PHYSIOLOGICAL PARTICULARITIES OF *MYRICARIA GERMANICA* SPECIES IN CLIMATIC CONDITIONS OF NATURA 2000DOMOGLED-CERNA VALLEY SITE

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Key words: *Myricaria germanica*, photosynthesis, transpiration, water content

ABSTRACT

Myricaria germanica is a pioneer species that is installed along watercourses in the Natura 2000 Domogled - Cerna Valley site, having a good representation in the Cerna springs and along the river Cernisoara.

The importance of this species is determined by its ability to populate flooded areas, its well-developed root system providing bracing and soil stability.

In mild climatic conditions of the Domogled-Cerna Valley site, with open, sunny areas, species find optimal growth conditions.

An interesting feature of this species is the fact that although it germinates and grows well in flooded soils, it is quite resistant, and drier conditions that usually occur in summer, when the water flow decreases, do not affect it.

INTRODUCTION

SCi 0069 Domogled-Cerna Valley National Site is a protected area located on the administrative territory of Caras-Severin, Mehedinti and Gorj County, in the South-Western side of Romania.

The site stretches across Cerna Mountains and Godeanu Mountains (onthe right side) and Vâlcan Mountains and Mehedinti Mountains (on the left side).

The site is characterized by an impressive floristic diversity, due to the complexity of climatic conditions and physical and geographical aspects. The scenery found along the valley is gorgeous, being dominated by towering massifs like Godeanu,Cerna Mountains, Mehedinti and Vâlcan Mountains that watch over the Cerna river basin.

Limestone formations combine here with rigid rocks and rich vegetation, creating a rare natural phenomenon that must be preserved.

The importance of the site consists in the richness of the flora, of great value in biological, geobotanical and ecological reports, especially regarding the association of various geographical origins species which also generated specific local vegetal associations (Nature 2000 Formulary).

The 3230 habitat *Alpine rivers and their ligneous vegetation with Myricaria germanica*is not included in the Standard Formular Nature 2000, but it is identified in the site (fig.1). The vegetable association is*Salici purpureae – Myricarietum* Moor 1958.

The ecological importance of the 3230habitat results from the capacity of *Myricaria germanica* to colonize new deposits of gravels and set up new biocoenosis, this ability being possible only in the case of natural morphodynamics of the mountain streams, not influenced by human activities.(Danci Oana, 2014)

German tamarisk or false tamarisk, *Myricaria germanica* L is a representative species of family *Tamaricaceae* in the Romanian flora (Sârbu, 2013). It is distributed in Europe and South-West Asia. There it can colonise an area very quickly and is reliant upon dynamic floods (Kammer, 2003).

Myricaria germanica and *Salixelaeagnos* are typical species of the shrubby pioneer vegetation (*Salici-Myricarietum* and *Salicetum elaeagni*) on gravel bars in the European Alps and restricted to this habitat. They have been decreasing rapidly in the last 50 years due to the loss of physical disturbances as a result of the construction of dams(Müller N., Scharm S.,2001).

If it is possible to bring back sand to a river ecosystem through restoration , *M. germanica* might profit from this additional habitat. However, it is crucial that the newly formed habitats can be colonized from a nearby population (Benkler C., Bregy,J.,2010)

The dense root system of the shrubs firmly anchors them in the substrate and thus reduces soil erosion. Flexible branches exhibit only minimal resistance to floodwaters and thus prevent the plants from being dislodged. Since natural river dynamics continuously alter the sites the plants rarely reach more than 15-20 years of age.

Damaged and buried plants show a high ability to regenerate, an important adaptation to repeatedly shifting gravel banks (Kudrnovsky, 2013).

MATERIAL AND METHODS

Experiences have been effectuated in May - September 2016 in Domogled-Cerna Valley site , in two different locations:

- Cerna springs ,Lat N $45^0 11'' 45,38''$, Long E $22^0 47' 8,68''$ 704 m altitude, S-E exposure
- Cernisoara Valley, Lat. N $45^0 13' 32,7''$ Long. E $22^0 48' 57,62''$, 840 m altitude, N-V exposure

For the determinations were used plants from *Myricariagermanica*species.

Myricaria germanica is a deciduous shrub 0.6-2.5 m in height, sparsely distributed from the hills to the spruce forest zone, on river gravels and sandy alluvia. It presents twigs erect, brown reddish. The leaves are small, three to five mm, linear-lanceolate, grayish-green, obtuse, sessile and imbricate. The bracts are longer than flowers. The flowers are pink to white, grouped in terminal spikes(fig.3); calyx and corolla five-lobed,ten anthers, the ovary with sessile stigmas (Clinovschi, 2005, cited by Danci Oana, 2014).

The fruit is a pyramidal capsule and the seeds are small, with a pappus of hairs. It flowers from June to August and disperses by the air-borne seeds.

Myricaria germanica is demanding of good conditions of both light and soil moisture (Sârbu, 2013).

On the biological material were determined: the intensity of leaf transpiration, the intensity of photosynthesis, the content of assimilatory pigments and the water content.

Transpiration, photosynthesis and respiration inleaveswere determinedusingLCiportabledevice.

Thechlorophyllcontentofleaveswas determined with the Minolta portable chlorophyll meter (SPADunits).

The water content and the dry matter were gravimetrically determined by maintaining the biological material to a temperature of 105^0C until reaching a constant weight.

Fig.1. 3230 Habitat (original)

Fig. 2. *Myricaria germanica*(original)

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RESULTS AND DISCUSSIONS

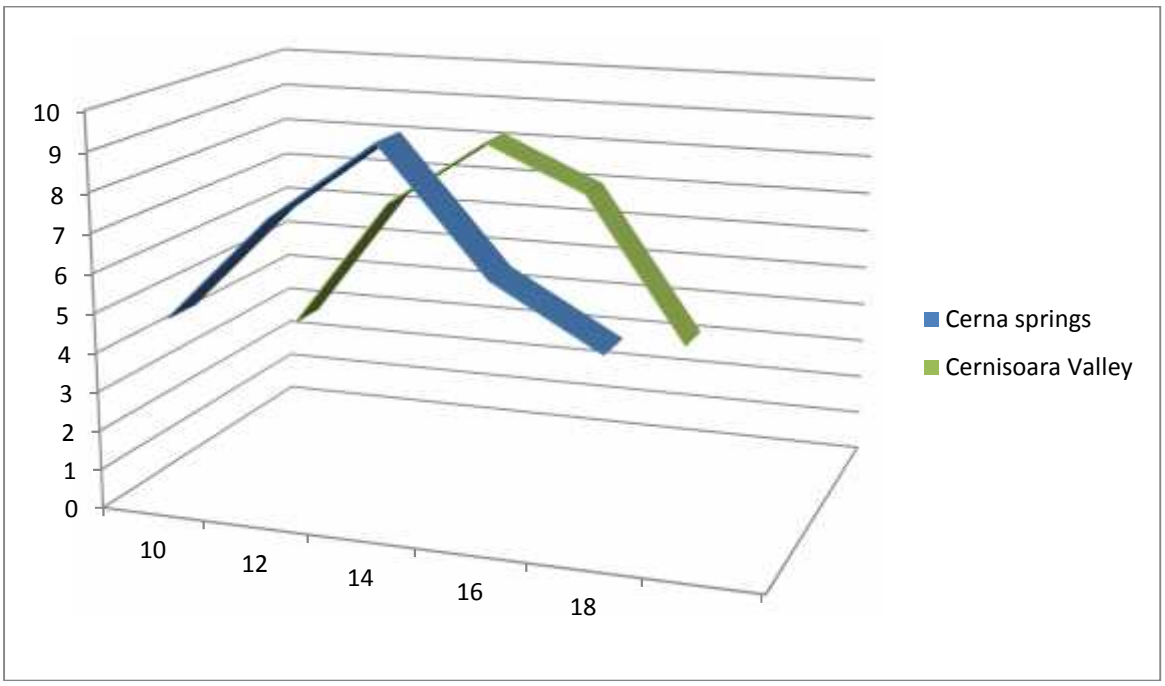
1. Photosynthesis

The diurnal variation of photosynthesis records a maximum at noon in both locations, higher values being present on plants that live near Cerna springs(gr.1), because of the fact that in this area the valley is wider, more open and the sun exposure period is also prolonged, causing both water and gravel to get warmer.

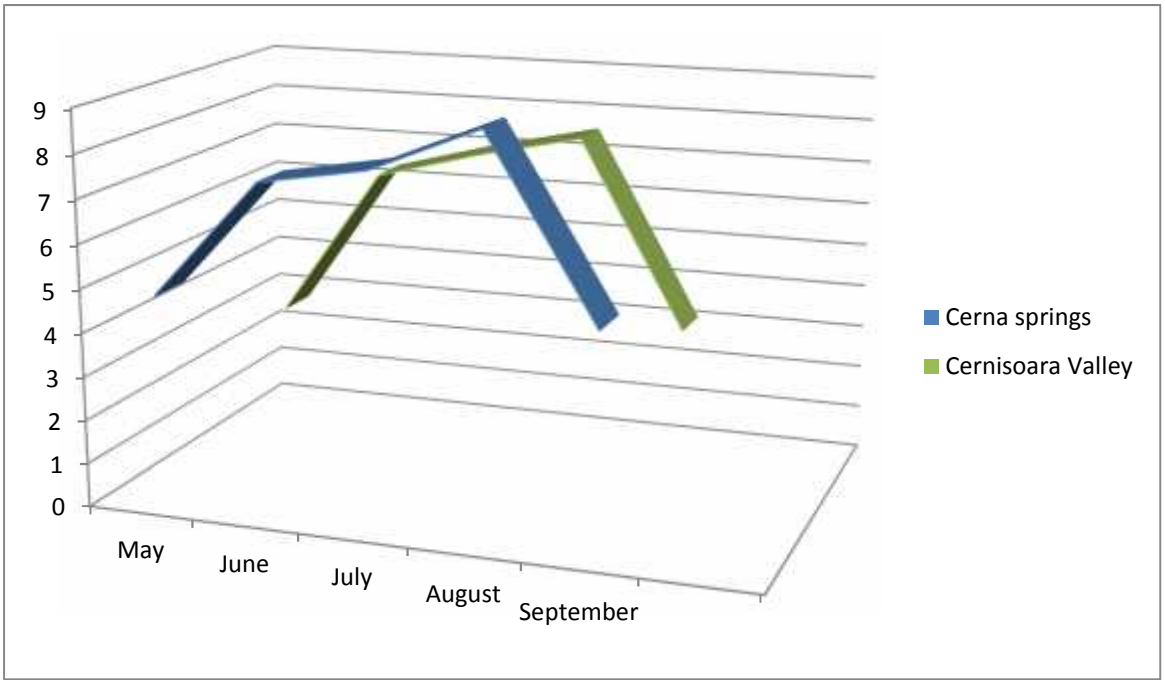
On Cernisoara Valley, the graph follows the same curve, the smallest value of photosynthesis intensity being recorded in the evening.

The seasonal dynamic of photosynthesis in the climatic conditions of year 2016 presents small values until the beginning of June because of the reduced foliar surface and the low content of chlorophyll pigments and records maximum values in the months of July and August, with a peak in the flowering period o plants (gr.2).

The chlorophyll amount in leaves is reduced, the highest content being recorded at plants from Cerna springs, in June, when leaves reach maturity (gr.6). The chlorophyll amount is not influenced by the humidity of the substrate, having similar values for plants that live near water as well as for those who live in drier arias.



Gr.1. The diurnal variation of photosynthesis ($\mu molCO_2/m^2/s$)



Gr.2. The seasonal variation of photosynthesis ($\mu molCO_2/m^2/s$)

2.Water regime

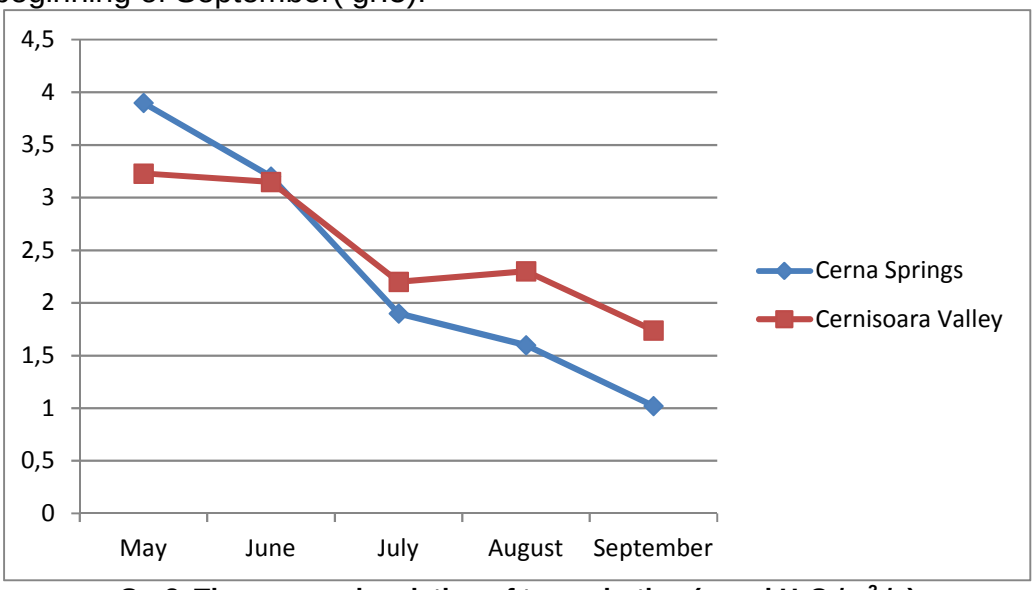
The seasonal variation of transpiration presents maximal values in the months of May and June(gr. 3), due to a large quantity of water which is present in the medium and also because of the fact that young leaves lose higher quantities of water trough their thin cuticle. If in this period the highest values of transpiration are being recorded in the area of Cerna springs, starting from July, the values recorded in Cernisoara Valley are greater.

Although the water flow reduced significantly, the summer of 2016 being one with small amounts of precipitations, on the higher sandbanks that easily lost water, just the young plants were affected. Plants with a life span of more than two years and heights of at least one meter have not presented any signs of water stress because the well developed root system allowed a good absorption of it.

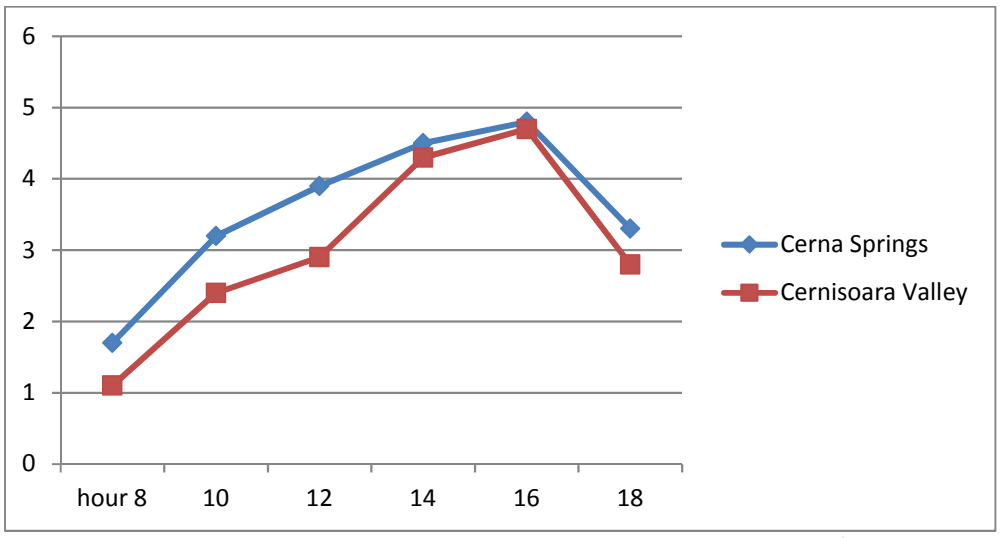
One can say that, although it is a water loving plant, seeds germinating fast in very high humidity conditions, *Myricaria germanica* shows, by a physiologically point of view, some aspects more related to xerophyte or halophyte species: small, scaly and overlapping leaves. This characteristic may represent an advantage in the drier months, the small leaf surface reducing the intensity of transpiration.

The hydric balance of plants was indirectly determined by comparing the total water content values. It remains equilibrate at exemplars situated further away from water too, although, in July and August, they are subjected to a severe water stress due to the reduction of the water flows. In these conditions, in addition to their capacity of reducing the transpiration, probably a major role is played by their well developed root system which can guarantee the sufficient amount of water.

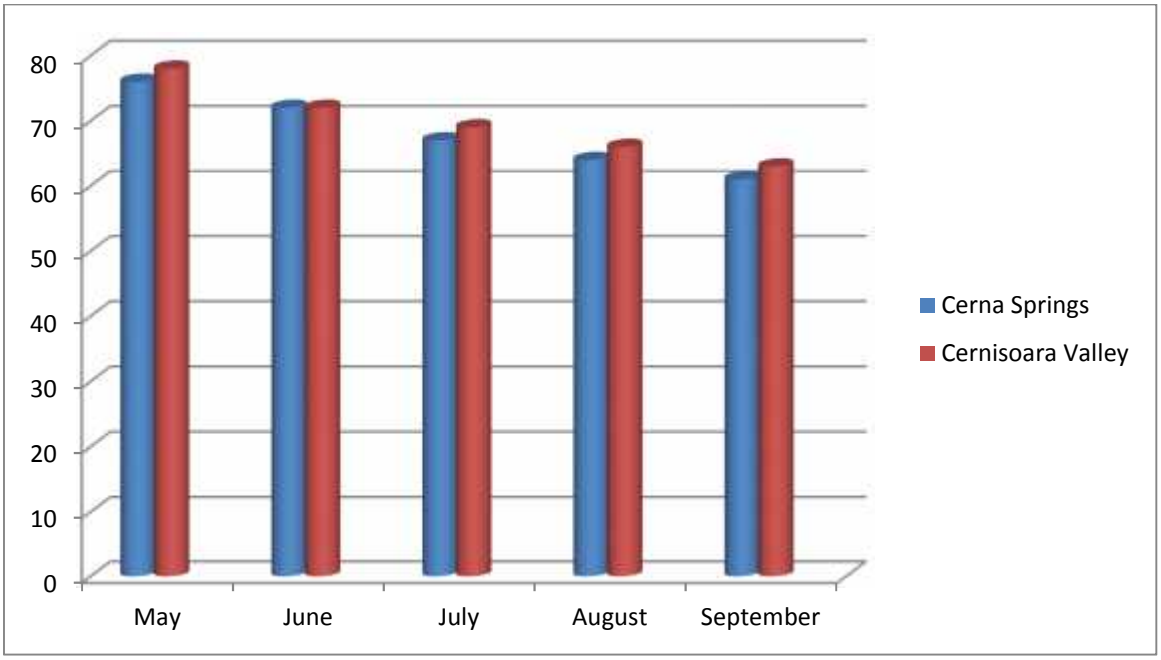
The water content of leaves varies depending on the plants ontogenetic phase, recording a maximum content in May and July and a minimum content at the end of August, beginning of September(gr.5).



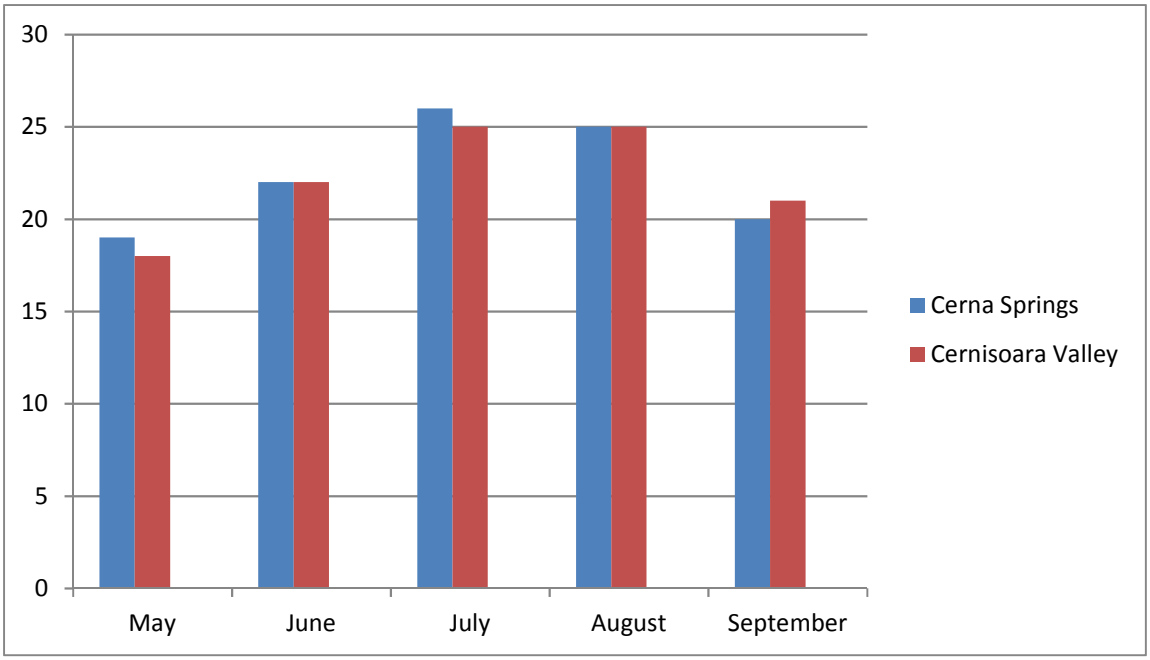
Gr. 3. The seasonal variation of transpiration (mmol H_2O /m^2 /s)



Gr.4. The diurnal variation of transpiration (mmol $H_2O/m^2/s$)



Gr.5. The total water content of leaves (%)



Gr. 6.The chlorophyll content (SPAD unities)

CONCLUSIONS

- *Myricariagermanica* is a pioneer species that is installed along watercourses in the Natura 2000 Domogled - Cerna Valley site, having a good representation in the Cerna springs and along the river Cernisoara
- The dense root system of the shrubs firmly anchors them in the substrate and thus reduces soil erosion
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- The hydric balance remains equilibrate at exemplars situated further away from water too. In these conditions, in addition to their capacity of reducing the transpiration, probably a major role is played by their well developed root system which can guarantee the sufficient amount of water.

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