

---

## Response of Scots Pine to climate and industrial emission in the most industrialized part of Poland

Barbara Sensuła 1, [@](#) , Sławomir Wilczyński 2, [@](#)

1 : Silesian University of Technology, Institute of Physics—Center for Science and Education (SUT)  
Konarskiego 22B, 44-100 Gliwice - Poland

2 : Department of Forest Protection, Entomology and Forest Climatology, University of Agriculture in Krakow  
Al. 20 Listopada 46, 31-425 Kraków - Poland

### Abstract

The conifers investigated in this study have grown for many years under the stress of environmental contamination. We present a complex analysis of the climatic (sunshine, temperature, precipitation, humidity and wind circulation), and the industrial *pollutant emissions* (*inter alia*:  $CO_2$ ,  $SO_2$ ,  $PM$ ) influencing the radial increment dynamics and stable isotope composition of Scots pine (*Pinus sylvestris* L.) growing in the vicinity of different factories in southern part of Poland (1) the combined heat and power plant in Łaziska Górne (2) chemical and nitrogen factories in Kędzierzyn-Koźle (3) steelworks in Dąbrowa Górnicza. We analysed the spatiotemporal distribution of growth reductions, the depth of reduction with respect to the distance from the emitter, the relationship between tree growth and stable isotope composition and climate during the industry development period and during pro-ecological strategy application. Pines chronologies indicate that trees have a similar sensitivity to most climatic elements of the previous and given year, but there is also observed a different rhythm between the studied populations of incremental growth of pines. The causes of diversity are due to the different types of habitat (site types) and environmental contamination.

**Keywords** : climate ; bio ; monitoring ; industrial pollution ; pine