VARIATION OF SOME PHYSIOLOGIC PARTICULARITIES OF *FICUS* SORT

VARIAȚIA UNOR PARTICULARITĂȚI FIZIOLOGICE ALE GENULUI *FICUS*

CHELARIU ELENA-LILIANA, DRAGHIA LUCIA
University of Agricultural Sciences and Veterinary Medicine Iasi

Abstract. *The floral species cultivated in pots gave harmony, soul and beauty to the closed spaces, inducing a pleasant atmosphere. Our studies were carried out at two species with very near properties face to the ecologic factors (Ficus benjamina and Ficus pumilla). Having in view this aim, the researches were focused on the observation of some important eco-physiological aspects for unfolding the vital processes of the plants such as: total content in assimilated pigments, intensity of the photosynthesis and respiration. After the done researches and observations was find out that between the total content of assimilated pigments and retain capacity of water in leave exists a direct correlation and also an indirect correlation with the apparent photosynthesis intensity.*

Rezumat. *Speciile floricole cultivate în ghivece dau armonie, suflet şi frumusețe spațiilor închise, contribuind la creearea unei atmosfere plăcute. Studiile noastre au fost efectuate pe două specii cu proprietăți apropiate de factorii ecologici (Ficus benjamina şi Ficus pumilla). Având în vedere acest obiectiv, cercetările au urmărit observarea unor importante aspecte eco-fiziologice pentru desfăşurarea proceselor vitale ale plantelor cum ar fi: conținutul total în pigmenți asimilatori, intensitatea fotosintezei şi a respirației. În urma cercetărilor şi observațiilor efectuate s-a stabilit că între conținutul total de pigmenți asimilatori şi capacitatea de reținere a apei în frunze există o corelație directă şi deasemenea o corelație indirectă cu intensitatea fotosintezei aparente.*

Ficus sort have numerous species which assures the décor of the inner spaces, due to the leave aspect but also due to port, providing a clear atmosphere enriched with oxygen.

The main groups of assimilated pigments from superior plants are chlorophyll pigments and carotene pigments.

The researches done till now on those pigments shown a great variability of them, quantitative and even qualitative, induced by their sensibility face to numerous inner factors or from environment.

Photosynthesis and respiration are two vital processes for plants. The intensity of them varies function of the floral species particularities.

MATERIAL AND METHODS

In the present paper we study two species of *Ficus* sort (*Ficus benjamina, Ficus pumilla*), cultivated in pots, in the conditions of didactical greenhouse belonging to U.Ş.A.M.V. Iaşi

Were made two harvestings: June 2007 and July 2007, when plants were in the vegetative grow phase.

From the fresh harvest material was determine the content in assimilated pigments, intensity of apparent photosynthesis and respiration.

Determination of the assimilated pigments content was made with the help of spectro-photometric method, and determination of photosynthesis and respiration intensity was made by Ivanov - Kosivici method.

RESULTS AND DISCUSSIONS

Content in assimilated pigments

Chlorophyll pigments are different as regarding composition and quantity. Chlorophylls are in a quantity of 0.05 – 0.3 g at 100 g fresh leave. This quantity varies due to the soils content in fertilizer substances, environment conditions and due to vegetation stage.

Carotene pigments present a yellow – red colour and could be found together with green pigments. In plants were found a number of 60 carotene pigments from which a role in photosynthesis have carotene and xantophile. The content in carotene and xantophile is different regarding specie and vegetal conditions.

The quantity of assimilated pigments determinate for each specie, in the stage of intense vegetative growth, presents differences between species.

The most important assimilated pigments are “a” chlorophyll, “b” chlorophyll and carotene pigments. Chlorophyll, as the main receiver of sun energy, react by an according adaptation at different conditions of light receiving function of leaf exposure, adaptation showed by differences between the two types (“a” and “b”). The dates from literature show that the ratio between the two chlorophylls is, usually, 3:1.

After the done observations and researches we observe that, the content in total assimilated pigments show differences connected with specie and leaf age (*fig. 1*).

Analysing the obtained results (*fig. 1*), we observe that at *Ficus pumilla* the total quantity of assimilated pigments reported at fresh weight unit had greater values (1.4256 mg/g s. pr.) that at *Ficus benjamina* (1.0310 mg/g s. pr.).

At the studied floral species, the ratio between the two types of chlorophyll is respected, so the quantity of “a” chlorophyll is 2 - 3 times higher that the quantity of “b” chlorophyll. In these situations, a/b and (a + b)/c ratios, present

different values. So, the value of a/b ratio at *Ficus pumilla* (1.65) is higher that at *Ficus benjamina* (0.96). (*fig. 2*)

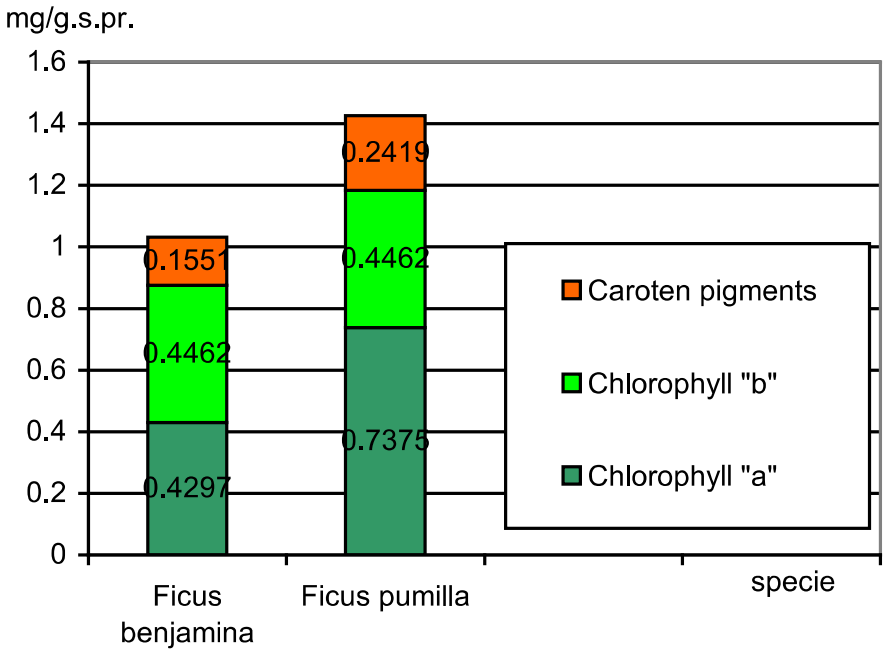

Figure 1. - Variation of assimilated pigments content in leave

The decreasing of the carotene pigments quantity makes that photosynthesis activity to be reduced, due to the decreasing of water quantity in leave (in the stage of relative repose, when wettings are reduced or even interrupted).

The content in assimilated pigments record higher intensities in July at the studied species, due the increased quantity of water from leave, which provide optimal conditions for unfolding of biochemical and physiologic processes in plants (66 – 76 %).

The plants' photosynthesis capacity, is showed by the quantity of chlorophyll pigments, and varies function of intensity of light, temperature and water regime modification. In this way, at *Ficus pumilla* specie (1.1837 mg/g s. pr.) are recorded high quantities of assimilated pigments, which decrease in autumn, due to the decrease of photosynthesis, together with decreasing of light and temperature intensity.

The differences between "a" and "b" chlorophyll are also found in the case of carotene pigments, which play an important role in the protecting system of chlorophyll against photo-oxidation. In those conditions chlorophyll/carotene ratio reaches maximal value at *Ficus benjamina* (5.67) and the minimal value at *Ficus pumilla* (4.89) (*fig. 2*), being well-known the fact that the theoretical ration between green pigments/yellow pigments is 4/1.

Taking in account the role of assimilated pigments in photosynthesis process could tell that if are assured specific ecologic conditions (in protected

spaces), the higher photosynthetic activity is recorded at *Ficus pumilla* specie followed by *Ficus benjamina* specie.

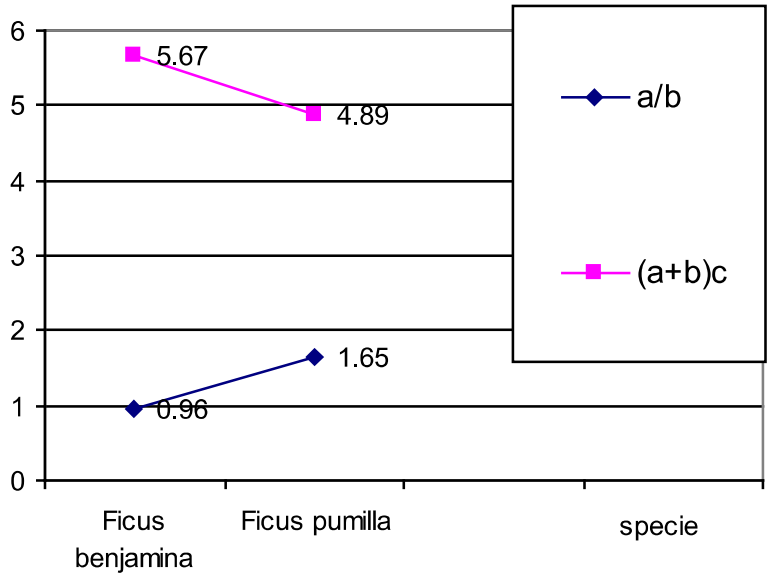

Figure 2. - Variation of ratio between "a" and "b" chlorophyll (a/b) and between chlorophyll and carotene (a+b)/c

Variation of photosynthesis and respiration intensity

Photosynthesis and respiration are two vital processes for plants. Their intensity varies function of the particularities of each floral specie.

From the total quantity of sun energy which fall down at a certain moment on a surface covered with a vegetal cover, only a part of it is adsorbed by plants. Also only a part from the energy adsorbed by plants became active in chloroplasm and only another part is fixed under the form of potential chemical energy. This energy leads to an accumulation of a 5,0 x 10^{16} g quantity of carbon hydrates.

The global photosynthetic efficiency depends by vegetal cover covering degree and photosynthetic action of each plant. Almost half of the energy is in the 400 – 700 nm spectral domain, photosynthetic active. Appreciating that to create a CO_2 molecule is necessary the energy from 8 photons quanta, the photosynthetic fixed energy is theoretical situated at the half of 34 % value. But from this incident light interferes deflexion and re-adsorbed of un-photosynthetic components. So, in ideal conditions for photosynthesis, the value is not greater than 10 %.

Photosynthesis is strongly influenced by the genetic fund of a photosynthesised specie and also by the en-lighting conditions in the period in which the chlorophyll apparatus is formed. Photosynthesis is an unidirectional process, with well known stages, generally characterized as a irreversible process.

In the conditions from the glasshouse in 2007 we observed the intensity variation of apparent photosynthesis and respiration at the end of the annual vegetation cycle of the studied floral species (*fig. 3*).

Generally speaking, the apparent photosynthesis increase rapidly during leaf development and reaches maximum level before ending the entire growth of foliar surface.

From the obtained dates, by us, regarding the variations of the apparent photosynthesis intensity *(fig. 3)*, was observed that at the both studied species the recorded values was the same, 0.32 CO_2/g s. pr./h.

The low value of apparent photosynthesis intensity could be explain with the help of assimilated pigments content on foliar mass unit.

The period of photosynthetic maturity of foliar apparatus and maximum of net photosynthetic intensity are characterized by a stable concentration of compensation.

The values of real photosynthesis (apparent photosynthesis + respiration) differs from specie to specie (*fig. 3*). The greatest value was recorded at *Ficus pumilla* (4.59 CO_2/g s. pr./h), and the lowest one at *Ficus benjamina* (2.22 CO_2/g s. pr./h).

Could be observed that *Ficus pumilla* specie have a much more intensity of respiration in comparison with *Ficus benjamina*, but the ratio apparent intensity/respiration is the lowest one (0.07). So, the apparent photosynthesis tends to be negative, and respiration increase.

Because photosynthesis is one of the most sensitive processes, at lack of water all the damages provoked by these are reflected in the activity of photosynthetic apparatus.

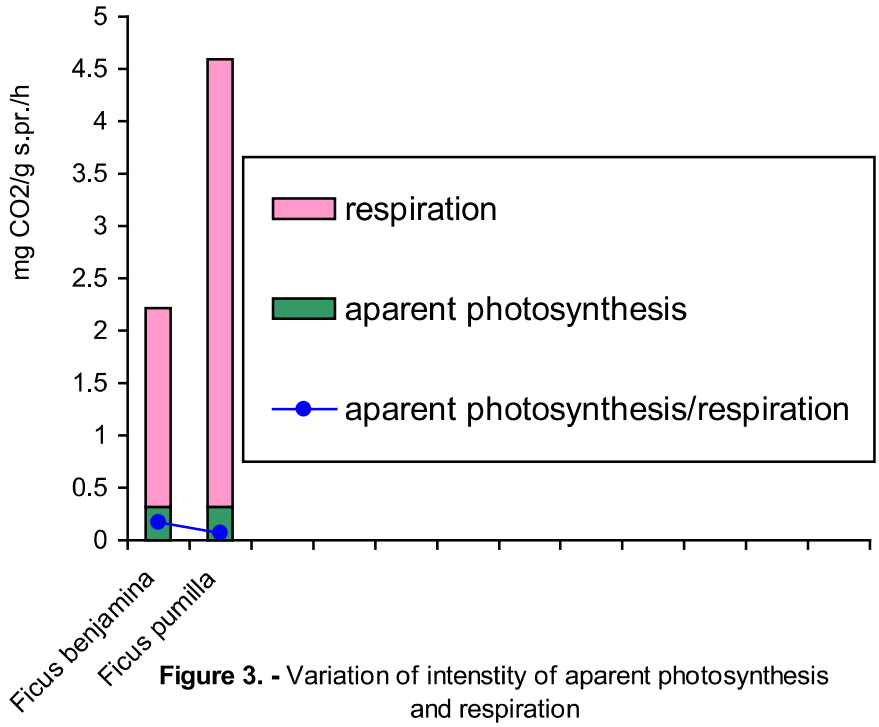

Figure 3. - Variation of intenstity of aparent photosynthesis and respiration

CONCLUSIONS

The total content in assimilated pigments of the studied species have a positive correlation with maintain capacity of high quantities of water in leave, which will be able to satisfy in an optimal way the unfolding of physiologic processes.

The value of "a" chlorophyll/"b" chlorophyll ratio at *Ficus pumilla* (1.65) is greater that at *Ficus benjamina* (0.96).

The chlorophylls/carotenes ratio reaches the maximal value at *Ficus benjamina* (5.67) and the minimal one at *Ficus pumilla* (4.89).

The two studied species of Ficus had the same value of the apparent photosynthesis intensity, 0.32 CO_2/g s. pr./h.

The values of the real photosynthesis differs from specie to specie, the highest value being recorded at *Ficus pumilla* (4.59 CO_2/g s. pr./h).

At *Ficus pumilla* respiration intensity is much higher in comparison with *Ficus benjamina*, but the ratio apparent photosynthesis/respiration is lower (0.07 mg CO_2/g s. pr./h).

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