

**RHEOLOGICAL PROPERTIES OF SOILS AS ONE OF THE CHARACTERISTICS OF PLANT
PHYSICAL HABITAT**

D. D. Khaidapova, A. A. Mishchenko, D. V. Karpova

*Lomonosov Moscow State University, Faculty of Soil Science,
1/12, Leninskiye Gory, Moscow, 119234, Russia;**[E-mail: dkhaydapova@yandex.ru](mailto:dkhaydapova@yandex.ru)*

The physical properties of soils as a characteristic of plant habitat are extremely important, since they provide optimal water and air conditions for the growth and development of plants. The optimal physical conditions for plants are provided by an agronomically valuable structure, which traditional assessment methods are based on determining the ratio of the content of agronomically valuable (10-0.25 mm) and non-valuable (>10 mm and <0.25 mm) aggregates. However, this approach does not allow assessing the structure of soils using strength characteristics, which are the main parameters for structured bodies. The rheological approach makes it possible to assess the strength of the soil structure as a result of interparticle interaction depending on many factors (humidity, organic matter content, etc.). This paper presents the results of determining the rheological properties of an agro-gray soil of the Vladimir Opolye and agrochernozem of the Kursk region by the amplitude sweep method on an MCR-302 rheometer (Anton Paar, Austria). Despite the fact that both studied soils were characterized by a structural coefficient indicating an excellent state of aggregation, a comparison of their rheological properties revealed significant differences in rheological behavior. Thus, the range of elastic behavior of the chernozem under the application of deformation forces was much larger compared to the agro-gray soil, which indicated a better resistance of the chernozem to mechanical loads. However, the strength of interparticle bonds in the agro-gray soil was higher than in the chernozem. The value of the yield strength, or the value of deformation forces, at which the soil structure passes from a plastic state to a fluid state, was significantly higher for the chernozem than for the agro-gray soil. The results of the study indicate that the rheological characteristics of soils are a reliable diagnostic indicator of the physical state of the soil as a plant habitat.

Key words: soil structure, soil aggregates, rheology, amplitude sweep.