



Status and Propagation of Black Locust (*Robinia Spp.*) Under Moist Temperate Conditions of Kashmir Province

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ABSTRACT

The study was undertaken to identify the species of *Robinia* growing in the valley, status of the species and to find out the possible best and cheapest method of propagation of the species from the root cutting of different diameter classes in the Kashmir valley. The observations revealed that only one species identified as *Robinia pseudoacacia* L. which was growing on the basis of phenol-typical characteristics in Kashmir valley. Black locust tree was found both on farm lands and wastelands with regard to its distribution although sparsely in case of farmlands and abundantly on wastelands. The highest concentration was recorded on wastelands as 110 trees/ha⁻¹ in district Kulgam (Southern zone). The average concentration and average land holdings were recorded as 23 trees/ha⁻¹ and 0.35 ha/family, respectively. Vegetative reproduction through root cuttings depicted that all the parameters studied viz. sprouting (%), survival (%), shoot height (cm) and collar diameter (mm), the best exhibited in case of diameter class D4 at the end of first growing season which were recorded as 88.20%, 78.40%, 32.84 cm and 6.97mm, respectively. Thus one year study concluded, *R. pseudoacacia* dominates in region and farmers resisted the plantation on their agricultural lands owing to its invasive nature and confined it to their wasteland holdings/degraded sites which play subsistence role in their economy with maximum average annual income recorded as Rs. 8,250 ha⁻¹ family⁻¹year⁻¹ in district Kulgam on the wastelands. The best method for the regeneration is through the root cuttings with thickness 2.6 to 3.0 cm which is cheap and the fast method for its multiplication.

Keywords:

Distribution, identification, propagation, *Robinia pseudoacacia*, wasteland

INTRODUCTION

The genus *Robinia* is noteworthy for its numerous uses and therefore assumes importance. Black locust (*Robinia* spp.) belongs to family leguminosae and locally known as 'Kiker'. It is fast growing species and thus makes it a biomass based

fuel source. It dominates early forest regeneration in many native forest stands where it occurs (Boring and Swank 1984). It is among the few leguminous nitrogen fixing trees adapted to frost prone areas. The natural distribution of *Robinia* include the Appalachian and Ozark mountain of the

United States between 35° to 43° N latitude. In India, it was first introduced in Himachal Pradesh in 1890 and later to Jammu and Kashmir in 1919 with the purpose to afforest the barren hills and found to perform well even at an elevation range from 1,800 to 3,000m above mean sea level (Muthoo and Kangoo 1965 and Luna 1996). The literature pertaining to its extensive distribution and propagation is very limited and is lacking across the world. Nursery and plantation failure is often seen due to collection and sowing of non-viable and immature seeds. Therefore, the information on maturity indices assumes greater importance for its successful regeneration. The knowledge of raising seedlings by various methods viz. open beds, poly bags and root trainers is essential for having the success of plantation programme.

There is lack of general information regarding the Status, distribution and propagation of *Robinia spp.* in Kashmir valley despite being the tremendous potential of tree in common mans' life and well being. In view of the promising potential and problems related to its propagation programmes, the present study was undertaken with main aim to identify existing species, their distribution and propagation through root cuttings.

MATERIAL AND METHODS

Experimental site

The valley of Kashmir lies between the inner Himalayan range comprising of Nanga Parbat in East and outer Himalayan range in the West and South known as Pir Panjal range. The valley of Kashmir lies between 32° 17' and 38° 58' North latitude and 73° 35' and 80° 36' East longitude. The average altitude of Kashmir valley ranges between 1,500-2,300 m amsl. The area has temperate climate where winter is severe extending from December to March. The region faces a wide temperature range from a minimum of -8.0°C in winter to a maximum of 33.0°C in the summer. Snowfall takes place and area receives an annual precipitation of 676-1193 mm. The experimental site i.e. forest nursery at Shalimar is located between 34° 08' N latitude and 74° 83' E longitude at an elevation of about 1,587m amsl. The nursery soil is well drained and silty loam.

Identification, status and distribution

The detailed survey was conducted at block level of all the districts of Kashmir valley. The information was gathered through testified questionnaire, informal interview with respondent and transit walk methods. A questionnaire prepared for the purpose was filled on spot during interaction with respondent. Questionnaire consisted of both the open and close ended questions. Information was also collected during informal talks with the local inhabitants including oldest and respectable citizens of the concerned areas. Generally open-ended questions were asked for getting the information. Information was collected during transit walk of the villages. Transit walk gave more space to discuss with local inhabitants freely in their farmlands while walking through their farms. The observations with regard to identification, status and distribution of *Robinia spp.* was recorded and analyzed through standard tools and procedures to have the conclusive and valid outcome of the proposed investigation. The whole of the Kashmir valley is divided into three administrative zones namely South, North and Central as per the agro-climatic conditions prevailed (Table 1).

Vegetative propagation

Robinia spp. has reproducing ability from root suckers. Reproducing ability of cuttings is believed to be effected by the thickness of the cuttings. Therefore, in order to determine the effect of different thickness in the form of diameter on sprouting, survival percentage, shoot height and collar diameter was investigated. The length of each root cutting was 5 cm. The four selected diameter is given in Table 2.

The experiment was carried out in the forest nursery of Faculty of Forestry, SKUAST-K, Shalimar. The cuttings were planted horizontally at a spacing of 10x10 cm in the last week of March month. Cuttings were covered with soil, pressed tightly and flooded just after planting. The beds were regularly irrigated to ensure moisture availability. Weeding was carried out as and when required. The experiment was laid out in RBD design with five replications of each diameter class. The numbers of cuttings in each replication of each

Table 1: Zone-wise details of the Kashmir valley

S. No.	Zone(s)	Name of District(s)	Number of districts
1.	North	Baramulla, Kupwara and Bandipora	3
2.	Central	Srinagar, Ganderbal and Budgam	3
3.	South	Anantnag, Kulgam, Pulwama and Shopian	4
		Total	10

Table 2: Details of diameter classes of black locust

S. No.	Dia. classes	Diameter (cm)
1.	D ₁	<1.5
2.	D ₂	1.6 - 2.0
3.	D ₃	2.1 - 2.5
4.	D ₄	2.6 - 3.0

Table 3: Pheno-typical characteristics of black locust

S. No.	Characteristic(s)	Observation(s)
1.	Tree form	Medium sized tree with irregular crown
2.	Average height	19 cm
3.	Average tree girth	85 cm
4.	Bark	Rough brown to dark grey with deep longitudinal cracks
5.	Leaves	10-15 cm long; imparipinnate; petioles swollen at the base; leaflets 9-19, oval; 2.5-5.0 cm long
6.	Inflorescence	Raceme (15-20 cm long)
7.	Flowers	White/pinkish fragrant
8.	Pods	2.5 - 9 cm long ; 1.0-1.8 cm broad dark brown outside ; silvery white inside
9.	Seeds	Black/Brown, compressed, 4.50 mm long

diameter class was 15. The observations were recorded for sprouting percentage, survival percentage, shoot length (cm) and collar diameter (mm) at the end of one growing season in October.

RESULTS AND DISCUSSION

Species identification

A detailed survey undertaken at block and village level of all districts revealed that only one *Robinia* species viz. *Robinia pseudoacacia* L. was

identified on the basis of various morphological characteristics of the species such as tree form, size and shape of the leaves, flower colour, seed shape, seed size etc. (Table 3 and Photo 1). It was found to grow in valley conditions in each and every landscape of the region. It is a medium sized deciduous tree with irregular crown. The average height was recorded as 19 m. However, under dense plantation, the average tree height increased and was recorded as 26 m. The bark was rough brown

Table 4: Status and distribution of black locust

S. No.	District(s)	Farm lands			Wastelands		
		Average farmland holding of surveyed family (ha)	Average number of Black locust/ha	Average annual income (Rs.) from Black locust tree/ha/family	Average wasteland holding of surveyed family (ha)	Average number of kikar tree/ha	Average annual income (Rs.) from kikar tree/ha/family
A. Central Zone							
1.	Ganderbal	0.31	20	1,258	0.06	95	6,416
2.	Budgam	0.27	15	900	0.07	90	7,142
3.	Srinagar	0.12	8	650	0.02	70	6,550
B. South zone							
4.	Anantnag	0.35	23	1,428	0.05	98	7,840
5.	Shopian	0.46	15	978	0.08	87	5,212
6.	Kulgam	0.38	17	1,131	0.09	110	8,250
7.	Pulwama	0.46	16	782	0.06	93	6,166
C. North zone							
8.	Baramulla	0.35	19	1,142	0.05	105	7,950
9.	Kupwara	0.32	16	1,406	0.08	107	6,512
10.	Bandipora	0.35	25	1,385	0.07	90	4,751

Table 5: Vegetative propagation of black locust (*R. pseudoacacia L.*) through root cuttings

Treatments (Diameter Classes)	Sprouting (%)	Survival (%)	Shoot height (cm)	Collar diameter (mm)
D1 (<1.6cm)	84.00	68.00	27.76	05.83
D2 (1.61 -2.0 cm)	84.80	73.20	29.36	06.21
D3 (2.1 -2.5 cm)	85.20	77.40	32.00	06.79
D4 (2.6 -3.0 cm)	88.20	78.40	32.84	06.97
CD (P≤ 0.05)	NS	06.04	02.61	00.36

with deep longitudinal furrows. Leaves were 10 to 15 cm long, imparipinnate, with oval shaped leaflets which ranged from 9 to 11. The flowers were 15 to 20 cm long. The flowers were pinkish or white in colour and appeared in auxiliary racemes. The pods when mature were dark brown outside and silver white inside. The seeds were either black or brown, the black being larger in size.

The thorn less trees which developed as a results of natural bud mutation was almost lacking in the valley. Only one tree was located at village

Bearwah of district Budgam. There may be possibility of some more trees which if located, can be an important source material for the propagation of the thorn less character. This tree is generally used as fodder and thorn present in the trees caused difficulty in lopping the branches of the trees. Therefore, thorn less Robinia trees prove boom to the resident of valley.

The thorn less trees can be produced through stem cuttings only when taken from thorn less trees. Since, the stem cuttings of Robinia show



(a) Pink flower



(b) White flower



(c) Bark



(d) Pod with seed

Photo 1. Phenological characteristics of Black Locust (*Robinia pseudoacacia* L.)

poor rooting response and can be propagated only when stem cuttings are subjected to hormonal application. This may have hampered the propagation of the thorn less tree by the farmers despite their availability, if any. The phenological observations recorded revealed that the characteristics penned down resembled to *R. pseudoacacia* as has been described by Singh (1982), Karesztesi (1988) Therefore, the identified species of genus *Robinia* is *pseudoacacia* growing in the valley.

Status and distribution

It is revealed during the survey that the black locust tree was found both on farm lands and wastelands almost in each district (Table 4). The tree was found sparsely in farm lands. The species contributed significantly to the economy of the

farmers. The maximum average annual income realized from kikar cultivation on farm lands was recorded as Rs. 1,428 ha⁻¹ family⁻¹ in district Anantnag. The average concentration and land holdings were recorded as 23 trees ha⁻¹ and 0.35 ha⁻¹family⁻¹, respectively. The minimum average income from the species in district Srinagar was recorded as Rs. 650 ha⁻¹ family⁻¹. The average concentration and land holdings were recorded as 8 trees ha⁻¹ and 0.12 ha family⁻¹, respectively. On wastelands, trees were seen growing abundantly in all the districts with maximum concentration recorded as 110 trees ha⁻¹ in district Kulgam (Table 4). The average income from kikar cultivation was recorded as Rs. 8,250 per ha family⁻¹. The average wasteland holding was observed as 0.09 ha family⁻¹ which was recorded as its maximum value.

Vegetative propagation

The thickness of cuttings influenced the vegetative propagation in terms of sprouting and survival percentage, shoot height and collar diameter (Table 5). Vegetative reproduction through root cuttings depicted that all the studied parameters exhibited superiority in case of diameter class D₄ at the end of growing season which were recorded as 88.20 (sprouting percentage), 78.40 (survival percentage), 32.84 cm (shoot height) and 6.9 mm (collar diameter), respectively. The vigorous growth of the cuttings of D₄ diameter class over D₁ may be attributed to the presence of high carbohydrate concentration in root cuttings which resulted in the early sprouting. The effect of thickness of root cuttings on sprouting was reported to be non-significant (Table 5). Whereas, other tested parameters showed statistically significant effect. The cuttings which could not sprout when examined were found rotten. The rotting of cuttings may have depleted the food reserves available for root and shoot development (Stringer, 1994). These results are in harmony with the findings of Singh et al. (2002) in case of *Buchanania lanzan* in which 5.6-7.5 mm diameter class of root cuttings registered superiority with respect to number of roots and number of leaves.

CONCLUSIONS

The present study concluded that only one species identified as *R. pseudoacacia* was existing in Kashmir valley on farm and wastelands in sparse and clustered fashion. The trees were found and growing in abundance on wastelands in all districts comprising of three zones of the Kashmir valley. The said trees were found play significant role in the

economy of the local inhabitants. It was reported that number of trees was more on wasteland as compared to farm lands. Anantnag district of south zone exhibited the highest number of trees and economy per hectare. The vegetative propagation by means of cuttings having thickness of 2.6 to 3.0cm proved good in terms of all growth characters studied and can be alternative to mass propagation of thorn less *Robinia* which often has failure due to their non-viability of seeds.

REFERENCES

- Boring LR and Swank WT 1984 The role of Black locust (*Robinia pseudoacacia*) in forest succession. *Journal of Ecology* **72**: 749-766.
- Karesztesi B 1988 The Black Locust. Akademiai Kiado, Budapest, Hungary 65-75 pp.
- Luna RK 1996 Plantation trees. International Book Distribution, Dehardun, 634 pp.
- Muthoo MK and Kangoo GH 1965 *Robinia pseudoacacia* Linn. in India with special reference to Jammu and Kashmir. *Indian Forester* **91(2)**: 22-24.
- Singh RV 1982 Fodder Trees of India. Oxford Publishing Company, 66 Janpath, New Delhi 110001, India, 663pp.
- Singh J Banerjee SK and Alfred F 2002 Vegetative propagation of *Buchanania lanzan*. *Indian Forester* **128(6)**: 701-704.
- Stringer JW 1994 Sprouting and growth of *Paulownia tomentosa* root cuttings. *Tree Planters Notes* **45(3)**: 95-100.