



# Overview of conservation activities on threatened plant species in Serbia with special focus on *Cardamine serbica* and *Dracocephalum ruyschiana*

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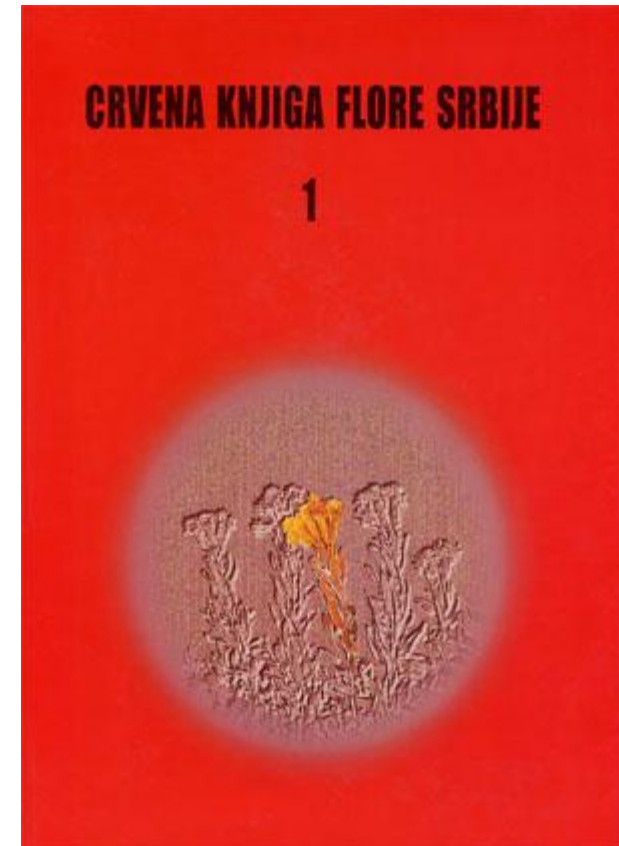
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# Flora of Serbia



- 4200-4300 plant species, subspecies and hybrids (Niketić & Tomović, 2018)
- 492 endemic species and subspecies (Tomović et al., 2014) – 11,4%
- Red Data Book of Flora of Serbia 1 – Extinct and Critically Endangered Taxa (Stevanović et al., 1999)
  - Estimated number of threatened plant species – c. 600





# Flora of Serbia



- 1075 protected and strictly protected plant species
  - 516 protected
  - 559 strictly protected

B	C	D	E	F	G	H
Grupa	Vrsta	Kategorija	potrebna količina sakupljanja (broj individua/kilogrami)	period sakupljanja	područje sakupljanja	istraživač/grupa istraživača
93	<i>Abies borisii-regis</i> Mattf.	strogo zaštićene				
94	<i>Acer heldreichii</i> Orph. ex Boiss.	strogo zaštićene				
95	<i>Acer hyrcanum</i> Fischer & C. A. Meyer subsp. <i>intermedium</i> (Pančić) Bormm.	strogo zaštićene				
96	<i>Achillea ageratifolia</i> (Sm.) Benth. & Hooker fil. subsp. <i>serbica</i> (Nyman) Heimerl	zaštićene				
97	<i>Achillea alexandri-regis</i> Bormm. & Rudski	strogo zaštićene				
98	<i>Achillea aspleniifolia</i> Vent.	zaštićene				
99	<i>Achillea chrysocoma</i> Friv.	strogo zaštićene				
100	<i>Achillea clypeolata</i> Sibth. & Sm.	zaštićene				
101	<i>Achillea fraasii</i> Schultz-Bip.	zaštićene				
102	<i>Achillea grandifolia</i> Friv.	zaštićene				
103	<i>Achillea holosericea</i> Sibth. & Sm.	zaštićene				
104	<i>Achillea millefolium</i> L. subsp. <i>millefolium</i>	zaštićene				
105	<i>Achillea ochroleuca</i> Ehrh.	strogo zaštićene	5 individua	VII-VIII	Kladovska peščara	Lazarević, M., Lazarević, P.
106	<i>Achillea pindicola</i> Hausskn. subsp. <i>corabensis</i> (Heimerl) Greuter	strogo zaštićene				
107	<i>Achillea pseudopectinata</i> Janka	strogo zaštićene				
108	<i>Achillea ptarmica</i> L.	strogo zaštićene				
109	<i>Acinos hungaricus</i> (Simonkai) Šilić	zaštićene				
110	<i>Aconitum anthora</i> L.	strogo zaštićene				
111	<i>Aconitum burnatii</i> Gayer subsp. <i>penthari</i> (Hayek) J alas	zaštićene				
112	<i>Aconitum lycoctonum</i> L. subsp. <i>vulparia</i> (Reichenb.) Nyman	zaštićene				
113	<i>Aconitum toxicum</i> Reichenb. subsp. <i>bosniacum</i> (G. Beck) Niketić	zaštićene				
114	<i>Aconitum toxicum</i> Reichenb. subsp. <i>toxicum</i>	strogo zaštićene				
115	<i>Aconitum variegatum</i> (Fischer ex Reichenb.) Gotz subsp. <i>nasutum</i> (Fischer ex Reichenb.)	strogo zaštićene				
116	<i>Aconitum napellus</i> L.	zaštićene				



Active conservation measures are scarce



*Nepeta rtanjensis*



*Adiantum capillus-veneris*



*Gentiana lutea*







## *Dracocephalum ruyschiana* L.



- IUCN Global – LC
- IUCN National – CR
- Threatened in all European countries except Russia (Ericsson et al., 2011)
- Only one population in Balkan Peninsula, in the border area between Montenegro and Serbia
- First assessments – very small population of c. 200 flowering individuals (Lazarević et al., 2009)
- Threats:
  - increase in shrub and forest vegetation
  - planned highway





## *Dracocephalum ruyschiana* L.



### • Activities 2021-2023

- Comparison between population in Pešter plateau and the nearest population situated in Hungary
- Monitoring
- Ecological studies (soil, climate, vegetation, pollination ecology)
- Genetic studies on the way







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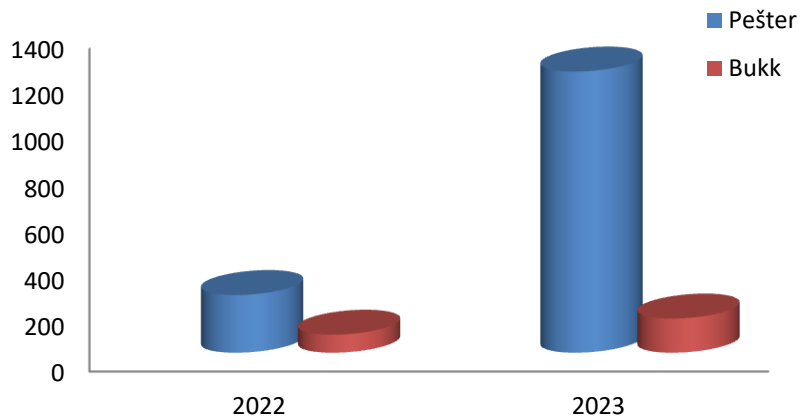
## *Dracocephalum ruyschiana* L.



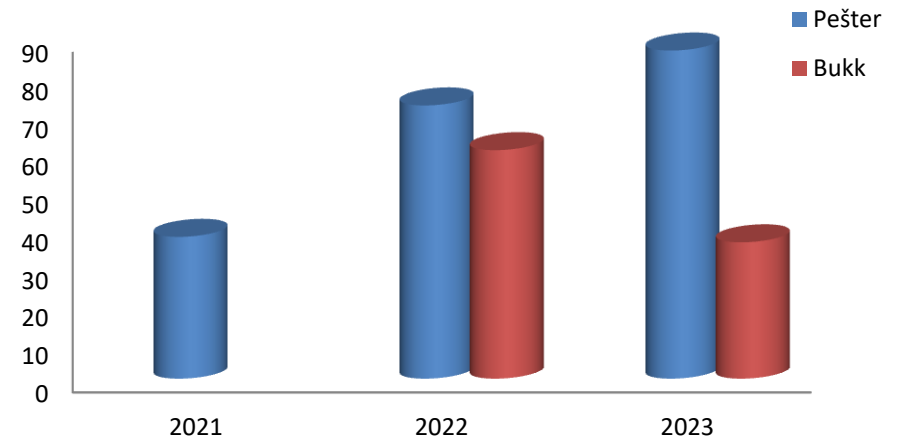
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### No. of individuals per population



### Seed number per inflorescence







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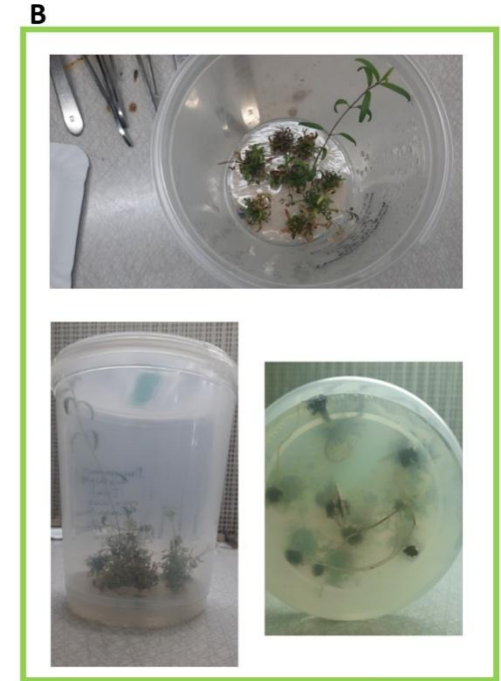
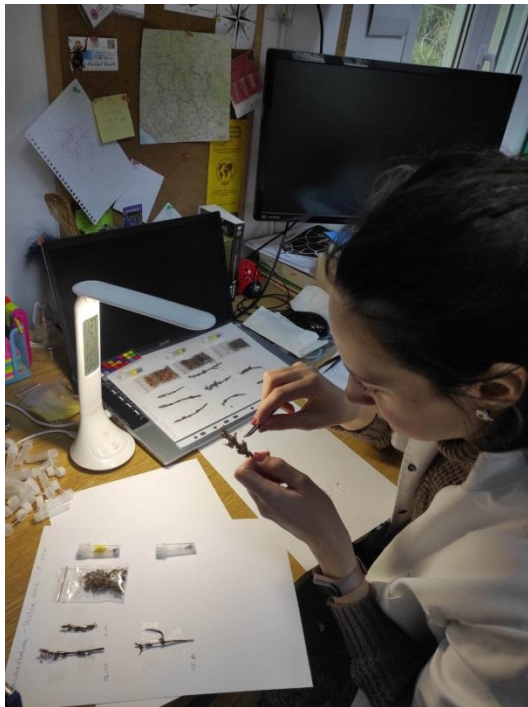


## *Dracocephalum ruyschiana* L.



- Activities 2021-2023
  - Seed bank
  - In vitro propagation

Cooperation with the Institute For Biological research “Siniša Stanković”, National Institute of the Republic of Serbia







## *Cardamine serbica* Pančić



- IUCN Global – NE
- IUCN National – NE (CR)
- Species status confirmed recently (Kučera et al., 2008, 2010)
- Only one population in Serbia (type locality)
- Annual plant species (Pančić, 1884; Jovanović-Dunjić, 1972)
- Flowers in May
- In 2018 – 1 flowering individuals + 18 in vegetative phase
- There was no fruits and seeds produced







# Cardamine serbica Pančić



- Threats:
  - habitat destruction
  - small population with low genetic diversity
- Activities in the first year
  - Monitoring
  - Labeling of individuals
  - Removal of competing vegetation
  - Dissemination to the public

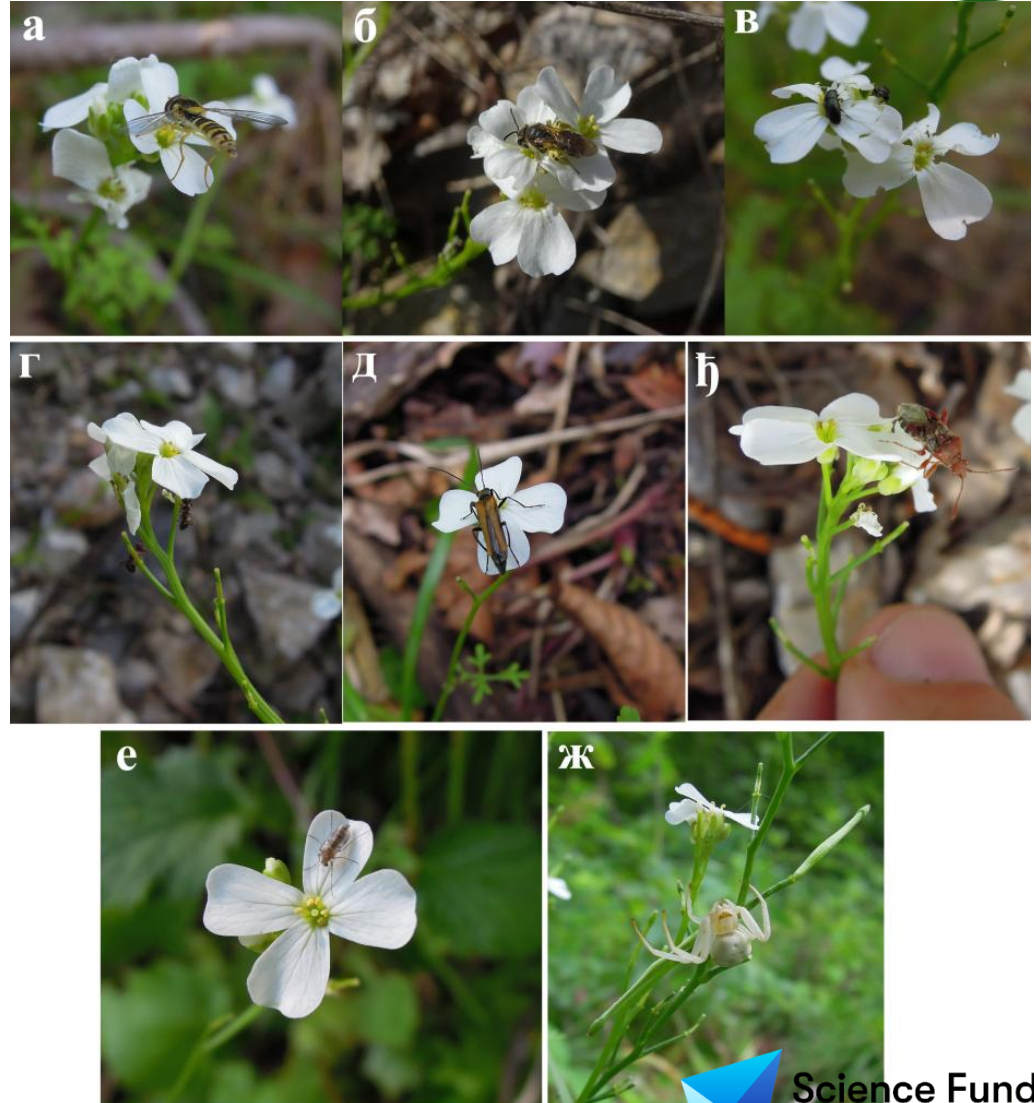




## *Cardamine serbica* Pančić

### • Activities in 2019-2023

- Monitoring
- Labeling of individuals
- Ecological studies
  - climatic characteristics
  - soil
  - vegetation
  - pollination ecology
- Dissemination to the public







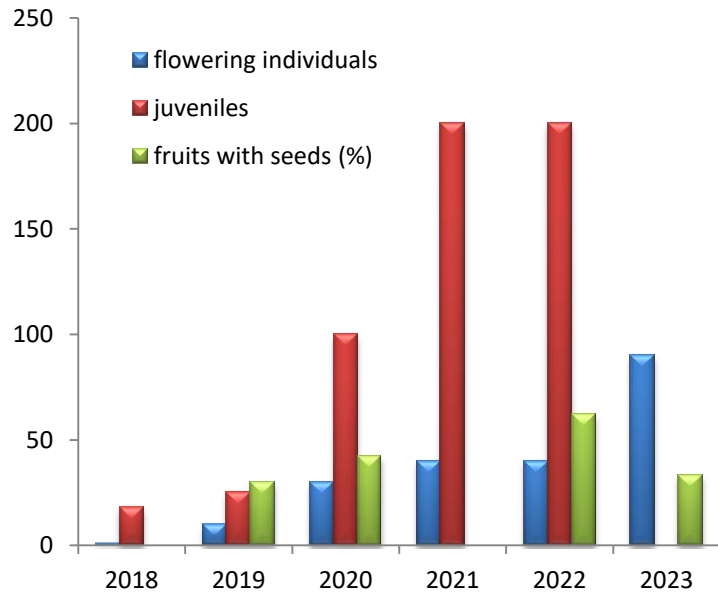
# *Cardamine serbica* Pančić



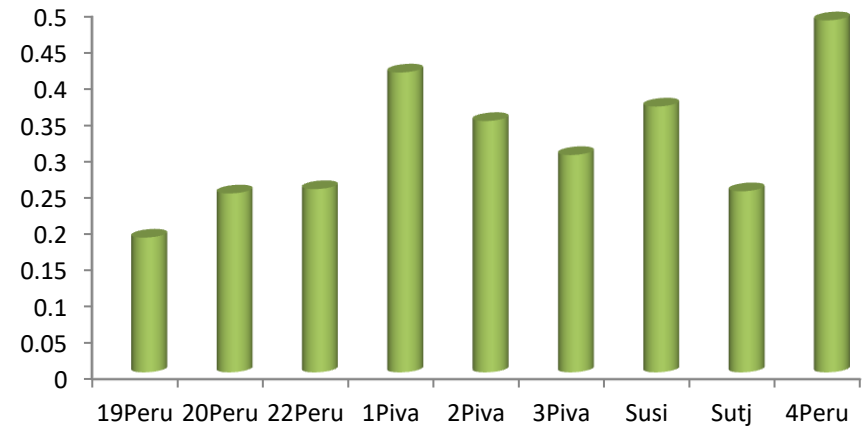




# *Cardamine serbica* Pančić



## Ho-observed heterozygosity



**STSM (2023)** – Mira Fiškalović “Population genetics of rare and thretaned *Cardamine serbica* in the Balkan Peninsula” (hosted by Judita Zozomová-Lihová, Slovak Academy of Sciences)





## *Cardamine serbica* Pančić



Sabovljević et al. (2022). *Botanica Serbica* 46(1): 125-132.



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*Cardamine serbica* Pančić



Excellent start of the vegetative period.



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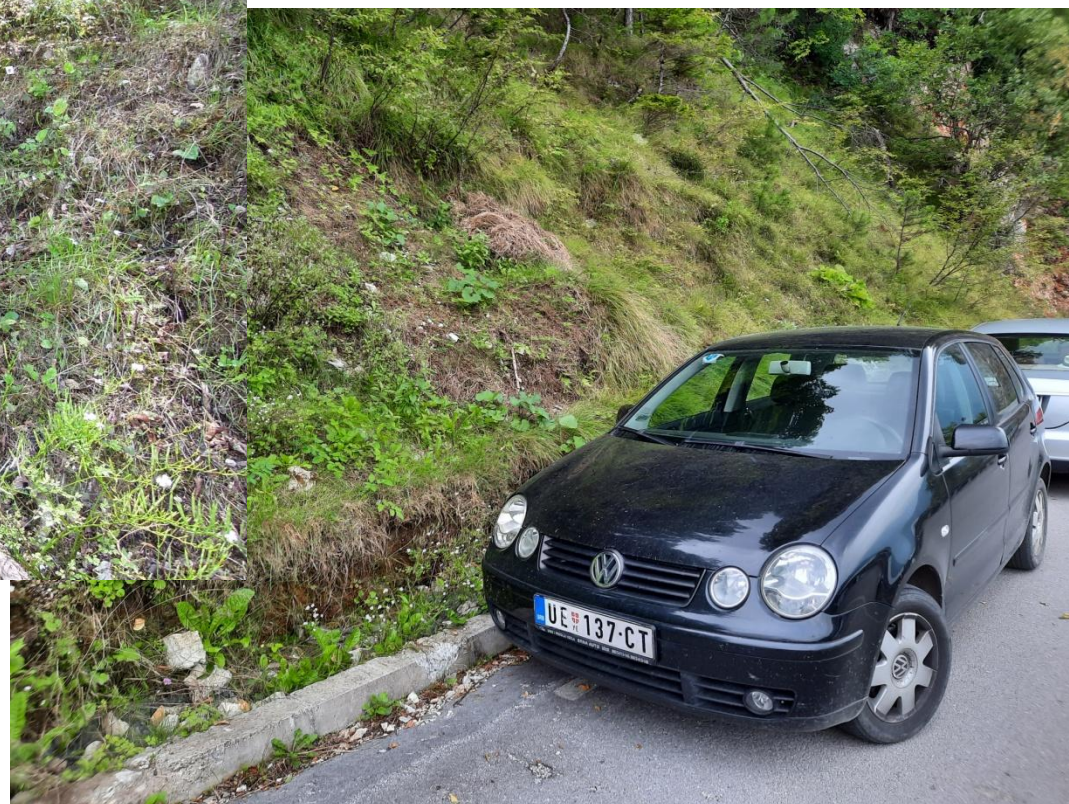




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But problems appeared later on.



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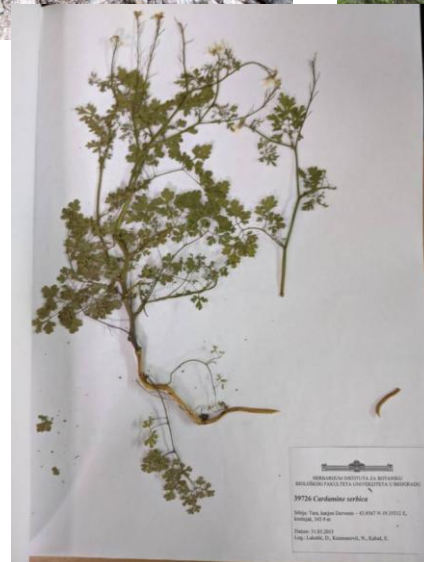


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Thank you for your attention!



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