

Original Research Article

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Economics of Different Grafting Methods on Pecan Nut (*Carya illinoensis* Wangenh) under Intermediate Agro-Climatic Conditions of Jammu and Kashmir

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ABSTRACT

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An economic analysis of pecan nut plants has been presented through studying their cost and returns under intermediate agro-climatic conditions of Jammu and Kashmir. The study revealed that the total cost of grafting of pecan nut plants up-to their survival was same in all the three methods (₹ 20415.60). After different survival rate of three methods, tongue grafting gave maximum returns (₹ 5384.00) and minimum in side grafting (₹ 484.20). However, benefit: cost (B: C) ratio was found to be maximum in tongue grafting (1:1.26) and minimum in side grafting (1: 1.02).

Introduction

The Pecan (*Carya illinoensis* Wang.) belonging to family Jug land aceae was originated from the south east of U.S.A. It is considered as the “queen of nuts” in U.S.A. because of its value both as wild and cultivated nut (Woodroof, 1979). Their nuts have high nutritional and calorific value. So, pecan is more acceptable in comparison to other nuts. Pecan nut contains high content of proteins (12.5%), fats (71.42%), P₂O₅ (0.46%), K₂O (0.23%) and is rich in oil content and some varieties have shown as high as 76% oil. 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. Besides having large potential as nut its timber is also very expensive and used in gun-stock, carving, cabinet manufactures of high class and many other use. It requires warm temperate climate. It requires 240 to 280 days growing under warm climate with a mean temperature of above 26.7⁰C (Naira *et al.*, 2013). It is one of the most important nut fruits of the world ranking fifth in production. 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 Baramula 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. The available data revealed that the area under pecan nut in Jammu and Kashmir is about 656.00 hectares, whereas, the production per annum was to the tune of 13.00 MT (Anonymous, 2015).

The economics of best grafting method is to be worked out to get maximum benefit with minimum cost as it helps to raise the socio-economic conditions of the orchardists by giving more income per unit area. Thus, by keeping the beneficial aspects of grafting into consideration, the present investigation was undertaken to assess the economic feasibility of different grafting methods.

Materials and Methods

The present investigation entitled “Standardization of method and time of grafting in pecan (*Carya illinoensis* Wangenh) under intermediate agro-climatic zones of Jammu and Kashmir” was carried out in the experimental farm of Regional Agriculture Research Station (RARS), Rajouri, Tandalwal, SKUAST-Jammu during 2016. The mean annual rainfall is about 769 mm (26.3 inch). The altitude of the place is 915 m from mean sea level. The experiment was carried out by grafting 1800 plants with three different grafting methods viz., Tongue grafting, Cleft grafting, Side grafting on four different dates viz., 4th week of February, 1st Week of March, 2nd week of March and 3rd week of March. Total number of treatments were 12 with 50 plants per treatment so that the total plants grafted per treatment were 600. The experiment were laid in a Factorial Randomized Block Design with three

replications. The economics of using different grafting methods of Pecan nut have been worked out by calculating net returns from each of the three methods. In this analysis, only the cost of the treatments for different grafting methods and cultural management practices has been considered for estimating the cost. This cost includes material as well as labour cost of the treatment. Thus the net returns are based on the following components.

Cost of treatment

The cost incurred on each treatment for 1800 pecan nut plants was worked out by taking into consideration the cost of variable inputs only viz., rootstock, scion, grafting cost, land preparation, labour charge and FYM etc.

$$\text{Variable cost (Vc)} = C_1 + C_2 + C_3 + \dots + C_n$$

Gross income

Gross income was calculated by multiplying the grafted plant of a given treatment by the sale price of the plant.

$$\text{Gross income (GI)} = \text{Grafted plant} \times \text{sale price}$$

In order to evaluate most profitable treatment, economic analysis of treatment was worked out in terms of net returns and benefit: cost (B: C) ratio. The net returns and B: C ratio was calculated as follows.

Net returns were calculated by deducting the cost of grafting from the gross income.

$$\text{Net income} = \text{Gross income} - \text{Cost of treatment}$$

Benefit Cost Ratio (BCR)

The benefit cost ratio (BCR) of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all cash

outflows during the life of the project. It can be estimated as follows

$$BCR = \frac{\sum_{t=0}^n \{(B_t)/(1+r)^t\}}{\sum_{t=0}^n \{(C_t)/(1+r)^t\}}$$

Where,

B_t = gross returns in time t

C_t = variable cost in time t

r = rate of interest

t = time period ($t = 0, 1, 2, \dots, i, \dots, 30$)

Results and Discussion

The data pertaining to the effect of time and method of propagation on cost and return analysis of grafting methods of pecan nut plants is presented in Table1. It revealed that the total cost for grafting of pecan nut plants

upto their survival was found to be (₹ 32.02) per plant, (₹ 1701.00) per plot, (₹ 20415.60) for 12 plots and (₹ 61246.80) for 36 plots. Each method of grafting (tongue, cleftandside) contains 12 plots i.e. 600 plants.

It was observed from the table that cost incurred on root stock for 12 plots of each method was found to be highest (₹ 9000.00) followed by grafting (₹ 3300.00), scion (₹ 3000.00), labour charges (₹ 2400.00), land preparation (₹ 600.00) and FYM (₹ 600.00).

The data pertaining to the net returns is presented in Table2. It is evident from the table that after different survival rate of each of the three methods, tongue grafting gave maximum net returns (₹ 5384.20) which was followed by cleft grafting (₹ 2984.20). The lowest net returns (₹ 484.20) were found inside grafting.

Table.1 Cost and return analysis of grafting methods of pecan nut plants

Items	Cost per plant (₹)	Cost per plot (₹)	Cost for 12 plots (₹)	Cost for 36 plots (₹)
	Tongue/Cleft/Side	Tongue/Cleft/Side	Tongue/Cleft/Side	Tongue/Cleft/Side
Cost Analysis				
Rootstock	15	750	9000	27000
Scion	5	250	3000	9000
Land preparation	1	50	600	1800
Grafting	5.5	275	3300	9900
Irrigation (electricity used)	0.10	5	60	180
Insecticide (chlorpyrifos + carbofuran)	0.50	25	300	900
Farmyard manure	1.0	50	600	1800
Total labour (weeding + irrigation + insecticide + rootstock planting + uprooting of plants)	4.00	200	2400	7200
Totalvariablecost(₹)	32.10	1605	19260	57780
Interestonworkingcapital@6 %perannum	1.92	96	1155.6	3466.8
Totalcost(₹)	34.02	1701.00	20415.60	61246.80

Table.2 Benefit: cost ratio analysis of different grafting methods of pecan nut

Date of Grafting	Total Number of Plants (No.)			Number of plants Survived			Survival percentage (%)			Price per plant (₹)			Returns (₹)		
	Tongue	Cleft	Side	Tongue	Cleft	Side	Tongue	Cleft	Side	Tongue	Cleft	Side	Tongue	Cleft	Side
D₁	150	150	150	62	56	51	41	37.33	33.66	100	100	100	6200	5600	5100
D₂	150	150	150	71	65	59	47.33	43.66	39.33	100	100	100	7100	6500	5900
D₃	150	150	150	67	61	55	44.33	40.33	36.33	100	100	100	6700	6100	5500
D₄	150	150	150	58	52	44	38.66	34.33	29.33	100	100	100	5800	5200	4400
Total	600	600	600	258	234	209	42.83	38.91	34.66				25800	23400	20900
Total Returns (₹)													25800	23400	20900
Cost (₹)													20415.8	20415.8	20415.8
Net Returns (₹)													5384.2	2984.2	484.2
B: C Ratio													1:1.26	1:1.14	1:1.02

The table further revealed that benefit: cost ratio (B: C ratio) was found maximum in tongue grafting (1: 1.26) which was followed by cleft grafting (1: 1.14) and side grafting (1: 1.02). This might be due to high return and maximum survival percentage in tongue grafting as compared to other methods.

Similar estimates for gross income were reported by Joubert *et al.*, (1991) in which chestnut plants were grafted with tongue grafting gave maximum returns as compared to others. These findings are in agreement with the work of Khopade (2011) in custard apple. The results were also in accordance with Germain (1983) in walnut.

Net returns were recorded highest (₹ 5384.20) in tongue grafting and lowest of (₹ 484.20) in side grafting. Benefit: Cost ratio (B: C ratio) was found maximum (1: 1.26) in tongue grafting and minimum in side grafting (1: 1.02). From the present study it can be concluded that among the different grafting methods, tongue grafting is most suitable and economically feasible as it resulted in highest net returns under intermediate agro-climatic conditions of Jammu and Kashmir.

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