

1. **Research Unit:** Laboratory of Plant Pathogenesis
2. **Supervisor:** Prof. dr hab. Jacek Hennig
3. **Supervisor (email):** jacekh@ibb.waw.pl
4. **Auxiliary supervisor:** dr Marta Grech-Baran (mgrech@ibb.waw.pl)
5. **Project title (English):** Comprehensive study of the role of *Ry_{sto}*, a TIR-NB-LRR class receptor in plant innate immunity
6. **Project title (Polish):** Kompleksowa analiza funkcji *Ry_{sto}* receptora typu TIR-NB-LRR w odporności roślin na infekcje
7. **Description of the project (up to 500 words):**

Potato Virus Y (PVY) is one of the most harmful pathogens infecting potato (*Solanum tuberosum* ssp. *tuberosum*), as well as other plants of the *Solanaceae* family, such as pepper, eggplant and tobacco. The most effective strategy mounted by plants against PVY is referred to as extreme resistance (ER). This phenomenon occurs within the cells adjacent to the infection site and manifests itself in the complete inhibition of the PVY multiplication. Although, ER-type PVY immunity is the most desirable trait used in a breeding practice, its nature remains poorly understood both at molecular and cellular levels.

We have recently cloned potato *Ry_{sto}* gene conferring the ER phenotype and we have identified its cognate viral component. Thereby we have at our disposal a unique system to characterize the early stages of ER activation at the molecular and cellular level. The project aims to understand early stages of ER activation. In the proposed project we will test which physiological and molecular markers are associated with the ER activation. Next, using CRISP-Cas9 genome editing technique, we will switch off the function of some known signal components to check which of the are critical for *Ry_{sto}* function. These results will be supported by profiling of global transcriptome undergoing in the resistant plants after PVY infection.

8. **References related to conducted /planned research (maximum 3):**
Grech-Baran, M., Witek, K., Szajko, K., Witek, A.I., Morgiewicz, K., Wasilewicz-Flis, I., Jakuczun, H., Marczewski, W., Jones, J.D.G., **Hennig, J.**, 2020. Extreme resistance to Potato virus Y in potato carrying the *Rysto* gene is mediated by a TIR-NLR immune receptor. *Plant Biotechnology Journal* 18, 655–667. <https://doi.org/10.1111/pbi.13230>
9. **Scholarship amount (net):** 3000 PLN for mid-term evaluation, after mid-term evaluation, change to 57% professor's remuneration (currently it would be 3242 PLN net).