Name and surname:	**Kamila Nowosad**
Academic Degree:	dr hab. inż. (DSc.)
Institute/Department:	Department of Genetics, Plant Breeding and Seed Production
e-mail address:	kamila.nowosad@upwr.edu.pl
ORCID:	https://orcid.org/0000-0001-6837-7806
UPWr Base of Knowledge - link:	https://bazawiedzy.upwr.edu.pl/info.seam?id=UPWr60ed5ccd95364870838b47fdd2605c01
Researchgate:	
Personal website / Working group website:	
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1.Implementation of genetic tools into creative crop breeding in order to introduce modern varieties adapted to climate change, market conditions and the principles of the European Green Deal – NCBIR FENG.01.01-IP.01-001/23, 2024-2026 - RF 2.Identification of the molecular mechanism of winter rye resistance to brown rust. MRiRW 2020-2026 – PI 3.Development of new biotechnological tools enabling effective assessment of sugar beet's resistance to bolting and selection of parental forms for breeding heterosis of this species. MRiRW 2020-2026 - RF
Do you plan to engage support of second supervisor or auxiliary supervisor?	YES
	Auxiliary supervisor
Name and surname:	Katarzyna Patejuk
Academic Degree:	dr inż. (Dr. Eng.)
Faculty, Institute/Department:	The Faculty of Life Sciences and Technology, Department of Plant Protection
e-mail address:	katarzyna.patejuk@upwr.edu.pl
ORCID:	https://orcid.org/0000-0001-7236-8005
UPWr Base of Knowledge - link or most important publications from last 3 year (JCR) / patents from last 3 years (maximum 5):	https://bazawiedzy.upwr.edu.pl/info.seam?id=UPWr196e6a4028bb4a279338251c48cb57f2&affil=&lang=pl
Researchgate:	
Personal website / Working group website:	
Projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	2024Identification and description of new to science phytopathogenic fungi of the genera Colletotrichum, Coniochaeta and Plectosphaerella Project fund by National Science Center – Miniatura 7; the PI of the project 2022-2023„WINO-ROŚL: alternative technology of vine production using innovative biological preparations improving the quality of wines and ciders” Project fund by PROW - Rural Development Programme - RF 2022„Development of biotechnological production of vanillin using by-products of the agri-food industry” Project fund by the NCBiR - National Center for Research and Development RF 2021-2023“Invasive alien plants as a source of pathogens threatening native plant species” Project financed by the Wrocław University of Environmental and Life Sciences (Poland) as part of the Ph.D. research program “Innovative Scientist III”; the PI of the project 2020-2023„Possibilities of using Puccinia komarovii in limiting the population of Impatiens parviflora in the Wigry National Park” Project financed by the Forest Fund RF 2021“The importance of the Corylus avellana in oak-hornbeam forests (on the example of the Wigry National Park)” Project financed by the Forest Fund RF 2016, 2021"Epixylitic lichens on circular surfaces in the Polish part of the Karkonosze - stage III (2016) and IV (2021)" Project financed by the Forest Fund RF
PhD topic:	Diversity and identification of Xylariales order in New Zealand and its potential use in biotechnology
Research discipline in Doctoral School:	Agriculture and Horticulture

Short description of the research problem to be solved in the PhD (minimum 1000 characters):	After undergoing 80 million years of evolution in geographical isolation from other land masses, New Zealand boasts a remarkable array of native species that are endemic, meaning they exist naturally nowhere else in the world. The combination of New Zealand's geographical and climatic diversity, coupled with its isolation, has earned it international recognition as a biodiversity hotspot. In New Zealand, there are approximately 80,000 native species, with nearly 55,000 of them identified, and around 30,000 having been scientifically described, named, and classified. Among these, there are 6,781 fungal species. Globally, our knowledge is estimated to encompass only 7% of the 2.2-3.8 million (some sources suggest up to 11.7-13.2 million) existing fungal species. Microscopic fungi often elude the attention of scientists due to their size and cryptic nature. Yet, it is these very organisms that have given us the first antibiotics, revolutionizing transplantology (cyclosporine) and cardiology (lovastatin), as well as contributing to the production of bread, fermentation products, blue cheese, soy sauce, flavors, and food dyes. The decline in biodiversity, and consequently, the disappearance of microscopic fungi on a global scale, represents a missed opportunity for enhancing human life and advancing technologies through their utilization. In New Zealand alone, a staggering 45.7% of plant species are at risk of extinction (data for fungi not available; statistics from the New Zealand government in 2019). However, to unlock the biotechnological potential of microscopic fungi, we must first collect them and identify, which involve studying fungi from both natural and extreme environments to uncover their biochemical capabilities, such as enzyme production, valuable substance synthesis, and antibiotic production, and exploring their potential applications in industry. The families Xylariaceae and Hypoxylaceae (Xylariales, Ascomycota) represent one of the most prolific lineages of secondary metabolite producers. Like many other fungal taxa, they exhibit their highest diversity in the tropics. Mycelial cultures of these fungi (the latter of which are frequently isolated as endophytes of seed plants), have given rise to the discovery of many unprecedented secondary metabolites. Some of these have served as lead compounds for the development of pharmaceuticals and agrochemicals. Recently, the endophytic Xylariales have also come into focus for biological control, as some of their species show strong antagonistic effects against fungal and other pathogens. New compounds, including volatiles as well as non-volatiles, are steadily being discovered from these ascomycetes, and polythetic taxonomy now allows for elucidation of the life cycle of the endophytes for the first time. The aim of the PhD project is to identify the diversity of the Xylariales order in New Zealand and its potential use in biotechnology as producers of antimicrobial metabolites. As part of the planned collaboration with New Zealand's Crown Research Institute (CRI) - Manaaki Whenua Landcare Research, the primary focus will involve conducting taxonomic and genetic research at the New Zealand Fungarium (PDD), under the curation of Dr. Mahajabeen Padamsee, and the International Microbial Culture Bank (ICMP). Datasets of both microbial banks are accessible online at https://scd.landcareresearch.co.nz, which allow to preliminary studies of stored biodiversity of Xylariales orded. Some of the taxa listed in this database are marked as "unidentified," although they have fragments of the ITS gene stored in the NCBI-BLASTn database, facilitating preliminary taxon identification. Furthermore, there is an extensive database of deposited saprotrophic fungi of the order Xylariales, which, upon preliminary analysis, are categorized as new species (including numbers: ICMP2016028, ICMP2020255, ICMP2015990, ICMP2019131, ICMP2015989, ICMP2016131). This information allows for the potential recognition of a species as new to science, paving the way for further genetic analysis. Following an initial survey, numerous taxa can be found in the ICMP database, some of which may constitute distinct species and even new genera. The first part of the PhD research will consist of traveling to Manaaki Whenua Landcare Research to access and study stored material of members of the Xylariales order in the Fungarium. During the first screening, fungi with high potential to be undescribed species will be selected. Further research will include collecting isolates from the field for comparison and to broaden the dataset. The next step will include taxonomical studies such as DNA sequencing and morphological identification of fungi. Additional pathogenicity assays and growth measurements might need to be conducted. The second part of the project will involve scanning the literature for information about the potential antimicrobial activity of isolated and identified taxa and the genes responsible for it. The next step will be genetic screening to select 20 isolates with the greatest potential to produce the desired substances, which will be used in the subsequent study. The last part of the work will be to examine the antimicrobial effect of isolated fungi, especially in the context of their potential use in medicine and plant protection. Depending on the group of organisms, it is planned to test the effects of substances secreted by fungi into post-culture media in 96-well plates or plate cultures. Particular attention should be paid to economically important plant pathogens, including fungi of the genus Fusarium spp., Colletotrichum spp., Phoma spp., Botritis cinerea, Sclerotinia sclerotiorum, and Rhizoctonia spp. The effect of the doctoral research is to describe and precisely characterize the biodiversity of selected representatives of the order Xylariales in New Zealand, as well as to organize the knowledge in the field of genetic scanning of this group of fungi in antimicrobial substances. The result of the research should be the selection of strains with particularly strong antifungal activity for further research.

Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):	Higher microbiological degree Advanced knowledge of techniques used in phytopathogenic and microbiological laboratories, such as: isolation of fungi from plant and animal materials, pathogenicity assay, knowledge of the principles of safe work with microbiological material, microorganisms storage techniques, antimicrobial properties assays, identification techniques of different groups of microorganisms etc. Advanced knowledge of molecular techniques, used in taxonomical research, such as DNA isolation using the CTAB method and kits, PCR, DNA sequencing etc. Basic knowledge of bioinformatics programs for processing genetic data, such as Mega7, BioEdit, Geneious Prime Basic botanical and mycological knowledge Mobility; willingness to travel and temporarily change of residence, depending on the requirements of the research project Readiness and a passion for spending time in nature and to carry out field work in difficult terrain High work culture, conscientiousness, scrupulosity, independence and initiative in solving research problems Ability to work under time pressure and on multiple projects at once High interpersonal communication skills and fluency in English and Polish, spoken and written Driving license Interest in fungal biology and ecology
a) Project title:	none
b) Agreement number:	0
c) Number of months in the project to support PhD student (in months; starting from 1st of October 2024):	0
Project website:	