



Latvijas Zinātnes padome



APP Dārzkopības institūts

Project: **lzp-2020/1-0422**

“Dicotyledonous plant families and green tools as a promising alternative approach to increase the accessibility of tocotrienols from unconventional sources”

Summary: 01.01. – 31.12.2023

The dissemination of the project results

1. G. Baškirovs, P. Górnas “An eco-friendly method for simultaneous determination of tocopherols, tocotrienols and plastochromanol-8 in oils using supercritical fluid chromatography”. 4th International Scientific Conference “Sustainable Horticulture from Plant to Product: Challenges in Temperate Climate”, 25–26 August, 2021, Dobele, Latvia (oral presentation) https://www.darzkopibasinstitutus.lv/sites/dobele/files/files/lapas/DI_Book_of_Abstract_2021_1.pdf
2. G. Baškirovs, P. Górnas “Isolation of four tocotrienol homologues and plastochromanol-8 from plant oils and the rapid ‘green’ analysis of nine tocopherols in cold-pressed plant oils via superficially porous particle packed column technology and supercritical fluid chromatography”. 80th International Scientific Conference of the University of Latvia 2022, 11 February, 2022, Riga, Latvia (oral presentation) <https://conferences.lu.lv/event/46/> Book of abstracts: <https://doi.org/10.22364/iscul.80.cs.ba> (pp. 10).
3. D. Lazdiņa, Z. Krūma, P. Górnas “Chemical composition and chemical stability of selected spice seed oils”. 17th International Scientific Conference “Students on Their Way to Science”, 22 April, 2022, Jelgava, Latvia (oral presentation) Abstracts proceedings, p.43, <https://www.sws.llu.lv/proceedings>
4. Danija Lazdiņa "Triacilglicerīdi, taukskābes, steroli, tokohromanoli garšaugu sēklu eļļās un to oksidatīvā stabilitāte". Pūres Pētījumu centra ēkas atklāšana, 15 septembris, Dārzkopības Institūts (oral presentation). <https://www.darzkopibasinstitutus.lv/lv/raksts/2022-09-20/pures-petijumu-centra-ekas-atklasana>
5. P. Górnas “Challenges and trends in the chromatographic determination of tocopherols” 19th Euro Fed Lipid Congress and Expo. 17–20 September 2023, Poznań, Poland (oral presentation) <https://eurofedlipid.org/past-events/>

Popular scientific papers in the Latvian language

- D. Segliņa, P. Gornas. Lielogu dzērveņu sēklas – “mazo cinīšu lielais spēks”, Saimnieks, 11. (233), decembris 2023., lpp. 48.-50.
- Danija Lazdiņa, Uģis Klētnieks, Dalija Segliņa, Pawel Gornas “Daudzsološie E vitamīna savienojumi un to avoti”, Latvijas ārsts, Nacionālais medicīnas žurnāls, 2023. g. marts, lpp. 64-70. <https://www.arstubiedriba.lv/latvijas-arsts-2023-marts/>

Information about the project was published in the LatHort webpage <https://www.darzkopibasinstitut.lv/en/projects/dicotyledonous-plant-families-and-green-tools-as-a-promising-alternative-approach-to> (Summary of the project; 1st, 2nd, 3rd year's results)

Information about the project was presented in the seminar which took place on September 15, 2022, in Pure, <https://www.darzkopibasinstitut.lv/lv/raksts/2022-09-20/pures-petijumu-centra-ekas-atklasana>

Student engagement

- ✓ **Georgijs Baškirovs obtained a master's degree**, defending work on the topic: "Development of a supercritical fluid chromatography method for the determination of tocochromanol compounds in plant matrix", developed within the project
- ✓ **Danija Lazdiņa obtained a master's degree**, defending work on the topic: "Triacylglycerides, fatty acids, sterols and tocochromanols in spice seed oils and their oxidative stability", developed within the project.
- ✓ **PhD studies at Latvia University started Georgijs Baškirovs** (theme "Environmentally friendly methods as an alternative approach to increasing the availability of tocotrienols and other tocochromanol-related compounds from non-traditional sources").
- ✓ **PhD studies at Latvia University of Life Sciences and Technologies started Danija Lazdiņa** (theme "Study of fruit seed protein isolates").
- ✓ **Master studies at Latvia University of Life Sciences and Technologies started Elise Sipeniece** (theme "Microgreens: source of lipophilic bioactive phytochemicals").

List of scientific publication

1) Analytical scale supercritical fluid chromatography for the analysis of nine tocochromanols in 24 different cold-pressed plant oils: Method development, validation, and isolation of tocotrienols and plastochromanol-8. *Journal of Food Composition and Analysis (QI in Food Science)*, 2022, 110, 104586, <https://doi.org/10.1016/j.jfca.2022.104586>

2) Free and esterified tocopherols, tocotrienols and other extractable and non-extractable tocochromanol-related molecules: Compendium of knowledge, future perspectives and recommendations for chromatographic techniques, tools, and approaches used for tocochromanol determination. *Molecules (QI in Analytical Chemistry)*, 2022, 27, 6560, <https://doi.org/10.3390/molecules27196560>

3) Seven underutilized species of the Fabaceae family with high potential for industrial application as alternative sources of oil and lipophilic bioactive compounds. *Industrial Crops and Products (QI in Agronomy and Crop Science)*, 2022, 186, 115251, <https://doi.org/10.1016/j.indcrop.2022.115251>

4) Crab apple (*Malus* spp.) seed tocopherol profile: Impact of genotype, species, purpose and rootstock. *Agronomy (QI in Agronomy and Crop Science)*, 2022, 12, 2736, <https://doi.org/10.3390/agronomy12112736>

5) Evaluation of selected medicinal, timber and ornamental legume species' seed oils as sources of bioactive lipophilic compounds. *Molecules (QI in Analytical Chemistry)*, 2023, 28, 3994, <https://doi.org/10.3390/molecules28103994>

6) Free tocopherols and tocotrienols in 82 plant species' oil: Chemotaxonomic relation as demonstrated by PCA and HCA. *Food Research International (QI in Food Science)*, 2023, 164, 112386, <https://doi.org/10.1016/j.foodres.2022.112386>

7) Lipophilic profile of mature seeds of unconventional edible tree legumes. *European Food Research and Technology (Q1 in Food Science)*, 2023, 249, 1543–1550, <https://doi.org/10.1007/s00217-023-04234-9>

8) Tocopherols in cultivated apple *Malus* sp. seeds: Composition, variability and specificity. *Plants (Q1 in Plant Science)*, 2023, 12, 1169, <https://doi.org/10.3390/plants12051169>

9) Cranberry (*Vaccinium macrocarpon* Aiton) seeds: An exceptional source of tocotrienols. *Scientia Horticulturae (Q1 in Horticulture)*, 2024, 331, 113107, <https://doi.org/10.1016/j.scienta.2024.113107>

10) Evaluation of RPLC stationary phases for tocopherol and tocotrienol positional isomer separation: Method development and profiling. *Talanta (Q1 in Analytical Chemistry)*, 2024, 277, 126360, <https://doi.org/10.1016/j.talanta.2024.126360>

11) Phytochemicals in recovered seed oils from by-products of common quince (*Cydonia oblonga*) and Japanese quince (*Chaenomeles japonica*). *European Journal of Lipid Science and Technology (Q2 in Food Science)*, 2024, 126, 2300265, <https://doi.org/10.1002/ejlt.202300265>

12) Supercritical fluid chromatography with fluorescence detection for tocochromanol profiling in oils and seed ethanol extracts: A comparative study with NPLC. *Microchemical Journal (Q1 in Analytical Chemistry)*, 2024, 199, 110225, <https://doi.org/10.1016/j.microc.2024.110225>

The patent "An alternative method for tocochromanols (tocotrienols and tocopherols) extraction from fruit seeds" (No. LVP2023000139) was submitted to the Latvian Patent Board.

The website www.tocochromanols.com was created as a result of the project.