ECOPHYSIOLOGICAL ASPECTS REGARDING THE ,,SIBLEAC,, ASSOCIATIONS FROM IRON GATES NATURAL PARK

BUSE DRAGOMIRLUMINITA [1], NICOLAE ION[2]
[1]University of Craiova, luminita25dragomir@yahoo.com
[2]University of Craiova,ionnicolaebio@yahoo.com

Key words: photosynthesis, transpiration, water content

ABSTRACT

As a result of soil ,climatic and exposure conditions , forest exploitation, but also at influence of Illiria and Meditteranean area, in Natural Park Iron Gates was installed Sibleac associations, typical from Donau Gorge. The edificatory species at this associations was Quercus pubescens, Carpinus orientalis, Fraxinus ornus, Cotinus coggigria, Syringa vulgaris.The adaptive advantage of these species is the high resistance to drought and the tolerance of soil reaction.In similar ecological conditions, Quercus pubescens have a slightly ecological growing advantage unlike the other species, due to the fotoasimilated consumption which is more reduced in the respiration process and directingthem towardsthe production of biomass.

INTRODUCTION

Iron Gates Natural Park is situated in south-western part of Romania, at the border with Republic of Serbia, covering about **115.655 ha** within Caras-Severin and Mehedinti counties in southern part of Locvei and Almajului Mountains and south west of MehedintiPlateau.**The limits of the Iron GatesNatural Park** are represented by the Danube's course to the South, the river Nera to the West, the Danube's tributaries watershed limits to the North and a winding line from downstream GuraVaii to the Motarat Peak to the East.

The present vegetation reflects the spatial and time dynamics of the migration processes and human induced intervention it is composed of pontic eastern panonic western central European northern and southern sub Mediterranean elements The heat loving floristic elements give the distinctive colour of the Iron Gates Natural Park vegetation they are found at higher altitudes than in other regions of the country. Such elements are *Quercus cerris Quercus frainetto Cotinus coggygria Fraxinus ornus Syringa vulgaris Corylus colurna Celtis australis Carpinus orientalis*.

The Iron Gates Natural Park vegetation is mainly composed of forests shrubs and grasslands. The forests cover approximately 70 -75% of the Natural Parks total surface and belong to the deciduous forest layer or broad leaved forests *Q. pubescens* preserved the functionality of the photosynthetic apparatus and controlled the antioxidant system response, thus confirming its drought and thermo-tolerance and therefore its potential to adapt to the ongoing climate change.(Contran N., 2013).

Seedlings and the tree growing near the spring exhibited equal or slightly higher rates of photosynthesis, while leaf conductance was significantly lower, in comparison with plants growing at the control site. Instantaneous leaf water use efficiency was higher in plants growing near the spring than in control plants.(Johnson J.D., 2010).

MATERIAL AND METHODS

Quercuspubescens is a medium-sized deciduoustree growing up to 20 m. The twigs are light purple or whitish, tomentose. The buds are small (3–6 mm) and blunt, light brown. The leaves are leathery usually 4–10 cm long (rarely to 13 cm) and 3–6 cm wide, usually widest beyond the middle. The leaves group at the ends of twigs. The young expanding leaves are whitish or pinkish with very soft tomentosum.The

*Quercuspubescens*acorns are light brown to yellow, 8–20 mm long, usually thin and pointed. The acorn cups are light grey to almost white, with pointed, overlapping scales, covered with tomentum. The acorn stalks are thick and pubescent, up to 2 cm long. The acorns usually occur in groups of 2-5 on the same stalk.

Syringa vulgaris L. (**lilac** or **common lilac**), *Oleaceae* family, is a large deciduousshrub or multi-stemmed small tree, growing to 6–7 m high, producing secondary shoots from the base or roots. The bark is grey to grey-brown, smooth on young stems, longitudinally furrowed and flaking on older stems. The leaves are simple, 4–12 cm and 3–8 cm broad, light green to glaucous, oval to cordate, with pinnate leaf venation, a mucronate apex and an entire margin.. The flowers have a tubular base to the corolla 6–10 mm long with an open four-lobed apex 5–8 mm across, mauve. They are arranged in dense, terminal panicles 8–18 cm long. The fruit is a dry, smooth brown capsule, 1–2 cm long, splitting in two to release the two winged seeds.

Fraxinus ornus (**manna ash** or **South European flowering ash**) is a species of *Fraxinus* native to southern Europe and southwestern Asia. *Fraxinus ornus* is a medium-sized deciduoustree growing to 15–25 m tall with a trunk up to 1 m diameter. The leaves are in opposite pairs, pinnate, 20–30 cm long, with 5-9 leaflets. The flowers are produced in dense panicles 10–20 cm long after the new leaves appear in late spring, each flower with four slender creamy white petals 5–6 mm long; they are pollinated by insects.The fruit is a slender samara.

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

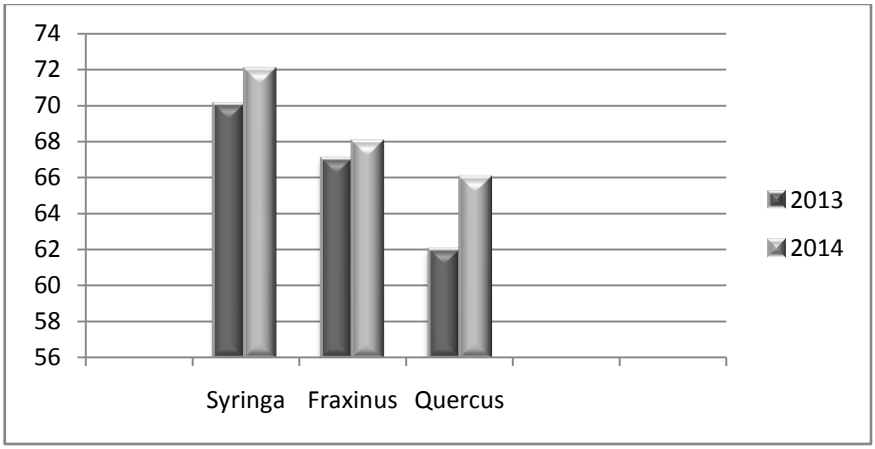
The chlorophyllcontentofleaveswas determined with the Minolta portable chlorophyll meter (SPADunits).

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.

RESULTS AND DISCUSSIONS

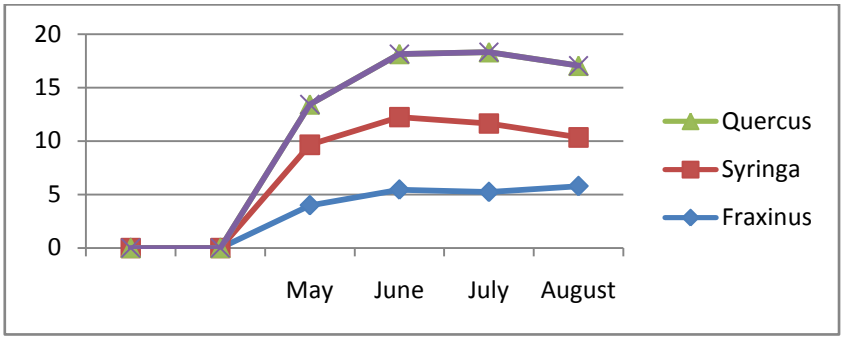
1.The total water content of leaves

Measurement were carried out in June 2013 and June 2014. The differences that appear are due to the different climatic conditions: if in 2013, at the beginning of the month it was manifasting in an accentuate drought area, in may 2014, it was a rainfall exces. The maximum content of water it was determined at *Syringa vulgaris* in 2014 and the minum content it was determined at *Quercus pubescens* leaves (gr. 1).



Gr.1. The total water content of leaves (%)

2.The seasonal dynamics of pfotosynthesis it was determined in may-august 2014. The graphic data show that it was registered a variation of photosynthesis ,with a maximum in july and minimum values in may, due to the foliar small surface and to the reduced amounts of chlorophyll (gr 2).

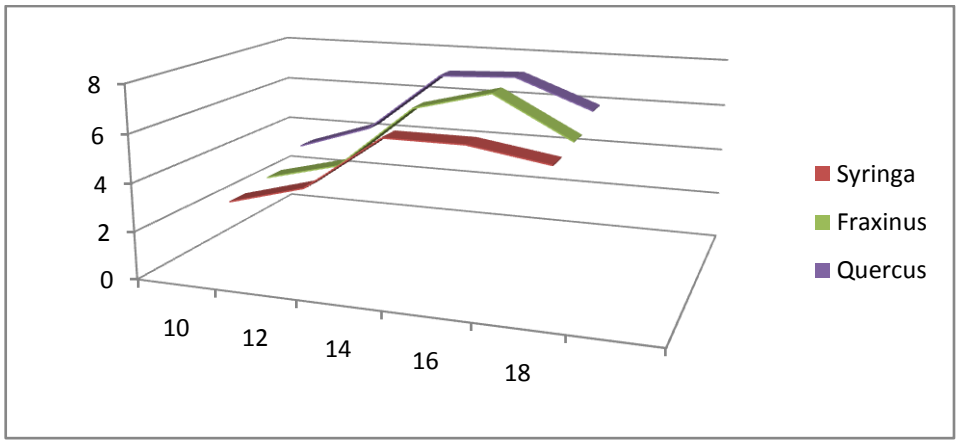


Gr. 2. The seasonal variation of photosynthesis intensity (μmolCO_2/m^2/s)

From the species which were taken to be studied, the most intense assimilation was noticed at *Quercuspubescens,* and *Fraxinusornus* have had the most reduced values of photosynthesis.

3.The diurnal dynamics of photosynthesisit was determined in June of 2013.The determinations which were made on leaves at an active photosynthetic radiation with a value of 29-100μmoli/m^2/s and at a temperature of 23^{0}C, has revealed that the intensity of the photosynthesis has varied between 2, 22 and 6, 77 μmol/m^2/s.

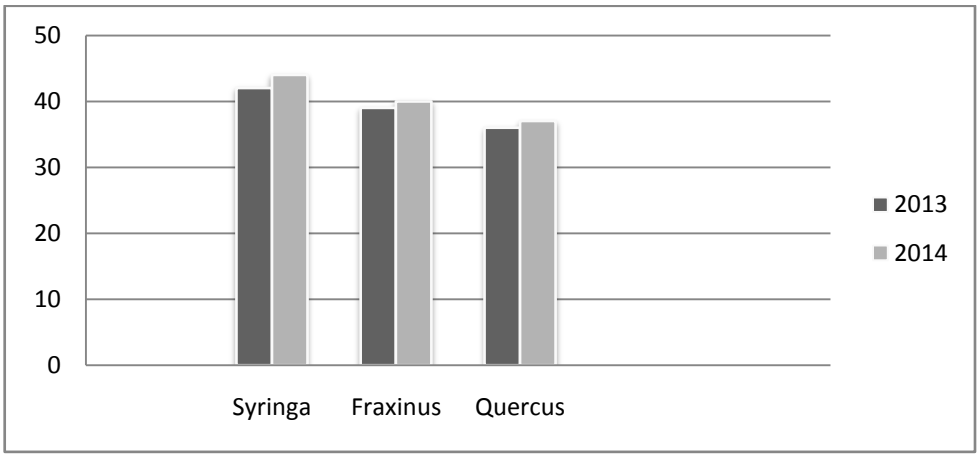
Analyzing the third graph, is observing that it was registered a maximum of photosynthesis around 15 o'clock, with the biggest values noticed at *Quercus pubescens.*



Gr. 3.The diurnal dynamics of photosynthesis (μmolCO_2 /m^2 /s)

4.The content of chlorophyllpigments of leaves was registered in June 2013 and in June 2014.

From the presented data is noticed a bigger content of pigments at all species which were studied in the determinations made in 2014. The maximum content of chlorophyll pigments it was registered at *Syringa vulgaris* and the minimum content of chlorophyll it was registered at *Fraxinus ornus(39 SPAD unities)*(gr. 4) .

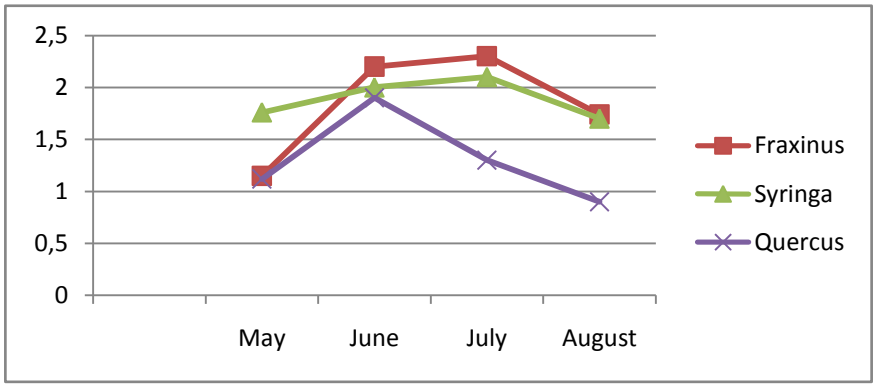


Gr. 4. The content of chlorophyllpigments of leaves (SPAD)

5. The seasonal variation of transpiration

The determinations which were made in the months may-august of 2014, have highlighted great variations of transpiration intensity. The biggest values were registeres in July at all the plants which were studied.

The most intense transpiration it ws noticed at *Fraxinus ornus* and the lowest values were noticed at *Quercus pubescens*(gr.5).*Quercus pubescens* has performed lower values of transpiration proving a better adaptation for drought condition, being rezistent to withering and haing a better adaptation to a varied climate.

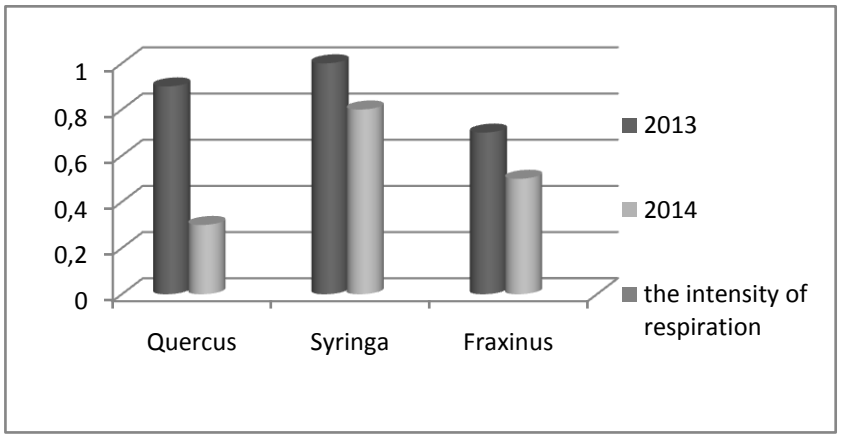


Gr. 5. The intensity of transpiration (mmol H_2O/m^2/s)

7. The intensity of leaf respiration

The determinations were made in 2013 and in 2014 in June, the assimilation chamber having a temperature of 25^0C.

The seventh graph shows that the leaves from*Quercus pubescens*have the lowest respiration and the most intense respiration have been observed at *Fraxinus ornus*leaves.



Gr. 6. The intensity of leaf respiration (µmolCO_2/m^2/s)

COCLUSIONS

The determinations which were made on the leaves which were providing from different species at an active photosynthetic radiation of 29-100µmoli/m^2/s and at a temperarure of 25^0C have revealed that the intensity of photosynthesis process is variating betwenn 2,22 and 6,77 µmol/m^2/s.

The seasonal variation of photosynthesis record a maximum in summer, and the diurn variation reprezenting variations depending on climatic conditions.

The chlorophyll pigments content represents big interspecific variations, not being able to determine a direct correlation between the chlorophyll quantity and the photosynthesis intensity.

In similar ecological conditions, *Quercus pubescens* is having a slightly ecological growing advantage unlike the other species, due to the fotoasimilated consumption which is more reduced in the respiration process and directingthem towardsthe production of biomass. It manifest promptitude in closing and opening of stomata counteracting in this way the effects of draught.

REFERENCES

Contran N, Günthardt-Goerg MS, Kuster TM, Cerana R, Crosti P, Paoletti E*, 2013,Physiological and biochemical responses of Quercuspubescens to air warming and drought on acidic and calcareous soils, Plant Biology, Stutgart*

Duan B.,Ly, I., Zhang X.,Korpelainen , H, Li,C, 2009,*Water deficit affects mesophyll limitation of leaves more strongly in sun that in shade***,** Three physiology, 29, pp 1551-1561

By J.D. Johnson,J.D., Michelozzi,M.,. Tognetti, R.,2010, *Carbon physiology of Quercus pubescens wild, growing at the Bossoleto CO_2 sprig in central Italy, Cambridge University Press , pp 148-164*

Koslowski,T.T., Pallardy, S.G., 2002**,** *Acclimation and adaptative responses of woody plants to environmental stresses, Bot. Rev.,68, 270-334*

Yan Li,Hongxia Zhao, Baoli Duan, Korpelainen H.,Chunyang Li, 2011, *Effect of drought, photosynthesisand antioxidant system of Cotinus coggigria seedlings under two different light conditions, Elsevier Journal of Environmental and Experimental Botany, pp 107-113*

Nardini A.,Salleo S.,Trifilo A., Lo Gullo M.A., 2003, *Water relations and hydraulic characteristics of three woody species co-occuring in the same habitat*, *Ann For. Sci.60, pp 297-305*

Nardini A.,Salleo S., Lo Gullo M.A.,1999, *Competitive strategies for water availability in two mediteranean Qercus species,Plant Cell Environ.22, pp 109-116*

Nardini A.,Pitt F.,1999, *Drought resistance of Quercus pubescens as a function of root hydraulic conductance, xyleme embolism and hydraulic architecture, New Phytol.143, pp 485-493*

Pilarski, J.,2002, *Diurnal and seasonal changes in the intensity of photosynthesis in stem of lilac(Syringa vulgaris), Acta Physiologiae plantarum, vol 24,pp 29-36*

Tognetti, R.,Longobucco, A.,Miglietha, F.,Raschi, A.,1999, *Water relations, stomatal response and transpiration of Quercus pubescens trees during summer in a Medditeranean carbon dioxide spring, Tree Physiology, Heron Publishing, Canada, pp 261-270*