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Česká zemědělská
univerzita v Praze

Úspěšnost experimentálních výsevů sekvojovce obrovského

Petr Novotný, Hana Prknová, Jaroslav Dostál,

Václav Bažant

Strnady, 17. 10. 2023

Školkařský experiment – vzcházení, přežívání

Sekvojovec obrovský

- malý areál (Sierra Nevada, CA)
- světlomilný
- lehké, hluboké, vlhké půdy
- Inhibiční červený pigment (longevita semen)
- šišky dozrávají 2. rok (na stromě více let, ⅔ zelené serotinní i 20–30 let)
- strom ročně uvolní 300–400 tis. semen
- osivo z ČR klíčivost do 30 % (PILÁT 1964)
- šišky z Ratměřic 1,8 % (PRKNOVÁ 2018)

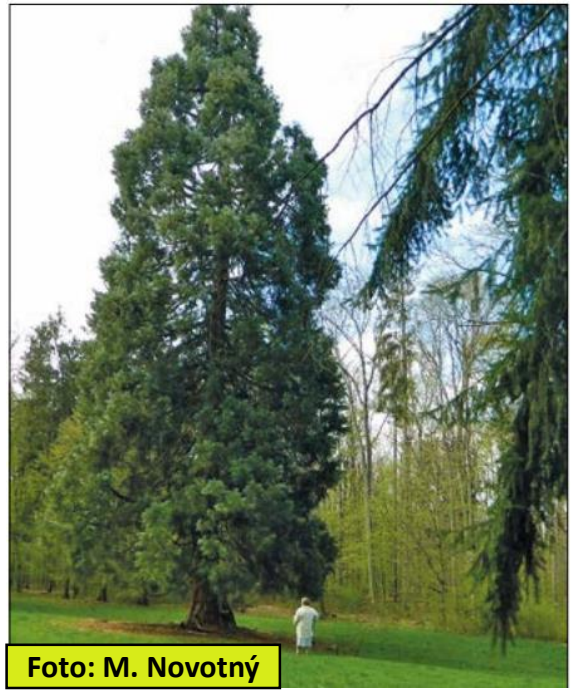
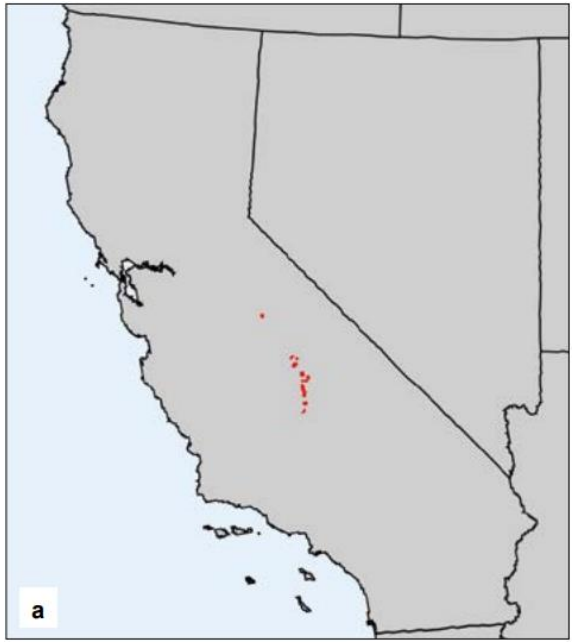


Foto: M. Novotný



JOURNAL OF FOREST SCIENCE, *64*, 2018 (2): 86–90

doi: 10.17221/148/2017-JFS

Contribution to seed ecology of *Sequoiadendron giganteum* (Lindl.) Buchholz growing in the Central European conditions

*Hana PRKNOVÁ**

Department of Silviculture, Faculty of Forestry and Wood Sci
Czech University of Life Sciences Prague, Prague, Czech Repu

**Corresponding author: prknova@fld.czu.cz*

Abstract

Prknová H. (2018): Contribution to seed ecology of *Sequoiadendron g*
the Central European conditions. J. For. Sci., 64: 86–90.

The properties of Giant Sequoia (*Sequoiadendron giganteum* (Lindley) B
cultivated Sequoia tree in the second gene strain in the Czech Republic
tion level was set at 1.8%. This type is a pyrophyte, but nonetheless the sh
simulating a natural fire are still lethal. The seeds were planted with the s
which is routine practice in nurseries, and in another case using a "biologi
of soil microflora. Both stratified and non-stratified seeds can germinate,
germinating individual trees to at least double.

Keywords: giant sequoia; germination; stratification; germination level; su

The Giant Sequoia (*Sequoiadendron giganteum* (Lindley) Buchholz) is cultivated in the Czech Republic only for decorative purposes. Due to its protected status, it is not used in commercial forestry even in the United States, but due to its large dimensions and quality of wood which is resistant to rotting, it has a huge potential for use.

The history of introduction of the Giant Sequoia into the Czech lands dates back to the end of the 19th century. In the Ratměřice municipality in Central Bohemia there are individual fertile trees which are more than 160 years old (Němec, Kyzlík 2003). However, the geographic latitude and climate of our territory differ greatly from the species natural range in California (Thomas et al. 2016). The individual tree cultivated already for 64 years in Kostelec nad Černými lesy, at the arboretum of the Faculty of Forestry and Wood Sciences, Cz
Prague – Tru
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that continue
properties th
from the ide
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climate for t
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they have be
trees on the
maturity (Č
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bel) Franco)
ex D. Don)
Podrázský

Supported by the Czech University of Life Sciences Prague, Project No. B_

Journal of Forest Science, 65, 2019 (6): 203–208 *Original Paper*

https://doi.org/10.17221/43/2019-JFS

The effect of the *Sequoiadendron giganteum* (Lindl.) Buchholz cone crystals on germination

*Hana Prknová**

Department of Silviculture, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Prague, Czech Republic

**Corresponding author: prknova@fld.czu.cz*

Citation: Prknová H. (2019): The effect of the *Sequoiadendron giganteum* (Lindl.) Buchholz cone crystals on germination. J. For. Sci., 65: 203–208.

Abstract: The cones of the giant sequoia contain red, water-soluble crystalline substances known as cone crystals. The inhibitory effect of this extracted material on Norway spruce, Scots pine and European larch germination was newly examined. Sown seed representative samples without and with added cone crystals were compared after their incubation in the same appropriate conditions. All these cases have brought compelling evidence that cone crystals totally inhibit germination. However, the chemically inhibited seeds being rinsed afterwards germinated very well. This switch effect caused by the cone crystals of the three above-mentioned conifers proved to be a nonspecific tool. Seeds of the giant sequoia, naturally affected by the cone crystals, were sown as rinsed and non-rinsed samples. Both the samples, grown on a wet peat substrate in appropriate conditions for 16 weeks, exhibited an equal, yet very low viability of 1.3% at the same time. This low number, fixed in seeds of the tree being far from the ecological optimum, does not allow any disputation with other authors.

Keywords: cone pigment; giant sequoia; inhibitory effect; tannin

The giant sequoia [*Sequoiadendron giganteum* (Lindl.)] Buchholz grows naturally in the Sierra Nevada Mountains of California. It was discovered in 1841 and introduced into Europe in 1853 (Pilát 1964). The two oldest trees of this species in the Czech Republic occur in the castle park in Ratměřice, they were planted around the year 1879 (Pospíšil 2017). The giant sequoia is cultivated only for decorative purposes in the Czech Republic. However, due to its large dimensions and high-quality wood, it has a great potential for commercial use. This article is aimed at enhancing the knowledge of the life strategy and ecology of this species.

The giant sequoia's cones are ovoid in shape and the average length is 5.08–8.89 cm while the average diameter is 3.81–5.72 cm. One cone produces about 200 seeds (Hartesveldt et al. 1975). The cone size and the number of seeds in one cone are highly variable (Beidleman 1950). The cones are not shed when the seeds are ripe. They may remain attached to the tree for many years, to be shed gradually at some later time, many of them through an external action such as wind, snow, the intervention of squirrels or beetles etc. All such cones remain green, and the tissues in the cone scales remain alive. Throughout this period, the seeds may be retained; in several cones that were more than twenty years old, a good quantity of seeds was still obtainable. As soon as the cones become detached, they dry out, and the seeds are freed within a few days (Buchholz 1938). The age of sequoia cones can be determined in a similar way like the age of a tree's trunk, i.e. by counting the annual growth rings in the cone peduncle or the stem (Buchholz 1938; Hartesveldt et al. 1975).

During the process of the seed extraction, a red, water-soluble crystalline substance falls out of the cones. Beidleman (1950) reported that the seeds

Supported by the Ministry of Agriculture of the Czech Republic, Project No. QK1920328.

LESNICKÝ PRŮVODCE

Certifikované METODIKY PRO PRAXI

KATALOG TAXONŮ
INTRODUKOVANÝCH DŘEVIN
S POTENCIÁLEM LESNICKÉHO VYUŽITÍ
NA STANOVIŠTÍCH
S NIŽŠÍ DOSTUPNOSTÍ VLÁHY

Foto 12a–f: Sekvojovec obrovský – Arboretum FLD Kostelec nad Černými lesy, (a) habitus, (b) detail větve s mladými šiškami a samčími šišticemi (H. Prknová, 8. 9. 2017 a 21. 5. 2016); Šlechtitelská stanice Truba, (c) semenáčky, (d) sazenice (H. Prknová, 11. 7. 2016 a 18. 10. 2020); Praha, Kunratický les, (e) báze kmene, (f) habitus (M. Novotný, 27. 4. 2022)

ČR – Arboretum FLD Kostelec nad Černými lesy (28. březen)

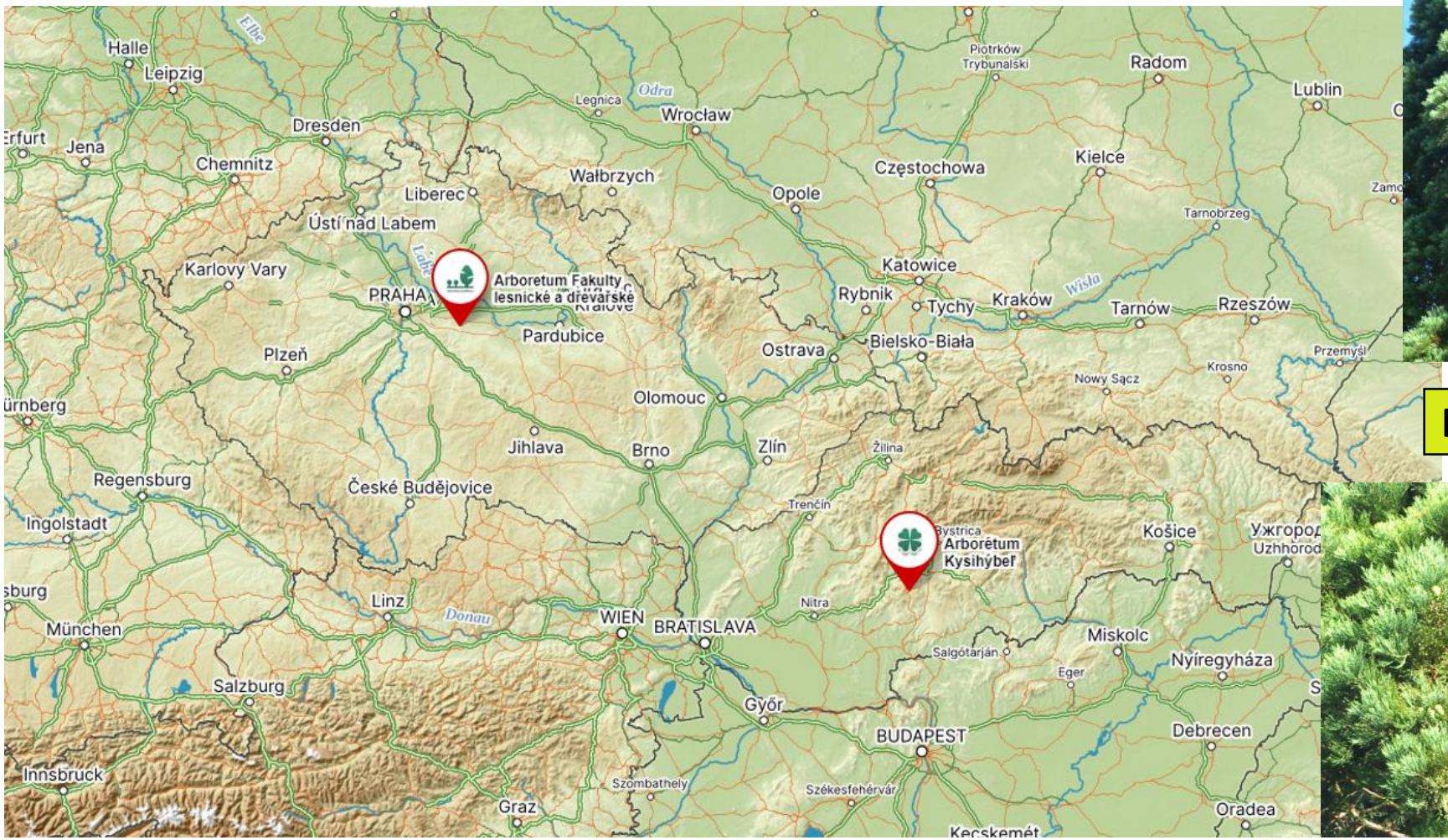


Foto: H. Prknová

Slovensko – Arborétum Kysihýbeľ (1. duben)

Typy šišek:

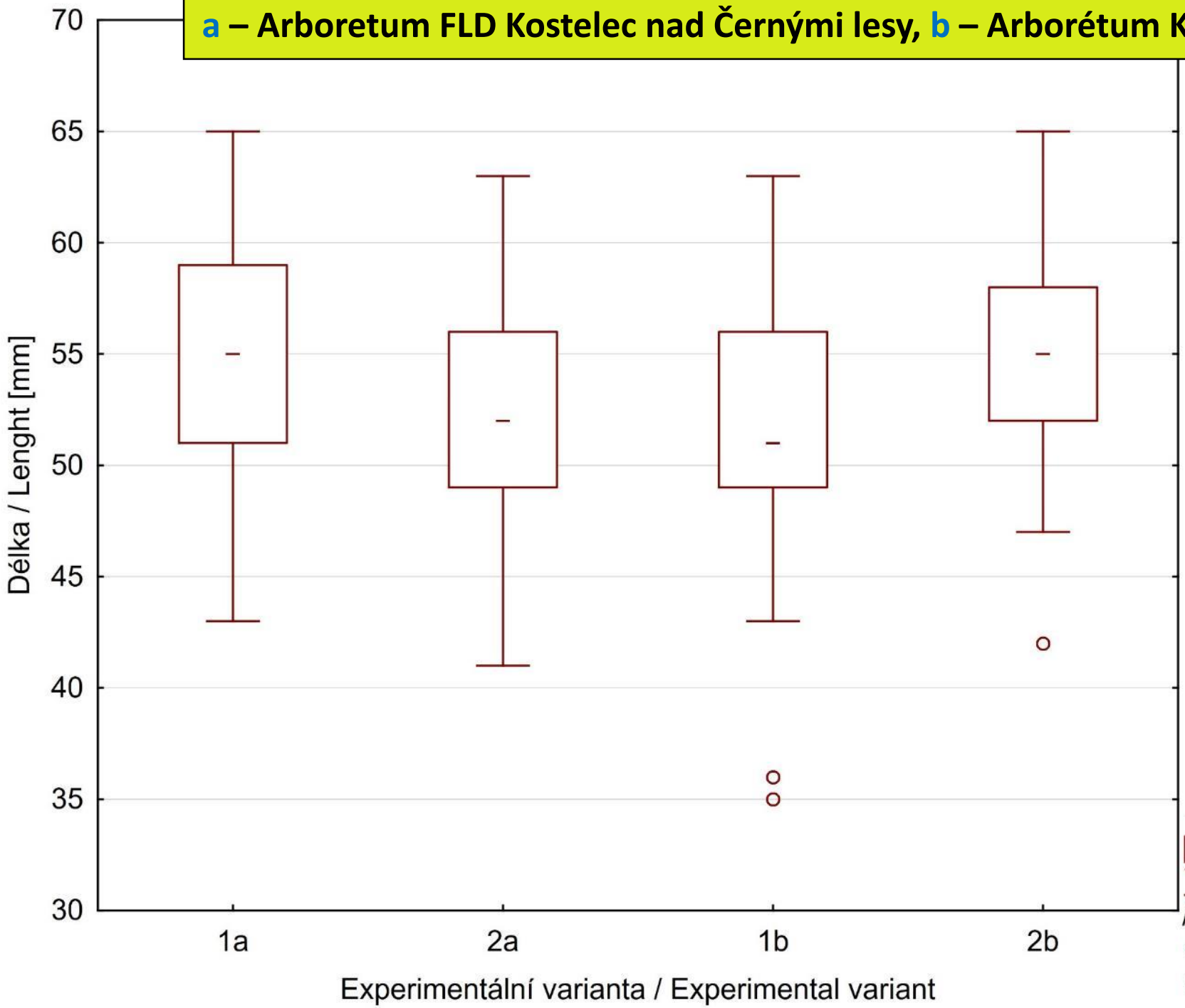
1. „**mladé**“ (špičky větví, nejnovější 2leté)
2. „**staré**“ (uvnitř koruny, starší část větví)

Foto: H. Prknová

Foto: P. Pospíšil

Pospíšil P. 2019. *Experimentální studie klíčení sekvojovce obrovského*. Diplomová práce. Praha, FLD ČZU v Praze: 67 s. MS, Dep.: ČZU v Praze.

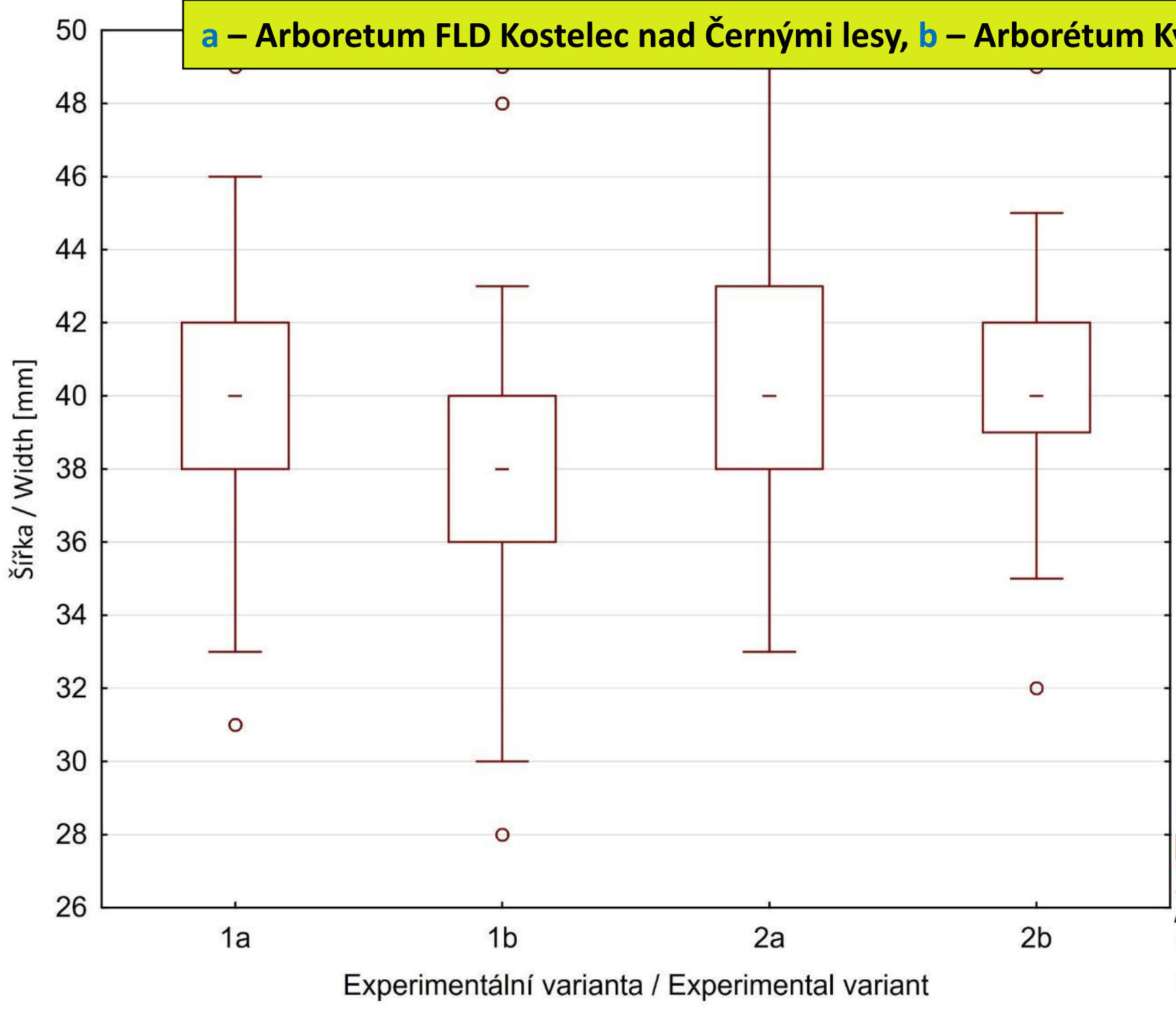
a – Arboretum FLD Kostelec nad Černými lesy, b – Arborétum Kysihýbeľ (*n* = 100)



1 – mladé šišky
2 – staré šišky

Délka *l* (mm)
1a = 55 +
2a = 52
1b = 51 +
2b = 55

a – Arboretum FLD Kostelec nad Černými lesy, b – Arborétum Kysihýbeľ (*n* = 100)



1 – mladé šišky
2 – staré šišky

Šířka *d* (mm)

1a = 40	NS
2a = 40	
1b = 38	+
2b = 40	

Medián / Median
25%-75%
Rozsah neodlehl. / Non-Outlying range
Odlehlé / Outliers
Extrémy / Extrems

Zjištěná hmotnost semen

Zdroj (arboretum)/ Source (arboretum)	Šišky/Cones	Hmotnost 1000 semen/ Weight of 1,000 seeds (g)	Hmotnost 13 000 semen/ Weight of 13,000 seeds (g)
Kostelec nad Černými lesy (CZ)	mladé/young	3,8	49,4
	staré/old	3,3	43,1
	mix	3,3	42,6
Kysihýbeľ (SK)	mladé/young	2,8	35,9
	staré/old	3,1	40,8
	mix	3,2	41,2

Varianty s odděleným osivem z mladých a starých šišek:

1a, 1b – osivo z mladých šišek/ seed from young cones

- ošetření fungicidy (Previcur, Topsin)

2a, 2b – osivo ze starších šišek/ seed from older cones

- ošetření fungicidy (Previcur, Topsin)

Varianty s mixem semen z mladých i starých šišek:

3a, 3b – kontrola/ control

- semena důkladně promyta a zbavena červeného barviva
- ošetření fungicidy (Previcur, Topsin)

4a, 4b – obohaceno mykorhizními houbami/ enriched with mycorrhizal fungi

5a, 5b – obohaceno o bakterie/ enriched with bacteria

6a, 6b – přelito vodou 80 °C (vyšší teplota)

- ošetření fungicidy (Previcur, Topsin)

7a, 7b – obohaceno o červené barvivo ze šišek/ enriched with red dye from cones

8a, 8b – obohaceno o popel/ enriched with ash

Standardní základ všech variant = 3 kontrola (rašelina + křemičitý písek 3 : 1)

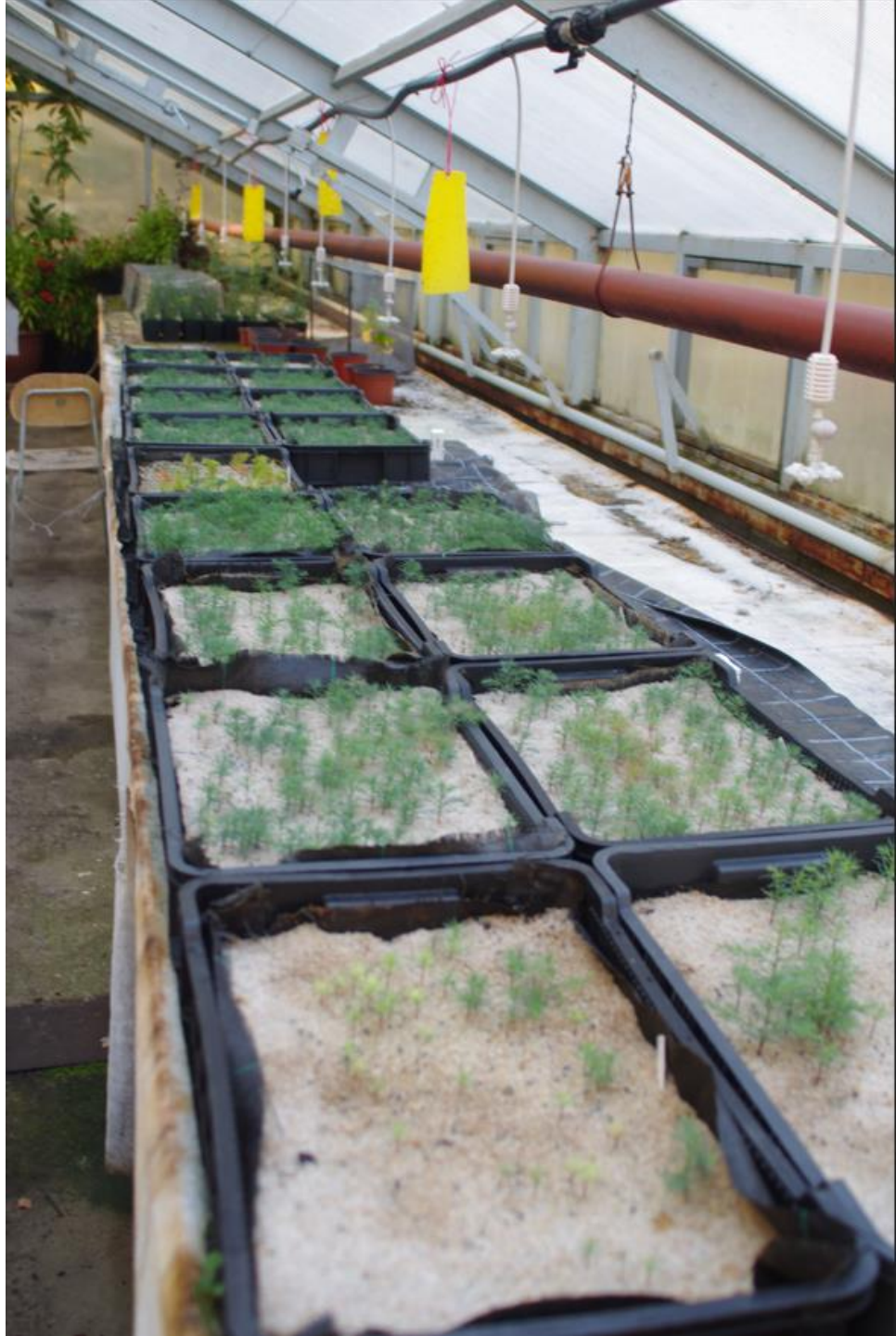
Připravené výsevové varianty

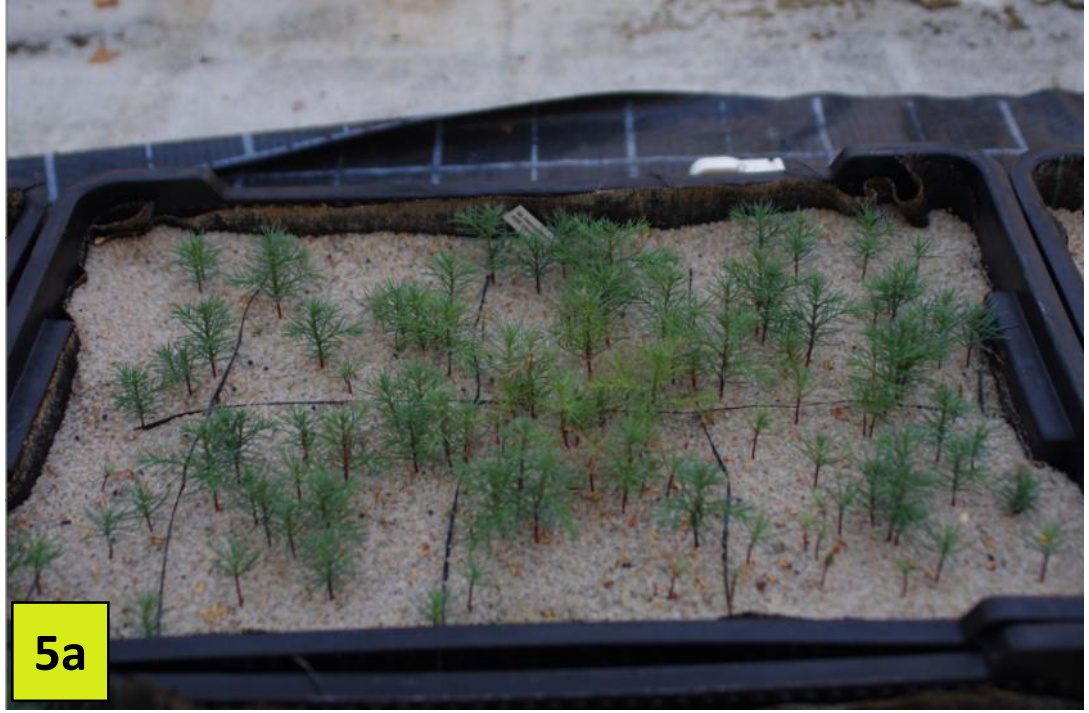
Varianta 8 – příměs popelu

Přísada pro variantu 7 – příměs červeného barviva (Foto: P. Pospíšil)

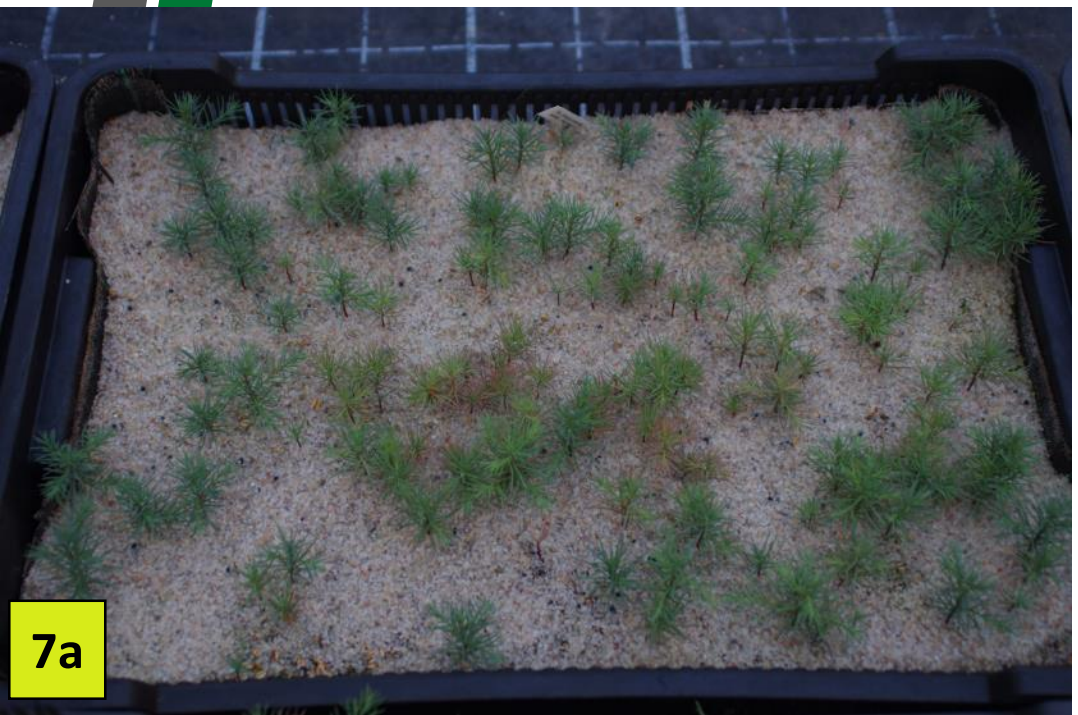
Pospíšil P. 2019. *Experimentální studie klíčení sekvojovce obrovského*. Diplomová práce. Praha, FLD ČZU v Praze: 67 s. MS, Dep.: ČZU v Praze.

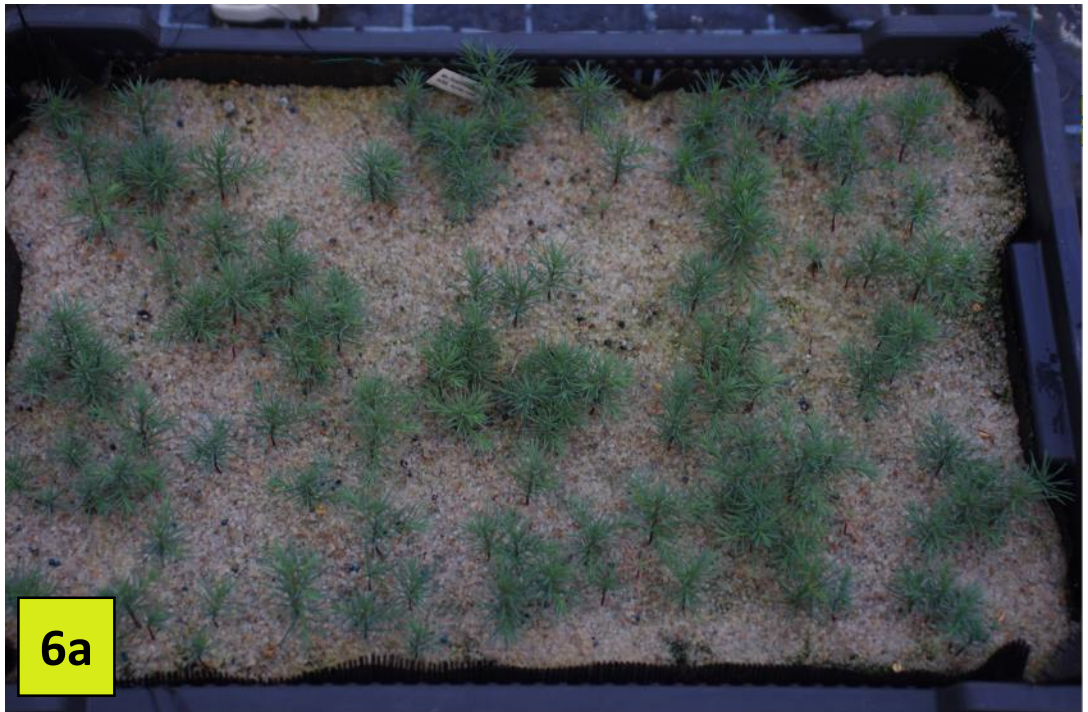
Překrytí všech variant výsevů 5 mm křemičitého písku

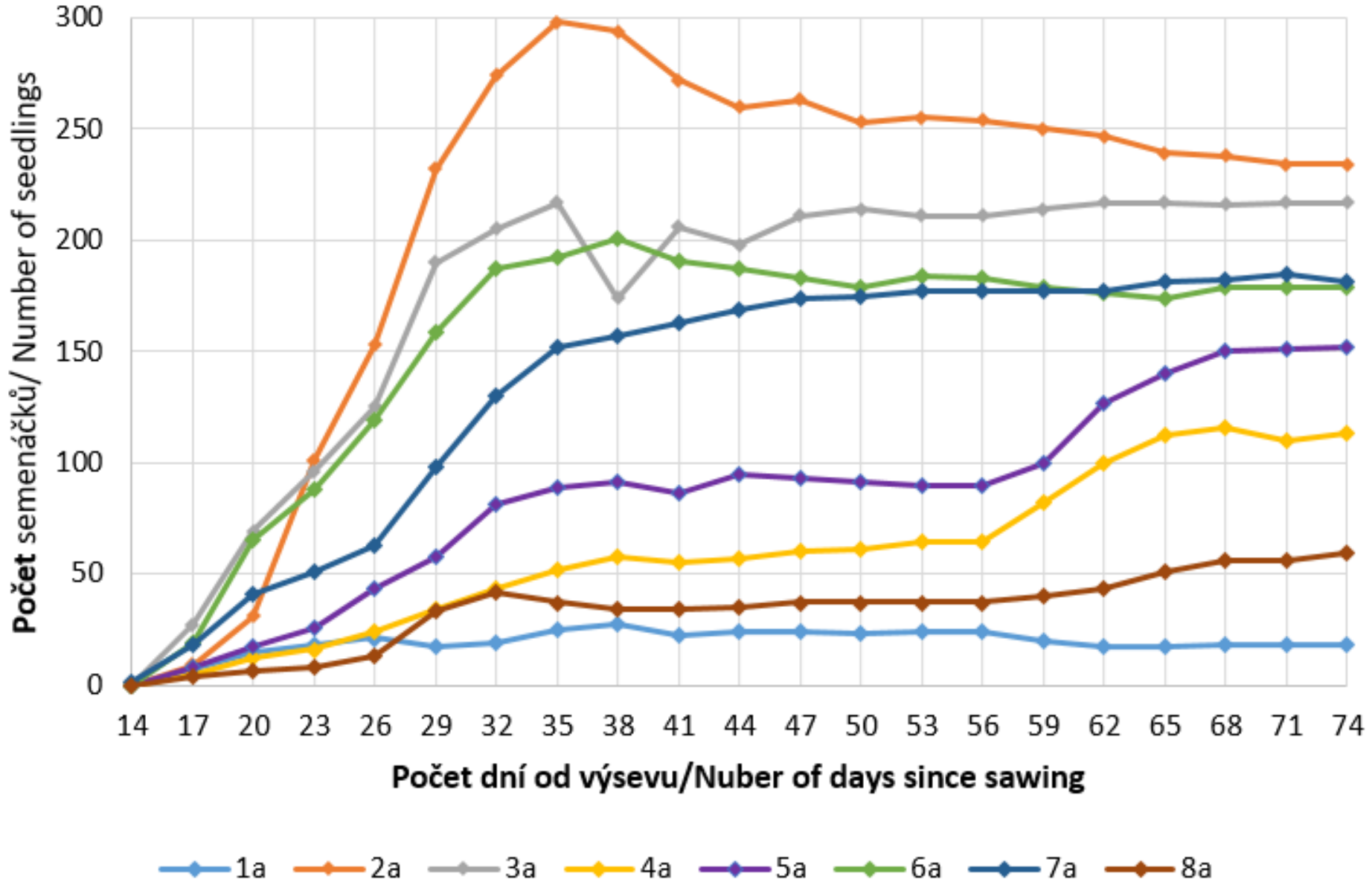


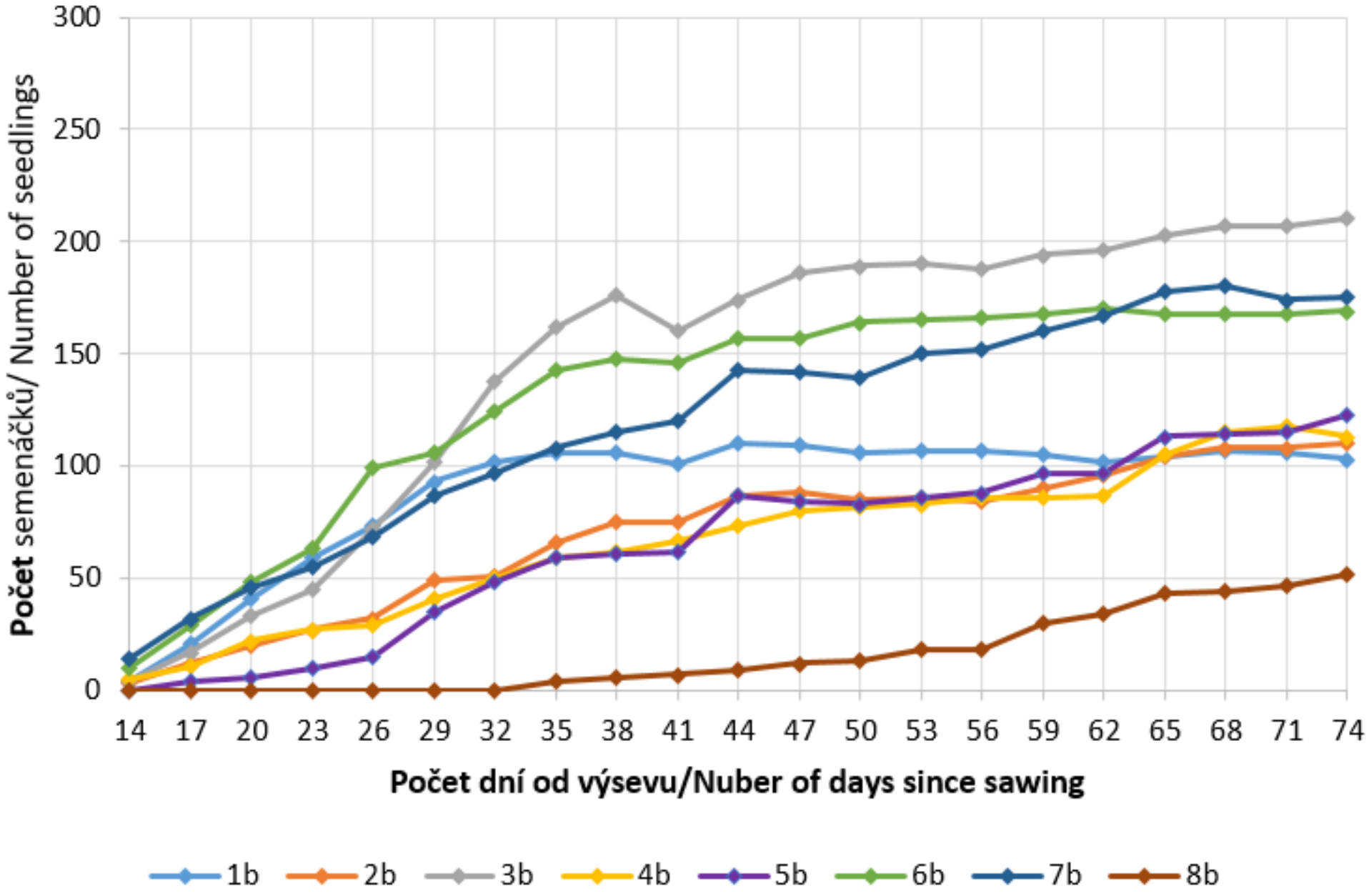


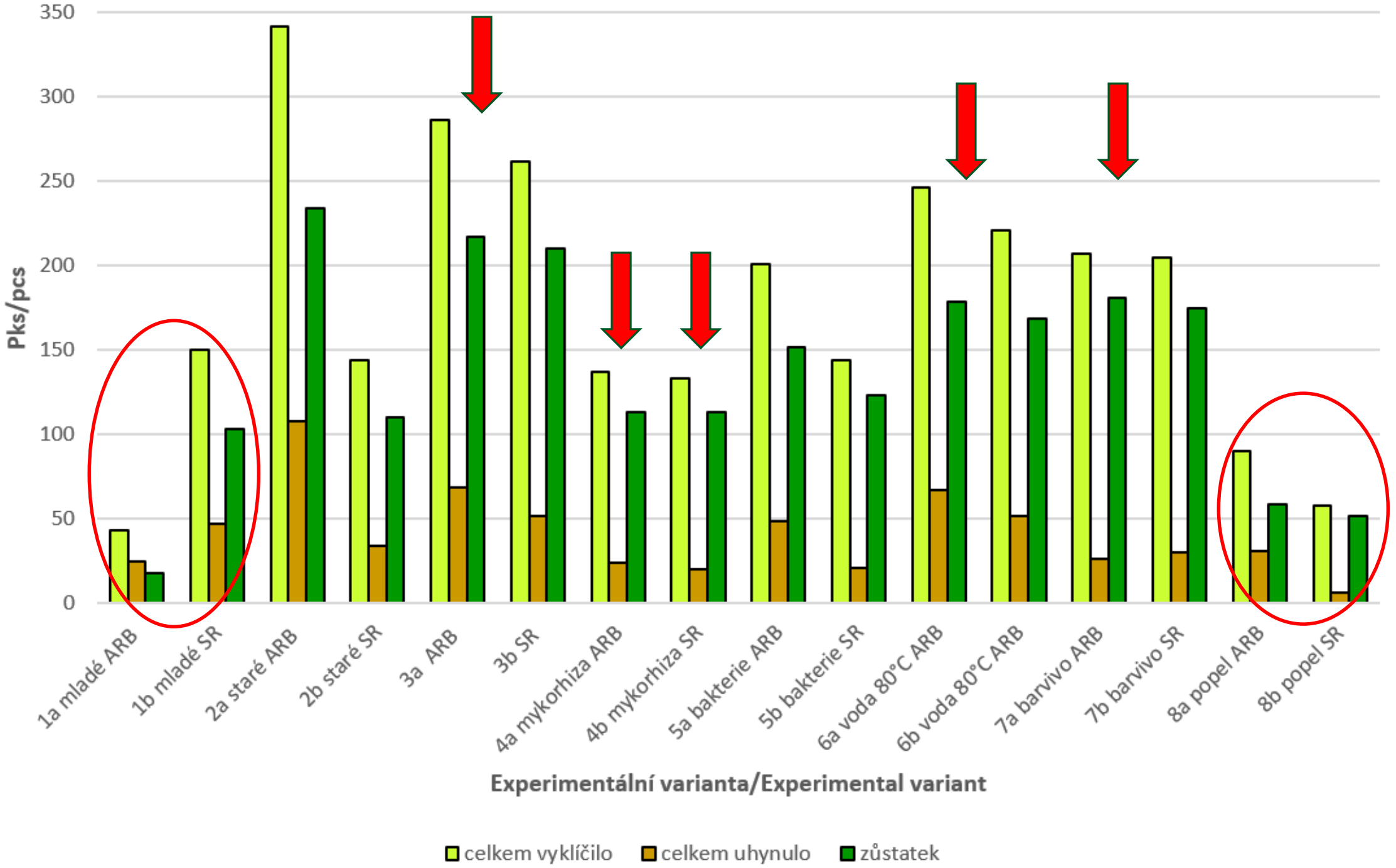
Ukázky vzcházení variant (5a pomůcka pro sčítání)






300
250
200
150
100
50
0
Počet semenáčků/ Number of seedlings
14 17 20 23 26 29 32 35 38 41 44 47 50 53 56 59 62 65 68 71 74
Počet dní od výsevu/Nuber of days since sawing
1a
2a
3a
4a
5a
6a
7a
8a


300
250
200
150
100
50
0
Počet semenáčků/ Number of seedlings
14 17 20 23 26 29 32 35 38 41 44 47 50 53 56 59 62 65 68 71 74
Počet dní od výsevu/Nuber of days since sawing
1b
2b
3b
4b
5b
6b
7b
8b


350
300
250
200
150
100
50
0
Pks/pcs
1a mladé ARB
1b mladé SR
2a staré ARB
2b staré SR
3a ARB
3b SR
4a mykorhiza ARB
4b mykorhiza SR
5a bakterie ARB
5b bakterie SR
6a voda 80°C ARB
6b voda 80°C ARB
7a barvivo ARB
7b barvivo SR
8a popel ARB
8b popel SR
Experimentální varianta/Experimental variant
celkem vyklíčilo
celkem uhynulo
zůstatek

Závěry:

- Rozměry šišek statisticky významně odlišné (vyžaduje větší soubory)
- Hmotnost semen nižší v porovnání s literaturou
- Výrazný rozdíl ve vzcházivosti osiva z mladých šišek (1a vs. 2a)
- Nejlepší vzcházivost a přežívání kontrolní varianta (3a, 3b)
- Dobré výsledky rovněž varianty 6a, 6b (horká voda) a 7a, 7b (barvivo)
- Méně uspokojivé výsledky u variant 4a, 4b (mykorhiza) a 5a, 5b (bakterie)
- Minimální vzcházivost u variant 8a, 8b (příměs popelu)

Děkujeme za pozornost:

pnovotny@vulhm.cz

prknova@szescaslav.cz

dostal@vulhm.cz

bazant@fld.czu.cz