THE INFLUENCE OF VARIETY AND ROOTSTOCK UPON CERTAIN PHYSIOLOGICAL PROCESSES AT SOME CULTIVARS OF PLUM TREE IN DIFFERENT PHENOPHASES

INFLUENȚA SOIULUI ŞI PORTALTOIULUI ASUPRA UNOR PROCESE FIZIOLOGICE LA UNELE SOIURI DE PRUN ÎN DIFERITE FENOFAZE

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Abstract. *Intensity of accumulation process of assimilates depends by the internal and external factors, the processes being different from one variety to another, from one rootstock to another and from one association cultivar-rootstock to another. The Miroval rootstock, which gives a bigger vigor, influences more intense the accumulation process of assimilates from leaves, being followed by the Oltesani 8 rootstock. The phenophase SCSG (slowing and cessation of shoot growth) among the vegetative phenophases is held with greater intensity than ISG (intensive shoots growth). ERF (the entry ripe fruit) of the generative phenophases is noted with intensity lower than vegetative phenophases within the ratio chlorophyll a / b.*

Key words: plum tree, variety, rootstock, phenophase

Rezumat. *Intensitatea procesului de acumulare a asimilatelor depinde de factorii interni şi externi, procesele fiind diferite de la soi la soi, de la portaltoi la portaltoi şi de la asociație soi x portaltoi la asociație soi x portaltoi. Portaltoiul Miroval, ce imprimă o vigoare mai mare, influențează mai intens procesul de acumulare a asimilatelor din frunze, fiind urmat de portaltoiul Oteşani 8. Fenofaza ICL (încetinirea şi încetarea creşterii lăstarilor) din cadrul fenofazelor vegetative se desfăşoară cu o intensitate mai mare decât CIL (creşterea intensă a lăstarilor). IPF (intrarea în pârgă a fructelor) din cadrul fenofazelor generative, se remarcă cu o intensitate mai mică decât fenofazele vegetative, în cadrul raportului clorofilă a/b.*

Cuvinte cheie: prun, soi, portaltoi, fenofază

INTRODUCTION

Compared with other plant species grown, the rootstocks of trees species represent the source of synthesis, absorption and distribution processes, so between the processes of growth and fructification will be a close correlation. Physiological changes by passing trees are of great importance in the growth and development of trees during the vegetation season (Cichi M., 2002 and 2008). Among the internal factors that influence development are the variety of trees and rootstock (Botu I. and coll., 2007; Meland M. and coll., 2007).

In the interpretation of issues that affect physiological processes was initiated an experiment in an area located in central Oltenia.

The research objectives were: the effect of variety, rootstock, and interaction variety x rootstock on the accumulation of assimilates in leaves.

MATERIAL AND METHOD

The research was conducted during 2006-2008 in a plantation established in 1995 with 4 stocks and 20 varieties. The experience has been positioned as randomized blocks in 4 repetitions with 10 trees in repetition, returning to 40 trees per variant.

Trees grafted on those rootstocks were headed in the form of bowl overlapped, works being uniform.

The analysis of physiological processes has been to seven varieties grafted on three rootstocks and referred to the contents of carotenoids and chlorophyll in the leaves of plum.

These aspects were studied in three final phenophases of vegetative organs and fruits namely intensive shoot growth (ISG), slowing and cessation of shoot growth (SCSG), the entry of ripe fruit (ERF).

Plum leaves were harvested from the shoot located at the base, middle and top of trees, and leaves undergrowth of these were collected from the middle of the shoot.

Statistical processing of individual data (gross) was performed using CSS Statistics computer program.

The research has been located at S.D.E. Banu Maracine on a preluvosol red soil with a pH of 6,5-6,7 medium supplied with macro and microelements. The average annual temperature is between 10,4-12,4 º C, absolute minimum temperature was -4.3 ° C. The annual quantity of rainfall amounts 640-752 mm, relative humidity not lower than 60%.

RESULTS AND DISCUSSIONS

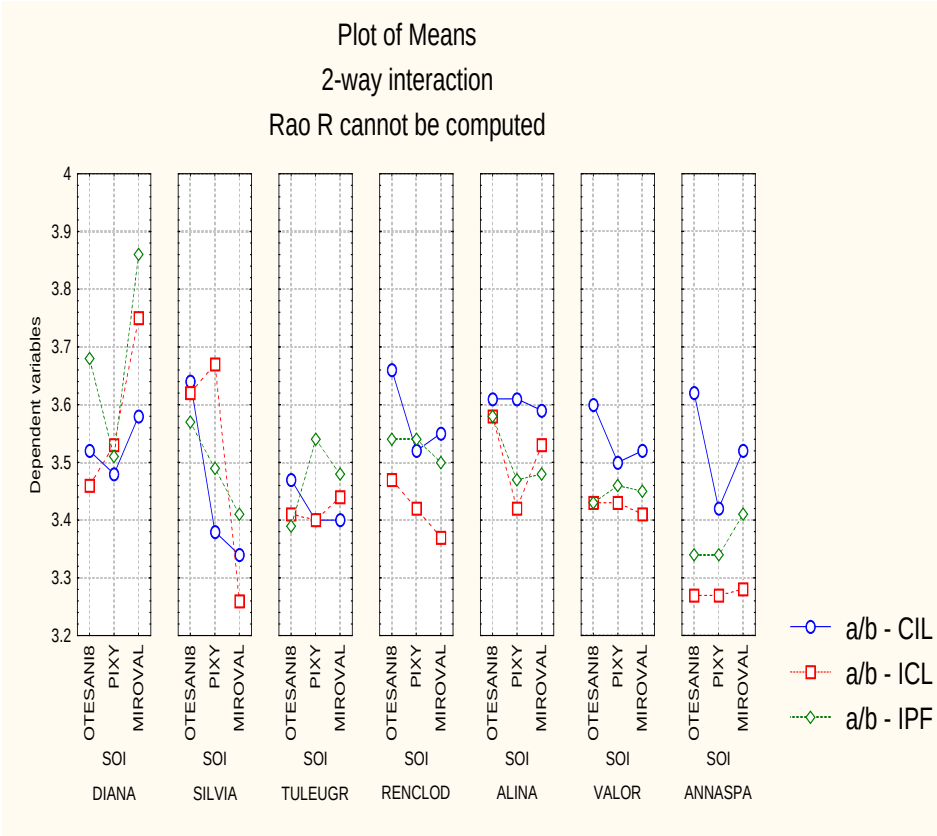
Content of leaf pigments vary by phenophase, species, varieties, rootstocks, light intensity etc.

We find that the average value of the report chlorophyll a / b varied to the varieties on the three rootstocks. Thus, three varieties on rootstocks in the years 2006 - 2008 showed that the average value of this report higher in Intense Growth of Shoot (ISG) phenophase, than SCSG phenophase (slowing and cessation of shoot growth).

This is due the biosynthesis in a higher proportion of chlorophyll a versus chlorophyll b. On the rootstock Oteşani 8, the average value of the chlorophyll report a / b carried out in seven varieties in phenophase ISG was 3.56 (2007) 3.46 (2008), slightly more than average of the same report on rootstock Miroval.

To the shoot growth cessation, the average value of this report was in 2008: 3.50 per rootstock Oteşani 8, 3.51 for Miroval rootstock and 3.47 on Pixy, actually was higher than in 2006 and 2007, (fig. 1).

On entering ripe fruit, this report was 2.14 mg/100g in 2008, being lower than in 2006 and 2007 (3.45 - 3.49 mg/100g).



CIL = ISG - Intense Growth of Shoot
ICL = SCSG - Slowing and Cessation Of Shoot Growth
IPF = ERF - the Entry of Ripe Fruit

Fig. 1 - Report Chlorophyll a / Chlorophyll din leaf of several plum varieties (Year 2008)

Analyzing separately the effect of variety on the chlorophyll a / b report, (Table 1), we see that the average ratio varied between 3.42 (ISG) in the variety Tuleu Gras (Haulm Fat) and 3.60 (ISG) in variety Alina.

Table 1

The effect of variety on Chlorophyll a/b report - year 2008

Rootstock	Variety	ISG	SCSG	ERF
....	DIANA	3.526667	3.580000	3.683333
....	SILVIA	3.453333	3.516667	3.490000
....	TULEU GRAS	3.423333	3.416667	3.470000
....	RENCLOD ALTHAN	3.576667	3.420000	3.526667
....	ALINA	3.603333	3.510000	3.510000
....	VALOR	3.540000	3.423333	3.446667
....	ANNA SPATH	3.520000	3.273333	3.363333

Varieties Tuleu Gras, Renclod Althan, Alina, Valor and Anna Spath had a decrease in this report in phenophase SCSG (slowing & cessation of shoot growth), until the senescence phase.

The influence of rootstock is varied, namely, during ISG (the intensive shoot growth) and SCSG (slowing & cessation shoot growth) of rootstock Oteşani 8 gives to the chlorophyll a / b report higher values (ISG = 3.58; ISG = 3.46) than the other rootstocks Pixy and Miroval, (Table 2). Oteşani 8 and Miroval rootstocks have greater influence on the ERF entry of ripe fruit (3.50 and 3.51).

Table 2

The effect of rootstock on Chlorophyll a/b report - year 2008

Rootstock	Variety	ISG	SCSG	ERF
OTE□ANI 8	....	3.588571	3.462857	3.504286
PIXY	....	3.472857	3.448571	3.478571
MIROVAL	....	3.500000	3.434286	3.512857

In Figure 2 we can see how the varieties Valor and Anna Späth presented the highest content in pigments carotenoids on all three rootstocks in phenophase ISG.

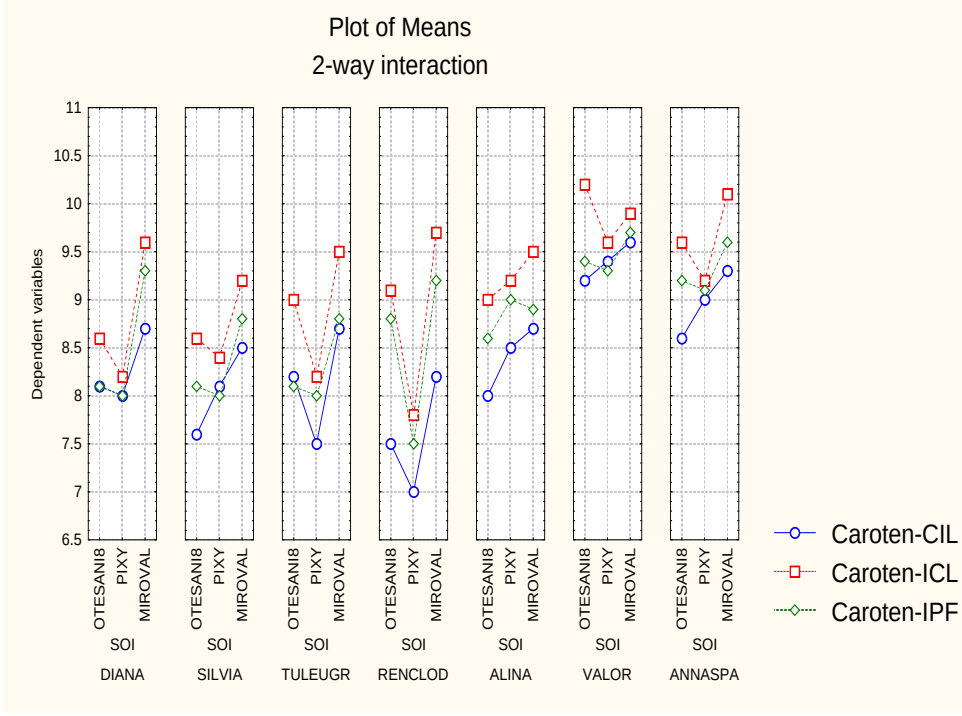


Fig. 2. Content of carotenoid pigments for various combinations variety/rootstock of plum (Year 2008**)**

Varieties Silvia, Alina, Anna Späth and Valor were observed with a decreasing content in pigments Carotenoids in the following order of rootstocks: Miroval, Pixy and Oteşani 8, during phenophase ISG (intense growth of shoot).

During phenophases ISG (slowing and cessation of shoot growth) and ERF (entry ripe fruit) the varieties Diana, Silvia, Tuleu Gras, and Renclod Althan and Anna Späth were revealed with a higher carotenoids content on rootstock Miroval, Oteşani 8 and Pixy.

Alina Variety had the largest content on rootstock Pixy (8.50 mg/100g) during phenophase ISG (intense growth of shoot) and 9.00 mg/100g in during phenophase ERF (entry ripe fruit).

Practically during SCSG (slowing and cessation of shoot growth) phenophase, is registered the highest growth in carotenoid pigments during three years of analysis and on all three rootstocks Oteşani 8, Pixy and Miroval.

A significant positive correlation is between SCSG (photosynthesis) and SCSG (carotene), where r=+0.4509, and ERF (carotene), where r = + 0.5046, (Table 3).

Table 3

Correlation between SCSG (photosynthesis-F) SCSG, ERF (caroten-K)

VARIABLE	Marked correlations are significant at p < .05000	
	K – SCSG (slowing and cessation of shoot growth)	K – ERF (entry ripe fruit)
F – SCSG (slowing and cessation of shoot growth)	.4509*	.5046*
	N=21*	N=21*
	p=.040*	p=.020*

CONCLUSIONS

Miroval rootstock, which gives a greater vigor, influences more intense the accumulation process of assimilates of leaves, followed by rootstock Oteşani 8.

Phenophase SCSG (slowing and cessation of shoot growth) of the vegetative phenophases is held with intensity greater than ISG (intensive shoot growth).

ERF (entry ripe fruit) of the generative phenophases is noted with an lower intensity than to vegetative phenophases, regarding the chlorophyll a/b ratio.

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