Dynamics of soil freezing

J. Rožnovský
Department of Agrosystems and Bioclimatology, Mendel University of Agriculture and Forestry Brno[1]

H. Pokladníková
Department of Applied and Landscape Ecology, Mendel University of Agriculture and Forestry Brno[2]

A b s t r a c t : The knowledge of the soil environment is significant from the climatological, technical and biological point of view. For plants, soil is an environment from which they get nutriments and water, soil supports them and creates conditions for wintering. In our climatic conditions, a typical manifestation of the climate is the decreasing of the soil temperatures during the winter season under the freezing point, i.e. the occurrence of the freezing of the soil. This phenomenon has not been studied very widely, and there are many more data to be found about the temperatures of soil. Freezing is often determined, according to the soil temperature of 0° C, but this procedure is not the best. The scarcity of data on the freezing of soil is given also by the fact, that its measurement is difficult. Out of the agroclimatological stations of the Czech Hydrometeorological Institute, the freezing of soil is being measured by the cryopedometer. The evaluation of measurement for the period of 1961 to 2004 at the Pohořelice station, where the soil is formed by chernozems, has brought the following results. On average the freezing of soil occurs from November 23 to March 28, i.e. 127 days. The freezing reached the maximum depth from January 26 to 30, 1964, when the soil was frozen to a depth of 74 cm. On the other hand, there are years, when the depth of freezing does not exceed 2 cm. The freezing of the soil is very variable both during individual years and during the cold period. A significant phenomenon is the alternation of the states of freezing and melting of the soil, mainly in March. The occurrence of the average height of the snow cover is in the period from November 22 to March 15. Its occurrence is also very changeable, extraordinarily it may occur out of the whole cold period only several days or just one day. The influence of the snow cover on the depth of soil freezing for height of snow to about 10 cm is overridden by the influence of the advection of cold air.

Key words: freezing of soil, snow cover, cryopedometer, soil temperature, agroclimatological stations

[1] Zemědělská 1, 613 00 Brno, Czech Republic; e-mail: roznov@mendelu.cz
[2] Zemědělská 1, 613 00 Brno, Czech Republic; e-mail: hana.pokladnikova@uake.cz