



## EVALUATION OF SEED VIABILITY OF CALLERY PEAR (*PYRUS CALLERYANA*) IN POZNAŃ

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**ABSTRACT.** Seeds of *Pyrus calleryana* were sampled from 11 stations located in Poznań green areas. Three of them represented cultivar ‘Capital’, whereas the remaining eight represented cultivar ‘Chanticleer’. The viability of seeds was qualified by means of tetrazolium test. The results of staining test showed that viability of Callery pear seeds was high and ranged from 90 to 100%.

**KEY WORDS:** *Pyrus calleryana*, street tree, seed viability, tetrazolium test

### INTRODUCTION

Callery pear *Pyrus calleryana* Decne. (Rosaceae) is a tree species native to China and its specimens in natural localities reach 15–20 m in height (CULLEY & HARDIMAN 2007). It is a species of considerable decorative value and tolerating urban conditions well (FRAZIK-ADAMCZYK 2004, BOROWSKI 2012). The species was brought to the US in the early 1900’s in attempt to improve fireblight resistance in edible pears and it was not promoted as an ornamental until the 1950’s. Numerous cultivars of the Callery pear are grown, differing slightly in habit, decorative value and frost resistance (BUGAŁA 1991, FRAZIK-ADAMCZYK 2004, LATOCHA 2006, ŁYSIAK 2006, CULLEY & HARDIMAN 2007, CZEKALSKI 2010). In Europe and in Poland the most common is cultivar ‘Chanticleer’, a relatively low tree with a pyramid-shaped crown, growing mainly along streets. Callery pear started to be planted in Poland only recently, since the early 2000’s (SWOCZYNA et al. 2008, BEDNORZ et al. 2013). Trees are particularly attractive in early spring when branches are profusely covered with white flowers and in the autumn, when leaves are colored orange and purple. Flowers are followed by small, persistent, russet-colored, almost woody fruits (pomes).

Trees are generally self-incompatible and do not produce viable seed when cross-pollinated with another tree of the same cultivar. However, they can produce viable seed when cross-pollinated by differ-

ent cultivars or between the scion and rootstock of cultivated individuals. If the seeds are fertile they can sprout and establish wild stands. In the US where lots of different cultivars had been planted the species became a relatively new invasive that has only recently begun to spread across the country after intraspecific hybridization between cultivars (CULLEY & HARDIMAN 2007, 2009, HARDIMAN & CULLEY 2010, CULLEY et al. 2011, MERRIT et al. 2013).

The aim of this study was to qualify the viability of seeds in two Callery pear cultivars – ‘Chanticleer’ and ‘Capital’, growing in Poznań in respect of their potential ability of invasiveness.

### MATERIAL AND METHODS

For green areas of Poznań *Pyrus calleryana* is quite a new species. Trees represented two cultivars – ‘Chanticleer’ (19 stations) and ‘Capital’ (3 stations), were planted in the years 2006–2012 mostly along streets (BEDNORZ et al. 2013).

The seeds for the study were collected in October 2013 from 11 of 19 stations of *Pyrus calleryana* located in Poznań. Three of them represented cultivar ‘Capital’, eight cultivar ‘Chanticleer’ (Fig. 1).

Viability of seeds was qualified by means of the tetrazolium test (TZ) following ISTA routine rules (LEIST et al. 2003). Preparation of seeds:

- the seeds were moistened by soaking in water in the temperature 20°C for 18 h

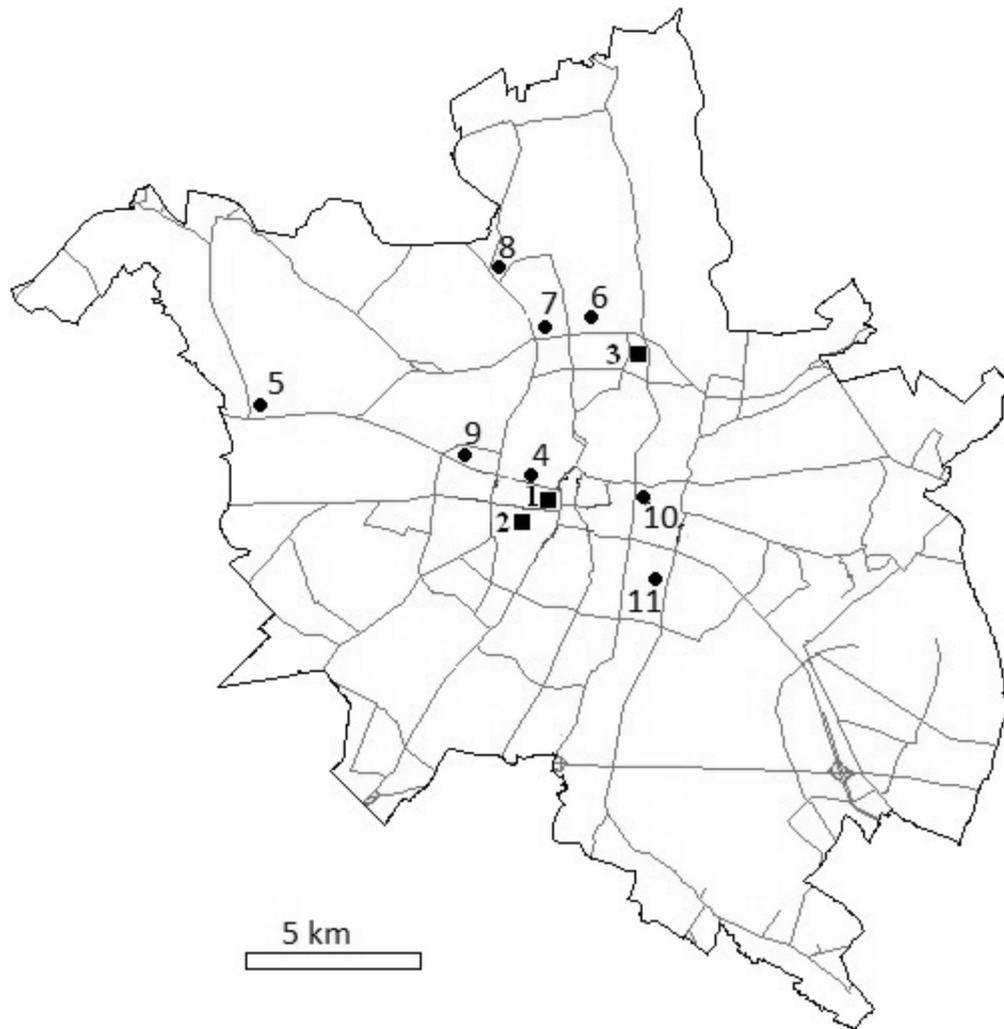


Fig. 1. Location of *Pyrus calleryana* stations in Poznań selected for this study: ■ – cultivar ‘Capital’, ● – cultivar ‘Chanticleer’ (the stations are listed in Table 1)

- the seed coats were removed before staining
- the seeds were stained in 1% TTC for 18 h in darkness in temperature 30°C
- the samples were evaluated (maximum area of unstained tissue permitted for seeds admitted as viable – radical tip, 1/3 distal area of cotyledons). Tetrazolium test was carried out in two replications of 50 seeds from each station.

## RESULTS AND DISCUSSION

The tetrazolium colour test is widely used for quick evaluation of dormant seeds of many plant species and providing information on potential germination ability of seeds. The results of staining test showed that viability of Callery pear seeds was high and ranged from 90 to 100% (Table 1). The mean percentage of viable seeds was slightly higher for cultivar ‘Chanticleer’ (95.9%) comparing with cultivar ‘Capital’ (95%).

The viability of seeds appeared to be higher than supposed prior to the study. Since we know that

Table 1. Viability of seeds of *Pyrus calleryana* (%)

Station (street)	Replication I	Replication II	Mean
Cultivar ‘Capital’			
1. Grunwaldzka	96	100	98
2. Szylinga	100	92	96
3. Murawa	90	92	91
Mean	95.0	95.0	95.0
Cultivar ‘Chanticleer’			
4. Barzyńskiego	96	100	98
5. Dąbrowskiego	96	90	93
6. Lechicka	100	92	96
7. Omańkowskiej	96	92	94
8. Stróżyńskiego	100	100	100
9. św. Wawrzyńca	96	100	98
10. Wieżowa	96	96	96
11. Wyzwolenia	92	92	92
Mean	96.5	95.0	95.9

the species exhibits gametophic self-incompatibility (CULLEY & HARDIMAN 2009), the trees growing in Poznań could produce viable seed when cross-pollinated between two cultivars – ‘Capital’ and ‘Chanticleer’. There are only three sites in Poznań city center where trees of cultivar ‘Capital’ have been planted. In all cases the distance from possible pollinators is short enough for efficient crossing. For cultivar ‘Chanticleer’ it looks different. The distances from possible pollinators are bigger and in case of station no 5 (Dąbrowskiego) the distance to the nearest trees of cultivar ‘Capital’ is approximately 8 kilometers, which seems to be too far for pollination by insects including honeybees and bumble bees which usually do not fly far than 3-4 km from their nests. Hence, the high level of viability of seed (93%) collected from this station needs explanation. It is possible that the trees have been pollinated by pollen grains originated from other pear tree species or fruit cultivars of *Pyrus communis*, what resulted in producing viable seeds. It is also possible that self-incompatibility (SI) system effectiveness, which depends on the number of SI alleles present within populations, is not high enough. The explanation of observed phenomena needs further studies of mating system in Callery pear cultivars growing in Poznań. Considering potential ability of invasiveness of *Pyrus calleryana* in Poland, including Poznań, it is also important that fruit set in our populations is rare and scanty and the number of cultivars is very limited. In the US where the species has recently become invasive, 25 different cultivars have been planted for years and fruit set in local populations is usually very abundant (CULLEY & HARDIMAN 2009).

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