

# Assesing the Monumental Willow Trees of Romania

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**Abstract:** The life of monumental trees has been fascinating throughout time due to their important cultural, botanical, symbolic or landscape value as well. Besides this, they are a hub for biodiversity as a result of their large girth, great height and impressive age. The aim of the research was to identify and measure the monumental willow trees of Romania and to register their main data. Apart from dendrometric data, their health status was included in order to better understand their actual vegetation status. In total a number of 25 monumental willow specimens were identified and measured. The trees are located on the premises of localities, within the radius of 14 counties.

The most frequent species with monumental dimensions of the genus *Salix* is White willow (*Salix alba*; 13 specimens) and Weeping willow (*Salix babylonica*; 9 specimens). Most of the specimens were located in park areas (32%) or on the river banks (28%). In terms of health status, 40% of the measured trees are in very good and good condition and 60% are having a bad vegetation condition. Due to their benefits and attractiveness, any research regarding monumental trees is greatly appreciated and additionally, all the monumental specimens must receive legal protection at the local or national level as soon as possible.

## 1. Introduction

A monumental tree as its name suggest is normally defined by its remarkable characteristics that are succeeding other trees due to its exceptional age (secular trees), great size (height or circumference), historical significance, cultural or mystical events that occurred during time and unique shape that provide a high aesthetic value (Read 2000; Fay 2002; Pautasso and Chiarucci 2008; Lindenmayer et al. 2012).

Trees in particular have always possessed an important cultural, botanical, symbolic or landscape value and monumental trees fall in this section, often living for hundreds or even thousands of years. Also they provide a large number of ecosystem benefits like

air-pollution reduction (Novak et al. 2006, Valades et al. 2020), temperature regulation (Gillner et al. 2015), carbon storage, water retention (Lachat et al. 2013; Sist et al. 2014) and maintaining biodiversity by the fact that they support a lot of microhabitats on their surface (Lindenmayer and Laurance, 2017, Seibold et al. 2018; Valades et al. 2020). They also represent an important reservoir for genetic resources for the future with strong genes for pathogen resistance or stress tolerance (Nolan et al. 2020).

Monumental trees provide a lot of possibilities within the field of environmental education, their heritage for society is invaluable. Their attributes confer greater educational, environmental, recreational and tourist (Ramon Fernandez 2018) attractiveness to the localities in which they were identified and allow the promotion of these places, thus local communities that protected monumental trees over decades can benefit from touristic activities leading to a development of the area.

The genus *Salix* L. of Salicaceae, known as willows, is formed of 450–520 species, forming one of the main groups of trees which is widespread in the Northern Hemisphere and North Temperate Zone (Argus et al. 2010, Wu et al. 2015). *Salix* species due to their diversity form an important resource for a great number of insect and mammalian herbivores (Wu et al. 2015). The genus consists of low growing shrubs, shrubby trees with multiple trunks and tall trees with a single trunk (Şofletea and Curtu 2007).

Willow is a pioneer and invasive species due to tiny seeds (less than 2 mm in length and a milligram in weight) that are disseminated by the wind over areas of up to 0.8 - 0.9 km (Tiebel et al., 2019, Charlton et al.2022). It is frequently one of the dominant vegetation species in marginal habitats such as wet woodlands, riverbanks, mountain tree lines and vacant or disrupted land (Gramlich et al., 2016; Charlton et al.2022).

The monumental trees in general and the monumental trees of genus *Salix* in Romania represent remarkable nature values and qualities as well as important landscape features. The primary aim of this research is to have a data base after field measurements where general data (circumference, height etc.) are recorded. Besides this a check on their health status is conducted.

The aim of this paper is to analyse and to describe the monumental trees from the *Salix* species that were inventoried from the entire surface of Romania.

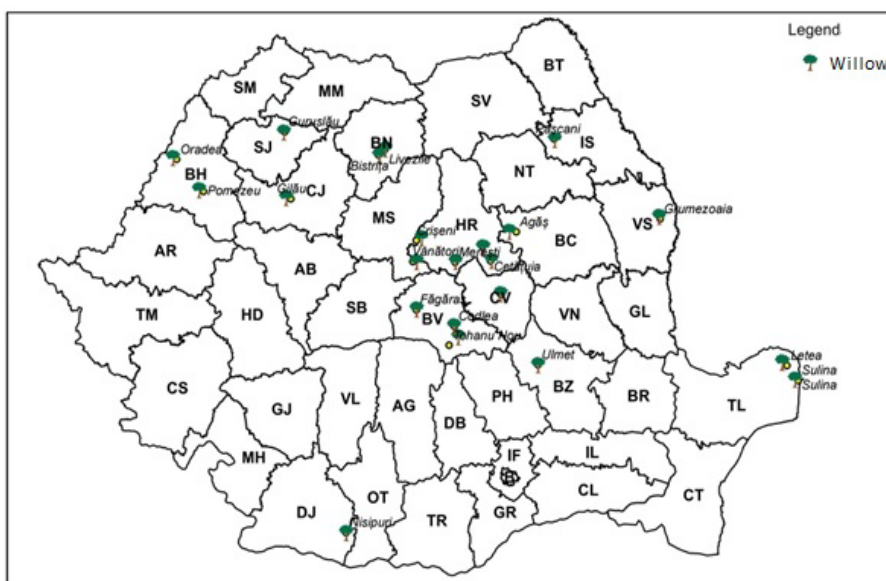
## 2. Materials and Methods

Romania is situated in the east part of the Europe and has a temperate continental climate.

The research conducted in May through September spanning from 2019 and 2022 was based on an observation method. The research covered the entire surface of the country, identifying willow trees that had monumental dimensions in 22 localities within 14 counties (Figure 1).

A tree categorized as monumental has been rigorously verified in the field by checking the following characteristics: dendrometry measurements such as height were taken of its total height by using a Vertex while circumference at DBH of 1.3 m was taken with tape measure. In case on a tree, cancer or excrescence was present at that height, measurements were taken above it. In case of a trees growing on a slope, circumferences were measured from the higher side of the slope. The canopy was measured on two

perpendicular directions (from north to south and from east to west). The age of the trees was estimated because dendrochronological sampling such as tree coring may deteriorate the tree, particularly the old ones.



**Figure 1.** The location of the monumental trees from the genus *Salix* (Coman S.)

Their accurate geographical location was determined by using the program Avenza Maps (Avenza Maps is a mobile mapping app available on Apple and Android mobile devices which allows to see the location in real-time on a PDF map, using the device’s built-in GPS).

In order that the specimens would qualify for monumental trees from the *Salix* genus specific criteria’s that are presented Table 1 were used (values of the circumference, height and age lower limits) thus making them entering the category of monumental trees (Vasile et al. 2022).

**Tabel 1.** Criteria for willow specimens to be declared as monumental trees

Nr.	Species	Height (m)	Circumference at 1,3 (m)	Age (years)
1	White willow ( <i>Salix alba</i> L.)	≥25	>4,5	>100
2	Weeping willow ( <i>Salix babylonica</i> L.)	>15	> 3,5	>100
3	Goat willow ( <i>Salix caprea</i> L.)	>20	> 2,0	>100

Health condition of the tree (the trunk and canopy) was established using a 3-level scale (Kasprzak 2005; Antkowiak and Materak, 2009; Takács and Malatinszky 2009) and are as follows:

**Very good** health condition – completely healthy trees, with no dry branches, no damage to the trunk or present pests;

**Good** health condition – trees with dead, dry small branches, especially at the top, little damage to bark, appearance of plant and animal pests;

**Bad** health condition - trees having 70% dead canopy, substantial damage in wood tissue, with a lot of cavities, significantly infested with pests.

### 3. Results and discussion

In the inventory a total of 25 monumental trees of genus *Salix* were identified. They belong to five different species. Most represented species are White willow (*Salix alba* L., 13 trees) and Weeping willow (*Salix babylonica* L., 9 trees) (Table 2).

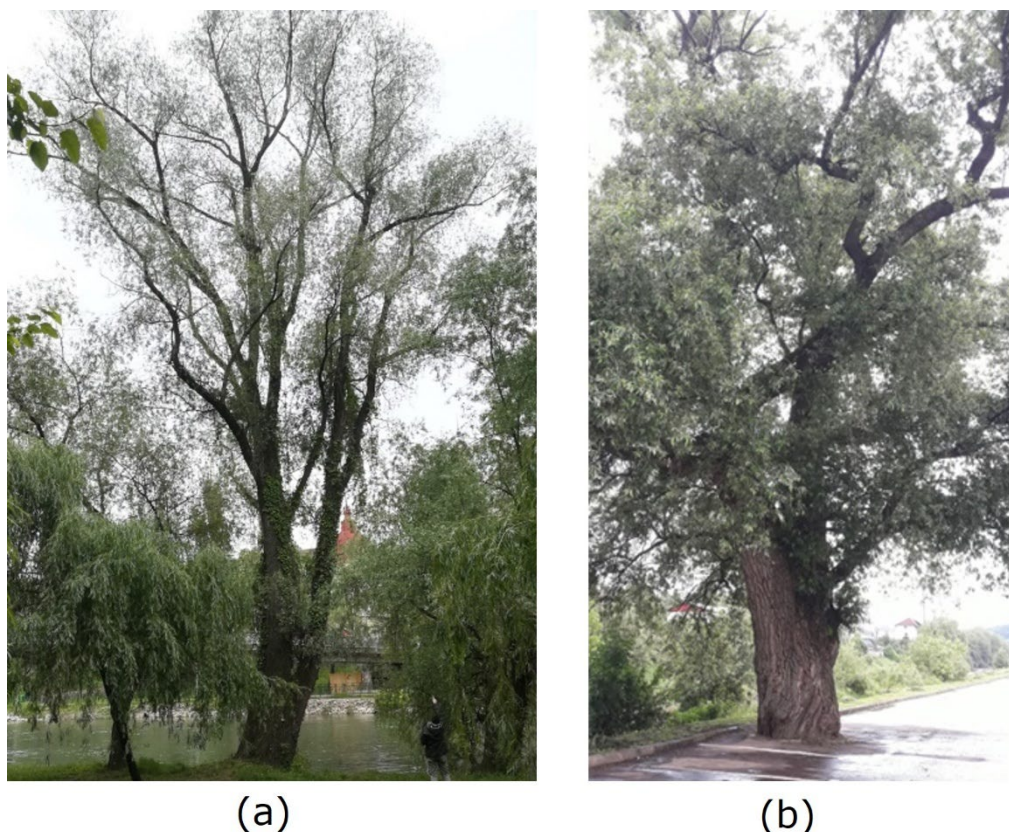
**Table 2.** Measured size characteristics and the age of the 25 monumental willow trees

The species	Locality	County	Coordinates		Height (m)	Girth (m)	Diam. of the canopy (m)	Estimated age (years)
			Lat.	Long.				
White willow ( <i>Salix alba</i> L.)	Crișeni	HR	46.440055	25.034444	22.90	4.36	18.90	200
	Vânători	MS	46.239892	24.972161	17.30	4.24	12.30	150
	Cetățuia	HR	46.245181	25.904784	11.2	3.80	11.40	150
	Grumezoaia	VS	46.804920	22.223960	16.5	4.58	14.85	150
	Pomezueu	BH	47.066010	21.879310	17.50	3.49	17.00	150
	Oradea	BH	47.127717	24.499210	30.30	3.67	14.55	150
	Bistrița	BN	47.310270	23.279070	19.5	6.30	20.40	200
	Guruslău	SJ	46.578230	28.019140	14.3	3.67	15.75	150
	Letea	TL	45.311102	29.464167	11.6	4.58	10.85	200
	Letea	TL	45.309873	29.466541	16.6	5.65	10.50	250
	Sulina	TL	45.162740	29.608340	16.6	4.58	19.25	200
	Ulmet	BZ	45.369594	26.465716	18.4	5.75	19.15	200
	Nisipuri	DJ	43.970159	24.126479	16.8	6.00	14.70	200
Weeping willow ( <i>Salix babylonica</i> L.)	Merești	HR	46.238978	25.456471	15.26	4.14	9.70	150
	Cernat	CV	45.966735	26.015609	15.3	4.49	15.15	150
	Tohanul Nou	BV	45.608381	25.487831	13.8	4.33	9.03	150
	Miercurea Ciuc	HR	46.358554	25.801554	18	4.84	14.60	200
	Miercurea Ciuc	HR	46.357588	25.803300	14.8	4.14	13.45	150
	Codlea	BV	45.701501	25.436534	22.9	4.93	17.70	100
	Pașcani	IS	47.128124	24.495403	17.3	3.64	14.00	200
	Bistrița	BN	47.180921	24.572653	16.2	3.39	12.05	150
	Livezile	BN	47.245198	26.729345	15.4	4.58	12.85	150
Crack willow ( <i>Salix fragilis</i> L.)	Agăș	BC	46.486290	26.134640	23.1	5.5	15.35	100
Goat willow ( <i>Salix caprea</i> L.)	Gilău	CJ	46.762820	23.327610	12.2	2.51	15.95	100
Curly willow ( <i>Salix matsudana</i> Tortuosa)	Făgăraș	BV	45.841938	24.970060	11.2	4.2	8.7	100

Trees are placed over the territory of 22 localities from 14 counties. Most of them are concentrated in the counties situated in the central part of the country (Harghita, Covasna and Braşov) (Figure 1).

The tallest White willow tree is in Oradea (Bihar County) (Figure 2a), with a height of 30.30 m, being much taller than the White willow from Czechoslovakia which is 26 m height (Uradnicek et al. 2017) and that from Goluchow village (Poland) which has a height of 25 m (Wronska-Pilarek et al. 2016).

The thickest White willow, with a girth of 6.30 m is in Bistriţa (Bistriţa Năsăud county) (Figure 2b). This specimen has greater dimensions than White willow from Poznan (Poland), which is 4.30 m in circumference (Wieloch et al. 2017) and that from Goluchow (Poland) which is 5.55 m in circumference (Szczepkowski et al. 2020). But the White willow from Berlin (Germany) is the thickest, with the 8.34 m in circumference (Gomolka 2017), similar with the willow from Czechoslovakia which has a circumference of 8.20 m (Uradnicek et al. 2017).



**Figure 2.** (a) White willow with 30 m height from Oradea (Mihalache E.), (b) White willow with 6.30 m girth from Bistriţa (Scărlătescu V.)

In terms of age of the trees, the oldest willow tree is the White willow from Letea (Tulcea county) (Figure 3) with an estimated age of 250 years.

The tallest and the thickest specimen of Weeping willow from our country was identified in the city of Codlea (Braşov county) (Figure 4a), with a height of 22.90 m and a girth of 4.93 m.

Also, in Agăş (Bacău county) it was registered a specimen of *Salix fragilis* (Figure 4b) with a height of 23.10 m and with a girth of 5.5 m, being the greatest specimen

comparing with the *Salix fragilis* from Czechoslovakia which is 14 m height and 5.40 m girth (Uradniecek et al. 2017), and from Poland (Goluchow village) which is 19 m height and 4.51 m girth (Wronska-Pilarek et al. 2016).



**Figure 3.** White willow with an estimated age of 250 years from Letea (Scărlătescu V.)



(a)



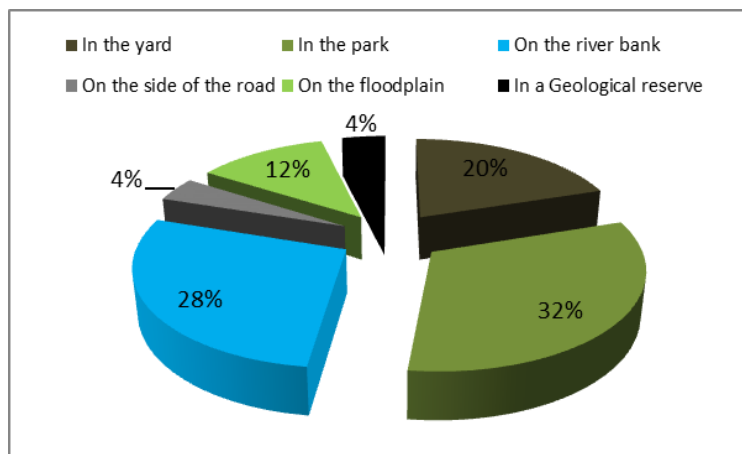
(b)

**Figure 4.** (a) Weeping willow with 22.90 m height and 4,93 m girth from Codlea (Mihalache E.), (b) Crack willow with 23.10 m height and 5.50 m girth from Agăș (Mihalache E.)

*The habitat of the monumental willows*

A percentage of 32% of the monumental willow trees are located in riverbanks and the proportion of those that are located in parks is almost identical (28%) (Figure 5).

Another group of willows (20%) are situated in the institution’s premises (respectively in the yard of a church, a monastery and a high school) and about 12% of willows has been identified in the floodplain areas. The willow from Letea (Figure 4) is a typical floodplain willow with traces of rot in the trunk and with some signs of the water level.

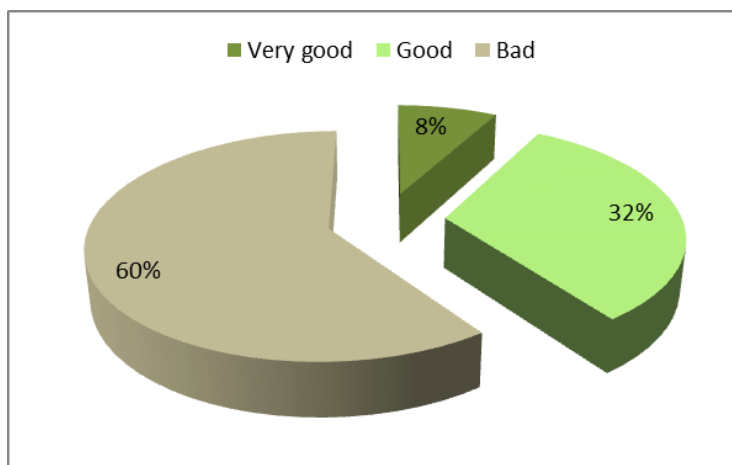


**Figure 5.** The habitats of the measured monumental willow trees

*The health status*

In terms of the health status of monumental willow trees (Figure 6), unfortunately 15 specimens are in bad conditions (representing 60% of the total number of registered willows) having 50%-70% dead canopy, with cavities and damage in wood tissue and infested with pests.

Eight willows (32%) are in good conditions, only with dry small branches in the canopy and very little damage to bark, while only two willows are in very good conditions being completely healthy trees, with no dry branches, no damage to the trunk or present pests.



**Figure 6.** Health status expressed on a 3-level scale

## 5. Conclusions

The identified willows specimens are good examples of monumental trees with great dimensions (height or girth) and with an impressive age. These natural monuments are still alive, but in the absence of the protection or monitoring most of them can be affected or even lost.

Only 40% of the measured monumental willows are in good or very good health condition, while 60% are in bad health conditions. This calls attention to the importance of such trees and applying an appropriate management, can lead to their survival in the future decades.

Identifying the monumental trees is in general not easy due to their location and the great distances that have to be covered in order to properly identify them. While some of the willows are situated in the parks, or on the side of the roads (36%), others are hidden in distant places, such as on the river banks, or in the floodplain (40%).

There is a very restricted number of cases in our country where a monumental tree is legal protected, only in some localities by the decision of the local Council. But this legal status sometimes does not guarantee real protection, attention or preservation. Whereas their identification and legal protection do not promise correct care and preservation of the monumental trees, there is an immediate requirement to implicate the people from the localities where the monumental trees were identified to act against the factors that threaten the integrity of these natural monuments.

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