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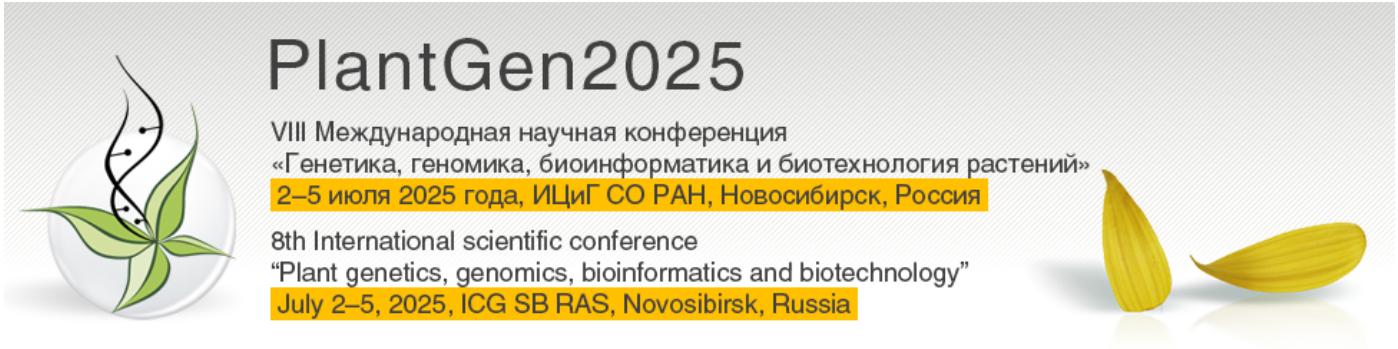

In vitro studying the photoperiod effect on morphophysiological and biochemical parameters of *Cotinus coggygria* Scop. and cherry rootstock VSL- 2 microshoots

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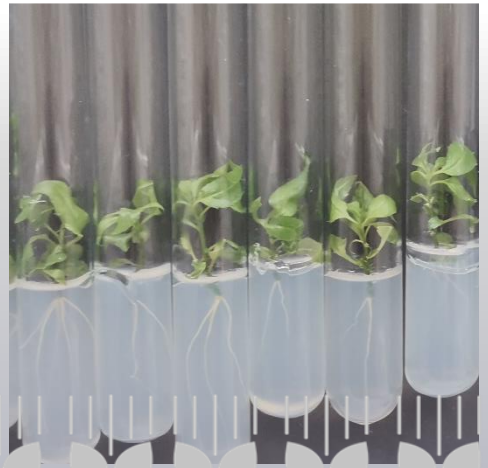
MOTIVATION AND AIM: The study of the photoperiod duration's effect on changes in morphophysiological and biochemical characteristics of promising in agrolesomelioration and horticulture microshoots of smoke tree (*Cotinus coggygria* Scop.) and cherry rootstock Krymsk® 5 (cv. VSL-2) (*Prunus fruticosa* × *Prunus serrulata* var. lannesiana) in vitro.

This study was conducted in the Laboratory of biotechnologies of the Federal Scientific Center of Agroecology of RAS, Volgograd, Russian Federation.

Smoke tree (*Cotinus coggygria* Scop.)



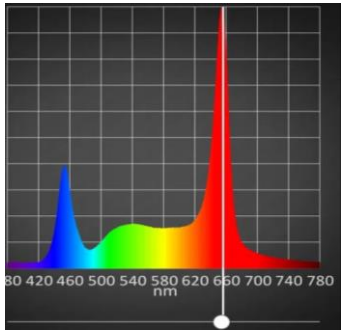
Krymsk® 5 (cv. VSL-2) (*Prunus fruticosa* × *Prunus serrulata* var. lannesiana)

Materials and Methods

We planted *C. coggygria* explants under different photoperiod conditions on the medium according to the protocol of Murashige and Scoog in three variants: MS without the addition of hormones (MS), with the addition of 6-benzylaminopurine at a concentration of 0.2 mg L^{-1}, and with indole-3-butyric acid at a concentration of 0.5 mg L^{-1}. VSL-2 explants were cultivated on MS medium, and with indole-3-butyric acid at a concentration of 0.5 mg L^{-1}, and with kinetin at a concentration of 0.5 mg L^{-1}.

We configured six photoperiod (h) options in a VeFarm Clima 2 climate chamber (Russia) (PPFD = 40 µmol m^{-2} s^{-1} with a spectral ratio of red (R), blue (G), and green components R:G:B = 2.5:1:0.4; and the temperature of 25 ± 0.2º. After six weeks of cultivation a wide range of parameters: shoot length, multiplication factor (number of shoots per explant), root length, number of roots per explant, presence of second-order roots, number of leaves, leaf's length and width, area, leaf index (length/width of leaf), and fresh and dry weight of shoot, and the total chlorophyll in leaf plates – were fixed.

Climate chamber
Ve Farm Clima 2



R:B:G = 2.5: 1.0: 0.4, 40 µmol m^{-2} s^{-1}
R- red spectrum, B- blue spectrum,
G – green spectrum

Variants of photoperiod	
Day, h	Night, h
8	16
12	12
14	10
16	8
20	4
24	0

Results

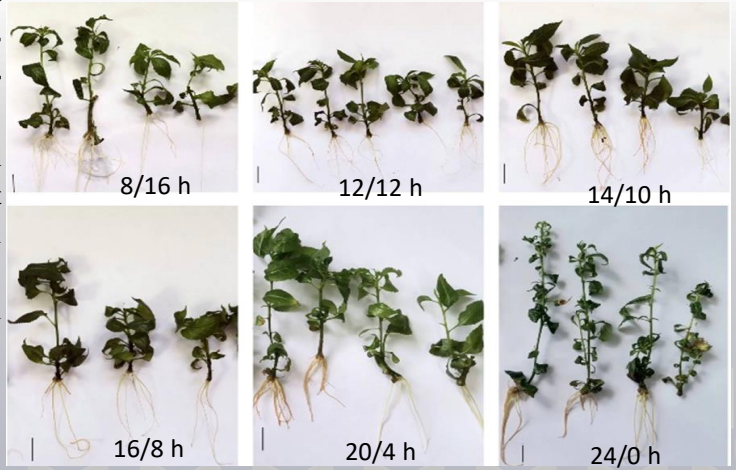
We determined the effect of photoperiod and type of media on explants of smoke tree and clonal rootstock for cherry VSL-2. Multivariate analysis of variance showed the influence of both separate factors (duration of photoperiod and type of medium) and their joint positive effect on the studied objects.

The predominant influence of photoperiod duration in clonal cherry rootstock VSL-2 was observed for the parameters: root length, number of leaves, leaf length and leaf area.

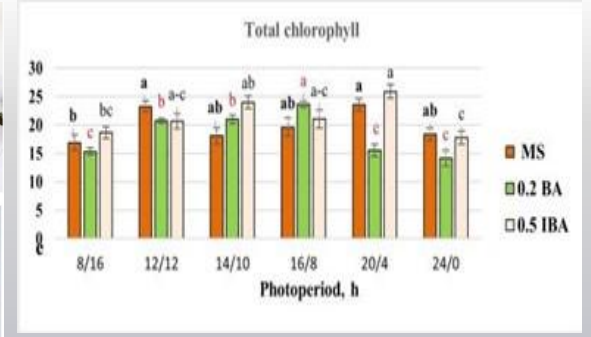
Type of medium and photoperiod had a combined effect on shoot length, root length, the total chlorophyll content, number of roots, fresh and dry weight, and leaf width in rootstock VSL-2.

Multivariate analysis of variance of the photoperiod effect on the *C. coggygria* explants showed that the combination of the photoperiod duration and the type of medium had an effect on all the parameters studied. Individually, the photoperiod duration did not affect the chlorophyll content, and the type of medium did not affect the leaf plates area and leaf index.

C. coggygria's regenerants after 6 weeks of cultivation on MS medium contained IBA at a concentration of 0.5 mg/L. The scale corresponds to 1 cm.



VSL-2 regenerants after 6 weeks of cultivation on MS medium. The scale corresponds to 1 cm



C. coggygria leaf plates' total chlorophyll after 6 weeks of growth with different photoperiods. Different letters in the column indicate statistically significant differences between the average values of the parameters in accordance with one-way ANOVA test according to the Fisher criterion with a confidence level of $p < 0.05$

Conclusion

- In the explants of *C. coggygria*, the combination of increased photoperiod and the addition of indole-3-butyric acid hormone had a positive effect on the development of the upper part of shoots in vitro.
- The maximum percentage of rooted explants with a developed root system was obtained at a photoperiod of 8/16 h.
- The results of the effect of photoperiod duration on explants will contribute to the improvement, namely the acceleration of micropropagation of *C.coggygria* and clonal rootstock VSL-2 under LED light in vitro.

Acknowledgment

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