

**DATA ON *PICEA OBOVATA* (PINACEAE) NEEDLES MOISTURE EXCHANGE UNDER THE  
AEROTECHNOGENIC POLLUTION (THE KOMI REPUBLIC)**

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REFERENCES

1. Malhotra S. S., Khan A. A. 1988. Biochemical and physiological effect of prior pollutants. In: Zagryazneniye vozdukh i zhizn rasteniy (Air pollution and plant life). Transl. from English. Moscow. P. 144–189. (In Russian)
2. Sazonova T. A., Kaibiyainen L. K., Kolosova S. V. 2005. Diagnostics of water regime of *Pinus sylvestris* (Pinaceae). — Botanicheskii zhurnal. 90(7): 1012–1022. (In Russian)
3. Tuzhilkina V. V. 2009. Response of the pigment system of conifers to long-term industrial air pollution. — Ekologiya. 4: 243–248. (In Russian)
4. Bobkova K. S., Pautov Yu. A., Tereshchuk N. A. 1997. The state of forests in a zone affected by the Syktyvkar timber complex. — Lesnoy zhurnal. 5: 84–88. (In Russian)
5. Robakidze E. A., Torloпова N. V., Bobkova K. S. 2010. Wooden plants state of spruce phytocenoses in zone of aerotechnogeneus effect of pulp-and-paper production. — Lesnoy zhurnal. 2: 47–56. (In Russian)
6. Robakidze E. A., Torloпова N. V. 2013. Dynamics of chemical composition of spruce needles under the influence of pulp-and-paper production. In: Mater. Vseros. nauchno-prakt. konf. «Aktualniye problemy regionalnoy ekologii i biodiagnostiki zhivyykh sistem». Kirov. P. 341–344. (In Russian)
7. Torloпова N. V., Robakidze E. A. 2011. Monitoring the state of spruce forests in zone polluted by pulp-and-paper production. In: Mater. Vseros. nauchno-prakt. konf. «Biologicheskii monitoring prirodno-tekhnogennykh system». Kirov. P. 160–163. (In Russian)
8. Tuzhilkina V. V., Plyusnina S. N. 2013. Structural and functional changes of photosynthetic apparatus of *Picea obovata* under the technogenic pollution. In: XIII Syezd Russkogo botanicheskogo obshhestva. Tolyatti. P. 250–251. (In Russian)

9. Tuzhilkina V. V., Plyusnina S. N. 2014. Evaluation of *Picea obovata* (Pinaceae) needle condition under aerotechnogenic pollution. — *Rastitelnye resursy*. 50(4): 579–587. (In Russian)
10. Kuznetsov V. V. 2006. *Fiziologiya rasteniy* [Plant physiology]. Moscow. 742 p. (In Russian)
11. Tuzhilkina V. V. 1997. Pigment complex of pine needles in zone of influence of timber processing complex. — *Lesnoy zhurnal*. 5: 108–112. (In Russian)
12. Tuzhilkina V. V., Ladanova N. V., Plyusnina S. N. 1998. Influence of technogenic pollution on photosynthetic apparatus of pine. — *Ekologiya*. 2: 89–93. (In Russian)
13. Terebova E. N., Galibina N. A., Sazonova T. A., Talanova T. Yu. 2003. Individual variability of metabolic indices in assimilative apparatus of Scots pine under industrial pollution. — *Lesovedenie*. 1: 73–77. (In Russian)
14. Sazonova T. A., Kolosova S. V., Isaeva L. G. 2007. Water regime of *Pinus sylvestris* and *Picea obovata* (Pinaceae) under industrial pollution. — *Botanicheskii zhurnal*. 92(5): 740–750. (In Russian)
15. Sazonova T. A., Pridacha V. B. 2009. The impact of industrial pollution on mineral and water exchange of pine and spruce. — *Trudy Karelskogo NC RAN. Petrozavodsk*. 3: 75–85. (In Russian)
16. Pridacha V. B., Sazonova T. A., Talanova T. Yu., Olchev A. V. 2011. Morphophysiological responses of *Pinus sylvestris* L. and *Picea obovata* Ledeb. to industrial pollution under conditions of Northwestern Russia. — *Ekologiya*. 1: 25–33. (In Russian)
17. Torloпова N. V., Robakidze E. A. 2003. *Vliyaniye pollutantov na khvoynnye fitotsenozy* [Influence of pollutants on coniferous phytocoenoses]. Yekaterinburg. 147 p. (In Russian)
18. Maksimov N. A., Petinov N. S. 1948. Evaluation of the leaves suction force by compensation method using refractometer. — *Doklady AN SSSR*. 62(4): 537–540. (In Russian)
19. Lakin G. F. 1980. *Biometriya* [Biometry]. Moscow. 293 p. (In Russian)
20. Plyusnina S. N. 2005. Influence of aerotechnogenic pollution and cooling on structure mesophyll of spruce needle. — *Izvestiya Samarskogo nauchnogo tsentra. Spets. vypusk «ELPIT-2005»*. Samara. P. 151–155. (In Russian)
21. Sukachev V. N. 1964. Basic concepts of forest biogeocenology. In: *Osnovy lesnoy biogeotsenologii*. Moscow. P. 5–49. (In Russian)
22. Molchanov A. G. 1986. The ratio of photosynthesis and transpiration from Scotch pine in the conditions of southern taiga. — *Lesovedenie*. 4: 76–82. (In Russian)

23. Sutinen S., Lumme I., Mäenpää M., Arkhipov V. 1998. Light microscopic structure of needles of Scots pine (*Pinus sylvestris* L.) in relation to air pollution and needle element concentrations in S. E. Finland and the Karelian Isthmus, N. W. Russia. — *Trees*. 12(5): 281–288. doi: 10.1007/PL00009718
24. Zhirov V. K., Golubeva E. I., Govorova A. F., Haitbaev A. H. 2007. Strukturno-funktsionalniye izmeneniya rastitelnosti v usloviyakh tekhnogennogo zagryazneniya na Karainem Severe [Structural and functional changes of vegetation under technogenic pollution in the far North]. Moscow. 166 p. (In Russian)
25. Varlagin A. V., Vygodskaya N. N. 1993. The influence of ecological and morphological factors on stomatal resistance of European spruce. — *Lesovedenie*. 3: 48–60. (In Russian)
26. Nikolaevskii V. S. 1979. Biologicheskiye osnovy gazoustoychivosti rasteniy [Biological bases of plants gas resistance]. Novosibirsk. 280 p. (In Russian)