

## Charakteristika predkladaného výstupu tvorivej činnosti / Characteristics of the submitted research/ artistic/other output

Tlačivo VTC slúži na predkladanie výstupov tvorivej činnosti podľa metodiky hodnotenia tvorivých činností (časť V. Metodiky na vyhodnocovanie štandardov) / The form is used to submit the research/artistic/other outputs according to the evaluation methodology of research/artistic/other activities (part V. The Methodology for Standards Evaluation).

ID konania/ID of the procedure: <sup>1</sup>

Kód VTC/Code of the research/artistic/other output (RAOO):<sup>1</sup>

OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person <sup>2</sup>	Moravčíková	
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person <sup>2</sup>	Jana	
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person <sup>2</sup>	Doc., Ing., PhD/ assoc. prof., Ing., PhD	
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff <sup>3</sup>	<a href="https://www.portalvs.sk/regzam/detail/30492">https://www.portalvs.sk/regzam/detail/30492</a>	
OCA5. Oblasť posudzovania / Area of assessment <sup>4</sup>	4. Biotechnológie/Biotechnology	
OCA6. Kategória výstupu tvorivej činnosti / Category of the research/ artistic/other output <i>Výber zo 6 možností (pozri Vysvetlivky k položke OCA6) / Choice from 6 options (see Explanations for OCA6).</i>	Vedecký výstup/ scientific output	
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2021	
OCA8. ID záznamu v CREPČ alebo CREUČ (ak je) / ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA) <sup>5</sup>	ID: 240657	
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA <sup>6</sup>	<a href="https://app.crepk.sk/?fn=detailBiblioFormChildWLULL&amp;sid=376FCAEA43ECD92AE16AE3DC06&amp;seo=CREP%C4%8C-detail-%C4%8C%C3%A11nok">https://app.crepk.sk/?fn=detailBiblioFormChildWLULL&amp;sid=376FCAEA43ECD92AE16AE3DC06&amp;seo=CREP%C4%8C-detail-%C4%8C%C3%A11nok</a>	
Charakteristika výstupu, ktorý nie je registrovaný v CREPČ alebo CREUČ / Characteristics of the output that is not registered in CRPA or CRAA	OCA10. Hyperlink na záznam v inom verejne prístupnom registri, katalógu výstupov tvorivých činností / Hyperlink to the record in another publicly accessible register, catalogue of research/ artistic/other outputs <sup>7</sup>	
	OCA11. Charakteristika výstupu vo formáte bibliografického záznamu CREPČ alebo CREUČ, ak výstup nie je vo verejne prístupnom registri alebo katalógu výstupov / Characteristics of the output in the format of the CRPA or the CRAA bibliographic record, if the output is not available in a publicly accessible register or catalogue of outputs	ADC Beta-1,3-Glucanases and chitinases participate in the stress-related defence mechanisms that are possibly connected with modulation of arabinogalactan proteins (AGP) required for the androgenesis initiation in rye ( <i>Secale cereale</i> L.) / Kamil Zielinski, Ewa Dubas, Zuzana Gerší, Monika Krzewska, Agnieszka Janas, Anna Nowicka, Ildikó Matušiková, Iwona Zur, Shohei Sakuda, Jana Moravčíková, 2021. DOI DOI 10.1016/j.plantsci.2020.110700. In: Plant Science : an international journal of experimental plant biology : an international journal of experimental plant biology. - ISSN 0168-9452, Roč. 302 (2021), 10700-10700 [print].
	OCA12. Typ výstupu (ak nie je výstup registrovaný v CREPČ alebo CREUČ) / Type of the output (if the output is not registered in CRPA or CRAA) <i>Výber zo 67 možností (pozri Vysvetlivky k položke OCA12) / Choice from 67 options (see Explanations for OCA12).</i>	Článok/article

<p>OCA13. Hyperlink na stránku, na ktorej je výstup sprístupnený (úplný text, iná dokumentácia a podobne) / Hyperlink to the webpage where the output is available (full text, other documentation, etc.)</p>	<p><a href="https://www.sciencedirect.com/science/article/pii/S016894522030306X">https://www.sciencedirect.com/science/article/pii/S016894522030306X</a></p>
<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>30%, korešpondenčný autor, navrhovanie a podieľanie sa na experimentoch, písanie a editovanie rukopisu / author for correspondence, designing and participation on experiments, writing and editing of the manuscript</p>
<p>OCA15. Anotácia výstupu s kontextovými informáciami týkajúcimi sa opisu tvorivého procesu a obsahu tvorivej činnosti a pod. / Annotation of the output with contextual information concerning the description of creative process and the content of the research/artistic/other activity, etc. <sup>8</sup>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak <sup>9</sup>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	
<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English <sup>9</sup>Rozsah do 200 slov / Range up to 200 words</p>	<p>This work presents the biochemical, cytochemical and molecular studies on two groups of PR proteins, <math>\beta</math>-1,3-glucanases and chitinases, and the arabinogalactan proteins (AGP) during the early stages of androgenesis induction in two breeding lines of rye (<i>Secale cereale</i> L.) with different androgenic potential. The process of androgenesis was initiated by tillers pre-treatments with low temperature, mannitol and/or reduced glutathione and resulted in microspores reprogramming and formation of androgenic structures what was associated with high activity of <math>\beta</math>-1,3-glucanases and chitinases. Some isoforms of <math>\beta</math>-1,3-glucanases, namely several acidic isoforms of about 26 kDa; appeared to be anther specific. Chitinases were well represented but were less variable. RT-qPCR revealed that the cold-responsive chitinase genes <i>Chit1</i> and <i>Chit2</i> were expressed at a lower level in the microspores and whole anthers while the cold-responsive <i>Glu2</i> and <i>Glu3</i> were not active. The stress pre-treatments modifications promoted the AGP accumulation. An apparent dominance of some AGP epitopes (LM2, JIM4 and JIM14) was detected in the androgenesis-responsive rye line. An abundant JIM13 epitopes in the vesicles and inner cell walls of the microspores and in the cell walls of the anther cell layers appeared to be the most specific for embryogenesis.</p>
<p>OCA17. Zoznam najviac 5 najvýznamnejších ohlasov na výstup / List of maximum 5 most significant citations corresponding to the output <sup>9</sup>Rozsah do 200 slov / Range up to 200 words</p>	<ol style="list-style-type: none"> <li>1. Anwaar S, Jabeen N, Ahmad KS, Shafique S, Irum S, Ismail H, Khan SU, Tahir A, Mehmood N, Gleason ML (2024) Cloning of maize <i>chitinase</i> 1 gene and its expression in genetically transformed rice to confer resistance against rice blast caused by <i>Pyricularia oryzae</i>. Plos One 19 (1). doi:10.1371/journal.pone.0291939</li> <li>2. Orłowska R (2022) Triticale doubled haploid plant regeneration factors linked by structural equation modeling. Journal of Applied Genetics 63 (4):677-690. doi:10.1007/s13353-022-00719-7</li> <li>3. Bednarek PT, Orłowska R, Mankowski DR, Zimny J, Kowalczyk K, Nowak M, Zebrowski J (2022) Glutathione and copper ions as critical factors of green plant regeneration efficiency of triticale <i>in vitro</i> anther culture. Frontiers in Plant Science 13. doi:10.3389/fpls.2022.926305</li> <li>4. Chen WH, Chen J, Xu YB, Gong H, Shi SS, Wang SC, Wang HJ (2024) Applications of the Yariv reagent in polysaccharide analysis and plant physiology from theory to practice. Carbohydrate Polymers 329. doi:10.1016/j.carbpol.2024.121781</li> <li>5. Zhou L, Wang YZ, Xu XB, Yan D, Yu WJ, Miao YF, Xu B (2022) Conjunctive Analyses of BSA-Seq and BSR-Seq Unveil the <i>Ms<math>\beta</math>-GAL</i> and <i>MsJMT</i> as Key Candidate Genes for Cytoplasmic Male Sterility in Alfalfa (<i>Medicago sativa</i> L.). International Journal of Molecular Sciences 23 (13). doi:10.3390/ijms23137172</li> </ol>
<p>OCA18. Charakteristika dopadu výstupu na spoločensko-hospodársku prax / Characteristics of the output's impact on socio-economic practice <sup>9</sup>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</p>	<p>Výsledky výskumu rozširujú poznatky týkajúceho sa procesu androgenézy na molekulárnej úrovni a to v súvislosti s úlohou tzv. PR proteínov a arabinogalaktanov v procese androgenézy v súvislosti s rekalcitrantnými druhmi ako je raž siata. Výsledky sú využiteľné pre šľachtiteľské prostredie pri príprave haploidov, čo umožní lepšie prekonávať problémy súvisiace s rekalcitrantnosťou niektorých voči androgenéze. / The results of the research expand the knowledge regarding the process of androgenesis at the molecular level. The results are useful for the breeding</p>

<p><i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	<p>environment in the preparation of haploids, which will allow better overcoming the problems related to the recalcitrantness of some to androgenesis.</p>
<p>OCA19. Charakteristika dopadu výstupu a súvisiacich aktivít na vzdelávací proces / Characteristics of the output and related activities' impact on the educational process  <i>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</i>  <i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	<p>Výstup je orientovaný na rastlinné biotechnológie a je viazaný na výučbu biotechnologických predmetov v rámci študijného programu Biotechnológie. Do vzdelávacieho procesu budú z tohto výstupu implementované poznatky, skúsenosti a výsledky z produkcie rastlinných enzýmov spájaných s vývinovými procesmi a obranou prakticky využiteľných v moderných biotechnológiách. Dopady sa prejavajú vo výučbe predmetov s biotechnologickým a biologickým obsahom./  The output is focused on plant biotechnology and is linked to the teaching of biotechnology courses within the study program Biotechnology. From this output, knowledge, experience, and results from the production of plant enzymes associated with plant development and defense that can be used in modern biotechnologies will be implemented into the educational process. Impacts will be reflected in the teaching of subjects with biotechnological and biological contents.</p>

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Tlačivo VTC slúži na predkladanie výstupov tvorivej činnosti podľa metodiky hodnotenia tvorivých činností (časť V. Metodiky na vyhodnocovanie štandardov) / The form is used to submit the research/artistic/other outputs according to the evaluation methodology of research/artistic/other activities (part V. The Methodology for Standards Evaluation).

ID konania/ID of the procedure: <sup>1</sup>

Kód VTC/Code of the research/artistic/other output (RAOO):<sup>1</sup>

OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person <sup>2</sup>	Moravčíková	
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person <sup>2</sup>	Jana	
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person <sup>2</sup>	Doc., Ing., PhD/ assoc. prof., Ing., PhD	
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff <sup>3</sup>	<a href="https://www.portalvs.sk/regzam/detail/30492">https://www.portalvs.sk/regzam/detail/30492</a>	
OCA5. Oblasť posudzovania / Area of assessment <sup>4</sup>	4. Biotechnológie/Biotechnology	
OCA6. Kategória výstupu tvorivej činnosti / Category of the research/ artistic/other output <i>Výber zo 6 možností (pozri Vysvetlivky k položke OCA6) / Choice from 6 options (see Explanations for OCA6).</i>	Vedecký výstup/ scientific output	
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2020	
OCA8. ID záznamu v CREPČ alebo CREUČ (ak je) / ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA) <sup>5</sup>	ID: 214537	
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA <sup>6</sup>	<a href="https://app.crepk.sk/?fn=detailBiblioFormChildWO86E&amp;sid=3CC7C8A2F9DA363A07DF0D5FC5&amp;seo=CREP%C4%8C-detail-%C4%8C%C3%A1nok">https://app.crepk.sk/?fn=detailBiblioFormChildWO86E&amp;sid=3CC7C8A2F9DA363A07DF0D5FC5&amp;seo=CREP%C4%8C-detail-%C4%8C%C3%A1nok</a>	
Charakteristika výstupu, ktorý nie je registrovaný v CREPČ alebo CREUČ / Characteristics of the output that is not registered in CRPA	OCA10. Hyperlink na záznam v inom verejne prístupnom registri, katalógu výstupov tvorivých činností / Hyperlink to the record in another publicly accessible register, catalogue of research/ artistic/other outputs <sup>7</sup>	
	OCA11. Charakteristika výstupu vo formáte bibliografického záznamu CREPČ alebo CREUČ, ak výstup nie je vo verejne prístupnom registri alebo katalógu výstupov / Characteristics of the output in the format of the CRPA or the CRAA bibliographic record, if the output is not available in a publicly accessible register or catalogue of outputs	ADC The effect of glutathione and mannitol on androgenesis in anther and isolated microspore cultures of rye ( <i>Secale cereale</i> L.) / Kamil Zielinski, Monika Krzewska, Iwona Zur, Katarzyna Juzon, Przemyslaw Kopec, Anna Nowicka, Jana Moravčíková, Edyta Skrzypek, Ewa Dubas, 2020. DOI DOI 10.1007/s11240-019-01754-9. In: Plant cell, tissue and organ culture : an international journal on in-vitro-culture of higher plants : an international journal on in-vitro-culture of higher plants. - ISSN 0167-6857, Roč. 140, č. 3 (2020), 577-592 [print, online].
	OCA12. Typ výstupu (ak nie je výstup registrovaný v CREPČ alebo CREUČ) / Type of the output (if the output is not registered in CRPA or CRAA) <i>Výber zo 67 možností (pozri Vysvetlivky k položke OCA12) / Choice from 67 options (see Explanations for OCA12).</i>	Článok/article

<p>OCA13. Hyperlink na stránku, na ktorej je výstup sprístupnený (úplný text, iná dokumentácia a podobne) / Hyperlink to the webpage where the output is available (full text, other documentation, etc.)</p>	<p><a href="https://link.springer.com/article/10.1007/s11240-019-01754-9">https://link.springer.com/article/10.1007/s11240-019-01754-9</a></p>
<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>10% participácia na experimentoch/ participation in experiments</p>
<p>OCA15. Anotácia výstupu s kontextovými informáciami týkajúcimi sa opisu tvorivého procesu a obsahu tvorivej činnosti a pod. / Annotation of the output with contextual information concerning the description of creative process and the content of the research/artistic/other activity, etc. <sup>8</sup>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak <sup>9</sup>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	
<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English <sup>9</sup>Rozsah do 200 slov / Range up to 200 words</p>	<p>Androgenic responsiveness in anther (AC) and isolated microspore cultures (MC) was analysed using 15 lines of Polish winter rye (<i>Secale cereale</i> L.). The effect of low temperature (LT) alone or in combination with osmotic stress induced by mannitol treatment (MAN) and/or with reduced glutathione (GSH) on the effectiveness of the process was studied. Interestingly, each treatment had a different effect on microspore (mcs) vitality and capability to divide symmetrically. The first criterion for successful embryogenesis was to exceed the threshold number of at least 25% dividing microspores, which determined 'embryogenic suspension culture'. In some configurations a spectacular effect was achieved, especially in lines highly recalcitrant to androgenesis induction. Relatively high effectiveness of androgenesis induction (up to 4.58 AS per 10<sup>5</sup> mcs per spike in MC and 21.29 AS per spike in AC) showed that the developed protocol with GSH and/or MAN tiller pre-treatments overcomes the genotypic barrier for androgenesis initiation in rye. Moreover, relatively high, spontaneous genome diploidization (55%) of regenerated plants demonstrated that the described protocols could be effectively integrated into conventional rye breeding programmes.</p>
<p>OCA17. Zoznam najviac 5 najvýznamnejších ohlasov na výstup / List of maximum 5 most significant citations corresponding to the output Rozsah do 200 slov / Range up to 200 words</p>	<ol style="list-style-type: none"> <li>1. Seguí-Simarro JM, Moreno JB, Fernández MG, Mir R (2021) Species with Haploid or Doubled Haploid Protocols. In: Seguí-Simarro JM (ed) DOUBLED HAPLOID TECHNOLOGY, VOL. 1: General Topics, Alliaceae, Cereals, vol 2287. Methods in Molecular Biology. pp 41-103. doi:10.1007/978-1-0716-1315-3_3</li> <li>2. Orłowska R, Zimny J, Zebrowski J, Androsiuk P, Bednarek PT (2024) An insight into tissue culture-induced variation origin shared between anther culture-derived triticales regenerants. BMC Plant Biology 24 (1). doi:10.1186/s12870-023-04679-w</li> <li>3. Liu CH, Song GX, Zhao YH, Fang B, Liu ZY, Ren J, Feng H (2022) Trichostatin A Induced Microspore Embryogenesis and Promoted Plantlet Regeneration in Ornamental Kale (&lt;i&gt;Brassica oleracea&lt;/i&gt; var. &lt;i&gt;acephala&lt;/i&gt;). Horticulturae 8 (9). doi:10.3390/horticulturae8090790</li> <li>4. Belic M, Zdravkovic-Korac S, Uzelac B, Calic D, Pavlovic S, Milojevic J (2020) Variability in somatic embryo-forming capacity of spinach. Scientific Reports 10 (1). doi:10.1038/s41598-020-76279-9</li> <li>5. Ari E, Bedir H, Mutlu N (2021) Enhancement of embryogenesis in freshly isolated microspore cultures of ornamental kale through direct cold shock treatment. Scientia Horticulturae 280. doi:10.1016/j.scienta.2021.109961</li> </ol>
<p>OCA18. Charakteristika dopadu výstupu na spoločensko-hospodársku prax / Characteristics of the output's impact on socio-economic practice Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	<p>Výsledky výskumu rozširujú poznatky o procese androgenézy a úlohe osmotického stresu a arabinogalaktanov v tomto procese, najmä v súvislosti s rekalcitrantnými druhmi ako je raž siata. Tieto zistenia sú využiteľné v šľachtiteľskom prostredí na prípravu haploidov, čo umožňuje lepšie riešenia problémov spojených s rekalcitrantnosťou určitých rastlinných druhov voči androgenéze. / The research results expand the knowledge regarding the process of androgenesis and the role of osmotic stress and arabinogalactans in this process, particularly in connection with recalcitrant species such as rye. These findings are applicable in the breeding environment for the preparation of haploids, enabling better solutions to challenges associated with the recalcitrance of certain plant species to androgenesis.</p>

OCA19. Charakteristika dopadu výstupu a súvisiacich aktivít na vzdelávací proces / Characteristics of the output and related activities' impact on the educational process

*Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak*

*Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English*

Výstup je zameraný na rastlinné biotechnológie a priamo nadväzuje na výučbu biotechnologických predmetov v rámci študijného programu Biotechnológie. Do vzdelávacieho procesu budú integrované poznatky, skúsenosti a poznatky súvisiace s procesom androgenézy s praktickými aplikáciami v moderných biotechnológiách. Táto integrácia výrazne skvalitní výučbu predmetov s biotechnologickým a biologickým obsahom, čím sa zabezpečí, že študenti získajú relevantné a použiteľné poznatky pre súčasný pokrok v odbore. /

The output focuses on plant biotechnology and is directly connected to the teaching of biotechnology-related subjects within the Biotechnology study program. Insights, experiences, and findings related to the process of androgenesis, with practical applications in modern biotechnologies, will be integrated into the educational process. This integration will significantly enhance the teaching of subjects with biotechnological and biological content, ensuring students gain relevant and applicable knowledge for contemporary advancements in the field.

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ID konania/ID of the procedure: <sup>1</sup>

Kód VTC/Code of the  
research/artistic/other output (RAOO):<sup>1</sup>

OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person <sup>2</sup>	Moravčíková	
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OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person <sup>2</sup>	Doc., Ing., PhD/ assoc. prof., Ing., PhD	
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff <sup>3</sup>	<a href="https://www.portalvs.sk/regzam/detail/30492">https://www.portalvs.sk/regzam/detail/30492</a>	
OCA5. Oblasť posudzovania / Area of assessment <sup>4</sup>	4. Biotechnológie/Biotechnology	
OCA6. Kategória výstupu tvorivej činnosti / Category of the research/ artistic/other output <i>Výber zo 6 možností (pozri Vysvetlivky k položke OCA6) / Choice from 6 options (see Explanations for OCA6).</i>	Vedecký výstup/ scientific output	
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2008	
OCA8. ID záznamu v CREPČ alebo CREUČ (ak je) / ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA) <sup>5</sup>	<a href="http://www.crep.sk/portal?fn=*recview&amp;uid=86571&amp;pageId=resultform&amp;full=0">http://www.crep.sk/portal?fn=*recview&amp;uid=86571&amp;pageId=resultform&amp;full=0</a>	
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA <sup>6</sup>		
Charakteristika výstupu, ktorý nie je registrovaný v CREPČ alebo CREUČ / Characteristics of the output that is not registered in CRPA or CRAA	OCA10. Hyperlink na záznam v inom verejne prístupnom registri, katalógu výstupov tvorivých činností / Hyperlink to the record in another publicly accessible register, catalogue of research/ artistic/other outputs <sup>7</sup>	
	OCA11. Charakteristika výstupu vo formáte bibliografického záznamu CREPČ alebo CREUČ, ak výstup nie je vo verejne prístupnom registri alebo katalógu výstupov / Characteristics of the output in the format of the CRPA or the CRAA bibliographic record, if the output is not available in a publicly accessible register or catalogue of outputs	ADC Heavy-metal stress induced accumulation of chitinase isoforms in plants / Békésiová Beáta, Hraška Štefan, Libantová Jana, Moravčíková Jana, Matušíková Ildikó, 2008. In: Molecular Biology Reports. - ISSN <a href="#">0301-4851</a> . - Vol. 35, no. 4 (2008), p. 579-588.
	OCA12. Typ výstupu (ak nie je výstup registrovaný v CREPČ alebo CREUČ) / Type of the output (if the output is not registered in CRPA or CRAA) <i>Výber zo 67 možností (pozri Vysvetlivky k položke OCA12) / Choice from 67 options (see Explanations for OCA12).</i>	Článok/article

<p>OCA13. Hyperlink na stránku, na ktorej je výstup sprístupnený (úplný text, iná dokumentácia a podobne) / Hyperlink to the webpage where the output is available (full text, other documentation, etc.)</p>	<p><a href="https://link.springer.com/article/10.1007/s00425-016-2608-1">https://link.springer.com/article/10.1007/s00425-016-2608-1</a></p>
<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>20% participácia na experimentoch/ participation in experiments</p>
<p>OCA15. Anotácia výstupu s kontextovými informáciami týkajúcimi sa opisu tvorivého procesu a obsahu tvorivej činnosti a pod. / Annotation of the output with contextual information concerning the description of creative process and the content of the research/artistic/other activity, etc. <sup>8</sup>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak <sup>9</sup>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	
<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English <sup>9</sup>Rozsah do 200 slov / Range up to 200 words</p>	<p>Plant chitinases belong to so-called pathogenesis related proteins and have mostly been detected in plants exposed to phytopathogenic viruses, bacteria or fungi. A few studies revealed that they might also be involved in plant defence against heavy metals. This work was undertaken to monitor the accumulation of chitinases in a set of heavy-metal stressed plants and bring evidence on their involvement during this kind of stress. Roots of different plant species including <i>Vicia faba</i> cvs. Aštar and Piešťanský, <i>Pisum sativum</i>, <i>Hordeum vulgare</i>, <i>Zea mays</i> and <i>Glycine max</i> were exposed to different concentrations of lead (300 and 500 mg l<sup>-1</sup> Pb<sup>2+</sup>), cadmium (100 and 300 mg l<sup>-1</sup> Cd<sup>2+</sup>) and arsenic (50 and 100 mg l<sup>-1</sup> As<sup>3+</sup>). In each case, the toxicity effects were reflected in root growth retardation to 80–10% of control values. The most tolerant were beans, most sensitive was barley. Extracts from the most stressed roots were further assayed for chitinase activity upon separation on polyacrylamide gels. Our data showed that in each combination of genotype and metal ion there were 2–5 different chitinase isoforms significantly responsive to toxic environment when compared with water-treated controls. This confirms that chitinases are components of plant defence against higher concentrations of heavy metals. In addition, accumulation of some isoforms in response to one but not to other metal ions suggests that these enzymes might also be involved in a more (metal) specific mechanism in affected plants and their biological role is more complex than expected.</p>
<p>OCA17. Zoznam najviac 5 najvýznamnejších ohlasov na výstup / List of maximum 5 most significant citations corresponding to the output <i>Rozsah do 200 slov / Range up to 200 words</i></p>	<ol style="list-style-type: none"> <li>1. Ahmed IM, Nadira UA, Bibi N, Cao FB, He XY, Zhang GP, Wu FB (2015) Secondary metabolism and antioxidants are involved in the tolerance to drought and salinity, separately and combined, in Tibetan wild barley. <i>Environmental and Experimental Botany</i> 111:1-12. doi:10.1016/j.envexpbot.2014.10.003</li> <li>2. Ahmed NU, Park JI, Jung HJ, Kang KK, Hur Y, Lim YP, Nou IS (2012) Molecular characterization of stress resistance-related chitinase genes of <i>Brassica rapa</i>. <i>Plant Physiology and Biochemistry</i> 58:106-115. doi:10.1016/j.plaphy.2012.06.015</li> <li>3. Arasimowicz-Jelonek M, Floryszak-Wieczorek J, Gwózdź EA (2011) The message of nitric oxide in cadmium challenged plants. <i>Plant Science</i> 181 (5):612-620. doi:10.1016/j.plantsci.2011.03.019</li> <li>4. Fontenele NMB, Otoch MDO, Gomes-Rochette NF, Sobreira ACD, Barreto A, de Oliveira FDB, Costa JH, Borges SDS, do Nascimento RF, de Melo DF (2017) Effect of lead on physiological and antioxidant responses in two <i>Vigna unguiculata</i> cultivars differing in Pb-accumulation. <i>Chemosphere</i> 176:397-404. doi:10.1016/j.chemosphere.2017.02.072</li> <li>5. Grover A (2012) Plant Chitinases: Genetic Diversity and Physiological Roles. <i>Critical Reviews in Plant Sciences</i> 31 (1):57-73. doi:10.1080/07352689.2011.616043</li> </ol>
<p>OCA18. Charakteristika dopadu výstupu na spoločensko-hospodársku prax / Characteristics of the output's impact on socio-economic practice <i>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</i></p>	<p>Výsledky výskumu rozširujú poznatky týkajúce sa rastlinných chitináz a ich akumulácie v podmienkach stresu spôsobeného ťažkými kovmi. / Research findings expand understanding of plant chitinases and their accumulation in response to heavy metal stress.</p>



<p><i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	
<p>OCA19. Charakteristika dopadu výstupu a súvisiacich aktivít na vzdelávací proces / Characteristics of the output and related activities' impact on the educational process</p> <p><i>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</i></p> <p><i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	<p>Výstup je orientovaný na rastlinné biotechnológie a je viazaný na výučbu biotechnologických predmetov v rámci študijného programu Biotechnológie. Do vzdelávacieho procesu budú z tohto výstupu implementované poznatky, skúsenosti a výsledky týkajúce sa výskytu chitináz a ich akumulácie v rastlinách v podmienkach stresu spôsobeného ťažkými kovmi s potenciálom pre využitie v moderných biotechnológiách. Dopady sa prejavujú vo výučbe predmetov s biotechnologickým a biologickým obsahom. /</p> <p>The output focuses on plant biotechnology and is closely tied to the teaching of biotechnology-related subjects within the Biotechnology study program. Knowledge, experiences, and findings about the occurrence of chitinases and their accumulation in plants under heavy metal stress, as well as their potential applications in modern biotechnologies, will be integrated into the educational process. These impacts will be reflected in the teaching of subjects with biotechnological and biological content.</p>

## Charakteristika predkladaného výstupu tvorivej činnosti / Characteristics of the submitted research/ artistic/other output

*Tlačivo VTC slúži na predkladanie výstupov tvorivej činnosti podľa metodiky hodnotenia tvorivých činností (časť V. Metodiky na vyhodnocovanie štandardov) / The form is used to submit the research/artistic/other outputs according to the evaluation methodology of research/artistic/other activities (part V. The Methodology for Standards Evaluation).*

ID konania/ID of the procedure: <sup>1</sup>

Kód VTC/Code of the  
research/artistic/other output (RAOO):<sup>1</sup>

OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person <sup>2</sup>	Moravčíková	
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person <sup>2</sup>	Jana	
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person <sup>2</sup>	Doc., Ing., PhD/ assoc. prof., Ing., PhD	
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff <sup>3</sup>	<a href="https://www.portalvs.sk/regzam/detail/30492">https://www.portalvs.sk/regzam/detail/30492</a>	
OCA5. Oblasť posudzovania / Area of assessment <sup>4</sup>	4. Biotechnológie/Biotechnology	
OCA6. Kategória výstupu tvorivej činnosti / Category of the research/ artistic/other output <i>Výber zo 6 možností (pozri Vysvetlivky k položke OCA6) / Choice from 6 options (see Explanations for OCA6).</i>	Vedecký výstup/ scientific output	
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2005	
OCA8. ID záznamu v CREPČ alebo CREUČ (ak je) / ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA) <sup>5</sup>		
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA <sup>6</sup>		
Charakteristika výstupu, ktorý nie je registrovaný v CREPČ alebo CREUČ / Characteristics of the output that is not registered in CRPA	OCA10. Hyperlink na záznam v inom verejne prístupnom registri, katalógu výstupov tvorivých činností / Hyperlink to the record in another publicly accessible register, catalogue of research/ artistic/other outputs <sup>7</sup>	<a href="https://ucm.dawinci.sk/?fn=resultform&amp;rankfield=true&amp;prequelF=3">https://ucm.dawinci.sk/?fn=resultform&amp;rankfield=true&amp;prequelF=3</a>
	OCA11. Charakteristika výstupu vo formáte bibliografického záznamu CREPČ alebo CREUČ, ak výstup nie je vo verejne prístupnom registri alebo katalógu výstupov / Characteristics of the output in the format of the CRPA or the CRAA bibliographic record, if the output is not available in a publicly accessible register or catalogue of outputs	Matusikova I, Salaj J, Moravcikova J, Mlynarova L, Nap JP, Libantova J (2005) Tentacles of in vitro-grown round-leaf sundew ( <i>Drosera rotundifolia</i> L.) show induction of chitinase activity upon mimicking the presence of prey. <i>Planta</i> 222 (6):1020-1027. doi:10.1007/s00425-005-0047-5
	OCA12. Typ výstupu (ak nie je výstup registrovaný v CREPČ alebo CREUČ) / Type of the output (if the output is not registered in CRPA or CRAA) <i>Výber zo 67 možností (pozri Vysvetlivky k položke OCA12) / Choice from 67 options (see Explanations for OCA12).</i>	Článok/article

<p>OCA13. Hyperlink na stránku, na ktorej je výstup sprístupnený (úplný text, iná dokumentácia a podobne) / Hyperlink to the webpage where the output is available (full text, other documentation, etc.)</p>	<p><a href="https://link.springer.com/article/10.1007/s00425-005-0047-5">https://link.springer.com/article/10.1007/s00425-005-0047-5</a></p>
<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>16%, navrhovanie experimentov a prítomnosť na experimentoch/ designing experiments and participating in experiments</p>
<p>OCA15. Anotácia výstupu s kontextovými informáciami týkajúcimi sa opisu tvorivého procesu a obsahu tvorivej činnosti a pod. / Annotation of the output with contextual information concerning the description of creative process and the content of the research/artistic/other activity, etc. <sup>8</sup>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak <sup>9</sup>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	
<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English <sup>9</sup>Rozsah do 200 slov / Range up to 200 words</p>	<p>Induction of plant-derived chitinases in the leaves of a carnivorous plant was demonstrated using aseptically grown round-leaf sundew (<i>Drosera rotundifolia</i> L.). The presence of insect prey was mimicked by placing the chemical inducers gelatine, salicylic acid and crustacean chitin on leaves. In addition, mechanical stirring of tentacles was performed. Chitinase activity was markedly increased in leaf exudates upon application of notably chitin. Application of gelatine increased the proteolytic activity of leaf exudates, indicating that the reaction of sundew leaves depends on the molecular nature of the inducer applied. In situ hybridization of sundew leaves with a <i>Drosera</i> chitinase probe showed chitinase gene expression in different cell types of non-treated leaves, but not in the secretory cells of the glandular heads. Upon induction, chitinase mRNA was also present in the secretory cells of the sundew leaf. The combined results indicate that chitinase is likely to be involved in the decomposition of insect prey by carnivorous plants. This adds a novel role to the already broad function of chitinases in the plant kingdom and may contribute to our understanding of the molecular mechanisms behind the ecological success of carnivorous plants in nutritionally poor environments.</p>
<p>OCA17. Zoznam najviac 5 najvýznamnejších ohlasov na výstup / List of maximum 5 most significant citations corresponding to the output <i>Rozsah do 200 slov / Range up to 200 words</i></p>	<ol style="list-style-type: none"> <li>1. Arai N, Ohno Y, Jumyo S, Hamaji Y, Ohyama T (2021) Organ-specific expression and epigenetic traits of genes encoding digestive enzymes in the lance-leaf sundew (<i>Drosera adelae</i>). <i>Journal of Experimental Botany</i> 72 (5):1946-1961. doi:10.1093/jxb/eraa560</li> <li>2. Egan PA, van der Kooy F (2013) Phytochemistry of the Carnivorous Sundew Genus <i>Drosera</i> (Droseraceae) - Future Perspectives and Ethnopharmacological Relevance. <i>Chemistry &amp; Biodiversity</i> 10 (10):1774-1790. doi:10.1002/cbdv.201200359</li> <li>3. Eilenberg H, Pnini-Cohen S, Schuster S, Movtchan A, Zilberstein A (2006) Isolation and characterization of chitinase genes from pitchers of the carnivorous plant <i>Nepenthes khasiana</i>. <i>Journal of Experimental Botany</i> 57 (11):2775-2784. doi:10.1093/jxb/erl048</li> <li>4. Ellison AM, Adamec L (2018) Carnivorous Plants Physiology, ecology, and evolution Preface. <i>Carnivorous Plants: Physiology, Ecology, and Evolution</i>.</li> <li>5. Król E, Plachno BJ, Adamec L, Stolarz M, Dziubinska H, Trebacz K (2012) Quite a few reasons for calling carnivores 'the most wonderful plants in the world'. <i>Annals of Botany</i> 109 (1):47-64. doi:10.1093/aob/mcr249</li> </ol>
<p>OCA18. Charakteristika dopadu výstupu na spoločensko-hospodársku prax / Characteristics of the output's impact on socio-economic practice <i>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</i> <i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	<p>Výsledky výskumu rozširujú na molekulárnej úrovni poznatky týkajúce sa úlohy rastlinných chitináz v tráviacich procesoch v mäsožravých rastlinách. / The research results expand on a molecular level, the understanding of the role of plant chitinases in the digestive processes of carnivorous plants.</p>

OCA19. Charakteristika dopadu výstupu a súvisiacich aktivít na vzdelávací proces / Characteristics of the output and related activities' impact on the educational process

*Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak*

*Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English*

Výstup je zameraný na rastlinné biotechnológie a nadväzuje na výučbu biotechnológiou príbuzných predmetov v rámci študijného programu Biotechnológie. Poznatky, skúsenosti a poznatky týkajúce sa chitináz v mäsožravých rastlinách a ich indukovateľnosti v reakcii na exogénne faktory budú integrované do vzdelávacieho procesu. Dopady sa prejaví vo výučbe predmetov s biotechnologickým a biologickým obsahom. /

The output is focused on plant biotechnology and is linked to the teaching of biotechnology-related subjects within the Biotechnology study program. Knowledge, experiences, and findings regarding chitinases in carnivorous plants and their inducibility in response to exogenous factors, will be integrated into the educational process. The impacts will be reflected in the teaching of subjects with biotechnological and biological content.

## Charakteristika predkladaného výstupu tvorivej činnosti / Characteristics of the submitted research/ artistic/other output

Tlačivo VTC slúži na predkladanie výstupov tvorivej činnosti podľa metodiky hodnotenia tvorivých činností (časť V. Metodiky na vyhodnocovanie štandardov) / The form is used to submit the research/artistic/other outputs according to the evaluation methodology of research/artistic/other activities (part V. The Methodology for Standards Evaluation).

ID konania/ID of the procedure: <sup>1</sup>

Kód VTC/Code of the research/artistic/other output (RAOO):<sup>1</sup>

OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person <sup>2</sup>	Moravčíková	
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person <sup>2</sup>	Jana	
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person <sup>2</sup>	Doc., Ing., PhD/ assoc. prof., Ing., PhD	
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff <sup>3</sup>	<a href="https://www.portalvs.sk/regzam/detail/30492">https://www.portalvs.sk/regzam/detail/30492</a>	
OCA5. Oblasť posudzovania / Area of assessment <sup>4</sup>	4. Biotechnológie/Biotechnology	
OCA6. Kategória výstupu tvorivej činnosti / Category of the research/ artistic/other output <i>Výber zo 6 možností (pozri Vysvetlivky k položke OCA6) / Choice from 6 options (see Explanations for OCA6).</i>	Vedecký výstup/ scientific output	
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2008	
OCA8. ID záznamu v CREPČ alebo CREUČ (ak je) / ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA) <sup>5</sup>		
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA <sup>6</sup>		
Charakteristika výstupu, ktorý nie je registrovaný v CREPČ alebo CREUČ / Characteristics of the output that is not registered in CRPA	OCA10. Hyperlink na záznam v inom verejne prístupnom registri, katalógu výstupov tvorivých činností / Hyperlink to the record in another publicly accessible register, catalogue of research/ artistic/other outputs <sup>7</sup>	<a href="https://www.sav.sk/?lang=sk&amp;doc=ins-org-ins&amp;institute_no=211&amp;action=publications">https://www.sav.sk/?lang=sk&amp;doc=ins-org-ins&amp;institute_no=211&amp;action=publications</a>
	OCA11. Charakteristika výstupu vo formáte bibliografického záznamu CREPČ alebo CREUČ, ak výstup nie je vo verejne prístupnom registri alebo katalógu výstupov / Characteristics of the output in the format of the CRPA or the CRAA bibliographic record, if the output is not available in a publicly accessible register or catalogue of outputs	Moravčíková, J., Vaculková, E., Bauer, M., Libantová, J. (2008). Feasibility of the seed specific cruciferin C promoter in the self excision Cre/loxP strategy focused on generation of marker-free transgenic plants. In Theoretical and Applied Genetics, 2008, vol. 23, no. 8, p.1325 – 1334, doi: <a href="https://doi.org/10.1007/s00122-008-0866-4">10.1007/s00122-008-0866-4</a>
	OCA12. Typ výstupu (ak nie je výstup registrovaný v CREPČ alebo CREUČ) / Type of the output (if the output is not registered in CRPA or CRAA) <i>Výber zo 67 možností (pozri Vysvetlivky k položke OCA12) / Choice from 67 options (see Explanations for OCA12).</i>	Článok/article

<p>OCA13. Hyperlink na stránku, na ktorej je výstup sprístupnený (úplný text, iná dokumentácia a podobne) / Hyperlink to the webpage where the output is available (full text, other documentation, etc.)</p>	<p><a href="https://link.springer.com/article/10.1007/s00122-008-0866-4">https://link.springer.com/article/10.1007/s00122-008-0866-4</a></p>
<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>30% navrhovanie a podieľanie sa na experimentoch, písanie a editovanie rukopisu/ designing and participation on experiments, writing and editing of the manuscript</p>
<p>OCA15. Anotácia výstupu s kontextovými informáciami týkajúcimi sa opisu tvorivého procesu a obsahu tvorivej činnosti a pod. / Annotation of the output with contextual information concerning the description of creative process and the content of the research/artistic/other activity, etc. <sup>8</sup>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak <sup>9</sup>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	
<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English <sup>9</sup>Rozsah do 200 slov / Range up to 200 words</p>	<p>This work is focused on the generation of selectable marker-free transgenic tobacco plants using the self excision Cre/loxP system that is controlled by a strong seed specific <i>Arabidopsis</i> cruciferin C (CRUC) promoter. It involves <i>Agrobacterium</i>-mediated transformation using a binary vector containing the <i>gus</i> reporter gene and one pair of the <i>loxP</i> sites flanking the <i>cre</i> recombinase and selectable <i>nptII</i> marker genes (floxed DNA). Surprisingly, an ectopic activation of CRUC resulting in partial excision of floxed DNA was observed during regeneration of transformed cells already in calli. The regenerated T<sub>0</sub> plants were chimeric, but no ongoing ectopic expression was observed in these one-year-long invitro maintained plants. The process of the <i>nptII</i> removal was expected in the seeds; however, none of the analysed T<sub>0</sub> transgenic lines generated whole progeny sensitive to kanamycin. Detailed analyses of progeny of selected T<sub>0</sub>-30 line showed that 10.2% GUS positive plants had completely removed <i>nptII</i> gene while the remaining 86.4% were still chimeras. Repeated activation of the <i>cre</i> gene in T<sub>2</sub> seeds resulted in increased rate of marker-free plants, whereas four out of ten analysed chimeric T<sub>1</sub> plants generated completely marker-free progenies. This work points out the feasibility as well as limits of the CRUC promoter in the Cre/loxP strategy.</p>
<p>OCA17. Zoznam najviac 5 najvýznamnejších ohlasov na výstup / List of maximum 5 most significant citations corresponding to the output Rozsah do 200 slov / Range up to 200 words</p>	<ol style="list-style-type: none"> <li>1. Amos PJ, Bozkulak EC, Qyang YB (2012) Methods of Cell Purification: A Critical Juncture for Laboratory Research and Translational Science. <i>Cells Tissues Organs</i> 195 (1-2):26-40. doi:10.1159/000331390</li> <li>2. Dalla Costa L, Piazza S, Campa M, Flachowsky H, Hanke MV, Malnoy M (2016) Efficient heat-shock removal of the selectable marker gene in genetically modified grapevine. <i>Plant Cell Tissue and Organ Culture</i> 124 (3):471-481. doi:10.1007/s11240-015-0907-z</li> <li>3. Hoenicka H, Lehnhardt D, Nunna S, Reinhardt R, Jeltsch A, Briones V, Fladung M (2016) Level of tissue differentiation influences the activation of a heat-inducible flower-specific system for genetic containment in poplar (<i>Populus tremula</i> L.). <i>Plant Cell Reports</i> 35 (2):369-384. doi:10.1007/s00299-015-1890-x</li> <li>4. Chen MY, Zhao FL, Chu WL, Bai MR, Zhang DM (2023) A review of tamoxifen administration regimen optimization for Cre/loxP system in mouse bone study. <i>Biomedicine &amp; Pharmacotherapy</i> 165. doi:10.1016/j.biopha.2023.115045</li> <li>5. Chong-Pérez B, Kosky RG, Reyes M, Rojas L, Ocaña B, Tejeda M, Pérez B, Angenon G (2012) Heat shock induced excision of selectable marker genes in transgenic banana by the Cre-<i>loxP</i> site-specific recombination system. <i>Journal of Biotechnology</i> 159 (4):265-273. doi:10.1016/j.jbiotec.2011.07.031</li> </ol>
<p>OCA18. Charakteristika dopadu výstupu na spoločensko-hospodársku prax / Characteristics of the output's impact on socio-economic practice Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</p>	<p>Práca prispieva k rozšíreniu poznatkov o možnom využití Cre/loxP rekombinačnej stratégie na odstránenie selekčných markerových génov z genómu transgénnych rastlín. Táto stratégia zvyšuje biologickú bezpečnosť transgénnych rastlín, čím zlepšuje ich akceptovateľnosť verejnosťou. / The work contributes to expanding knowledge on the potential use of the Cre/loxP recombination strategy for the removal of selectable marker genes from the genome of transgenic plants. This strategy enhances the biological safety of transgenic plants, thereby improving their acceptability by the public.</p>

OCA19. Charakteristika dopadu výstupu a súvisiacich aktivít na vzdelávací proces / Characteristics of the output and related activities' impact on the educational process

*Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak*

*Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English*

Výstup je zameraný na moderné rastlinné biotechnológie a je úzko spätý s výučbou biotechnológiou príbuzných predmetov v rámci študijného programu Biotechnológie. Do vzdelávacieho procesu budú zapracované poznatky, skúsenosti a poznatky týkajúce sa biologickej bezpečnosti transgénnych rastlín, ako aj aplikácia stratégie Cre/loxP na dosiahnutie tohto cieľa. Tieto pokroky skvalitnia výučbu biotechnologických a biologických predmetov, obohatia porozumenie študentov a praktické znalosti v danej oblasti. /

The output focuses on modern plant biotechnology and is closely tied to the teaching of biotechnology-related subjects within the Biotechnology study program. Insights, experiences, and findings concerning the biological safety of transgenic plants, as well as the application of the Cre/loxP strategy to achieve this goal, will be incorporated into the educational process. These advancements will enhance the teaching of biotechnological and biological subjects, enriching students' understanding and practical knowledge in the field.