



E-ISSN: 2278-4136

P-ISSN: 2349-8234

[www.phytojournal.com](http://www.phytojournal.com)

JPP 2020; 9(2): 1292-1294

Received: 22-01-2020

Accepted: 24-02-2020

**Gagan Mehta**Dept. of Fruit Science,  
SKUAST-Jammu, Chatha,  
Jammu and Kashmir, India**Rajesh Kumar**Dept. of Fruit Science,  
SKUAST-Jammu, Chatha,  
Jammu and Kashmir, India**VK Wali**Dept. of Fruit Science,  
SKUAST-Jammu, Chatha,  
Jammu and Kashmir, India**Akash Sharma**Dept. of Fruit Science,  
SKUAST-Jammu, Chatha,  
Jammu and Kashmir, India

## Evaluation of different grafting methods and time in pecan (*Carya illinoensis* Wangenh) in relation with vegetative growth

Gagan Mehta, Rajesh Kumar, VK Wali and Akash Sharma

**Abstract**

A study was conducted to evaluate the method and time of grafting on vegetative growth of pecan (*Carya illinoensis* Wangenh). Three grafting method, viz. Tongue grafting, Cleft grafting and Side grafting with four different timings, viz. 4th week of February, 1st week of March, 2nd week of March and 3rd week of March were used. The results indicated that among all the grafting methods, tongue grafting performed during 1st week of March showed maximum number of leaves (24.55), leaf area (193.66 cm<sup>2</sup>), number of secondary roots (8.88), plant spread (41.44 cm) in north-south and (45.66 cm) in east-west direction and plant biomass (131.37 g). Hence, the grafting performed during the 1st week of March showed better performance on vegetation as compared to other dates of grafting.

**Keywords:** Grafting methods, vegetative growth, *Carya illinoensis* Wangenh

**Introduction**

The Pecan (*Carya illenoinensis* Wang.) belonging to family Juglandaceae is a specie of hickory native to Northern Mexico and the Southern United States in the region of Mississippi river. It is considered as the "queen of nuts" in U.S.A because of its value both as wild and cultivated nut (Woodroof 1979) [6]. Pecans are good source of protein and unsaturated fats like walnuts, pecans are rich in omega-6 fatty acids, although pecans contain about half as much omega-6 as walnuts. The antioxidants and plant sterols found in pecans reduce high cholesterol by reducing the "bad" cholesterol (low-density lipoproteins) levels. The seeds of the pecan are edible, with a rich buttery flavor and vary widely in size, shape and shell thickness which are commonly used to add aroma, flavour, crispness, meatiness, tenderness, a rich colour. Pecan nuts vary widely in size, shape, and shell thickness. Seedling pecan trees often produce small, thick-shelled nuts while trees grafted to improved cultivars produce large, thin-shelled nuts. In the home landscape, these long-lived and sturdy trees provide ample shade and bright yellow fall colour and finally, pecans are a low-input orchard tree. Pecan can be grown in areas having 450 to 1550 m elevation which are free from severe spring frost and excessive heat in summer and receive annual rainfall ranging from 750 to 2000 mm. It requires warm temperate climate. It requires 240 to 280 days growing under warm climate with a mean temperature of above 26.7°C (Naira *et al.*, 2013) [4]. Pecan nut is the one of the most important temperate nuts grown in India. In India, it is mainly grown in Jammu and Kashmir, and Himachal Pradesh. In Jammu and Kashmir state, pecan nut is being successfully grown in Rajouri, Poonch, Udhampur, Kathua, Reasi, Doda, Kishtwar and Ramban districts of Jammu division and Baramulla and Kupwara districts of Kashmir division. The total area under pecan nut production is increasing due its high economic returns and adaptation to intermediate zone of J&K state of India. Woody tree seed often does not breed true due to uncontrolled pollination and favorable characteristics of the parent tree cannot be reliably transferred via seed. However, by grafting a scion of known production quality onto a rootstock with known features, the identical tree can be reproduced with ensured fruit quality (Onay 2000) [5]. Pecan nut cultivation suffers from lack of suitable methods of propagation, inadequate vegetatively propagated plants, lack of standard rootstocks and cultivars, problems of re-establishment of nursery plants in the orchard, pollination behaviour, and lack of suitable pollinizers, long juvenile period and lack of appropriate harvesting techniques. Therefore, evaluation of different grafting methods and time is very important to get the good vegetative growth of a plant.

**Corresponding Author:****Gagan Mehta**Dept. of Fruit Science,  
SKUAST-Jammu, Chatha,  
Jammu and Kashmir, India

## Materials and Methods

The present investigation entitled "Evaluation of different grafting methods and time in pecan (*carya illinoensis* Wangenh) in relation with vegetative growth" was carried out at Regional Agriculture Research Station (RARS), Rajouri, SKUAST-Jammu during 2015-16. Rajouri is classified as warm and temperate zone at an altitude of 33.38° North and longitude of 74.3° East. The altitude of the place is 915 m above mean sea level. The climate of Rajouri is somewhat cooler than the other areas of Duggardesh plains. Summers are short and pleasant. The summer temperature generally does not exceed 41 °C. Winters are cool and chilly characterized with rainfall due to western disturbance and the lowest average temperatures in the year occur in January, when it is around 9.2 °C. Snowfall is scanty but may occur in cool months. Average rainfall is 769 mm (26.3 inch) in the wettest month. The average annual temperature in Rajouri is 20.3 °C. The greatest amount of precipitation occurs in July, with an average of 140 mm. The experiment was carried out with different grafting methods, viz. tongue grafting (T<sub>1</sub>), cleft grafting (T<sub>2</sub>) and side grafting (T<sub>3</sub>) with different timing, viz. 4th week of February 2016 (D<sub>1</sub>), 1st week of March 2016 (D<sub>2</sub>), 2nd week of March 2016 (D<sub>3</sub>) and 3rd week of March 2016 (D<sub>4</sub>) and analysis of data were obtained through Factorial Randomized Block Design with three replications. The seedlings for propagation studies were raised in the field at RARS, Rajouri from locally (desi) available pecan seeds. The seedlings were about two years old of pencil thickness and were used as rootstock of diameter 0.5- 1.0 cm at the time of propagation. The bud-wood for the scion was collected from CSKHPKV, Palampur. The bud-woods were kept moist by wrapping in moist gunny bags to avoid desiccation of buds due to hot weather until the time of grafting operation. Bud sticks with at least 3-4 buds were used for grafting. The biometrical observations were recorded on three randomly

selected plants of each replication to assess the vegetative characters, viz. number of primary and secondary roots per rooted grafted plants, plant spread (e-w and n-s), total plant biomass (g), number of leaves/plant, average leaf area (cm<sup>2</sup>). Observations in each treatment were recorded at the end of growing season. Leaf area meter, measuring scale, measuring tape and digital Vernier Calliper were used to record various observations. The data was analyzed using the statistical programme OP STAT.

## Results and Discussion

Among all the grafting methods tongue grafting was found to be best in terms of maximum number of leaves (24.55) and maximum leaf area (193.66 cm<sup>2</sup>) when grafting performed during 1st week of March. This might be due to strong plant and better root system therefore, food intake was good and hence after union growth was quite faster and also during rainy season well matured rootstock favored with high atmospheric humidity along with fairly high temperature is found congenial for rapid callus production that ensure formation of an early and strong union between stock and scion (Gurjar *et al.* 2012) [1]. The results are in agreement with the finding of Mir and Kumar (2011) [3] where they resulted that tongue grafting during 1st week of March showed the leaf area ranged between 192-198 cm<sup>2</sup>.

The data pertaining to the effect of time and method of propagation on number of primary roots of pecan nut is presented in Table showed non- significant differences. But showed significant effect on number of secondary roots per plant of pecan nut. Tongue grafting showed maximum number of secondary roots (8.88) when grafted on 1<sup>st</sup> week of March and was significantly higher as compared to other methods of grafting, whereas, minimum number of secondary roots (6.33) was obtained in side grafting when grafted on 3<sup>rd</sup> week of March.

**Table 1:** Effect of method and time of grafting on number of leaves, leaf area (cm<sup>2</sup>), number of primary roots and number of secondary roots

Method of grafting	Time of grafting	Number of leaves	Leaf area (cm <sup>2</sup> )	Number of primary roots	Number of secondary roots
Tongue grafting	4 <sup>th</sup> week of February	20.66	168.58	1.67	7.33
Tongue grafting	1 <sup>st</sup> week of March	24.55	193.66	1.87	8.88
Tongue grafting	2 <sup>nd</sup> week of March	21.77	187.39	1.77	7.88
Tongue grafting	3 <sup>rd</sup> week of March	18.66	150.47	1.33	6.00
Cleft grafting	4 <sup>th</sup> week of February	17.66	144.33	1.22	7.00
Cleft grafting	1 <sup>st</sup> week of March	21.10	174.58	1.55	7.55
Cleft grafting	2 <sup>nd</sup> week of March	18.33	161.65	1.44	7.33
Cleft grafting	3 <sup>rd</sup> week of March	15.99	134.62	1.33	5.66
Side grafting	4 <sup>th</sup> week of February	16.55	137.88	1.33	6.00
Side grafting	1 <sup>st</sup> week of March	18.21	153.77	1.11	7.21
Side grafting	2 <sup>nd</sup> week of March	17.99	143.66	1.55	6.33
Side grafting	3 <sup>rd</sup> week of March	15.00	127.88	1.11	5.00
C.D (0.05)		0.81	5.68	N.S	0.70

The data shows significant effect on time and method of propagation when observed during 1<sup>st</sup> week of March and found tongue grafting with maximum plant spread (41.44 cm) and minimum (33.39 cm) in north-south direction and in east-west direction maximum (45.66 cm) and minimum of (36.88 cm) were observed.

Among all the grafting methods tongue grafting after the end of growing season was found to be best in terms of maximum plant biomass was (131.37 g) when performed of 1<sup>st</sup> week of March and minimum (94.78 g) in side grafting when performed on 3<sup>rd</sup> week of March and this is in a confirmation with finding of Germain *et al.* (1993) where they reported maximum plant biomass in tongue grafting. This might be due

to quick and strong union formation, greater uptake of nutrients (Howard 1974) [2] and longer growing period may account for maximum growth of tongue grafted plants.

## Conclusion

On the basis of the different parameters recorded, (number of leaves, leaf area, number of secondary roots, plant spread (e-w and n-s) direction and plant biomass), it is concluded that tongue grafting was better method of propagation over cleft and side grafting for obtaining effective vegetative growth at the end of growing season. The results also revealed that the best time for performing grafting in pecan nut is the 1<sup>st</sup> week of March under open conditions

**Table 2.** Effect of method and time of grafting on plant spread (E-W cm), plant spread (N-S cm) and plant biomass (g) in pecan.

Method of grafting	Time of grafting	Plant spread (E-W) (cm)	Plant spread (N-S) (cm)	Plant Biomass (g)
Tongue grafting	4 <sup>th</sup> week of February	40.88	39.00	114.93
Tongue grafting	1 <sup>st</sup> week of March	45.66	41.44	131.37
Tongue grafting	2 <sup>nd</sup> week of March	41.94	39.88	122.93
Tongue grafting	3 <sup>rd</sup> week of March	36.88	33.39	97.82
Cleft grafting	4 <sup>th</sup> week of February	36.33	34.66	110.19
Cleft grafting	1 <sup>st</sup> week of March	39.49	38.06	122.19
Cleft grafting	2 <sup>nd</sup> week of March	37.99	36.16	115.37
Cleft grafting	3 <sup>rd</sup> week of March	34.60	28.81	95.11
Side grafting	4 <sup>th</sup> week of February	34.50	30.31	98.67
Side grafting	1 <sup>st</sup> week of March	37.10	33.22	106.36
Side grafting	2 <sup>nd</sup> week of March	35.44	31.83	100.82
Side grafting	3 <sup>rd</sup> week of March	30.88	23.83	94.78
C.D (0.05)		3.36	3.24	5.61

## References

1. Gurjar PS, Singh R, Maksar SB, Singh N, Choubey R. Propagation of guava by wedge grafting under polyhouse and open conditions. *Plant Archives*. 2012; 12(2):827-832.
2. Howard BH, Skene DS, Coles JS. The effect of different grafting methods upon the development of one year old nursery apples trees. *Journal of Horticulture Science*. 1974; 49:287-295.
3. Mir MS, Kumar A. Effect of different method, time and environmental conditions on grafting in walnut. *International Journal of Farm Sciences*. 2011; 1(2):17-22.
4. Naira A, Moieza A, Tomar CS. Effect of foliar application of nutrients and biostimulant on growth, phenology and yield attributes of pecan nut cv. 'Western schley'. *Journal of Food, Agriculture and Environment*. 2013; 11(3, 4):1222-1226.
5. Onay A. Micropropagation of Pistachio from mature trees. *Plant Cell Tissue and Organ Culture*. 2000; 60:159-162.
6. Woodroof JG. *Tree nuts*. AVI Publishing Corporation and Incorporation Westport Connecticut, 1979.