



Data Article

New thousand-seed weight dataset for plant species of Central Europe



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ABSTRACT

One of the most important and most easily measurable physical characteristics of plant seeds is their weight, which influences and indicates crucial ecological processes. Seed weight affects spatial and temporal dispersibility, and can also influence seed predation and the germination, growth and survival of seedlings. Providing trait data for species missing from international databases is key to promote studies that advance our understanding of the functioning of plant communities and ecosystems, which is an essential issue in the face of the global climate change and biodiversity loss. Compared to species from Western and North-western Europe, those with an Eastern or Central European centre of distribution are underrepresented in most international trait databases. Therefore, the creation of specific trait databases is key to help regional studies. In this respect, it is

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important not only to collect fresh seeds for weight measurements, but also to measure and process data of seeds preserved in collections and make them available to the broader scientific community. In this data paper we provide seed weight data to fill in missing trait data of plant species of Central and Eastern Europe. Our dataset includes weight measurement for 281 taxa of the Central European flora including also some cultivated and exotic species. The seeds were collected between 1971 and 2021 mostly in Central Europe. One part of the measured seeds was collected in the last decade, the other part is from an older seed collection, but all seeds were measured recently. For each species, we collected a minimum of 3×100 intact seeds, if possible. The seeds were air-dried at room temperature (approximately 21 °C and 50% relative humidity) for at least two weeks and measured with an accuracy of 0.001 g using an analytical balance. The thousand-seed weights reported here were calculated based on the measured values. Our goal for the future is to incorporate the seed weight data reported here in a regional database (Pannonian Database of Plant Traits – PADAPT) that gathers plant traits and other plant characteristics for the Pannonian flora. The data presented here will facilitate trait-based analyses of the flora and vegetation of Central Europe.

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Specifications Table

Subject	Environmental sciences: Ecology
Specific subject area	Plant Ecology, Functional Ecology
Type of data	Table
How the data were acquired	Seeds of species were collected between 1971 and 2021. After collection, the seeds were air-dried and 3 series of 100 seeds of each species (if available) were weighed with an accuracy of 0.001 g.
Data format	Raw (measured and calculated)
Description of data collection	At collection, we aimed to collect seeds and fruits from at least 15-20 individuals. If possible, we collected a minimum of 3×100 intact seeds/fruits for each species, for which about 400-500 seeds are needed to ensure having at least 300 intact ones. During the collection, the fruits and seeds collected were cleaned of larger impurities and other plant residues. After 2 weeks of drying at room temperature (approximately 21 °C and 50% relative humidity), 3 series of 100 seeds of each species were measured.
Data source location	<i>City/Town/Region</i> : the sampling location for each species is indicated in the supplementary data table <i>Country</i> : Hungary, Azerbaijan, Germany, Slovakia, Finland, The Netherlands, France, England, Belgium, Czech Republic, Croatia, Switzerland, Denmark, Russia, Lithuania
Data accessibility	Repository name: Figshare Data identification number: 21739616 Direct URL to data: https://figshare.com/articles/dataset/Thousand-seed_weight_data_from_Central_Europe/21739616

Value of the Data

- The presented data can support trait-based studies.
- Most of the international trait databases are incomplete with regard to species with an Eastern or Central European centre of distribution, therefore publishing trait data from Eastern and Central Europe is key to help trait-based studies in the region.
- SID, the Seed Information Database [1] does not have any seed weight data for 37 (13%) of the 281 species in our dataset, while the LEDA Traitbase [2] does not have seed weight data for 106 (38%) of the species in our dataset.
- Our dataset contains trait data of several European species of great conservational importance.
- The presented data can also be useful for practical nature conservation and restoration projects in Eastern and Central Europe, and especially in the Pannonian region. Knowledge of the thousand-seed weight contributes to the assembling of seed mixtures for restoration [3].

1. Objective

As trait-based approaches can improve our understanding of ecosystem functioning and community assembly, they have been increasingly applied in ecological research in the recent decades [4,5]. In the meantime, efforts to develop and publish trait databases has also increased with the aim of facilitating trait-based studies [6,7].

Seed weight (also referred to as seed mass) affects several ecological processes from dispersal in both space [8] and time (seed bank formation [9]) through germination and seedling establishment [10] to seed predation [11]. Seed weight has high importance in evolutionary ecology as well, as it was shown to be evolutionary correlated for example to genome size [12] and growth form [13]. Consequently, it is one of the most frequently used plant traits in ecological research. Although seed weight is an easily measurable trait, its measurement is time consuming and labour intensive, so making seed weight data freely available online can promote trait-based analyses by saving time for researchers. We intend to incorporate the seed weight data reported here into the Pannonian Database of Plant Traits (PADAPT, <https://padapt.eu/>) which collects plant traits and attributes for more than 2500 species of the flora of the Pannonian region.

2. Data Description

Data table [14]: The data table contains the name of the measured species, the calculated three series of thousand-seed weight values, the location and date of sampling, the sample size, and the measured morphological unit of the plants. For details see Table 1.

3. Experimental Design, Materials and Methods

Seeds of 75.5% of the species were collected in Central Europe between 1971 and 2021. Seeds of 24.5% of the species were collected outside Central Europe, for example in Russia, Finland, or Azerbaijan. One set of the measured seeds was collected in the last decade, these seeds are stored in the seed collection of the Department of Ecology, University of Debrecen (Debrecen, Hungary). The other set of the measured seeds is from the seed collection of the József Attila City Library and Museum's seed collection (Kömlő, Hungary), but these older seeds were also measured recently. At collection, we aimed to collect seeds and fruits from at least 15-20 plant individuals. Different localities were treated separately, so fruits and seeds of the same

Table 1
Structure of the dataset.

Column	Description
Species	Name of the species – the taxonomic nomenclature is based on the Euro+Med database [15].
Weight 1	Weight of the first hundred-seed series (g)
Weight 2	Weight of the second hundred-seed series (g)
Weight 3	Weight of the third hundred-seed series (g)
TSW	Thousand-seed weights (g).
Location	The name of the settlement to which the sampling location belongs. The abbreviation of the country is given following the settlement (HU – Hungary; AZE – Azerbaijan; DE – Germany; SK – Slovakia; FI – Finland; NL – The Netherlands; FR – France; UK – United Kingdom; BE – Belgium; CZ – Czech Republic; HR – Croatia; CH – Switzerland; RU – Russia; DK – Denmark; LV – Lithuania). 'Bg' inserted in brackets after the sampling location indicates that the measured seeds originated from plants germinated from seed bank samples collected at the given location.
Date	Day/month/year
SN	Number of hundred-seed series measured. In cases where less than one hundred seeds were available, the number of seeds measured is reported in brackets.
M	Measured morphological unit.

species collected at different sites were treated separately. For each species, we collected a minimum of 3×100 intact seeds, if possible, for which about 400-500 seeds are needed to ensure having at least 300 intact seeds, because some of the seeds are always injured/broken or damaged by granivores or diseases. During the collection, the fruits and seeds collected were cleaned of larger impurities and other plant residues, but the final complete cleaning took place in the laboratory. For each collection, the following information was recorded: (i) species name, (ii) geographical location of the collection (the name of the settlement) and (iii) the exact time of collection. After at least 2 weeks of air-drying at room temperature (approximately 21 °C and 50% relative humidity), 3 series of 100 seeds of each species (if available) were measured with an accuracy of 0.001 g using an analytical balance. We calculated the thousand-seed weights from the average of the measured values.

Ethics Statements

The data have no personal information or institutional references that may compromise the privacy of any parties; therefore, no ethical implications should be declared.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Thousand-seed weight data from Central Europe (Original data) (Figshare)

CRediT Author Statement

Viktória Törő-Szjgyártó: Data curation, Resources, Investigation, Writing – original draft; **Nóra Balogh:** Data curation, Resources, Investigation, Writing – original draft; **Tamás Henn:** Data curation, Resources, Investigation; **Andrea McIntosh-Buday:** Investigation; **Judit Sonkoly:**

Conceptualization, Investigation, Resources, Writing – review & editing; **Attila Takács:** Investigation, Resources; **Gergely Kovacsics-Vári:** Investigation, Resources; **Patricia Díaz Cando:** Investigation; **Attila Molnár V.:** Resources; **Gábor Matus:** Resources; **Balázs Teleki:** Resources; **Kristóf Süveges:** Resources; **Balázs A. Lukács:** Methodology, Funding acquisition, Resources; **Ádám Lovas-Kiss:** Resources; **Béla Tóthmérész:** Conceptualization, Resources; **Edina Tóth:** Resources, Investigation; **Katalin Tóth:** Data curation, Resources, Investigation; **Péter Török:** Conceptualization, Methodology, Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition.

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