Politechnika Białostocka

Szkoła Doktorska

COURSE DESCRIPTION CARD

Course name	Stimulators of plant growth and resistance and heat shock gene expression in response to stress				
Course type	Optional	**Course code**	**SDPB0123**	**ECTS credits**	1
Forms and number of hours	Lecture: 10 h.	**Scientific discipline**	Forest sciences		
Course objectives	To familiarise PhD students with methods to strengthen plants and increase their resistance to adverse factors				
Course content	1. Phosphites as triggers of plant resistance to pathogens. 2. Stimulators of plant growth and biostimulants. 3. Silicon preparations to improve plant water management during drought. 4. Regulating the expression of heat shock genes in response to stress. 5. The "memory" of trees: a new look at priming effects in adaptive evolution				
Teaching methods	The multimedia presentation, information lecture, tasks for self-development				
Assessment method	Passing the lecture				

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)**	**Methods of assessing the learning outcomes**
LO1	The doctoral student has knowledge of immunological memory, known as defensive priming, in which exposure to a priming stimulus enables a faster or stronger response to a further attack by pests and pathogens.	SD_W1, SD_W2	Passing the lecture
LO2	The PhD student can explain how biostimulants strengthen plants and increase their resistance to unfavourable factors	SD_U1	Passing the lecture
LO3	Depending on requirements, the doctoral student is able to select suitable preparations and methods for their use.	SD_U1, SD_U8	Passing the lecture

Student workload (in hours)	
Lecture	10 / 0 / 0 / 0 / 0
Consultations	5
The unassisted student work	15
Implementation of project tasks and preparation for and participation in exams/test	10
Total	40
ECTS credits	1

Basic references	1. Tkaczyk, M., Nowakowska, J. A., & Oszako, T. (2014). Nawozy fosforynowe jako stymulatory wzrostu roślin w szkółkach leśnych. sylwan, 158(01), 3-9. 2. Kalitkiewicz, A., & Kępczyńska, E. (2008). Wykorzystanie ryzobakterii do stymulacji wzrostu roślin. Biotechnologia, 2(81), 102-114. 3. Menyailo, O. V., Sobachkin, R. S., Makarov, M. I., & Cheng, C. H. (2022). Tree species and stand density: the effects on soil organic matter contents, decomposability and susceptibility to microbial priming. Forests, 13(2), 284. 4. Koziara, W., Sulewska, H., & Panasiewicz, K. (2006). Effect of resistance stimulator application to some agricultural crops. *J. Res. Appl. Agric. Eng*, *51*(2), 82-87. 5. Oszako, T., Kowalczyk, K., Zalewska, W., Kukina, O., Nowakowska, J. A., Rutkiewicz, A., ... & Borowik, P. (2023). Feasibility of using a silicon preparation to promote growth of forest seedlings: application to pine (Pinus sylvestris) and Oak (Quercus robur). Forests, 14(3), 577.
Supplementary references	1. Smolen, S., & Szura, A. (2008). Środki poprawiające wzrost roślin (cz. I). Regulatory wzrostu i stymulatory odporności. Hasło ogrodnicze, (05). 2. Tuhy, Ł., Chowańska, J., & Chojnacka, K. (2013). Ekstrakty glonowe jako biostymulatory wzrostu roślin: przegląd piśmiennictwa. Chemik, 67(7), 636-641. 3. Mołoń, A., & Durak, R. (2018). Biopestycydy jako stymulatory odporności roślin. 4. Abbasi, S., Sadeghi, A., Omidvari, M., & Tahan, V. (2021). The stimulators and responsive genes to induce systemic resistance against pathogens: An exclusive focus on tomato as a model plant. Biocatalysis and agricultural biotechnology, 33, 101993. 5. Nowakowska, J., Dang, M., Kiełtyk, P., Niemczyk, M., Malewski, T., Szulc, W., ... & Oszako, T. (2024). Silicon Modifies Photosynthesis Efficiency and hsp Gene Expression in European Beech (Fagus sylvatica) Seedlings Exposed to Drought Stress. Genes, 15(9).
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Date of issuing the programme	4.01.2025