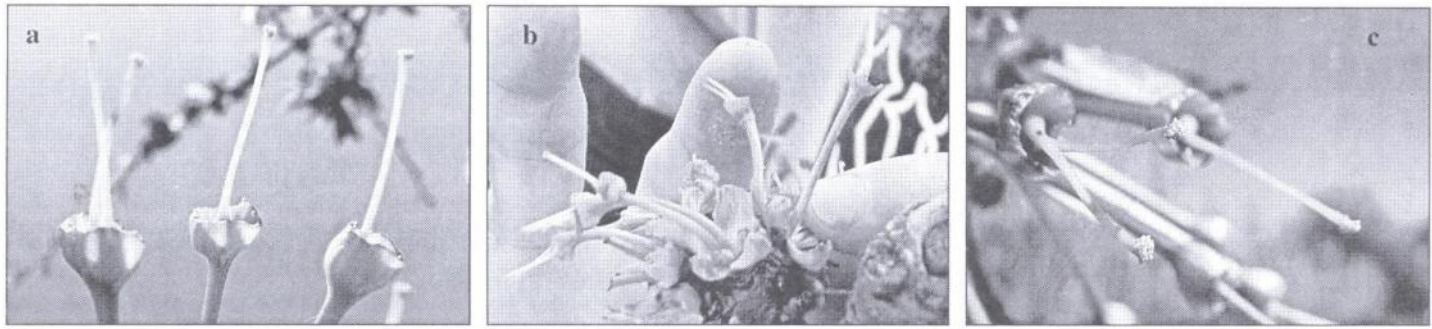


Figure 1. Process of cross pollination: a) demasculated flowers, b) cross pollination, and c) pollinated pistils.

Table 1 Place of origin, date of pollination and S-alleles groups of cultivars used for cross pollination

Cultivar	Place of origin	Date of pollination	S-alleles group
Anella	Italy	10–12 April 2007	–
Anellone = Duroni 3	Italy	10–12 April 2007	S ₄ S ₆
Badacsony	Hungary	10–12 April 2007	S ₃ S ₆
Cristalina	Canada	10–12 April 2007	S ₁ S ₃
Ferbolus	France	12 April 2007	S ₅ S ₁₃
Ferrovia	Italy	10–11 April 2007	S ₃ S ₁₂
Giorgia	Italy	10–11 April 2007	–
Hudson	USA	12 April 2007	S ₁ S ₄
Kordia	Czech Republic	10–11 April 2007	S ₃ S ₆
Sam	Canada	10–11 April 2007	S ₂ S ₄
Schneiders Spate Knorpelkirsche	Germany	10–11 April 2007	S ₃ S ₁₂
Skeena	Canada	10–12 April 2007	S ₁ S ₄
Summit	Canada	10–12 April 2007	S ₁ S ₂
Sylvia	Canada	10–11 April 2007	S ₁ S ₄

Results

Fruit set was assessed three times during fruit development. No significant difference was found between the first and second assessments. The difference was so small, that a close relationship was found between the two databases. Among the fourteen examined cultivars, full incompatibility was observed for cv. 'Cristalina', which is in the same S-allele group as cv. 'Regina'. Moreover, cvs. 'Hudson', 'Kordia' and 'Ferbolus' fertilized cv. 'Regina' at a very small ratio. These cultivars generated only 6% of fruit set, which is very low. Pollen of all other cultivars indicated higher than 10% of fruit set (Figure 2). Best fruit set results were shown by cvs. 'Sam'

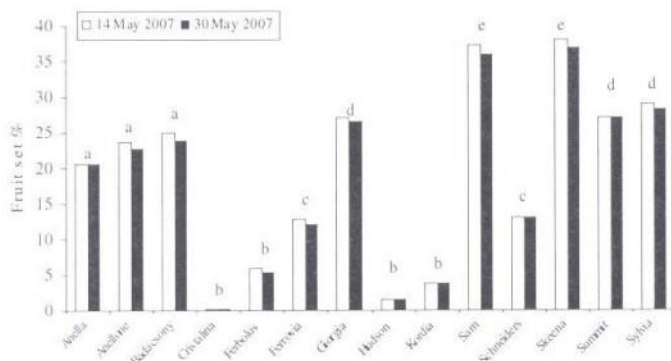


Figure 2 Fruit set of Regina pollinated with 14 sweet cherry cultivars 5 and 7 weeks after pollination

and 'Skeena'. For these two cultivars, 23.3% and 25.5% fruit set was measured. The results of this study have shown in most cases the same data of fruit set as were anticipated based on previous literature. Exceptions were cv. 'Summit' and cv. 'Giorgia' with very good pollination rate (27.1% and 26.6%, respectively), and cv. 'Schneiders Spaete Knorpelkirsche' with a low pollination rate (13.0%).

Most examined cultivars were not ideal pollinators of cv. 'Regina' (Figure 3). However, cvs. 'Sam' and 'Skeena' seemed to

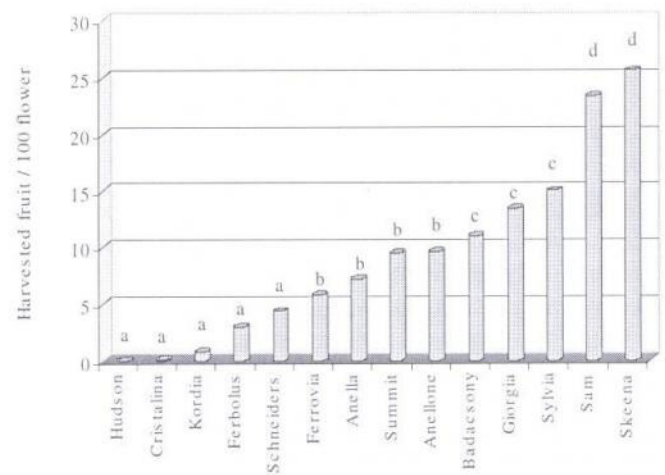


Figure 3 Fruit set of cv. Regina pollinated with 14 sweet cherry cultivars at harvest (27 June 2007).

be acceptable pollinators as percentage of ripened fruits was above 20%. These two cultivars can guarantee such a pollination which ensures ample quantity of ripened fruits. Results also showed that three additional cultivars were quite good pollinators for cvs. 'Regina', 'Sylvia', 'Giorgia' and 'Badacsony', with pollination rates of 15.0%, 13.4%, and 11.0%, respectively (Figure 3).

In conclusion, cvs. Sam and Skeena could be useful pollinators for sweet cherry producers. For ideal fertilization, favourable weather conditions are needed. The above-mentioned three sweet cherry cultivars could also be good pollenizers, if all weather conditions are perfect for fertilization. Otherwise, they are not efficient enough for fertilization resulting in low fruit set and yield.

There were significant correlations among cultivars at the three assessment dates. Results of 14 May and 30 May 2007 were identical as also shown by high correlation coefficients ($r = 0.99$) (data not shown). Additional strong correlation was found between the first and third dates as well as between the second and third dates ($r = 0.94$ and $r = 0.95$). In summary, it can be assumed that the severity of fruits set can be determined for cv. 'Regina' one month after pollination but before natural June drop. This also indicates that role of the cultivars as pollinators plays a minor role in fruit set than environmental factors.

Acknowledgements

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