Abstract

Soil, i.e. the natural outer layer of the lithosphere formed by the impact of climate and living organisms on saprolite, is an important component of many ecosystems in which it fulfils various functions. This non-renewable resource of the Earth can be degraded by different factors. These factors can be divided into three groups: chemical, physical, and biological. One of the types of physical degradation of soils is water erosion, which results in destruction of the land surface by the effect of water.

The research subject undertaken in the presented series of publications is the splash phenomenon (splash erosion) caused by the impact of a single water-drop on the soil surface. Splash is the first stage of the water erosion process in which soil material is detached and ejected, and then transported at different distances and in various directions.

Splash is a complex phenomenon depending on both soil properties (e.g. granulometric distribution, initial moisture content) and precipitation (e.g. drop size distribution, intensity), as well as the conditions in which it occurs. This complexity makes this kind of research difficult and requires development/improvement of new research methods, which is facilitated by the continuous technological progress. It allows undertaking new directions of soil splash research and gives the possibility to characterize aspects of the phenomenon that were previously difficult to measure.

The main aim of this thesis (a series of publications) was to enrich the description/characteristics of aspects of the splash phenomenon that either have not been described in the literature at all (proportions of the material transferred as a result of splash) or have already been addressed by other scientists, but require further research (characteristics of the crown forming phenomena and micro-crater formation as a result of the water-drop impact on soil surface).

Taking into account the methodical nature of the study, the soil samples used in each of the publications presented in the series were selected individually, and the criterion for selection was the possibility of the best presentation of the discussed aspect.

The proposed research methods allowed measurement of the mass of the ejected material, taking into account its division into the mass of the solid (soil) and liquid phase (water) and determining their proportions (mass ratio), parameterization of the crown forming phenomenon on the soil surface by determining their static, dynamic, and time-related parameters, and

determination of the dimensions of micro-craters formed after a single water-drop impact (diameter, depth, height of the rim).

Keywords: soil splash, single drop impact, soil erosion.