

# Changes of surface area of assimilating leaves

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JUHÁSZ, M., LÓKI, J.: *Changes of surface area of assimilating leaves.*

**Abstract:** Physiological state of dominant tree species of temporarily flooded alluvial forests was studied by measuring changes of assimilating surface area. A significant correlation between leaf size and water supply of the growing place was pointed out. Strongest connection with water level changes of the river was shown by changes of assimilation surface of *Salix alba*, living in the low floodplain.

**Key words:** biomonitoring, alluvial forests, leaf assimilation area

## Introduction

Changes of assimilation area of leaves were studied within the scope of biomonitoring of alluvial forests along the river Drava (JUHÁSZ 1997, 2004, JUHÁSZ & DÉNES 2001, 2004, MARKÓ & JUHÁSZ 1997). These studies are part of a complex environmental monitoring system, started in 2000, aiming to monitor environmental effects of a hydroelectric power plant - planned on the river Drava in Croatia - in Hungary.

Existence, species composition and other characteristics of plant communities living in floodplains are strongly dependent - through water supply of their growing place - on water level changes of the river. The assimilation surface area of leaves is a sensitive indicator of water supply of the growing place. Plants with high water demand are especially sensitive from this point of view, this is why we measured changes of assimilation surface area of leaves of dominant trees of alluvial forest communities temporarily flooded.

## Materials and methods

For measuring changes of assimilation surface area of tree leaves study material is collected exactly on the same plots every year in autumn after falling of the leaves. On every plot 200 leaves were collected randomly.

Leaf area is determined by an informatical method (LÓKI 1996) because we have no financial means to obtain a laboratory equipment for this purpose. Essence of the method: collected leaves (200 pcs per plot) are prepared as usual for herbariums (dried

between blotting papers, under light pressure) for about three weeks, then fastened on white paper and scanned. Assimilation area is determined through measuring leaf surface area. Files are prepared by software Paint Shop Pro for GIS processing. Every leaf area is measured by software IDRISI, average leaf area per plots will be determined by Microsoft Excel.

## Results

For measuring of assimilation surface area of leaves material is collected at four plots. Characteristic dominant tree species of low floodplain forests along the Drava is *Salix alba*; its leaves are collected at three plots. First plot is upstreams of the planned power plant (near village Őrtilos), second one is upstreams of the mouth of the lower canal of the planned power plant (near village Bélavár), and third one is downstreams of it (near village Vízvár). Fourth study plot is situated on the wide lowland plain beside the planned power plant, near village Gyékényes; here tree species *Alnus glutinosa* is studied. Research has begun in 2000; here we publish results of five study years (Table 1).

**Table 1.: Measured data of leaf assimilation area between 2000-2004, by study plots**

years	leaf assimilation area (cm <sup>2</sup> )			
	<i>Salix alba</i> B13	<i>Salix alba</i> B16	<i>Salix alba</i> B15	<i>Alnus glutinosa</i> B14
	Őrtilos	Vízvár	Bélavár	Gyékényes
2000	5.47	5.69	-	24.82
2001	5.93	5.44	5.09	21.9
2002	4.22	4.93	3.99	26.02
2003	5.22	5.35	5.23	26.49
2004	6.35	5.87	5.07	28.55

At study plot near Őrtilos (B13) average surface area of *Salix alba* changed between 4.22 and 6.35 cm<sup>2</sup> during study interval (Fig.1). Assimilating leaf surface area was the smallest in 2002, the largest in 2004. At study plot near Vízvár (B16) changes of average leaf area of *Salix alba* were a little smaller (Fig.2), but the smallest it was also in 2002 (4.93cm<sup>2</sup>), the largest also in 2004 (5.87 cm<sup>2</sup>). At study plot near Bélavár (B15) research has began a year later. The smallest value was measured here too in 2002 (3.99 cm<sup>2</sup>), but the largest value was measured in 2003 (5.23 cm<sup>2</sup>). Leaves of *Alnus glutinosa* are significantly larger then those of *Salix alba*. Average leaf surface area during study interval has changed between 21.90 and 28.55 cm<sup>2</sup> (Fig.4); the smallest was in 2001, the largest in 2004.

Result of the study show definite correlation between leaf size and water supply of the growing place. Changes of assimilation area of *Salix alba*, living in low floodplain, show the closest correlation with changes of water level of the river. Smallest values were measured at every plot in 2002, which inevitably shows a strong correlation with lower water levels of this period, resulted by less precipitation. Water supply of growing place of *Alnus glutinosa* depends partly also on water level changes of river Drava, but it is

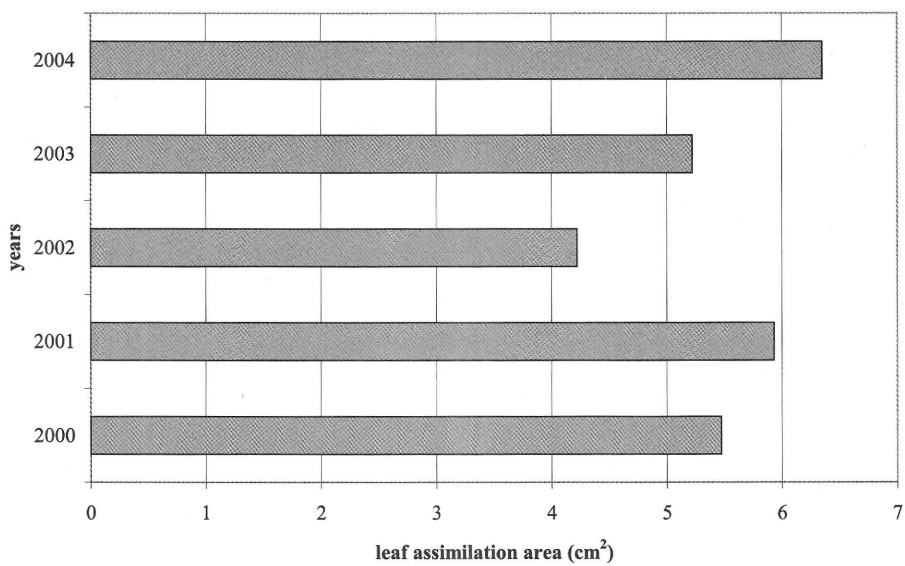


Fig.1. Changes of assimilation area of *Salix alba* at study plot B13 (Őrtilos)

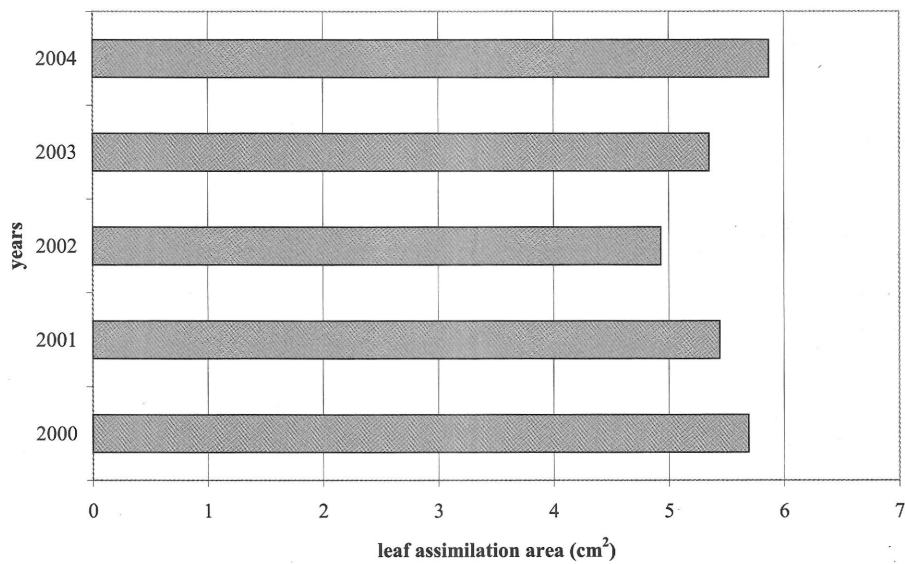


Fig.2. Changes of assimilation area of *Salix alba* at study plot B16 (Vízvár)

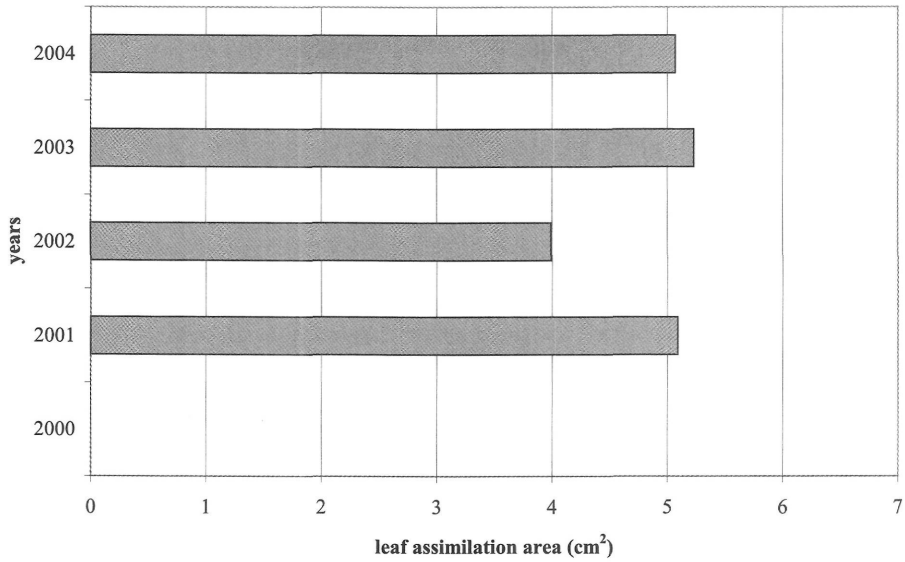


Fig.3. Changes of assimilation area of *Salix alba* at study plot B15 (Bélavár)

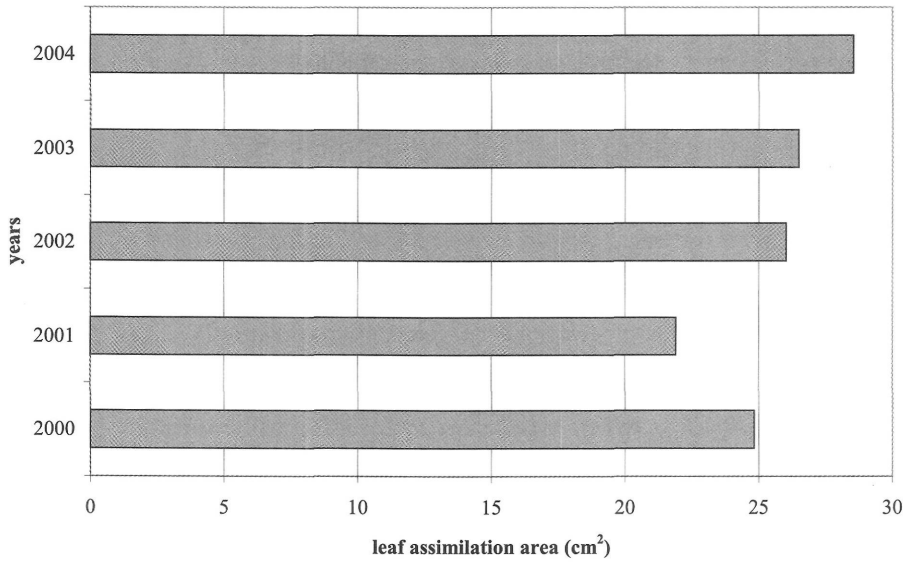


Fig.4. Changes of assimilation area of *Alnus glutinosa* at study plot B14 (Gyékényes)

influenced by the state of drainage canals of the higher floodplain and by waters coming from neighbouring hills. So effect of changes of river water levels is less inevitable; it can be shown out perhaps by evaluation of data of a longer-run measurement series.

## Conclusions

Physiological state of dominant tree species of temporarily flooded alluvial communities along river Drava was studied by measuring changes of assimilating surface area. Research was carried out in five consequent years (2000-2004), at four study plots. Evaluation of results shows a significant correlation between leaf size and water supply of the growing place. Strongest connection with water level changes of the river was shown by changes of assimilation surface of *Salix alba*, living in the low floodplain. Average leaf area of this species was smallest at all study plots in 2002, in strong correlation with low water levels of that period.

## References

- JUHÁSZ, M. 1997: A vegetáció jelenlegi állapota a Dráva-sík és Belső-Somogy határvidékén - Dráva Konferencia, p. 21.
- MARKÓ, A. & JUHÁSZ, M. 1997: A Duna-Dráva Nemzeti Park somogyi szakaszának talajtani viszonyairól. XI. Országos Környezetvédelmi Konferencia, Siófok, pp. 271-281.
- JUHÁSZ, M. - DÉNES, A. 2001: Időszakosan vízzel borított erdőtársulások alapállapot-felmérése a Dráva-monitoring keretében. - II. Dráva Konferencia, p. 9.
- JUHÁSZ, M. & DÉNES, A. 2004: Időszakosan vízzel borított erdőtársulások monitoring vizsgálata a Dráva mentén. - Flóra- és Vegetációkutatás a Kárpát-medencében VI. p. 71.
- JUHÁSZ, M. 2004: A somogyi Dráva-ártér növényzete. In: SALLAI Z. (szerk.): A drávai táj természeti értékei. - Nimfea Tanulmánykötetek 3:20-28.
- LÓKI, J. 1996: Távérzékelés. - Egyetemi jegyzet, KLTE TTK p.113.

## Asszimiláló levélfelületek változásainak vizsgálata

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A Dráva folyó árterületén élő, időszakosan vízzel borított ártéri erdőtársulások állományalkotó fafajainak fiziológiás állapotát vizsgáltuk az asszimilációs felület változásának a mérésével. A felmérés öt egymást követő évben (2000-2004) történt, négy mintavételi helyen. Az eredmények értékelése során határozott összefüggés mutatkozott a levelek mérete és a termőhelyek vízellátottsága között. A folyó vízjárásával a legszorosabb kapcsolatot a mélyártérben élő fehér fűz (*Salix alba*) asszimilációs felületének a változása mutatja. Ennek a fafajnak az átlagos levélterülete minden mintavételi helyen 2002-ben volt a legkisebb, ami szoros összefüggésben van az abban az időszakban kialakult alacsony vízsintekkel.