PHYSIOLOGICAL IMPLICATIONS OF THE ALTERNATIVE FERTILIZATION TECHNOLOGY OF VINEYARD

IMPLICAŢII FIZIOLOGICE ALE TEHNOLOGIILOR ALTERNATIVE DE FERTILIZARE A PLANTAŢIILOR VITICOLE

MOTOUNU Monica
University of Pitesti, Romania

Abstract. *Due the fact that ecosystem viticulture have a long period of life, it could have a lot of inconvenient: hydric erosion of soil, reduced the organic material from soil, degradation of biological, chemical and physic features which representing the base of the soil fertility. The alternative technology regarding protection against weed and biological fertilization in the vineyard have as a main target the eliminated this advantages of viticulture monoculture, in sense that through it application will have a new equilibrium at the level of ecosystem components with improving aspects for the environment. Experimental lot contains nine variants, with agro technical systems for soil maintaining in vineyards, witch may be included in alternative maintaining systems, witch can be replace classic soil maintaining system. We determinate physiological processes on leaves and grapes: rate of photosynthesis, rate of respiration, assimilatory pigments. We observe stimulating role of green fertilizers and organic fertilizers.*

Key words: alternative fertilization technology, physiology, vineyard.

Rezumat. *Ecosistemul viticol se confruntă cu o serie de inconveniente: eroziunea hidrică a solurilor, reducerea materiei organice din sol, degradarea însuşirilor fizice, chimice şi biologice (care reprezintă baza fertilităţii solului) etc., datorită faptului că reprezintă o monocultură îndelungată. Tehnologiile alternative propuse privesc atât combaterea buruienilor, cât sş fertilizarea biologică din plantaţiile viticole, cu principal targhet eliminarea dezavantajelor monoculturii viticole, în sensul că, prin aplicarea lor se va stabili un nou echilibru la nivelul componentelor ecosistemului, mult mai generos cu mediul înconjurator. Blocul experimental este compus din nouă variante experimentale, cu sisteme agrotehnice de întreţinere a solului din plantaţiile viticole care pot fi incluse în categoria sistemelor alternative de întreţinere, sisteme care pot înlocui sistemele clasice de întreţinere. S-au efectuat determinari fiziologice la nivelul frunzelor şi strugurilor, care au avut în vedere procesele de fotosinteză, respiraţie, cantitatea de pigmenţi asimilatori. Rezultatele obţinute evidentiază rolul stimulator pe care l-au avut înnierbarea şi fertilizarea cu gunoi de grajd.*

Cuvinte cheie: tehnnologie altenativă de fertilizare, fiziologie, viţă-de-vie.

INTRODUCTION

Vine plant, the main element of viticulture ecosystem is confronting with a lot of inconvenient: hydric erosion of soil, reduced the organic material from soil,

degradation of biological, chemical and physic features which representing the base of the soil fertility. The alternative technology regarding protection against weed and biological fertilization in the vineyard have as a main target the eliminated this advantages of viticulture monoculture, in sense that through it application will have a new equilibrium at the level of ecosystem components with improving aspects for the environment. Treatments of weeds from insensitive vineyards will be made by conservation and improving the biological, chemical and physic features of soil: rational of herbicides using, without major risk for environment by directional herbicides on nutritive organic stabile content of soil; maintenance of interval between rows plant with vegetal annual carpet; soil mulching on interval from rows plants with biologic material.

MATERIAL AND METHODS

This research is part of researches studies from CNMP Project no. 51009/2007.

Biologic material is representing by Aligoté cultivar. In the vineyard was made 9 experimental variants (fig. 1):

- V1 – unfertilized, without herbicides;
- V2 – fertilized with 40 t/h garbage without herbicides;
- V3 - fertilized with 40 t/ha garbage with herbicides;
- V4 – permanent grass with perennial plants (trefoil and lolium) on interval between rows plants, herbicides on rows;
- V5 – green fertilization (annual grass with pea and barley) on interval between rows plants, herbicides on rows;
- V6 – green fertilization of autumn in alternation with green fertilization of springtime on interval between rows plants, herbicides on rows; these green fertilizers are cutting and eliminated;
- V7 - green fertilization of autumn in alternation with green fertilization of springtime on interval between rows plants, herbicides on rows; these green fertilizers are cutting and keeping as mulch on the interval;
- V8 – permanent mulch on the intervals rows and rows plants, composed by straws cereals;
- V9 – unfertilized with total herbicides on the intervals rows and rows grape plants.

These nine experimental variants have elements from agro technical maintenance systems of vineyards that can be including in the system categories of maintenance alternative systems, that can unplaced the classic maintenance systems (fig. 2).

For all variants we made a lot of determinations: photosynthesis, respiration, content of assimilatory pigments.

Photosynthesis and respiration intensity was made by carbon dioxide analyzer. The results was expressing by μmol $CO_2/dm^2/s$.

Assimilatory pigments were determinate by spectrophotometer method. The results was expressing by fresh substance mg/g.

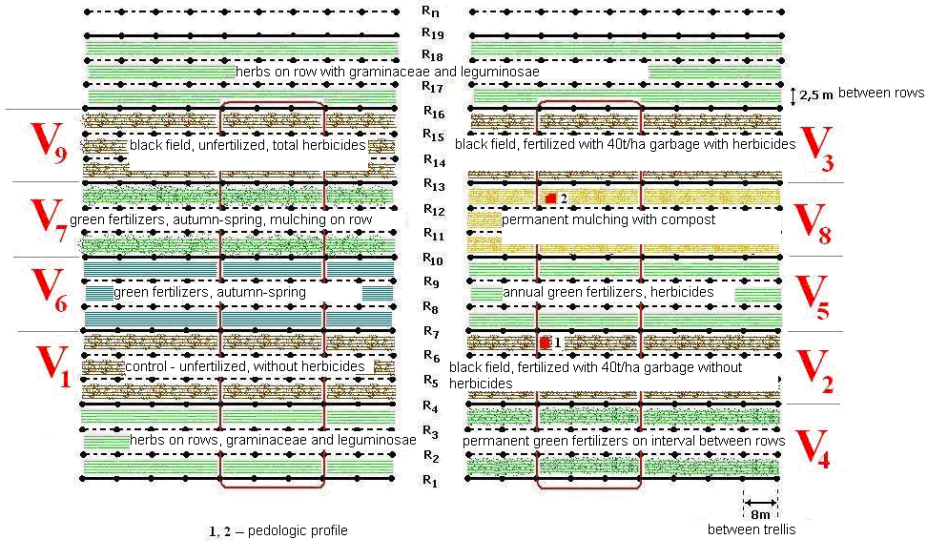


Fig.1. Experimental scheme of research

Fig. 2- Permanent mulching on interval rows with straws hashed

RESULTS AND DISCUSSIONS

In figure 3 are presenting the achieved results regarding photosynthesis intensity at leaves level of vine for all 9 experimental variants. The results are between 0,324 μmol $CO_2/dm^2/s$ (V3) and 0, 54 μmol $CO_2/dm^2/s$ (V6). The higher values of photosynthesis intensity was registered in variant fertilized with 40 t/ha garbage (V2 – 0,523 μmol $CO_2/dm^2/s$) and in variant V6 – green fertilization of autumn in alternation with green fertilization of springtime on interval between

rows plants, herbicides on rows; these green fertilizers are cutting and eliminated (V6).

In figure 4 are presenting the achieved results for respiration intensity at leaves vine level. Low values were determinate for variant V3 (fertilized with 40 t/ha garbage with herbicides) and variant V5 (green fertilization (annual grass with pea and barley) on interval between rows plants), herbicides on rows, while variant V2 (fertilized with 40 t/h garbage without herbicides) registered the bigger values regarding respiration intensity.

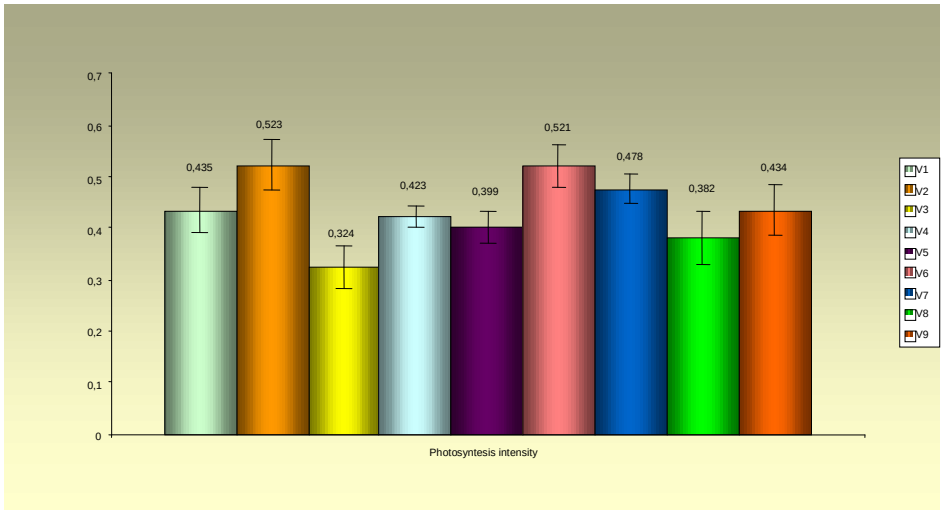


Fig.3. Determination of photosynthesis intensity (μmol $CO_2/dm^2/s$) – September 2009

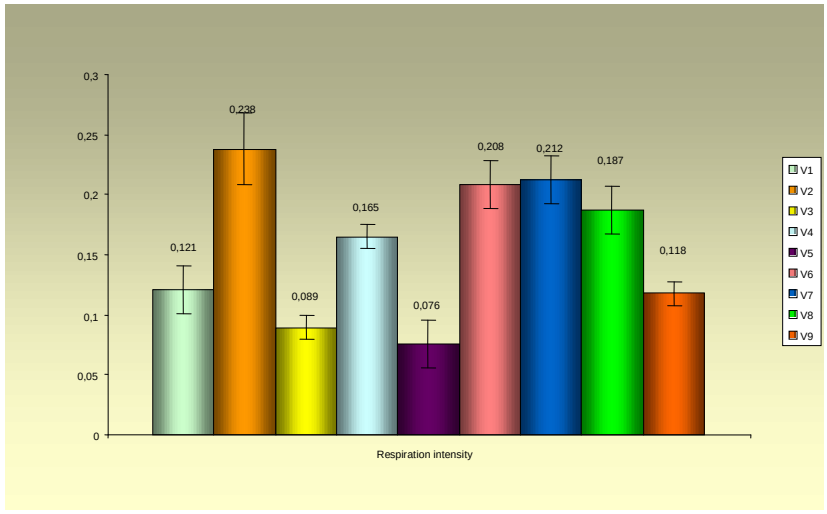
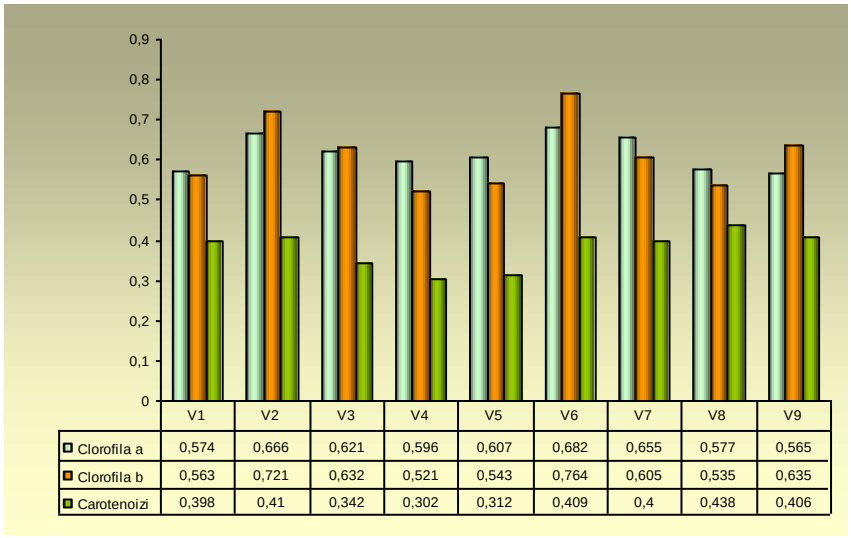


Fig.4. Determination of respiration intensity (μmol $CO_2/dm^2/s$) – September 2009

Regarding quantity of assimilatory pigments the bigger values of chlorophyll a and b was registered for variant V6. Carotenoids pigments had maximum values for variant V2. The lower values of chlorophyll a were registered in variant V2 while variants V4 had the smaller values for chlorophyll b and carotenoids.

The results of respiration and photosynthesis intensity are in correlation with production achieved in experimental variants. The production of grapes registered the higher values for V2, V4 and V6.



	V1	V2	V3	V4	V5	V6	V7	V8	V9
Clorofila a	0,574	0,666	0,621	0,596	0,607	0,682	0,655	0,577	0,565
Clorofila b	0,563	0,721	0,632	0,521	0,543	0,764	0,605	0,535	0,635
Carotenoizi	0,398	0,41	0,342	0,302	0,312	0,409	0,4	0,438	0,406

Fig.5. Determination of assimilatory pigments quantity from vine leaves (mg/g fresh substance)

Table 1

Production of grapes

Variant	Production (kg/ vine plant)
V1	2,8
V2	3,23
V3	3,15
V4	3, 34
V5	2,85
V6	3, 25
V7	2,6
V8	2,9
V9	2,75

CONCLUSIONS

Bigger values of physiological studied parameters were achieved in variant fertilized with 40t/ha garbage without herbicides and in variant with green fertilizers from autumn or spring.

The values of photosynthesis, respiration intensity and assimilatory pigments are correlating with grape productions.

To achieve a significant results that will establish an alternative technology for fertilize of vine, the experiment will be analyzed in the next two years.

REFERENCES

1. **Băbeanu Narcisa, Berca M., Borza I., Coste I., Cotigă C., Dumitrescu N., Olteanu I., Penescu A., Hortensia Rădulescu, Şchiopu D. (coordonator), Şchiopu T., Ştirban M., Vîntu V. (coordonator), 2002** - *Ecologie şi protecţia mediului.* Editura Ion Ionescu de la Brad, Iaşi.
2. **Berca M., 2004** - *Managementul integrat al buruienilor*. Editura Ceres, Bucureşti.
3. **Burzo I. şi colab**., **2004** - *Fiziologia plantelor de cultură*. Întreprinderea Editorial-Poligrafică Ştiinţa, Chişinău.
4. **Dumitriu I.C., 2008 –** *Viticultură*. Editura Ceres, Bucureşti.
5. **Şelaru E., 2002** - *Culturi pentru flori tăiate*. Editura Ceres, Bucureşti.