

RESEARCH REGARDING THE PHYSIOLOGY OF *COTINUS COGGIGRIA* Scop. SPECIES

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ABSTRACT

Cotinus coggygia is a deciduous shrub growing to 3 m at a medium rate. It is in flower from Jun to July, and the seeds ripen from September to October. The flowers are dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: acid, neutral and basic soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

INTRODUCTION

Cotinus coggygia (Eurasian smoketree, smoketree, or smoke bush) is a species of flowering plant in the order *Sapindales*, family *Anacardiaceae*, native to a large area from southern Europe, east across central Asia and the Himalayas to northern China.

The leaves are 3-8 cm long rounded ovals, green with a waxy sheen. In autumn the color can be strikingly varied, from peach and yellow to scarlet. The flowers are numerous, produced in large inflorescences 15–30 cm long; each flower 5-10 mm in diameter, with five pale yellow petals. Most of the flowers in each inflorescence abort, elongating into yellowish-pink to pinkish-purple feathery plumes (when viewed en masse these have a wispy 'smoke-like' appearance, hence the common name) which surround the small (2-3 mm) drupeous fruit that do develop.

It gets its common name of smoke tree (or smoke bush) not from the tiny, insignificant, yellowish flowers which appear in branching, terminal panicles (to 6-8" long) in spring, but from the billowy hairs (attached to elongated stalks on the spent flower clusters) which turn a smoky pink to purplish pink in summer, thus covering the tree with fluffy, hazy, smoke-like puffs throughout summer. Bluish green leaves are ovate to obovate. Fall color is highly variable, but at its best produces attractive shades of yellow, orange, and purplish-red.

Grows best in moderately fertile, moist but well-drained soil in full sun or partial shade, but is tolerant of alkaline soils, moist, clay soils, dry, rocky soils, and drought.

Cotinus coggygia grown in the south-west of Romania (Iron Gates Park, Domogled - Cerna Valley Park, Mehedinti Plateau). It plays a very important role in preventing soil erosion, soil water loss and regulating climate, as well as in retaining ecological stability in the region.

Owing to its fast growth and drought tolerance, contribute to forest restoration as a pioneer species.

Many studies on *Cotinus coggygia* have focused on the propagation and pigment extraction, but much less is known of its physiological and biochemical responses to environmental stress (Olmez et al., 2008, Oren-Shamir, 2009, cited by Yan Li, 2011).

Huang et al. (2008) observed that drought determined an increasing chlorophyll content. Yan Li et al. (2011) found that drought affected the differences in chl a /b and significantly drought decreases, the net photosynthesis. Similar results have been reported by Duan et al. (2009).

MATERIAL AND METHODS

The research was carried in May- September 2014 in three different areas:

- Danube Gorge, Dubova locality, Mehedinti county
- Mehedinti Plateau, Isverna locality, Mehedinti county
- Tesney Valey, Mehedinti and Caras Severin county

For determination were chosen plants of the same height (approximately 1,5 meters), on south -west and southern exposed slopes.



Fig. 1. Cotinus coggygria in Tesna Valey (orig.)



Fig 2. Cotinus coggygria in Iron Gates (orig.)



Fig.3. *Cotinus coggigria* Mehedinti Plateau (orig.)

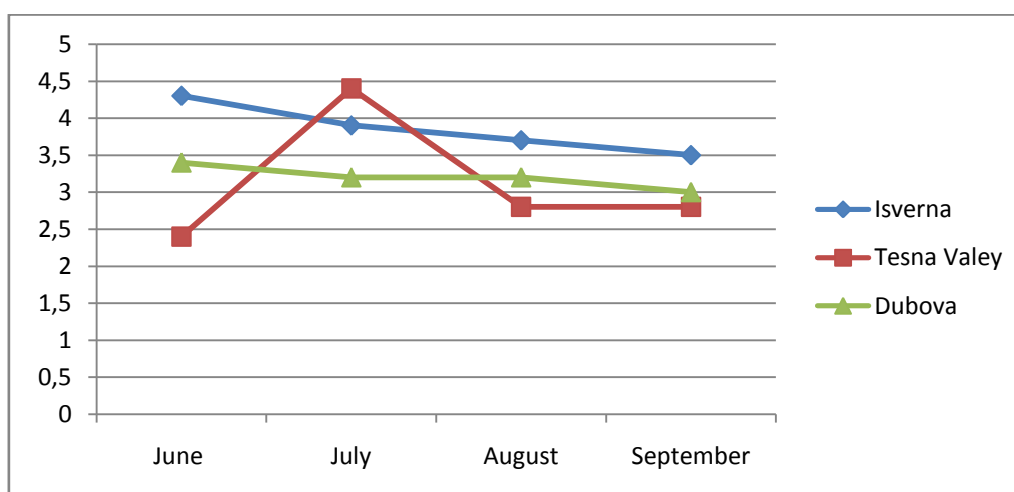
On the biological material were determined: the intensity of leaf transpiration, the respiration intensity, the compensation point of light, the intensity of photosynthesis, the content of assimilatory pigments and the water content.

Transpiration, photosynthesis and respiration in leaves were determined using LCi portable device.

The chlorophyll content of leaves was determined with the Minolta portable chlorophyll meter (SPAD units).

RESULTS AND DISCUSSIONS

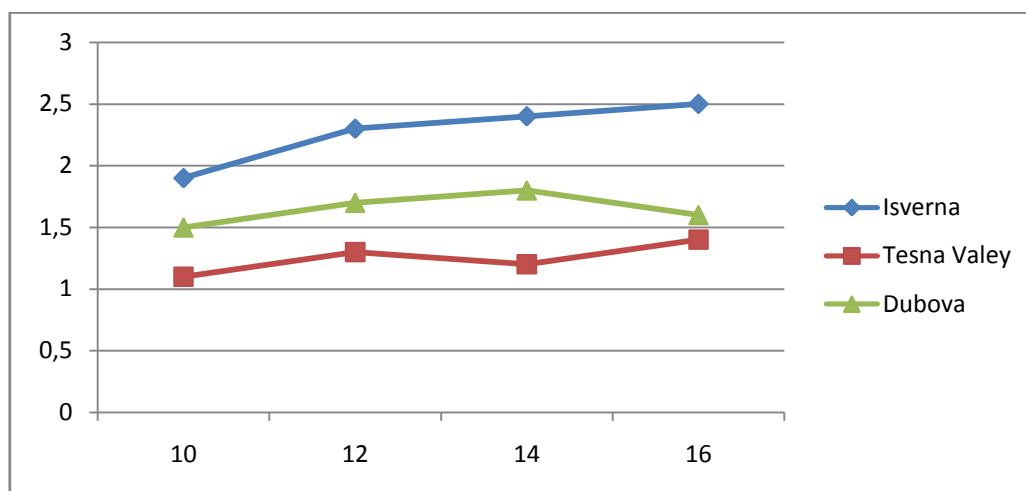
The intensity of photosynthesis ($\mu\text{mol CO}_2/\text{m}^2/\text{s}$) had relatively constant values during determinations at plants from Dubova si Tesna Valey, but it showed significant variations at plants from Tesna Valey. At these last ones, it was also recorded the highest value in July ($4,4 \mu\text{mol CO}_2/\text{m}^2/\text{s}$) (gr.1).



Gr. 1. The intensity of photosynthesis ($\mu\text{mol CO}_2/\text{m}^2/\text{s}$)

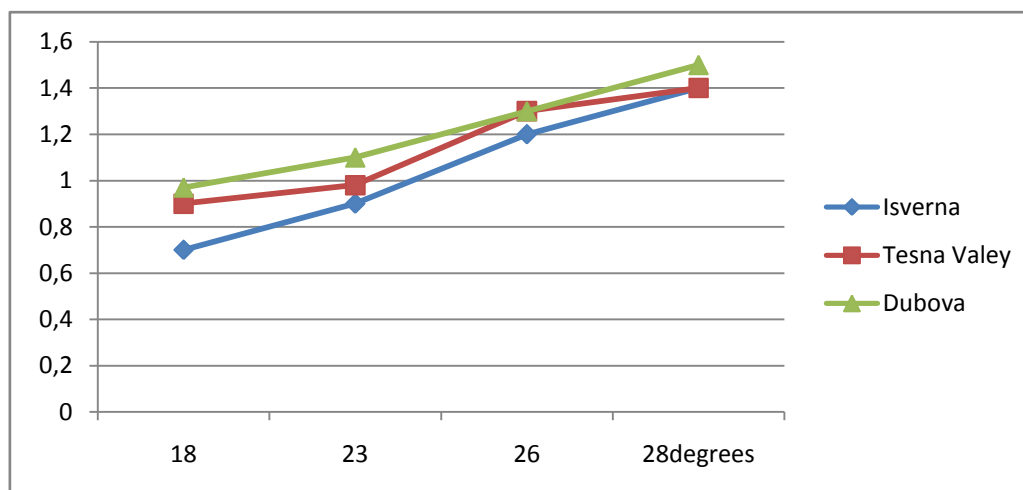
Regarding the sweat process, *Cotinus coggigria* leaves present high values throughout the day, from here resulting that the resistance to drought of these plants is not

due to their ability to reduce water losses, but the ability to achieve a high suction force that will allow the absorption of enough water. The greatest losses of water through sweat were recorded at plants from Mehedinți Plateau (gr.2).



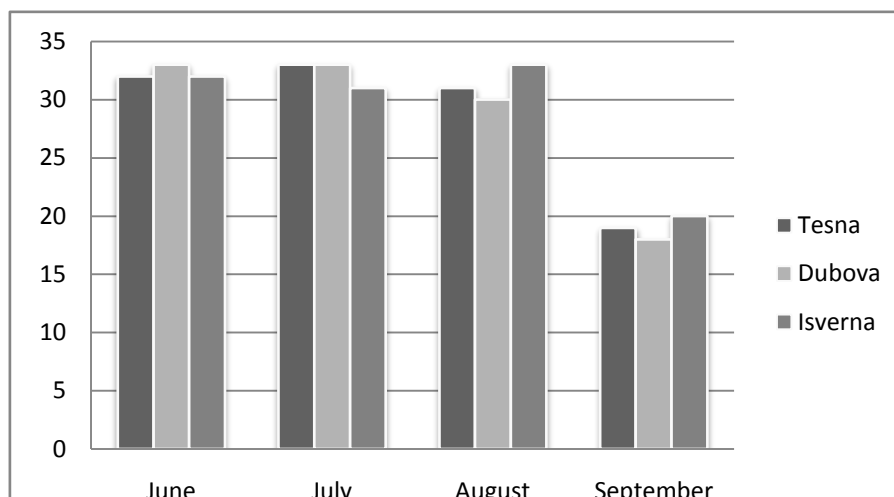
Gr.2. The intensity of transpiration (mmol H₂O/m²/s)

The intensity of leaf respiration has shown significant variations depending on the temperature that was in the assimilation room. If at 18 degrees Celsius it had an average value of 0,7 μmol CO₂/m²/s, the value doubled at all plants studied. The most intense breathing plants are those from Dubova area, this explaining the lower values of apparent photosynthesis obtained from them too (gr.3).



Gr.3. The intensity of leaf respiration (μmol CO₂/m²/s)

The amount of chlorophyll varies within very wide limits, even at the same plant. The data presented in graphic 4 shows the result of determinations made in the months from June to September. As seen, in September is recorded the minimum content of chlorophyll at plants from Dubova and Tesna Valey. During this period there is a great increase in red pigments content, which give the characteristic color to leaves of these plants.



Gr.4. The chlorophyll content (SPAD)

CONCLUSIONS

-*Cotinus coggygria* grows best in moderately fertile, moist but well-drained soil in full sun or partial shade, but is tolerant of alkaline soils, moist, clay soils, dry, rocky soils, and drought.

-In the climatic conditions of the year 2014, plants from Dubova area recorded the lowest values regarding the intensity of photosynthesis

-Although its drought resistance, *Cotinus coggygria* presents high values of sweat intensity.

-The amount of chlorophyll in the leaves shows significant variations within the same plant and depending on the period in which the determination was made.

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