

**N1-0235**

**Veliki pajesen (*Ailanthus altissima*) - potencialni vir biološko aktivnih spojin**

Tree of heaven (*Ailanthus altissima*) - a potential source of bioactive compounds

**Vodja projekta / Project leader**

dr. Irena Vovk (v Sloveniji), dr. Agnes Moricz (na Madžarskem)

dr. Irena Vovk (in Slovenia), dr. Agnes Moricz (in Hungary)

**1. VSEBINSKI OPIS RAZISKOVALNEGA PROJEKTA / DESCRIPTION OF THE RESEARCH PROJECT**

Veliki pajesen (*Ailanthus altissima*), ki je v svetovnem merilu problematična invazivna tujerodna rastlinska vrsta, je v Sloveniji prisoten po vseh nižinah, predvsem v toplejših predelih, splošno pa je razširjen tudi na Madžarskem. V okviru predlaganega projekta bomo določili kemijski profil in identificirali bioaktivne spojine v velikem pajesenu. Vzorčenje vseh posameznih delov velikega pajesena bomo izvedli vsako leto. Določitev kemijskega profila in identifikacije spojin bodo izvedene s sodobnimi kromatografskimi tehnikami (HPTLC, (U)HPLC, GC) sklopljenimi z masno spektrometrijo (HPTLC-MS/MS, (U)HPLC-MS/MS, GC-MS). Ker je vsak rastlinski material unikatni, bomo za analizo vzorcev velikega pajesena razvili nove analizne metode. Dodatno karakterizacijo izoliranih spojin bomo izvedli z NMR spektrometrijo. Na osnovi kemijskega profiliranja in karakterizacije bomo izvedli primerjavo med posameznimi deli rastlin in tudi primerjavo med rastlinami, ki rastejo v toplih, submediteranskih razmerah na jugozahodu Slovenije, s tistimi iz notranjosti Slovenije ter z Madžarske, kjer so podnebne razmere drugačne. Določili bomo tudi, katere izolirane in okarakterizirane spojine iz velikega pajesena so biološko aktivne. Pri teh raziskavah bomo uporabili neciljane analize usmerjene z biomonitoringom v kombinaciji s kromatografskimi tehnikami.

Tree of heaven (*Ailanthus altissima*), a globally very problematic invasive alien plant species, is widespread in Slovenia's lowlands (especially in warmer parts), as well as in Hungary. In the framework of the proposed project we will determine the chemical profiles and identify bioactive compounds in tree of heaven. Sampling of individual parts of the studied plant species will be performed annually throughout the duration of the project. Determination of the chemical profiles and identification of compounds will be performed with the state-of-the-art chromatographic techniques (HPTLC, (U)HPLC, GC) coupled to mass spectrometry (HPTLC-MS/MS, (U)HPLC-MS/MS, GC-MS). Every plant material is unique, and this requires new analytical methods, which will be developed in the frame of this project. Additional characterisation of isolated compounds will be performed with NMR spectroscopy. Based on chemical profiling and characterization comparative studies will be made between different parts of plants as well as between plants, which grow in warm sub-Mediterranean conditions in southwestern Slovenia with those that thrive in central Slovenia and Hungary, where climatic conditions are different. We will determine which isolated and characterised compounds from tree of heaven are bioactive. These investigations will be performed using non-targeted effect-directed analysis in combination with chromatographic techniques.

**2. OSNOVNI PODATKI GLEDE FINANCIRANJA / BASIC DATA ABOUT FINANCING**

Projekt financirata:

- ARRS - v okviru cenovne kategorije C za obdobje treh let v obsegu 786 ur letno.
- NKFIH (National Research, Development and Innovation Office; kot vodilna agencija)

Trajanje financiranja: 1. 1. 2022 – 31. 12. 2024.



**ARRS**

JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST  
REPUBLIKE SLOVENIJE



NATIONAL  
RESEARCH, DEVELOPMENT  
AND INNOVATION OFFICE

The project is funded by:

- ARRS – within price category C for the period of three years with 786 hours per year.
- NKFIH (National Research, Development and Innovation Office, the lead agency)

Funding period: 1. 1. 2022 – 31. 12. 2024.

### 3. SODELUJOČE ORGANIZACIJE / PARTICIPATING RESEARCH ORGANISATIONS

- Kemijski inštitut
- Biotehniška fakulteta (Univerza v Ljubljani)
- Plant Protection Institute, Centre for Agricultural Research (Madžarska)
  
- National Institute of Chemistry (Slovenia)
- Biotechnical Faculty (University of Ljubljana, Slovenia)
- Plant Protection Institute, Centre for Agricultural Research (Hungary)

### 4. SESTAVA PROJEKTNE SKUPINE S POVEZAVAMI NA SICRIS (LE ZA SLOVENSKO SKUPINO) / PROJECT TEAM MEMBERS WITH LINKS TO THE SICRIS DATABASE (FOR SLOVENIAN TEAM)

Ime in priimek / Name and surname	Raziskovalna organizacija / Research organisation
<a href="#">Irena Vovk</a> <a href="#">Vesna Glavnik</a> <a href="#">Alen Albreht</a> <a href="#">Urška Jug</a> (do / till 2022) <a href="#">Mateja Puklavec</a>	Kemijski inštitut / National Institute of Chemistry (Slovenia)
<a href="#">Simona Strgulc Krajšek</a>	Biotehniška fakulteta (Univerza v Ljubljani) / Biotechnical Faculty (University of Ljubljana, Slovenia)
Ágnes Móricz Schwarczinger Ildikó Bakonyi József Ott Péter G. Krüzselyi Dániel Kolozsváriné Nagy Judit	Plant Protection Institute, Centre for Agricultural Research (Madžarska / Hungary)

### 5. FAZE PROJEKTA IN NJIHOVA REALIZACIJA / PROJECT PHASES AND REALIZATION

**DS1:** Vzorčenje posameznih delov velikega pajesena v Sloveniji in na Madžarskem

**DS2:** Ekstrakcija bioaktivnih spojin iz rastlinskega materiala

**DS3:** Določitev kemijskega profila ekstraktov in identifikacija bioaktivnih spojin

**DS4:** Izolacija in karakterizacija izbranih bioaktivnih spojin

**DS5:** *In vitro* testiranje bioaktivnosti izoliranih spojin – preverjanje aktivnosti, določitev MIC in IC<sub>50</sub> vrednosti

**WP1:** Sampling of different parts of tree of heaven in Slovenia and Hungary

**WP2:** Extraction of the bioactive compounds from plant materials

**WP3:** Determination of the chemical profiles and identification of bioactive compounds

**WP4:** Isolation and characterization of bioactive compounds

**WP5:** *In vitro* testing of the bioactivity of the isolated compounds – verification of their activity, determination of MIC and IC<sub>50</sub> values

### 6. BIBLIOGRAFSKE REFERENCE, KI IZHAJAJO NEPOSREDNO IZ IZVAJANJA RAZISKOVALNEGA PROJEKTA / BIBLIOGRAPHIC REFERENCES ARISING DIRECTLY FROM THE IMPLEMENTATION OF THE RESEARCH PROJECT