

Viability of plum ovules at different temperatures

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Summary

The viability of ovules was studied in five plum cultivars under laboratory conditions at four constant temperatures: 5°C, 10°C, 15°C and 20°C and under field conditions over two years. During 10 days from the onset of full bloom, ovule viability in cvs 'Čačanska Rana', 'Čačanska Najbolja' and 'Čačanska Lepotica' was between 80–100% at the temperatures of 5°C, 10°C and 15°C, in both years. In the same period, ovule viability in cvs 'Wangenheims Frühzwetsche' and 'Požegača' was lower, but never below 50%. At the constant temperature of 20°C, all plum cultivars showed a decline in longevity of ovule viability, which was pronounced in cv. 'Čačanska Rana'. During the 10 days from the onset of full bloom, ovule viability in all five plum cultivars under field conditions showed a high viability, which approximated to the ovule viability of the cultivars at the constant temperatures of 5°C, 10°C and 15°C, in both years. Determination of the longevity of ovule viability in the mentioned plum cultivars is of great importance due to its effect on the effective pollination period and fertilisation success. This paper deals in detail with the interrelations between the temperature effects on ovule viability, pollen tube growth and fertilisation, as well as on fruit setting.

Key words: Plum cultivars, ovule fluorescence, ovule viability, temperature

Introduction

The viability of ovules in fruit crops is a factor directly affecting the effective pollination period (E.P.P.) (Williams, 1970). In stone fruits, short ovule viability is especially pronounced in cherries (Stösser & Anvari, 1982; Postweiler, Stösser & Anvari, 1985). Higher temperatures accelerate the ageing of ovules in sour cherry, thus diminishing the efficacy of fertilisation (Cerović & Ružić, 1992b). In plum, the ageing of ovules is somewhat slower than in cherries, where at the constant temperature of 20°C, all ovules lose viability in three to four days (Stösser & Anvari, 1990). On the other hand, low temperatures can inhibit pollen tube growth in the pistil, so that the pollen cannot reach the ovary before the onset of the ageing of the ovules (Keulemans & Van Laer, 1987). Both factors, viability of ovules and the velocity of pollen tube growth *in vivo*, in some pollination combinations in certain fruit crops, directly affect the degree of fertilisation (Cerović & Mičić, 1996).

This paper aimed to study the ovule viability at different temperatures under laboratory and field conditions during full bloom in the plum cultivars 'Čačanska Rana', 'Čačanska Najbolja' and 'Čačanska Lepotica' and their parental pairs 'Wangenheims Frühzwetsche' and 'Požegača'. In the work done so

far, 'Čačanska Rana' and 'Čačanska Najbolja' have been shown to be prone to irregular bearing and have been defined as partially self-compatible cultivars (Ogašanović, 1985). Determination of the longevity of ovule viability in the mentioned plum cultivars is of great importance due to its effect on E.P.P. (Williams, 1970) and fertilisation success (Cerović & Mičić, 1999).

Materials and Methods

The plum cultivars 'Čačanska Rana', 'Čačanska Najbolja', 'Čačanska Lepotica', 'Wangenheims Frühzwetsche' and 'Požegača' were used for the experiments. For the experiment under laboratory conditions, branches of the cultivars studied, 40–50 cm in length, were detached from the trees when most of the flowers were in the late balloon stage. The stem ends were cut off under water in the laboratory and placed in a 5% sucrose solution overnight. Open flowers were removed and the remaining ones were emasculated. Several twigs with non-emasculated flowers were left as the control of the onset of full bloom under laboratory conditions. The next day most of blossoms from the control were open, so this day was considered as the onset of full bloom in those cultivars. Twigs of those cultivars were placed in water in controlled-temperature chambers at constant

