**Submission of a research topic carried out at the Institute of Agrophysics, PAS during the training in the Doctoral School of Quantitative and Natural Sciences in the discipline agriculture and horticulture**

| | |
|---|---|
| Full name of proposed supervisor(s), academic title/degree, department, e-mail address | **Agata Sochan,<br>PhD, DSc<br>Institute of Agrophysics, Polish Academy of Sciences<br>a.sochan@ipan.lublin.pl** |
| Full name of proposed auxiliary supervisor (optional), academic title/degree, department, e-mail address | |
| Research topic | **Determination of the quantity characterising the susceptibility of soils to splash erosion** |
| Synthetic description of the research topic (up to 300 words) | The proposed research topic results directly from the research project no. 2024/55/B/ST10/01326 awarded by NSC and will concern the determination of a quantity (or set of quantities) on the basis of which the exact susceptibility of soil to splash erosion (*splashability*) will be determined. The splash phenomenon is the first stage of soil water erosion and, while its subsequent forms (e.g. surface runoff, rill or gully erosion) can only occur in specific conditions (e.g. high rainfall intensity or suitable terrain), the splash erosion always occurs, as it is responsible for the moment of interaction between the drop and the soil surface. Splash is already relatively well studied, however, so far there is no quantity in the literature that characterises the susceptibility of soils to this phenomenon.<br>The main objectives of the project are the same as the research topic of this application. Research will be carried out on soils that are susceptible to water erosion, among other things, based on high-speed imaging technique using so-called high-speed cameras. Based on the determined quantity (quantities), a characterisation of the investigated soils will be carried out. In addition, the determined *splashability* parameter will be correlated with other analysed soil physico-chemical properties. The assumption is that the developed factor will be able to determine erosion susceptibility classes of soils commonly found in Central Europe.<br>The topic planned within the framework of the project which provides the basis for the doctoral thesis is of significant interest to scientists studying the water erosion process of soils, as well as in the research community modelling current and projected long-term physical degradation of soils. These research will provide new knowledge that can be used in the future to restore soil health and function, which is fundamental to the European Green Deal and the UN Sustainable Development Goals. |
| Additional requirements for the candidate | • basic knowledge of soil physics<br>• basic knowledge of laboratory techniques and apparatus for soil analysis, |

| | |
|---|---|
| | • basic knowledge of the methodology for preparing soil material for tests (drying and sieving soils),<br>• knowledge of English at an intermediate level,<br>• ability to use Microsoft Office, knowledge of statistical methods and tools;<br>**Nice to have:**<br>• ability to operate high-speed cameras for recording fast-changing phenomena,<br>• basic knowledge of graphic analysis of images,<br>• ability to operate a laser diffractometer to measure the particle size distribution of soil,<br>• ability to program in LabView environment; |
| An indication of the sources and extent of funding for the scholarship from outside the subsidy | **NSC research project no. 2024/55/B/ST10/01326 entitled "Determination of splashability - a parameter characterising the susceptibility of soil splash erosion"**<br>**Project duration: 48 months** |
| Bibliography | 1. Borrelli P., Robinson D.A., Fleischer L.R., Lugato E., Ballabio C., Alewell C., Meusburger K., Modugno S., Schütt B., Ferro V., Bagarello V., Van Oost K., Montanarella L., Panagos P. 2013. An assessment of the global impact of 21st century land use change on soil erosion. NATURE COMMUNICATIONS 8: 1-13.<br>2. European Commission, 2023. Proposal for a Directive on Soil Monitoring and Resilience, Bruksela, 05.07.2023, COM(2023) 416 Final.<br>3. Ganasri B.P., Ramesh H. 2016. Assessment of Soil Erosion by RUSLE Model using Remote Sensing and GIS - A Case Study of Nethravathi Basin Geoscience Frontiers, 7 (2016), pp. 953-961.<br>4. Marcinkowski P., Szporak-Wasilewska S., Kardel I. 2022. Assessment of soil erosion under long-term projections of climate change in Poland. J. Hydrol. 607, 127468.<br>5. Panagos, P., Ballabio, C., Himics, M., Scarpa, S., Matthews, F., Bogonos, M., Poesen, J., Borrelli, P., 2021. Projections of soil loss by water erosion in Europe by 2050. Environ. Sci. Pol. 124, 380–392<br>6. Salvacion A.R.. 2023. Chapter 14 - Soil erosion modeling under future climate change: a case study on Marinduque Island, Philippines in Water, Land, and Forest Susceptibility and Sustainability, 2023, 381-398.<br>7. Sochan A., Beczek M., Mazur R., Polakowski C., Ryżak M., Bieganowski A. 2023. Splash erosion and surface deformation following drop impact on soil with different soil hydrophobicity level and moisture content. PLoS ONE 18(5): e0285611. |
| The topic was submitted within a separate admissions limit for externally funded research projects. **YES~~/NO*~~**<br>***Select inappropriate** | |