

Original article

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Using Fractal Methods to Assess Soil Structure after the Creation of Firebreaks

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Annotation. This paper presents a new method for assessing the quality of mechanical processing of soils and underlying rocks based on measuring the fractal characteristics of their section images. The method is proposed to be used to improve the efficiency of mechanical processing of the substrate when organizing fire-prevention mineralized strips. At the same time, the use of fractal methods is substantiated for assessing changes in the structure of the substrate arising from external action, which, in this case, is carried out by a plow channel digger at different angles of inclination of the cutting plate and speeds of its movement in the soil thickness. The experiment was planned and its results were processed based on the assumption that both soils and aeration zone soils are a heterogeneous dissipative system with self-organized criticality of states that change regularly during external action on the substrate. In this case, the effect of self-organized criticality of the dissipative system is observed, the distinctive feature of which is the manifestation (self-similarity) of its constituent elements. That is, the described method is based on the study of the scale invariance of soil structural elements during external mechanical action. Based on the proposed methodology, optimal operating modes of special equipment and mechanisms for medium-loamy dark-gray forest soils have been developed.

Keywords: fractal dimension, fire-prevention mineralized strips, structural characteristics of soils, fractal Koch curve, dynamic models.

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