

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: ¹ Kód VTC/Code of the research/artistic/other output (RAOO): ¹	
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OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person ²	Kraic
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person ²	Ján
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person ²	prof., RNDr., PhD.
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff ³	https://www.portalvs.sk/regzam/detail/10524
OCA5. Oblasť posudzovania / Area of assessment ⁴	3. Biológia/ 3. Biology
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>	<i>Vedecký výstup/ scientific output</i>
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) ⁵	253983
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA ⁶	https://app.crepc.sk/?fn=detailBiblioForm&sid=992271BC46F7F8BAC57C96ABA7
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 ⁷ 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

Biotic and Abiotic Elicitors of Stilbenes Production in *Vitis vinifera* L. Cell Culture, Sák, Martin; Dokupilová, Ivana; Kaňuková, Šarlota; Mrkvová, Michaela; Mihálik, Daniel; Hauptvogel, Pavol; Kraic, Ján. *Plants-Basel*, 2021, 10, 3, no. 490, 1-14.

	accessible register or catalogue of outputs	
	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
	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.)	https://www.mdpi.com/2223-7747/10/3/490
	OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution	[24 %] Spoluautor konceptu experimentálnej časti a metodológie iniciovania <i>in vitro</i> kultúry a elicítácie produkcie sekundárnych metabolitov, vyhodnotenie výsledkov experimentálnej časti práce, príprava konceptu rukopisu a finálnej verzie rukopisu, konečné úpravy a opravy po recenzii, korešpondujúci autor. [24 %] Co-author of the concept of the experimental part and the methodology of initiating <i>in vitro</i> culture and elution of production of secondary metabolites, evaluation of the results of the experimental part of the work, preparation of the concept of the manuscript and the final version of the manuscript, final adjustments and corrections after review, corresponding author.
	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. ⁸ Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak ⁹ Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English	
	OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English ⁹ Rozsah do 200 slov / Range up to 200 words	The <i>in vitro</i> cell cultures derived from the grapevine (<i>Vitis vinifera</i> L.) have been used for the production of stilbenes treated with different biotic and abiotic elicitors. The red-grape cultivar Váh has been elicited by natural cellulose from <i>Trichoderma viride</i> , the cell wall homogenate from <i>Fusarium oxysporum</i> and synthetic jasmonates. The sodium-orthovanadate, known as an inhibitor of hypersensitive necrotic response in treated plant cells able to enhance production and release of secondary metabolite into the cultivation medium, was used as an abiotic elicitor. Growth of cells and the content of phenolic compounds trans-resveratrol, trans-piceid, δ -viniferin, and ϵ -viniferin, were analyzed in grapevine cells treated by individual elicitors. The highest accumulation of analyzed individual stilbenes, except of trans-piceid has been observed after treatment with the cell wall homogenate from <i>F. oxysporum</i> . Maximum production of trans-resveratrol, δ - and ϵ -viniferins was triggered by treatment with cellulase from <i>T. viride</i> . The accumulation of trans-piceid in cell cultures elicited by this cellulase revealed exactly the opposite effect, with almost three times higher production of trans-resveratrol than that of trans-piceid. This study suggested that both used fungal elicitors can enhance production more effectively than commonly used jasmonates.
	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>	Record 1 of 4 By: Hedayati, A (Hedayati, Ahad); Naseri, F (Naseri, Fatemeh); Nourozi, E (Nourozi, Elnaz); Hosseini, B (Hosseini, Bahman); Honari, H (Honari, Hossein); Hemmaty, S (Hemmaty, Syavash Title: Response of <i>Saponaria officinalis</i> L. hairy roots to the application of TiO ₂ nanoparticles in terms of production of valuable polyphenolic compounds and SO6 protein) Source: PLANT PHYSIOLOGY AND BIOCHEMISTRY Volume: 178 Pages: 80-92 DOI: 10.1016/j.plaphy.2022.03.001 Published: MAY 1 2022 Times Cited in Web of Science Core Collection: 0 Total Times Cited: 0 Accession Number: WOS:000783637100001

	<p>Record 2 of 4 By: Maciel, G (Maciel, Gevaldo); Lopes, AA (Lopes, Adriana Aparecida); Cantrell, CL (Cantrell, Charles L.); Franca, SD (Franca, Suzelei de Castro); Bertoni, BW (Bertoni, Bianca Waleria); Lourenco, MV (Lourenco, Miriam Verginia) Title: Jasmonates promote enhanced production of bioactive caffeoylquinic acid derivative in <i>Eclipta prostrata</i> (L.) L. hairy roots Source: PLANT CELL TISSUE AND ORGAN CULTURE Volume: 149 Issue: 1-2 Special Issue: SI Pages: 363-369 DOI: 10.1007/s11240-021-02201-4 Early Access Date: NOV 2021 Published: MAY 2022 Times Cited in Web of Science Core Collection: 0 Total Times Cited: 0 Accession Number: WOS:000720803400001 Record 3 of 4 By: Heath, R.S., Ruscoe, R.E., Turner, N.J. Title: The beauty of biocatalysis: Sustainable synthesis of ingredients in cosmetics Source: NATURAL PRODUCT REPORTS, 2022, 39 (2), pp. 335-388. DOI: 10.1039/d1np00027f Cited: 1 Record 4 of 4 By: Navarro-Orcajada, S., Conesa, I., Vidal-Sánchez, F.J., Matencio, A., Albaladejo-Maricó, L., García-Carmona, F., López-Nicolás, J.M. Title: Stilbenes: Characterization, bioactivity, encapsulation and structural modifications. A review of their current limitations and promising approaches Source: CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION, 2022. DOI: 10.1080/10408398.2022.2045558</p>
<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><i>In vitro</i> bunkovými kultúrami sa dajú získavať z viniča hroznorodého, ale aj iných druhov rastlín, sekundárne metabolity s rôznymi biologickými účinkami. V tomto prípade išlo o stilbény a ich syntéza bola zvýšená rôznymi biotickými a abiotickými elicitormi. Použitie je možné aj biotické elicitory (celulóza z <i>Trichoderma viride</i> a homogenát bunkovej steny z <i>Fusarium oxysporum</i> v tejto práci) a tiež bežnými syntetickými jasmonátmi. Rast buniek a obsahy fenolických zlúčenín trans-resveratrol, trans-piceid, δ-viniferín a ε-viniferín boli potvrdené v bunkách ošetrovaných jednotlivými elicitormi. Najvyššia akumulácia analyzovaných stilbénov, okrem trans-piceidu, bola pozorovaná po ošetrovaní homogenátom bunkovej steny z <i>F. oxysporum</i>. Maximálna produkcia trans-resveratrolu, δ- a ε-viniferínov bola indukovaná elicitáciou s celulózou z <i>T. viride</i>. Akumulácia trans-piceidu v bunkových kultúrach vyvolaná touto celulózou odhalila presne opačný účinok, s takmer trikrát vyššou produkciou trans-resveratrolu ako trans-piceid. Táto štúdia naznačila, že oba použité hubové elicitory môžu zvýšiť produkciu efektívnejšie ako bežne používané jasmonáty. <i>In vitro</i>, secondary metabolites with various biological effects, can be obtained from grapevine as well as other plant species. In this case, they were stilbenes and their synthesis was increased by various biotic and abiotic elicitors. It is also possible to use biotic elicitors (cellulase from <i>Trichoderma viride</i> and cell wall homogenate from <i>Fusarium oxysporum</i> in this work) as well as common synthetic jasmonates. Cell growth and the contents of the phenolic compounds trans-resveratrol, trans-piceid, δ-viniferin and ε-viniferin were confirmed in cells treated with individual elicitors. The highest accumulation of analyzed stilbenes, except trans-piceid, was observed after treatment with cell wall homogenate from <i>F. oxysporum</i>. Maximal production of trans-resveratrol, δ- and ε-viniferins was induced by elicitation with cellulose from <i>T. viride</i>. The accumulation of trans-piceid in cell cultures induced by this cellulase revealed the exact opposite effect, with almost three times higher production of trans-resveratrol than trans-piceid. This study suggested that both fungal elicitors used could increase production more efficiently than commonly used jasmonates.</p>
<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</p>	<p>Výstup je orientovaný na rastlinné, potravinárske a medicínske 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 možnosti biotechnologického využitia biosyntetických dráh sekundárnych metabolitov vo vybraných rastlinných druhoch. The output is focused on plant, food and medical biotechnology and is linked to the teaching of biotechnology subjects within the study program Biotechnology. From this output, knowledge, experience and results from the possibilities of biotechnological use of biosynthetic pathways of secondary metabolites in selected plant species will be implemented into the educational process.</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: ¹ Kód VTC/Code of the research/artistic/other output (RAOO): ¹	
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OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person ²	Kraic
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person ²	Ján
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person ²	prof., RNDr., PhD.
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff ³	https://www.portalvs.sk/regzam/detail/10524
OCA5. Oblasť posudzovania / Area of assessment ⁴	3. Biológia/ 3. Biology
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) ⁵	218717
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA ⁶	https://app.crepc.sk/?fn=detailBiblioFormChildYN196&sid=94F319F714ECDC29E27BB76AD3&seo=CREP%C4%8C-detail-%C4%8C%C3%A1nok
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 ⁷
	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
	Procedures for DNA Extraction from Opium Poppy (<i>Papaver somniferum</i> L.) and Poppy Seed-Containing Products. Kaňuková, Šarlota; Mrkvová, Michaela; Mihálik, Daniel; Kraic, Ján. <i>Foods</i> , 2020, 9, 10, 1-15.

	output is not available in a publicly accessible register or catalogue of outputs	
	<p>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)</p> <p><i>Výber zo 67 možností (pozri Vysvetlivky k položke OCA12) / Choice from 67 options (see Explanations for OCA12).</i></p>	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>	https://www.mdpi.com/2304-8158/9/10/1429
	<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>[35 %] Korešpondujúci autor, autor konceptu, metodológie, príprava rukopisu, vedenie experimentov. [35 %] Corresponding author, author of the concept, methodology, preparation of the manuscript, conducting 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. ³<i>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</i>³<i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	
	<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English ⁹<i>Rozsah do 200 slov / Range up to 200 words</i></p>	<p>Several commonly used extraction procedures and commercial kits were compared for extraction of DNA from opium poppy (<i>Papaver somniferum</i> L.) seeds, ground seeds, pollen grains, poppy seed filling from a bakery product, and poppy oil. The newly developed extraction protocol was much simpler, reduced the cost and time required for DNA extraction from the native and ground seeds, and pollen grains. The quality of extracted DNA by newly developed protocol was better or comparable to the most efficient ones. After being extended by a simple purification step on a silica membrane column, the newly developed protocol was also very effective in extracting of poppy DNA from poppy seed filling. DNA extracted from this poppy matrix was amplifiable by PCR analysis. DNA extracted from cold-pressed poppy oil and suitable for amplifications was obtained only by methods developed previously for olive oil. Extracted poppy DNA from all tested matrices was analysed by PCR using primers flanking a microsatellite locus (156 bp) and two different fragments of the reference tubulin gene (553 bp and 96 bp). The long fragment of the reference gene was amplified in DNA extracted from native seeds, ground seeds, and pollen grains. Poppy DNA extracted from the filling of bakery product was confirmed only by amplification of short fragments (96 bp and 156 bp). DNA extracted from cold-pressed poppy oil was determined also only by amplification of these two short fragments.</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>	<p>Record 1 of 1 By: Amaral, JS (Amaral, Joana S.) Author Identifiers: Title: Target and Non-Target Approaches for Food Authenticity and Traceability Source: FOODS Volume: 10 Issue: 1 Article Number: 172 DOI: 10.3390/foods10010172 Published: JAN 2021 Times Cited in Web of Science Core Collection: 1 Total Times Cited: 1 Accession Number: WOS:000611004900001</p>

<p>OCA18. Charakteristika dopadu výstupu na spoločensko-hospodársku prax / Characteristics of the output's impact on socio-economic practice</p> <p><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>Porovnávané boli bežne používaných extrakčných postupov a komerčných súprav na extrakciu DNA zo semien maku siateho (<i>Papaver somniferum</i> L.), pomletých semien, peľových zŕn, makovej náplne z pekárenského produktu a makového oleja. V rámci tejto práce bol vyvinutý nový extrakčný protokol, oveľa jednoduchší, znížil náklady a čas potrebný na extrakciu DNA z natívnych a rozomletých semien a peľových zŕn. Kvalita extrahovanej DNA podľa novovyvinutého protokolu bola lepšia alebo porovnateľná s najefektívnejšími. Po rozšírení o jednoduchý krok čistenia na stĺpci silikagélovej membrány bol novo vyvinutý protokol tiež veľmi efektívny pri extrakcii makovej DNA z makovej náplne pekárského výrobku. DNA extrahovaná z tejto makovej matrice bola amplifikovateľná pomocou PCR. Extrahovaná DNA maku siateho zo všetkých testovaných matric sa dala analyzovať pomocou PCR s použitím primerov ohraničujúcich mikrosatelitný lokus (156 bp) a dva rôzne fragmenty referenčného génu pre tubulín (553 bp a 96 bp). Dlhý fragment referenčného génu bol amplifikovaný v DNA extrahovanej z natívnych semien, rozomletých semien a peľových zŕn. Maková DNA extrahovaná z náplne pekárského produktu bola potvrdená iba amplifikáciou krátkych fragmentov (96 bp a 156 bp). DNA extrahovaná z makového oleja lisovaného za studena sa stanovila tiež iba amplifikáciou týchto dvoch krátkych fragmentov. Význam týchto výsledkov pre prax spočíva v možnosti použiť novú extrakčnú metódu pri analýzach maku siateho pri autentifikácii semien ale najmä produktov vyrobených z maku siateho.</p> <p>Commonly used extraction procedures and commercial DNA extraction kits from poppy seeds (<i>Papaver somniferum</i> L.), ground seeds, pollen grains, poppy seed filling from bakery product and poppy seed oil were compared. As part of this work, a new extraction protocol was developed, much simpler, reducing the cost and time required to extract DNA from native and ground seeds and pollen grains. The quality of the extracted DNA according to the newly developed protocol was better or comparable to the most efficient ones. After being extended by a simple purification step on a silica gel membrane column, the newly developed protocol was also very effective in extracting poppy DNA from the poppy filling of a bakery product. DNA extracted from this poppy matrix was amplifiable by PCR. The extracted poppy seeded DNA from all matrices tested could be analyzed by PCR using primers flanking the microsatellite locus (156 bp) and two different fragments of the tubulin reference gene (553 bp and 96 bp). The long fragment of the reference gene was amplified in DNA extracted from native seeds, ground seeds and pollen grains. Poppy DNA extracted from the bakery product load was confirmed only by amplification of the short fragments (96 bp and 156 bp). DNA extracted from cold-pressed poppy seed oil was also determined only by amplification of these two short fragments. The significance of these results for practice lies in the possibility of using a new extraction method in the analysis of poppy seeds in the authentication of seeds, but especially products made from poppy seeds.</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> <i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	<p>Výstup je orientovaný na rastlinné a potravinárske 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 metód extrakcie DNA z rôznych foriem rastlinných matric. Dopady sa prejavia vo výučbe predmetov s biotechnologickým obsahom.</p> <p>The output is focused on plant and food biotechnology and is tied to the teaching of biotechnology subjects within the study program Biotechnology. From this output, knowledge, experience and results from methods of DNA extraction from various forms of plant matrices will be implemented into the educational process. Impacts will be reflected in the teaching of subjects with biotechnological content.</p>

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

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OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff ³	https://www.portalvs.sk/regzam/detail/10524
OCA5. Oblasť posudzovania / Area of assessment ⁴	3. Biológia/ 3. Biology
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	2019
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) ⁵	159935
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA ⁶	https://app.crepc.sk/?fn=detailBiblioForm&sid=BCCBB3B3C2736EEF32BB4FCC05
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 ⁷
	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
	Ondreičková, K.; Gubišová, M.; Piliarová, M.; Horník, M.; Matušinský, P.; Gubiš, J.; Klčová, L.; Hudcovicová, M.; Kraic, J. Responses of Rhizosphere Fungal Communities to the Sewage Sludge Application into the Soil. <i>Microorganisms</i> 2019, 7, 505. https://doi.org/10.3390/microorganisms7110505

<p>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></p>	<p>Článok/article</p>
<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>https://www.mdpi.com/2076-2607/7/11/505</p>
<p>OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution</p>	<p>[11 %] Spoluautor konceptu experimentálnej časti a metodológie, vedúci príslušného výskumného projektu, zabezpečenie a úprava (sušenie, homogenizácia) experimentálneho materiálu (t.j. čistiarenskeho kalu), príprava konceptu rukopisu, finálne úpravy rukopisu (po recenzii). [11 %] Co-author of the concept of the experimental part and methodology, leader of the relevant research project, provision and treatment of experimental material (i.e. sewage sludge), preparation of the manuscript concept, final manuscript modifications (after review).</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. ⁸<i>Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak</i>⁹<i>Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English</i></p>	
<p>OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English ⁹<i>Rozsah do 200 slov / Range up to 200 words</i></p>	<p>Due to the increasing sewage sludge production in the world and problems with its disposal, an application of sludge to the soil appears to be a suitable solution considering its fertilizer properties and ability to improve the soil physical conditions. On the other hand, the sludge may also contain undesirable and toxic substances. Since soil microorganisms are sensitive to environmental changes, they can be used as indicators of soil quality. In this study, we used sewage sludge (SS) from two municipal wastewater treatment plants (SS-A and SS-B) in the dose of 5 t/ha and 15 t/ha in order to determine possible changes in the fungal community diversity, especially arbuscular mycorrhizal fungi (AMF), in the rhizosphere of <i>Arundo donax</i> L. Rhizosphere samples were collected in summer and autumn for two consecutive years and the fungal diversity was examined using terminal restriction fragment length polymorphism and 18S rDNA sequencing. Fungal alpha diversity was more affected by SS-A than SS-B probably due to the higher heavy metal content. However, based on principal component analysis and ANOSIM, significant changes in overall fungal diversity were not observed. Simultaneously, 18S rDNA sequencing showed that more various fungal taxa were detected in the sample with sewage sludge than in the control. <i>Glomus</i> sp. as a representative of AMF was the most represented. Moreover, <i>Funneliformis</i> in both samples and <i>Rhizophagus</i> in control with <i>Septoglomus</i> in the sludge sample were other representatives of AMF. Our results indicate that the short-term sewage sludge application into the soil does not cause a shift in the fungal community composition.</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>	<p>Record 1 of 5 By: Iticescu, C (Iticescu, Catalina); Georgescu, PL (Georgescu, Puiu-Lucian); Arseni, M (Arseni, Maxim); Rosu, A (Rosu, Adrian); Timofti, M (Timofti, Mihaela); Carp, G (Carp, Gabriel); Cioca, LI (Cioca, Lucian-Ionel) Title: Optimal Solutions for the Use of Sewage Sludge on Agricultural Lands Source: WATER Volume: 13 Issue: 5 Article Number: 585 DOI: 10.3390/w13050585 Published: MAR 2021 Accession Number: WOS:000628587600001 Record 2 of 5 By: Latosinska, J (Latosinska, Jolanta); Kowalik, R (Kowalik, Robert); Gawdzik, J (Gawdzik, Jaroslaw) Title: Risk Assessment of Soil Contamination with Heavy Metals from Municipal Sewage Sludge Source: APPLIED SCIENCES-BASEL Volume: 11 Issue: 2 Article Number: 548 DOI: 10.3390/app11020548 Published: JAN 2021 Times Cited in Web of Science Core Collection: 0 Total Times Cited: 0</p>

	<p>Accession Number: WOS:000610950000001 Record 3 of 5 By: Wydro, U (Wydro, Urszula); Wolejko, E (Wolejko, Elzbieta); Lozowicka, B (Lozowicka, Bozena); Jablonska-Trypuc, A (Jablonska-Trypuc, Agata) Title: Microbial Diversity and P Content Changes after the Application of Sewage Sludge and Glyphosate to Soil Source: MINERALS Volume: 11 Issue: 12 Article Number: 1423 DOI: 10.3390/min11121423 Published: DEC 2021 Accession Number: WOS:000737008900001 Record 4 of 5 By: De Corato, U (De Corato, Ugo) Title: Effect of value-added organic co-products from four industrial chains on functioning of plant disease suppressive soil and their potentiality to enhance soil quality: A review from the perspective of a circular economy Source: APPLIED SOIL ECOLOGY Volume: 168 Article Number: 104221 Published: DEC 2021 DOI: 10.1016/j.apsoil.2021.104221 Accession Number: WOS:000701814300010 Record 5 of 5 By: Boudjabi, S (Boudjabi, Sonia); Chenchouni, H (Chenchouni, Haroun) Title: On the sustainability of land applications of sewage sludge: How to apply the sewage biosolid in order to improve soil fertility and increase crop yield? Source: CHEMOSPHERE Volume: 282 Article Number: 131122 Published: NOV 2021 DOI: 10.1016/j.chemosphere.2021.131122 Accession Number: WOS:000541750900095</p>
<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>Vzhľadom na zvyšujúcu sa produkciu splaškových kalov vo svete a problémy s ich zneškodňovaním, sa javí aplikácia kalu do pôdy ako vhodné riešenie vzhľadom na jeho vlastnosti hnojiva a schopnosť zlepšovať fyzikálne parametre pôdy. Kal však môže obsahovať aj nežiadúce a toxické látky. Pôdne mikroorganizmy sú citlivé na zmeny životného prostredia, môžu sa teda použiť ako ukazovatele kvality pôdy. V tejto štúdii bol použitý čistiarenský kal z komunálnych čistiarní odpadových vôd v rôznych dávkach, s cieľom stanoviť možné zmeny v rozmanitosti spoločenstiev húb, najmä arbuskulárnych mykorrhíznych húb (AMF) v rizosfére <i>Arundo donax</i> L. Vzorky rizosféry a diverzita húb sa sledovali pomocou polymorfizmu dĺžky terminálnych reštrikčných fragmentov a sekvenovania 18S rDNA. Na základe analýz neboli pozorované významné zmeny v celkovej diverzite húb. Sekvenovanie 18S rDNA súčasne ukázalo, že vo vzorke s čistiarenským kalom bolo identifikovaných viac rôznych taxónov húb ako v kontrole. <i>Glomus</i> sp., ako zástupca AMF, bol najviac zastúpený. Ďalšími zástupcami AMF boli <i>Funneliformis</i> v oboch vzorkách a <i>Rhizophagus</i> v kontrole so <i>Septoglomus</i> vo vzorke kalu. Výsledky naznačili, že krátkodobá aplikácia týchto kalov do pôdy nespôsobuje zmeny v zložení spoločenstiev húb. Due to the increasing production of sewage sludge in the world and the problems with their disposal, the application of sludge to the soil seems to be a suitable solution due to its fertilizer properties and ability to improve the physical parameters of the soil. However, the sludge may also contain undesirable and toxic substances. Soil microorganisms are sensitive to environmental changes, so they can be used as indicators of soil quality. In this study, sewage sludge from municipal wastewater treatment plants was used in different doses to determine possible changes in the diversity of fungal communities, especially arbuscular mycorrhizal fungi (AMF) in the <i>Arundo donax</i> L rhizosphere. restriction fragments and 18S rDNA sequencing. Based on the analyses, no significant changes in the overall diversity of fungi were observed. Simultaneous sequencing of 18S rDNA showed that more different fungal taxa were identified in the sewage sludge sample than in the control. <i>Glomus</i> sp., as a representative of AMF, was the most represented. Other representatives of AMF were <i>Funneliformis</i> in both samples and <i>Rhizophagus</i> in control with <i>Septoglomus</i> in the sludge sample. The results indicated that short-term application of these sludges to the soil does not cause changes in the composition of fungal communities.</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 environmentálne biotechnológie a je viazaný na výučbu biotechnologických predmetov v rámci študijného programu Biotechnológie. Do vzdelávacieho procesu budú z tohto výstupu implementované použité laboratórne postupy a poznatky, skúsenosti a výsledky z interakcií bioindikátorov prostredia (pôdy) s bezpečnosťou aplikácie čistiarenských kalov buď ako objemových materiálov (podkladové materiály, násypy, úpravy terénu), alebo ako druhotných surovín považovaných za pôdne aditíva a kondicionéry (aj v prípade ornej pôdy). Dopady sa prejavujú vo výučbe predmetov s biotechnologickým, mikrobiologickým, biologickým a molekulárno-biotechnologickým obsahom. The output is focused on environmental biotechnology and is linked to the teaching of biotechnology subjects within the study program Biotechnology. From this output, the used laboratory procedures and knowledge, experience and results from the interactions of bioindicators of the environment (soil) with the safety of sewage sludge application will be implemented into the educational process either as bulk materials (substrates, embankments, landscaping) or as secondary raw materials considered as soil additives and conditioners (also in the case of arable land). Impacts will be reflected in the teaching of subjects with biotechnological, microbiological, biological and molecular-biotechnological 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: ¹ Kód VTC/Code of the research/artistic/other output (RAOO): ¹	
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OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person ²	Kraic
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person ²	Ján
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person ²	prof., RNDr., PhD.
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff ³	https://www.portalvs.sk/regzam/detail/10524
OCA5. Oblasť posudzovania / Area of assessment ⁴	3. Biológia/ 3. Biology
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>	<i>Vedecký výstup/ scientific output</i>
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2018
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) ⁵	175582
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA ⁶	https://app.crepc.sk/?fn=detailBiblioForm&sid=7E3114D01432D19183706423
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 ⁷ 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

Ján Kraic, Daniel Mihálik, Lenka Klčová, Marcela Gubišová, Tatiana Klemková, Martina Hudcovicová, Katarína Ondreičková, Michaela Mrkvová, Michaela Havrlentová, Jozef Gubiš, Milan Čertík, Progress in the genetic engineering of cereals to produce essential polyunsaturated fatty acids, Journal of Biotechnology, Volume 284, 2018, Pages 115-122, ISSN 0168-1656.
<https://doi.org/10.1016/j.jbiotec.2018.08.009>.

	accessible register or catalogue of outputs	
	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
	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.)	https://www.sciencedirect.com/science/article/abs/pii/S0168165618306084
	OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution	[35 %] Korešpondujúci autor, autor a príprava konceptu review rukopisu, finálne úpravy rukopisu (po recenzii). [35 %] Corresponding author, preparation of the manuscript review concept, final manuscript modifications (after review).
	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. ⁸ Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak ⁹ Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English	
	OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English ⁹ Rozsah do 200 slov / Range up to 200 words	Essential polyunsaturated fatty acids with more than two double bonds and length of carbon chain 18–22 must be taken in the diet to prevent diseases and imbalances caused by their deficiency. Terrestrial sources of polyunsaturated fatty acids are limited to only a few plant species whose large-scale cultivation is not possible and the production of their seeds and oil is ineffective. The complete biosynthetic pathway of fatty acids is known in organisms, including plants. After the first gene encoding the enzyme catalysing the initial steps of PUFA biosynthesis (ω -3 desaturase, Δ 6-desaturase) were isolated, isolation of other genes encoding relevant enzymes of the PUFA pathway from different donor organisms followed. Genetic transformations of model plants by the desaturase- and elongase-encoding genes opened the way for the genetic engineering of oilseed crop species. Some of the developed transgenic plants produced PUFAs, including eicosapentaenoic and docosahexaenoic acids. Seed oils extracted from them were similar to fish oil. Tools of the synthetic biology can be applied in modifications of the PUFA pathway and also in overcoming of limitations when the gene and its expression product are absent in the pathway. Such progress in cereals (barley, wheat, maize) has been made only recently, when the first successful modifications of the ω -3 and ω -6 PUFA pathways succeeded. This review focuses on genetic modifications of the PUFA biosynthetic pathway in cereals in relation to the status reached in model plants and oilseed crops.
	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>	Record 1 of 5 Title: Genetic modification of cereal plants: A strategy to enhance bioethanol yields from agricultural waste Author(s): Rocha-Meneses, L (Rocha-Meneses, Lisandra); Ferreira, JA (Ferreira, Jorge A.); Mushtaq, M (Mushtaq, Maryam); Karimi, S (Karimi, Sajjad); Orupold, K (Orupold, Kaja); Kikas, T (Kikas, Timo) Source: INDUSTRIAL CROPS AND PRODUCTS Volume: 150 Article Number: 112408 DOI: 10.1016/j.indcrop.2020.112408 Published: AUG 2020 Times Cited in Web of Science Core Collection: 2 Total Times Cited: 2 Accession Number: WOS:000530684700027 Record 2 of 5

	<p>Title: Development and characterization of marker-free and transgene insertion site-defined transgenic wheat with improved grain storability and fatty acid content Author(s): Cao, XM (Cao, Xuemin); Dong, ZY (Dong, Zhenying); Tian, D (Tian, Dong); Dong, LL (Dong, Lingli); Qian, WQ (Qian, Weiqiang); Liu, JX (Liu, Jinxing); Liu, X (Liu, Xin); Qin, HJ (Qin, Huanju); Zhai, WX (Zhai, Wenxue); Gao, CX (Gao, Caixia); Zhang, KP (Zhang, Kunpu); Wang, DW (Wang, Daowen) Source: PLANT BIOTECHNOLOGY JOURNAL Volume: 18 Issue: 1 Pages: 129-140 DOI: 10.1111/pbi.13178 Published: JAN 2020 Times Cited in Web of Science Core Collection: 2 Total Times Cited: 2 Accession Number: WOS:000530370800016 Record 3 of 5</p> <p>Title: Development and characterization of marker-free and transgene insertion site-defined transgenic wheat with improved grain storability and fatty acid content Author(s): Cao, XM (Cao, Xuemin); Dong, ZY (Dong, Zhenying); Tian, D (Tian, Dong); Dong, LL (Dong, Lingli); Qian, WQ (Qian, Weiqiang); Liu, JX (Liu, Jinxing); Liu, X (Liu, Xin); Qin, HJ (Qin, Huanju); Zhai, WX (Zhai, Wenxue); Gao, CX (Gao, Caixia); Zhang, KP (Zhang, Kunpu); Wang, DW (Wang, Daowen) Source: PLANT BIOTECHNOLOGY JOURNAL DOI: 10.1111/pbi.13178 Early Access Date: JUL 2019 Times Cited in Web of Science Core Collection: 2 Total Times Cited: 2 Accession Number: WOS:000474104700001 Record 4 of 5</p> <p>Title: Postprandial incorporation of EPA and DHA from transgenic Camelina sativa oil into blood lipids is equivalent to that from fish oil in healthy humans Author(s): West, AL (West, Annette L.); Miles, EA (Miles, Elizabeth A.); Lillycrop, KA (Lillycrop, Karen A.); Han, LH (Han, Lihua); Sayanova, O (Sayanova, Olga); Napier, JA (Napier, Johnathan A.); Calder, PC (Calder, Philip C.); Burdge, GC (Burdge, Graham C.) Source: BRITISH JOURNAL OF NUTRITION Volume: 121 Issue: 11 Pages: 1235-1246 Article Number: PII S0007114519000825 DOI: 10.1017/S0007114519000825 Published: JUN 14 2019 Times Cited in Web of Science Core Collection: 4 Total Times Cited: 4 Accession Number: WOS:000476919700004 Record 5 of 5</p> <p>Title: Ocimum basilicum var. purpurascens leaves (red rubin basil): a source of bioactive compounds and natural pigments for the food industry Author(s): Fernandes, F (Fernandes, Filipa); Pereira, E (Pereira, Eliana); Ciric, A (Ciric, Ana); Sokovic, M (Sokovic, Marina); Calhelha, RC (Calhelha, Ricardo C.); Barros, L (Barros, Lillian); Ferreira, ICFR (Ferreira, Isabel C. F. R.) Source: FOOD & FUNCTION Volume: 10 Issue: 6 Pages: 3161-3171 DOI: 10.1039/c9fo00578a Published: JUN 1 2019 Times Cited in Web of Science Core Collection: 2 Total Times Cited: 2 Accession Number: WOS:000476531200009</p>
<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>V strave sa musia vyskytovať aj esenciálne polynenasýtené mastné kyseliny (PUFA) s viac dvoma dvojitými väzbami a dĺžkou uhlíkového reťazca 18-22, aby sa zabránilo chorobám a nerovnováhe spôsobenej ich nedostatkom. Suchozemské zdroje PUFA sú obmedzené iba na niekoľko druhov rastlín, ktorých kultivácia nie je možná a produkcia ich semien a oleja je neefektívna. Kompletná biosyntetická dráha mastných kyselín je známa v organizmoch, vrátane rastlín. Po izolácii prvého génu kódujúceho enzým katalyzujúci počiatočné kroky biosyntézy PUFA (omega-3 desaturáza, delta 6-desaturáza) nasledovala izolácia ďalších génov kódujúcich príslušné enzýmy dráhy PUFA z rôznych donorových organizmov. Genetické transformácie modelových rastlín pomocou génov kódujúcich desaturázu a elongázu otvorili cestu pre genetické inžinierstvo druhov olejnatých rastlín. Niektoré z vyvinutých transgénnych rastlín produkovali PUFA, vrátane kyselín eikosapentaénovej a dokozahexaénovej. Oleje z nich vyrobené boli podobné rybiemu oleju. Nástroje syntetickej biológie možno použiť pri modifikáciách dráhy PUFA a tiež pri prekonávaní obmedzení, keď gén a jeho produkt expresie v biosyntetickej dráhe nie sú prítomné. Takýto pokrok v obilninách (jačmeň, pšenica, kukurica) sa dosiahol iba nedávno, keď boli úspešné prvé genetické modifikácie dráh PUFA omega-3 a omega-6. Táto práca sa zamerala na genetické modifikácie biosyntetickej dráhy PUFA v obilninách, vo vzťahu k stavu dosiahnutému v modelových rastlinách a olejnatých plodín.</p> <p>Essential polyunsaturated fatty acids (PUFAs) with more than two double bonds and a carbon chain length of 18-22 must also be present in the diet to prevent diseases and imbalances caused by their deficiency. Terrestrial PUFA resources are limited to a few plant species that cannot be cultivated and their seed and oil production is inefficient. The complete biosynthetic pathway of fatty acids is known in organisms, including plants. Isolation of the first gene encoding an enzyme catalyzing the initial steps of PUFA biosynthesis (omega-3 desaturase, delta 6-desaturase) was followed by isolation of additional genes encoding the respective enzymes of the PUFA pathway from various donor organisms. Genetic transformations of model plants using genes encoding desaturase and elongase have paved the way for the genetic engineering of oilseed species. Some</p>

	<p>of the developed transgenic plants produced PUFAs, including eicosapentaenoic and docosahexaenoic acids. The oils made from them were similar to fish oil. Synthetic biology tools can be used to modify the PUFA pathway, as well as overcoming limitations where the gene and its expression product are not present in the biosynthetic pathway. Such progress in cereals (barley, wheat, maize) has only recently been made when the first genetic modifications of the PUFA omega-3 and omega-6 pathways have been successful. This work focused on genetic modifications of the PUFA biosynthetic pathway in cereals, in relation to the state achieved in model plants and oilseeds.</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, potravinárske a medicínske 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 možností modifikovania biosyntetických dráh mastných kyselín, resp. aj konštrukcie nových biosyntetických dráh vo vybraných rastlinných druhoch.</p> <p>The output is focused on plant, food and medical biotechnology and is linked to the teaching of biotechnology subjects within study program Biotechnology. From this output, knowledge, experience and results from the possibilities will be implemented into the educational process modification of biosynthetic pathways of fatty acids, resp. as well as the construction of new biosynthetic pathways in selected plant species.</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: ¹ Kód VTC/Code of the research/artistic/other output (RAOO): ¹	
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OCA1. Priezvisko hodnotenej osoby / Surname awarded to the assessed person ²	Kraic
OCA2. Meno hodnotenej osoby / Name awarded to the assessed person ²	Ján
OCA3. Tituly hodnotenej osoby / Degrees awarded to the assessed person ²	prof., RNDr., PhD.
OCA4. Hyperlink na záznam osoby v Registri zamestnancov vysokých škôl / Hyperlink to the entry of the person in the Register of university staff ³	https://www.portalvs.sk/regzam/detail/10524
OCA5. Oblasť posudzovania / Area of assessment ⁴	3. Biológia/ 3. Biology
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>	<i>Vedecký výstup/ scientific output</i>
OCA7. Rok vydania výstupu tvorivej činnosti / Year of publication of the research/artistic/other output	2013
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) ⁵	
OCA9. Hyperlink na záznam v CREPČ alebo CREUČ / Hyperlink to the record in CRPA or CRAA ⁶	
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 ⁷ 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
	Gubišová, M., Gubiš, J., Žofajová, A., Mihálik, D., Kraic, J.: Enhanced <i>in vitro</i> propagation of <i>Miscanthus × giganteus</i> , Industrial Crops and Products, Volume 41, 2013, Pages 279-282, ISSN 0926-6690, https://doi.org/10.1016/j.indcrop.2012.05.004 .

	accessible register or catalogue of outputs	
	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
	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.)	https://www.sciencedirect.com/science/article/abs/pii/S0926669012002695
	OCA14. Charakteristika autorského vkladu / Characteristics of the author's contribution	[20 %] Korešpondujúci autor, autor konceptu, metodológie, príprava rukopisu, vedúci projektu, vedenie experimentov. [20 %] Corresponding author, author of the concept, methodology, preparation of the manuscript, project leader, conducting experiments.
	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. ⁸ Rozsah do 200 slov v slovenskom jazyku / Range up to 200 words in Slovak ⁹ Rozsah do 200 slov v anglickom jazyku / Range up to 200 words in English	
	OCA16. Anotácia výstupu v anglickom jazyku / Annotation of the output in English ⁹ Rozsah do 200 slov / Range up to 200 words	Two approaches for <i>Miscanthus × giganteus</i> in vitro propagation – direct and indirect, were improved as effective alternatives to asexual propagation from rhizomes. The direct multiplication using stem segments containing axillary buds combined with in vitro tillering phase turns out to be fifty–sixty times more effective than the conventional ex vitro rhizome-based approach. On average, 64 regenerants per one immature inflorescence were produced using the indirect system through callus growth and shoots regeneration and inclusion of in vitro tillering increased multiplication by coefficient 2–2.5. Both in vitro systems were improved and could be integrated into effective production of <i>M. × giganteus</i> plantlets.
	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>	Record 1 of 5 Title: Present and future options for <i>Miscanthus</i> propagation and establishment Author(s): Xue, S (Xue, Shuai); Kalinina, O (Kalinina, Olena); Lewandowski, I (Lewandowski, Iris) Source: RENEWABLE & SUSTAINABLE ENERGY REVIEWS Volume: 49 Pages: 1233-1246 DOI: 10.1016/j.rser.2015.04.168 Published: SEP 2015 Times Cited in Web of Science Core Collection: 30 Total Times Cited: 35 Accession Number: WOS:000357141900097 Record 2 of 5 Title: In vitro-propagated <i>Miscanthus x giganteus</i> plants can be a source of diversity in terms of their chemical composition Author(s): Plazek, A (Plazek, A.); Dubert, F (Dubert, F.); Kopec, P (Kopec, P.); Krepski, T (Krepski, T.); Kacorzyk, P (Kacorzyk, P.); Micek, P (Micek, P.); Kurowska, M (Kurowska, M.); Szarejko, I (Szarejko, I.); Zurek, G (Zurek, G.) Source: BIOMASS & BIOENERGY Volume: 75 Pages: 142-149 DOI: 10.1016/j.biombioe.2015.02.009 Published: APR 2015 Times Cited in Web of Science Core Collection: 8 Total Times Cited: 9 Accession Number: WOS:000353744100015 Record 3 of 5 Title: <i>Miscanthus</i> : Genetic Diversity and Genotype Identification Using ISSR and RAPD Markers

	<p>Author(s): Cichorz, S (Cichorz, Sandra); Goska, M (Goska, Maria); Litwiniec, A (Litwiniec, Anna) Source: MOLECULAR BIOTECHNOLOGY Volume: 56 Issue: 10 Pages: 911-924 DOI: 10.1007/s12033-014-9770-0 Published: OCT 2014 Times Cited in Web of Science Core Collection: 14 Total Times Cited: 20 Accession Number: WOS:000341815700005 Record 4 of 5 Title: An efficient in vitro shoot regeneration from immature inflorescence and ex vitro rooting of <i>Arnebia hispidissima</i> (Lehm). DC. - A red dye (Alkannin) yielding plant Author(s): Phulwaria, M (Phulwaria, Mahendra); Shekhawat, NS (Shekhawat, N. S.) Source: PHYSIOLOGY AND MOLECULAR BIOLOGY OF PLANTS Volume: 19 Issue: 3 Pages: 435-441 DOI: 10.1007/s12298-013-0171-9 Published: JUL 2013 Times Cited in Web of Science Core Collection: 9 Total Times Cited: 11 Accession Number: WOS:000322015100012 Record 5 of 5 Title: Shoot organogenesis in three <i>Miscanthus</i> species and evaluation for genetic uniformity using AFLP analysis Author(s): Rambaud, C (Rambaud, Caroline); Arnoult, S (Arnoult, Stephanie); Bluteau, A (Bluteau, Aurelie); Mansard, MC (Mansard, Marie Chantal); Blassiau, C (Blassiau, Christelle); Brancourt-Hulmel, M (Brancourt-Hulmel, Maryse) Source: PLANT CELL TISSUE AND ORGAN CULTURE Volume: 113 Issue: 3 Pages: 437-448 DOI: 10.1007/s11240-012-0284-9 Published: JUN 2013 Times Cited in Web of Science Core Collection: 11 Total Times Cited: 11 Accession Number: WOS:000319358000008</p>
<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>V práci boli vylepšené dva prístupy pre množenie in vitro <i>Miscanthus × giganteus</i> - priamy a nepriamy, ako účinné alternatívy k nepohlavnému množeniu z rizómov. Priame množenie pomocou segmentov stonky ukázalo, že segmenty obsahujúce axilárne púčiky kombinované s in vitro fázou odnožovania je 50-60 krát účinnejšie ako konvenčný prístup založený na rizómoch ex vitro. V priemere sa produkovalo 64 regenerantov na jedno nezrelé súkvetie pomocou nepriameho systému prostredníctvom rastu kalusu a regenerovaných výhonkov. Inklúzia kultivácie in vitro zvýšila multiplikáciu koeficientom 2–2,5. Oba in vitro systémy boli vylepšené a môžu byť integrované do efektívnej produkcie energeticky použiteľných rastlín <i>Miscanthus × giganteus</i>. Two approaches for in vitro propagation of <i>Miscanthus × giganteus</i> have been improved - direct and indirect as effective alternatives to asexual reproduction from rhizomes. Direct propagation using stem segments has shown that segments containing axillary buds combined with an in vitro rooting phase are 50-60 times more effective than the conventional approach based on ex vitro risks. On average, 64 regenerants per immature inflorescence were produced by an indirect system through callus growth and regenerated shoots. Inclusion of in vitro culture increased the multiplication by a factor of 2–2.5. Both in vitro systems have been improved and can be integrated into the efficient production of energy-efficient <i>Miscanthus × giganteus</i> plants.</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 a energetické 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 in vitro postupov a in vitro mikropropagácie významnej energetickej rastliny. Dopady sa prejavujú vo výučbe predmetov s biotechnologickým a biologickým obsahom. The output is focused on plant and energy biotechnology and is tied to the teaching of biotechnology subjects within the study program Biotechnology. From this output, knowledge, experience and results from in vitro procedures and in vitro micropropagation of an important energy plant will be implemented into the educational process. Impacts will be reflected in the teaching of subjects with biotechnological and biological content.</p>