IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 9, Issue 10 Ver. II (Oct. 2016), PP 70-72
www.iosrjournals.org

The influence of light intensity and xylem sap flow on success of walnut budding.

Majlinda Kasmi[1], Petrit Rama[2], Aulona Veizi[2], Hekuran Vrapi[3]
[1*] *(PhD Candidate, Agricultural University of Tirana, Department of Horticulture, Kodër Kamëz, Tirana, Albania,)*
[2]*Agricultural University of Tirana, Department of Horticulture, Kodër Kamëz, Tirana, Albania,*
[3]*Department of Plant Protection, Faculty of Agriculture and Environment, Agricultural University of Tirana, Albania.*

Abstract *Most of the existing walnut trees in Albania are seedlings and notably variable in production and nut quality. Walnut propagation is achieved by using seeds coming from valuable varieties. This type of propagation produces a large number of plants with various characteristics into the walnut orchards. The present study aimed to experiment the influence of light intensity and xylem flux flow on success of walnut budding. 60 potted (3x20) seedling where budded in the shade with about 3500 lux light intensity, while 60(3x20) seedlings were held and were budded in the field. The percentages of budding success were measured 4 weeks after budding. The budding of walnut seedlings (potted seedlings) that are located in low-intensity environment 3000-4000 lux has a higher percentage of success compared with those seedlings that are located in direct light (in the field) with high light intensity, 20000-30000 lux. Also, four budding times were applied as follow: 24 of may,2 of june,11 of June and 19 of June. At the same dates were measured the leaf surface area of the seedlings, the mean temperatures, the rate of sap flow. Was calculated the ratio between the leaf surface area, the ln of temperatures and the rate of sap flow. The percentages of budding success were measured 4 weeks after budding. In the end, was determined the dependence of budding success from this ratio. The small ratio of the flux intensity to the surface leafy and to the air' temperatures has given better results of budding success than the higher ratio.*

Keywords: *budding, dependence, leafy, surface*

I. Introduction

The population of Juglans regia in Albania is currently estimated around 144000 plants (Rama.P ,2011) and, according to a government's program, three million walnut trees should be planted in Albania during the years 2012-2017(Rama. P. 2011) . Most of the existing walnut trees are seedlings and notably variable in production and nut quality. In Albania, walnut propagation is achieved by using seeds coming from valuable varieties. This type of propagation produces a large number of plants with various characteristics into the walnut orchards.

Walnut trees are more difficult to graft than most of other fruit trees (Ozkan and Gumus, 2001)**.** Environmental conditions have a major impact for better graft success in walnut. (Avanzato and Atefi, 1997). Investigations conducted so far on walnut grafting and budding distinctly indicate many factors determining a high percentage of their successful. These factors are: the temperature, methods of grafting or budding , date of grafting or budding (Kasmi and Rama 2013) and the environmental moisture(Karadeniz,T.2005) Optimally, the temperature should be maintained at about 27°C (Germain, 1998). The low direct light has a positive effect in budding success of walnut. To reduce direct light and temperature effects on the graft unions in the field, budding was done on the north-west side of the rootstocks.(Zia Nosrati and Abdollah Khadivi). The top of the rootstocks were also bent on the junction portion to reduce light penetration. Light intensity ranged between 3,000 and 5,000 lux during the day in the greenhouse. The robustness of different seedlings is an important factor for the budding successful . Also, Reza Rezaee et al. 2008 reported that the rate of xylem flow bleeding had a important role in the success of walnut budding.(International Journal of Fruit Science Improved Success of Persian Walnut Grafting Under Environmental Aziz Ebrahimi , Kourosh Vahdati a,Esmaeil Fallahi (September 2007))

The present work aimed to experiment the effect of light intensity on budding success of walnut and to determine the time of budding depending on sap flow intensity of seedling xylem than patch budding performed in field seedlings(high vigour),

II. Materials And Methods

The present study was conducted in a private nursery located in the Peze, a village in the district of Tirana, during the years 2013 and 2014. The rootstocks were (*Juglan sregia*L) seedlings, which had been direct sown on January (20-25 January) in the pots.

Scion woods of *Juglans regia* var. 'Franquette' were obtained from a 7-years-old orchard block on the day of budding. Patch budding were employed, as the most common budding method used, as more successful budding was used (Kasmi and Rama 2013).

Experiment one: 60 potted (3x20) seedlings were placed in the shade with 3500 lux light intensity, while 60(3x20) seedlings were held in the field. So, the experimental design was a randomized complete block with three replicates of each treatment. Each replicate contained 20 plants. The percentages of budding success were measured 4 weeks after budding.

Experiment two: Four budding times were applied as follow: 24 of may,2 of june,11 of June and 19 of June. At the same dates were measured the leaf surface area of the seedlings, the mean temperatures, the rate of sap flow The percentages of budding success were measured 4 weeks after budding..

Was calculated the ratio between the leaf surface area and ln of temperatures and the rate of sap flow. In the end, was determined the dependence of budding success from this ratio

III. Results And Discussion

The results, summarized in Table 1, show that the budding of walnut seedlings (potted seedlings) that are located in low-intensity environment 3000-4000lux, has a higher percentage of success compared with those seedlings that are located in direct light (in the field) with high light intensity, 20000-30000 lux / The success rate of budding of the seedlings that are located in the shade, with light intensity 3000-4000lux was 48,5 %, while the rate of budding of seedlings (field seedlings) with high light intensity ,was 43,75%. Other authors: Azis Ebrahimi, Kurosh Vahadi and Esmaeil Fallahi (2007), reported the good success of walnut grafting in the light intensity ranged between 3,000 and 5,000 lux during the day in the greenhouse .

This can happen for the following reasons:

a.-The low light intensity can reduce the presence of the high concentration of phenolic compounds in the tissues and their oxidation by wounding

b- It avoids disintegration and oxidation of phytohormones (auxins and cytokinins) that are necessary for the callus formation. **Table 2** shows that the success of walnut budding is influenced by the intensity of stem sap flow per unit of leaf surface (cm^2) end natural logarithm of air temperature in the day of budding.

The small ratio of the flux intensity to the surface leafy and to the air' temperatures has given better results of budding success than the higher ratio. The increase of the leafy surface increases the transpiration and the photosynthesis, consume more much water, lowers the pressure of liquids circulating in the vascular xylem of the seedlings. Also, decrease of the air temperatures result in a fairly exponential decrease of transpiration (AA.ABD.EL Rahma,1959

Most probably, budding success of small ratio of the flux intensity to the surface leafy and to the air' temperatures is due to the equality between roots' pressure and the suction power of the leaves. This balance between these two pressures avoid that scions be damaged from excessive liquids coming from the root. Also, Reza Rezaee et al reported that percentages of grafting success was more higher in low vigour seedlings (40.22%), while in semi vigour and high vigour was 35,44% and 30.33% respectively.

Most probably, the success is due to the low bleeding rate in low vigour seedlings (Reza Rezaee et al 2008).The dependence of the budding success from the xylem flux has been expressed from the linear equation: y=6.2x+7,5 (figure 1)

IV. Figures and Tables

Table1. The effect of light intensity in budding success of walnut (%)

The light intensity	r1	r2	r3	r4	Mean
In the field: 20000-30000 lux	48	43	44	40	43.75
In the shade 3000-4000 lux	47	49	47	51	48.5

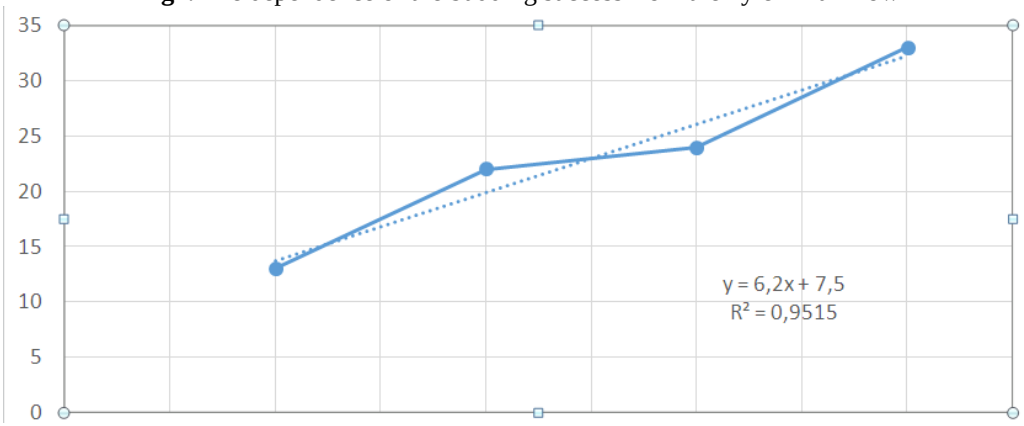
Anova: Single Factor Summary				
Groups	*Count*	*Sum*	*Average*	*Variance*
48	3	127	42.33333	4.333333
47	3	147	49	4

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	66.666667	1	66.666667	16	0.0161301	7.7086474
Within Groups	16.666667	4	4.1666667			

Table2 The effect of the leaf surface area of the seedlings, the mean temperatures and the rate of sap flow in budding success of walnut (Nr of success budding from 60 grafted plants).

Date	18/4	24/5	2/6	11/6	19/6
Leaf surface area(cm^2)	713.145	826.160	1028,61	1287.11	1376,35
Temperature(ln)		22(3.091)	25(3.2188)	27(3.2958)	29(3.36720
The rate flow l/hour	0,0203690	0,021005	0.021232318	0.0277349	0,0266760
The ration Flux/leaf Surface. lnt^0c	0,2856	0.2543(0.08227)	0,2065(0.06454)	0.2154(0.06535	0,1938(0.05755)

Fig1. The dependence of the budding success from the xylem flux flow



V. Conclusion

The small ratio of the flux intensity to the surface leafy and to the air' temperatures has given better results of budding success than the higher ratio. The increase of the leafy surface increases the transpiration and the photosynthesis, consume more much water, lowers the pressure of liquids circulating in the vascular xylem of the seedlings. Also, decrease of the air temperatures result in a fairly exponential decrease of transpiration (AA.ABD.EL Rahma,1959

Most probably, budding success of small ratio of the flux intensity to the surface leafy and to the air' temperatures is due to the equality between roots' pressure and the suction power of the leaves. This balance between these two pressures avoid that scions be damaged from excessive liquids coming from the root. Also, Reza Rezaee et al reported that percentages of grafting success was more higher in low vigour seedlings (40.22%), while in semi vigour and high vigour was 35,44% and 30.33% respectively.

References

[1]. Avanzato, D. 2001. Effect of different hygro-thermic environments on growth of potted walnut grafted seedlings. Acta Hort. 544:459-464
[2]. Aziz Ebrahimi,Kourosh Vahdati,Esmail Fallahi 2007.Impruved Success of Persian Walnut Grafting Under Environmentally Controlled Conditions. International Journal of Fruit Science 6: 4-12.
[3]. A.A.ABD EL Rahman and J.F Bierhuzen1959.The effect of temperature and water supply on growth, transpiration and water requirement on tomato under controlled condition, Wageninegen Netherlands,188th Communication
[4]. Germain, E. 1998. Production and economics of nut crops. Advanced course, May 18-29, Adana, Turkey
[5]. Karadeniz, T. 2005. Relationships between graft success and climatic values in walnut (Juglans regal.). J. Central European Agr. 6:631-634.
[6]. Majlinda Kasmi, Petrit Rama, Bari Hodaj*, Edlira Kukali, Albert Rabeta. 2013.Budding of Walnut (*Juglans regia L.*)Albanian Journal of Agricultural Sciences (AJAS). 465 – 469
[7]. Ozkan, Y. and A. Gumus. 2001. Effects of different applications on grafting under controlled conditions of walnut. Acta Hort. 544:515-520
[8]. Rama P: National Study on Actual Situation and Perspective of Nut Trees in Albania Study Summary 2011, Page 54
[9]. Rezaee,R,. Vahdati, K,. Grigoorian,.Valizadeh.M.2008.Walnut grafting success and bleeding rate as affected by different grafting methods and seedling vigour. The journal of horticulture science and biotechnology. Volume 83,Issue1:94-99
[10]. Zia Nosrati and Abdollah Khadivi-Khub(2014). Effect of Different Budding Methods and Times on Grafting Success of Walnut.K orean Journal of Horticultural Science and Technology. Volume 32, Issue 6, 2014, pp.788-793.