

## The Rate of Pollen Germination and the Pollen Viability at Ten Apple Cultivars in the Climatic Conditions of Transylvania

Ciprian PETRISOR<sup>1)</sup>, Viorel MITRE<sup>1)</sup>, Ioana MITRE<sup>1)</sup>, Lorentz JANTSCHI<sup>2)</sup>,  
Mugur C. BALAN<sup>2)</sup>

<sup>1)</sup> University of Agricultural Sciences and Veterinary Medicine, Faculty of Horticulture, 3-5  
Manastur Str., Cluj-Napoca 400372, Romania; geo\_cip\_81@yahoo.com.

<sup>2)</sup> Technical University of Cluj-Napoca, Bd. Muncii 103-105, Cluj-Napoca 400641, Romania;  
mugur.balan@termo.utcluj.ro; lori@academicdirect.org.

**Abstract.** Pollen viability and germination are very important in choosing pollinating varieties needed to ensure high and quality yields. In this study, the viability and germination of pollen from ten apple cultivars growing in high density system (3174 trees/ha), in the climatic conditions of Cluj-Napoca, Romania were investigated. In vitro germination tests (hanging drop and agar-plate) were used to estimate pollen viability and germination in these cultivars. The viability and the germination of pollens varied significantly according to the cultivars. Among the cultivars analyzed in terms of pollen viability best results are recorded in ‘Pinova’ (89.92%), ‘Gala’ (80.48%), ‘Florina’ (76.67%), ‘Topaz’ (75.97%) and ‘Top Red’ (74.64%), which differed statistically from ‘Golden Reinders’ used as a control. The cultivar that shows the lowest values on pollen germination percentage was ‘Jonagold’, with differences statistically assured to ‘Golden Reinders’ cultivar, used as a control variant.

**Keywords:** apple, cultivar, pollen viability, germination, percentage

**Introduction.** Pollination is a very important and inseparable component in respect of regular and consistent production in a number of fruit crops. In a crop like apple, pollination is of utmost significance and its proportion and magnitude is primarily based upon appropriate selection of varieties (Chauhan *et al.*, 2008). The viability, tube growth and morphological homogeneity related to pollen quality are the most important properties in fruit trees. These properties are useful for plant breeders, geneticists, and growers (Bolat and Pirlak, 1999). Relationships between viability and pollen germination have been studied. Positive correlation between viability and pollen germination reported Werner and Chang (1981), Pearson and Harney (1984) and Norton (1966).

**Aims and objectives.** The aim of this study was to determine the pollen viability and germination percentage of the ten apple studied cultivars.

**Materials and methods.** For the experiment were taken ten cultivars of apple trees grafted on M9 rootstocks, growing in high density system at Cluj-Napoca, Romania. The ten apple cultivars studied were (‘Florina’, ‘Jonagold’, ‘Jonica’, ‘Top Red’, ‘Mutsu’, ‘Granny Smith’, ‘Golden Reinders’, ‘Gala’, ‘Topaz’, ‘Pinova’). In vitro germination tests (hanging drop and agar plate) were used to estimate pollen viability and germination in these cultivars. Sowing was done in vitro on medium containing 15% sucrose, 10 ppm boric acid and 1.5% agar. Germination and pollen viability were observed using a digital microscope. Each experimental variant had three repetitions. The result were statistically processed and interpreted by means of the ANOVA test.

**Results and Discussion.** Tab. 1 shows the viability and pollen germination in ten cultivars of apple from experience. Pollen viability, recorded statistically differences between

most varieties and control. ‘Mutsu’ or ‘Granny Smith’ cultivars registered values of pollen viability similar to the control, with no statistically differences assured. The highest values of this character occurred ‘Pinova’ (89.92%), ‘Gala’ (80.48%), ‘Florina’ (76.67%), ‘Topaz’ (75.97 %) and ‘Top Red’ (74.64%) with positive very significant differences compared to the control. Positive significant differences compared to the control registered ‘Jonica’. On the other hand the ‘Jonagold’ (52.55%), which is a triploid cultivar, presented significantly differences negative compared to the control. The results are similar to other authors such as Chauhan *et al.* (2008). The percentage of pollen germination varied between 93.22-99.3%.

Tab. 1

Syntheses of experimental results regarding pollen viability and pollen germination percentage at ten apple cultivars, in Cluj-Napoca, 2010-2011

Cultivar	Pollen viability (%)	Pollen germination (%)
‘Golden Reinders’ (Control)	60.14	100
‘Florina’	76.67***	98.7
‘Jonagold’	52.55 <sup>o</sup>	93.22 <sup>o</sup>
‘Jonica’	67.87*	95.7
‘Top Red’	74.64***	97.6
‘Mutsu’	58.89	95.8
‘Granny Smith’	54.2	96.5
‘Gala’	80.48***	99.5
‘Topaz’	75.97***	97.1
‘Pinova’	89.92***	99.3
Mean value	69.13	97.3
LD5%	7.55	6.16
LD1%	10.36	8.44
LD0.1%	14.1	11.5

**Conclusion.** Pollination is an important biologic factor in apple culture, and pollen viability and germination are two rings on the fundamental, indicating the productive potential of the cultivar. Pollen viability, recorded statistically differences between most varieties and control. The highest values of this pollen viability registered ‘Pinova’ (89.92%), ‘Gala’ (80.48%), ‘Florina’ (76.67%), ‘Topaz’ (75.97 %) and ‘Top Red’ (74.64%) with positive very significant differences compared to the control. In terms of percentage of pollen germination there were no differences statistically assured compared to the control except ‘Jonagold’ with significant negative difference.

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