Journal homepage www.jzs.univsul.edu.iq
Journal of Zankoy Sulaimani
Part-A- (Pure and Applied Sciences)

# Effect of Kinetin and Budding Date on Top Working for Black Mulberry (*Morus nigra* L.)

Rasul Rafiq Aziz[1], Fakhraddin Mustafa Hama Saleh[1] & Faraydwn Karim Ahmad[1]

*1 College of Agricultural Science-Sulaimani University, Bakrajo Street,Sulaimanyah-Iraq*
E-mail: rasul.aziz@univsul.edu.iq

**Article info**

Original: 26/12/2017
Revised: 30/01/2018
Accepted: 06/02/2018
Published online:

***Key Words:***
*Mulberry*
*Budding dates*
*Kinetin*
*budding success*

**Abstract**

This study was carried out at Tawella, Located north east of Sulaimani, Iraqi Kurdistan Region in order to determine the effect of two budding date (June 5 and June 20) and three concentrations (0, 5 and 10) mg/l$^{-1}$ of Kinetin on budding success and growth scion of black mulberry .Results showed that the highest bud success (60%) was obtained on June 20 compared to 50% for June 5 while 5 mg/l$^{-1}$ Kinetin gave the highest budding success. Interaction of June 5 and 5 mg/l$^{-1}$ Kinetin resulted in highest budding success (80%). Budding on June 5 gave the highest averages of budshoot length and Number of leaves per budshoot. Kinetin at 5mg/l$^{-1}$ gave highest budshoot length. Interaction June5 and 5mg/l$^{-1}$ Kinetin gave the highest budshoot length.

## Introduction

Black mulberry (*Morus nigra* L.) is deciduous fruit tree belongs to Moraceae family, which has been cultivated over thousands of year and adapted to a wide range of tropical, subtropical and temperate zones of Asia, Europe , North and South America , and Africa ***[1]***. Black mulberry fruit is used as dry fruit, syrup, cake and ice cream industry. Different methods of propagation are used to cultivate black mulberry in a large scale.***[2]***. Mulberry cultivation is very limited because of the difficulties facing grafting and budding. Grafting success in prevented because the emergence of the milk secretion and the space under the bud tissue emerge on mulberry ***[3]***. Failure of grafting success is due to the milk secretion under the union region. and Environmental factors such as temperature, humidity as well as time of budding and water exudate effect the budding success ***[4]***. Kako et al.(2012)***[5]*** reported that Kinetin at (12 mg/l$^{-1}$) increased the success percentage of peach budding (76.17%). Fadhil, (2011)***[6]*** demonstrated that treatments with IAA and Kinetin resulted in a higher budding success and improved vegetative growth of scion of persimmon Tamopan cultivar. The aim of this study was to examine the effect of cytokine represented by Kinetin and budding date in bud success and some growth characteristics of black mulberry .

## Material and Methods

This study was conducted during the 2015 growing season, at Tawella, located 100km south east Sulaimani, Iraqi Kurdistan region. Scions were taken from local commercial cultivar of black mulberry (*Morus nigra* L.) while 10-12 year old white mulberry which are grown naturally in the region were used as rootstocks.

Winter pruning on February 15, 2015 was conducted to obtain new shoot sprouts for budding process. 10-15mm diameter shoots of Homogeneous as much as possible white mulberry were used in top working process applying T-budding method ***[4]***. The experiment was laid out in a factorial randomlzed complet

block design with three replications and 10 buddings for experimental units . The treatments consisted of two budding date (June 5 and June 20) and three concentration (0, 5 and 10) mg/l$^{-1}$ of kinetin were applied. bud sticks were taken directly before budding process on the two dates and scion dipped quickly in Kinetin solution for 5 seconds. Data were analyzed using XLSTAT system, Duncun multiple range test at (5%) level was used for comparisons. The following parameters were recorded on November 1, 2015.

1- Budding success %: Number of succeeded budded x 100 /total number of budding (10 buddings) for every experimental unit.
2- Bud shoot length (cm): Was measured with measuring tape at a point of budding union.
3- Bud shoot diameter (cm): Recorded by using a digital Vernier at a point 5 cm above the budding union.
4- Number of lateral branches per budding : Recorded as a for bud shoot length .
5- Leaves number per bud shoot: Leaves on bud shoot counted according to Zenginbal and Esitken (2016) *[7]*.
6- Leaf area (cm$^2$): The leaf area was measured according to Drovnic et al. (1965) ***[8]***.
   S = G X s / g where:
   S = Leaf area (cm$^2$)
   G = Leaf dry weight (g)
   s = Average area of cut disc given from the leaves (cm$^2$) .
   g = Average dry weight of cut discs (g)

## Results and Discussion

### *A. Budding success percentage (%):*

Figure (1)first effect of Kinetin indicate that Budding date showed effect on budding success, June 20 gave the highest success (60%) compared to 50% on June 5 . This result agreed with ***[9]*** on budding pistachio. Differences in budding success may be due to physiological condition of both rootstock and scions with relation to the environmental factors, particularly temperatures ***[4]***. The interaction of budding date and Kinetin concentration had the highest value on budding success. Maximum values of budding success percentage (80%) recorded when budding was carried out on June 5 and treated with 5 mg/l$^{-1}$ Kinetin .The Findings are in accordance with the finding of kako et al. (2015)***[10]*** Who showed that the highest budding success rate of peach was 85.33% when budded on (29/9/2012) and treated with 12 mg/l$^{-1}$ Kinetin.

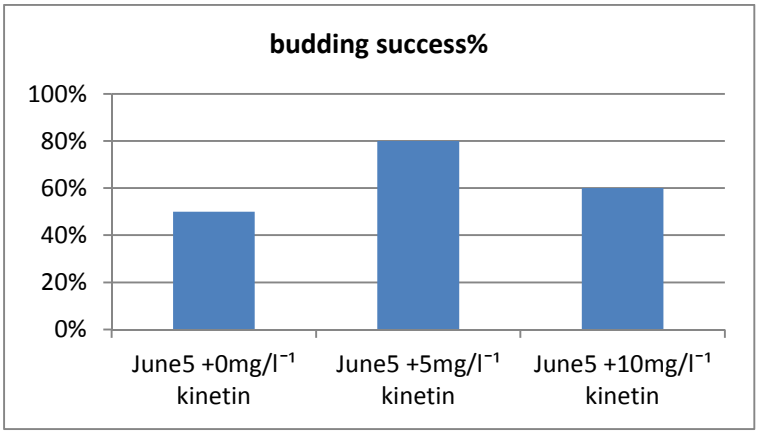


Figure-1: Effect of Kinetin and Budding date on budding success percentage% of black mulberry.

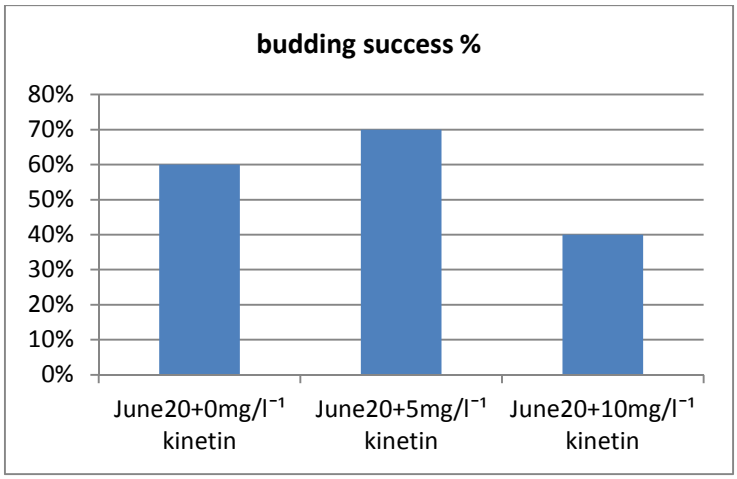


Figure-2: Effect of Kinetin and Budding date on budding success percentage% of black mulberry.

### *B. Budshoot length (cm):*

Table (1) shows that budshoot length was significantly affected by the date of budding. The highest budshoot length was (67.37 cm) when budding process was done on June 5, the result was in conformity with the results of many workers *[11]* and *[9]*.Kinetin application Significantly increased the budshoot length of black mulberry, the best results (68.80cm) was obtained from 5 mg/l$^{-1}$ kinetin .The study shows that the highest budshoot length (71.50cm) was obtained from the interaction of June 5 and 5mg/l$^{-1}$ kinetin which is superior Significantly to the other interaction.

Table-1: Effect of Budding date and Kinetin and their interactions on the budshoot length (cm) of black Mulberry.

| *Date* | *Kinetin* | | | *Mean* |
|---|---|---|---|---|
| | *0 mg /l$^{-1}$* | *5 mg/l$^{-1}$* | *10 mg/l$^{-1}$* | |
| *June 5* | *67.40 ab* | *71.50 a* | *61.83 bc* | *67.37 a* |
| *June 20* | *61.83 bc* | *65.71 b* | *57.75 c* | *62.47 b* |
| *Mean* | *64.36 b* | *68.80 a* | *60.20 b* | |

*Numbers with the same letters are not Significant by Duncan's New Multiple Range Test (P≤0.05)

### *C. Budshoot diameter (cm):*

Data presented in table (2) illustrates that Budding date had no significant effect on budshoot diameter. While 5mg/l$^{-1}$ Kinetin gave the highest value (1.13cm) which Significantly superior to the other concentrations. June 5 budding date and 5mg/l$^{-1}$ Kinetin resulted in the highest budshoot diameter (1.16cm) which was superior Significantly to the other treatment interactions.

Table-2: Effect of Budding date and Kinetin and their interactions on the budshoot diameter (cm) of black Mulberry.

| *Date* | *Kinetin* | | | *Mean* |
|---|---|---|---|---|
| | *0 mg /l$^{-1}$* | *5 mg/l$^{-1}$* | *10 mg/l$^{-1}$* | |
| *June 5* | *1.03 ab* | *1.16 a* | *0.93 b* | *1.05 a* |
| *June 20* | *0.90 b* | *1.09 a* | *0.95 b* | *0.99 a* |
| *Mean* | *0.96 b* | *1.13 a* | *0.93 b* | |

*Numbers with the same letters are not Significant by Duncan's New Multiple Range Test(P≤0.05)

### *D. Number of branches per budshoot :*

Table (3) Shows that each dates and Kinetin concentrations as well as their interactions had no significant effects on the number of branches on budshoot.

Table-3: Effect of Budding date and Kinetin and their interactions on the Number of branches per budshoot of black Mulberry.

| Date | Kinetin | | | Mean |
|---|---|---|---|---|
| | 0 mg /l$^{-1}$ | 5 mg/l$^{-1}$ | 10 mg/l$^{-1}$ | |
| June 5 | 1.40 a | 1.63 a | 1.17 a | 1.42 a |
| June 20 | 1.50 a | 1.57 a | 1.25 a | 1.47 a |
| Mean | 1.45 a | 1.60 a | 1.21 a | |

*Numbers with the same letters are not Significant by Duncan's New Multiple Range Test (P≤0.05)

## *E. Leaves numbers per budshoot.*

Table (4) explains that the highest number of leaves per budshoot was (20.74)on June 5 which was superior Significantly to June 20. Kinetin concentrations had no Significant effects on the number of leaves/scion , whereas the highest number of leaves per scion (20.80) was observed under 5mg/l$^{-1}$ Kinetin treatment.On the other hand, June 5 budding date interated with 5mg/l$^{-1}$ Kinetin resulted in the highest number of leaves/scion (21.63) which was super Significantly to the other interactions.

Table-4: Effect of Budding date and Kinetin and their interactions on the leaves numbers per budshoot of black Mulberry.

| Date | Kinetin | | | Mean |
|---|---|---|---|---|
| | 0 mg /l$^{-1}$ | 5 mg/l$^{-1}$ | 10 mg/l$^{-1}$ | |
| June 5 | 20.00 ab | 21.63 a | 20.17 ab | 20.74 a |
| June 20 | 18.33 ab | 19.86 ab | 16.50 b | 18.53 b |
| Mean | 19.09 a | 20.80 a | 18.70 a | |

*Numbers with the same letters are not Significant by Duncan's New Multiple Range Test (P≤0.05)

## *F. Leaf area (cm$^2$):*

Table (5) Shows that dates of budding had no Significant effects on the leaf area.10 mg/l$^{-1}$ Kinetin gave maximum leaf area (128.05 cm$^2$) which was superior Significantly to the control. The interaction of dates and Kinetin had a Significant effect on leaf area, the maximum value (129.69 cm$^2$) was recorded when budding carried out on June 5 and treated with 10 mg/l$^{-1}$ Kinetin. Budding date (June 20) had Significant influence on budding success percentage and subsequent growth of budshoot length. Kinetin concentration (5 mg/l$^{-1}$) Significantly increases budshoot length, budshoot diameter. The interaction of dates (June 5) and 5 mg/l$^{-1}$ Kinetin gave the highest budshoot length, budshoot diameter and number of leaves per budshoot.

The results may be caused by the fact that budding in sutable date allow physiological condition of both rootstock and scions with relation to the environmental factors, particulary temperatures ***[4]***. Also Kinetin enhances budding success and another parameters by inducing cell division and formation callus tissus, 5 mg/l$^{-1}$ Kinetin shows the highest effect on most parameters, this could be interpreted on the basis of the existence of sufficient natural cytokinin with the plant. The interaction of June 20 and 5 mg/l$^{-1}$ Kinetin gave the highest percentage of budding success, while the interaction of June 5 and 5 mg/l$^{-1}$ Kinetin gave the highest budshoot length, budshoot diameters and number of leaves per budshoot. This may be due to the fact that this treatment interactions has agreat role in budding union formation, budshoot length and thus giving the highest number of leaves on the budshoots because of the greater chance of nutrient uptake that resulted in a faster and more uniform growth ***[12]***.

Table-5: Effect of Budding date and Kinetin and their interactions on the leaf area ($cm^2$) of black Mulberry.

| Date | Kinetin | | | Mean |
|---|---|---|---|---|
| | 0 mg /l$^{-1}$ | 5 mg/l$^{-1}$ | 10 mg/l$^{-1}$ | |
| June 5 | 125.18 b | 126.92 b | 129.69 a | 127.34 a |
| June 20 | 126.68 b | 126.81 b | 125.58 b | 126.47 a |
| Mean | 125.99 b | 126.87 ab | 128.05 a | |

*Numbers with the same letters are not Significant by Duncan's New Multiple Range Test (P≤0.05)

## References


[1] Ozgen, M.,Serce, S. and Kaya, K. *"Phytochemical and antioxidant properties of anthocyanin-Rich Morus nigra and Morus rubra fruits*", Sci. Hort., Vol.(119), No.3, pp. 275-279.(2009).

[2] Zenginbal, H. *"The influence of various methods and budding dates on production of Black Mulberry (Morus nigra L.) sapling*". Acta Sci. Pol. Hortorum Cultus, Vol.(16), No.5, pp. 77– 87.(2017).

[3] Ünal A., Özcağıran R., Hepaksoy S. "*Kara dut ve mor dut çeşitlerinde odun çeliklerinin köklenmesi üzerinde bir araştırma*". Türkiye I. Ulusal Bahçe Bitkileri Kongresi, Vol.(1), pp.267- 270.(1992).

[4] Hartmann, H.T., Kester, D.E., Davies, Jr.F.T. and Geneve, R.L. *''Plant propagation and Practices* '': Eighth Edition.Regents/Prentice Hall International Ed.,Englewood Cliffs, New Jersey, pp. 915.(2011).

[5] Kako, S.M. *"The effect of auxin IBA and Kinetin in budding success percentage of Mulberry (Morus sp .)*". Int .J. Pure Appl. Sci.Technol.,Vol.(13), No.1, pp.50-56.(2012).

[6] Fadhil, N.N. "*Effect of Indole Acetic Acid and Kinetin on budding success and growth of persimmon*". Mesopotamia Journal of Agriculture, Vol. (39), No.4, pp.52-60. (2011).

[7] Zenginbal, H., Eşitken, A. *"Effects of the application of various substances and grafting methods on the grafting success and growth of black mulberry (Morus nigra L.)*". Acta Sci. Pol. Hortorum Cultus, Vol.(15), No.4,pp 99-109.(2016).

[8] Dvornic*,:''Lacrali practicde ampelogratic E-Didacti siped agogica Du cureset R. S. Romania*''.(1965).

[9] Hama Salieh, F.M. *''Effect of IAA , Kinetin and dates on T-budding success of Pistacia vera Dissertation. On tow rootstocks*''. PhD. Thesis. College of Agriculture. University of Sulaimani. Iraq. (2004).

[10] Kako, S.M., Al-Douri, E-F.S. and Mohmud, P.J. *"Effect of budding date,Kinetin and IBA on Success percentage and producted saplings characteristics of peach cv. Dixired*". J. of Tkret for Agricultural Sciences Vol. (15), No.1, in Arabic.(2015).

[11] Mohammad Ali, J.J., Noori, I.M. and Hama Salieh, F.M. *"Utilization of wild pears rootstocks as a natural resource for loquat production under rain-fed condition in Sulaimani Governorate*". Tikrit University Journal for Humanities. Vol.(19), No.3.(2012).

[12] Erdal, I.M., Askin, A., Kucukyumuk, Z., Yildirim, F. and Yidirim, A. *"Rootstock has an important role in iron nutrition of apple trees*" . World Journal of Agricultural Sciences. Vol.(4), No.2, pp.173-177.(2008).