

ECONOMIC ANALYSIS OF *ACACIA AURICULAEFORMIS* PLANTATION IN GAYA DISTRICT OF BIHAR

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Introduction

Gaya Afforestation Division was created in the year 1956 to do the afforestation work in the territorial jurisdiction of the Gaya Forest Division. The total area of the forest under the jurisdiction of Gaya Forest Division is 1495 71 km². The forests of the division extends over Gaya, Aurangabad, Nawadah and Nalanda districts. The forests of this division falls under tropical dry deciduous forests as per Seth and Champion classification. The plantation done by the division have now become exploitable and a regular working scheme for exploitation of the plantation raised by the division was drawn by the Working Plans Officer, Magadh Circle in the year 1986. Since then regular exploitation of these plantations as per this scheme is being carried out by the State Trading Division, Gaya.

Of late plantations are being raised on private lands by people with the idea that it will fetch them better economic return. The other factor which attracts them is that it requires less supervision as compared to agriculture crops. Hence, it is important that economic analysis of different species of plantations raised by the Forest Department is carried out. Any private plantation can be supposed to have better survival percentage.

One such plantation—Ghagar 1973 Plantation—was exploited by the State Trading Division, Gaya in the year 1988-89. This plantation is being chosen for the economic analysis as it was predominantly an *Acacia auriculaeformis* plantation and at the time of exploitation only this species was surviving and hence exploited. *Acacia auriculaeformis* is one of the exotic species and has a short rotation. Technically, it is one of the easiest species to grow and protect. Economically, this is not a very attractive species as its use as timber is very restricted. Moreover, more often than not, it has got crooked stem, thus robbing it of whatsoever timber value it has got. If one looks at the revenue realisation chart of this plantation, it will become clear that this species had fetched revenue only through the use of poles, firewood, tramline and cogging sleepers. Even with so much limited use of species, the IRR of the plantation is 13%.

Brief details of the plantation

Situation : This Block is known as Ghagar 1973. The Mouze is known as Ghagar. It is situated about 5 km South of Sherghati. The entire plantation is situated in a single concentrated patch and was divided in 12 sectors.

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Topography, Rock and Soil : The entire area is flat having no undulation. Most of the soil profile pit exhibit clayey texture mixed with murrum scattered at places. The base rock is sedimentary and dead. In the 1st and 2nd sector which start from extreme eastern zone, the soil is mostly sandy loam which thus differs from the rest.

Natural habitat : The entire area was filled with thorny bushes of carissa and denuded stumps of *Butea* and *Diospyros melanoxylon* (Kend). The remote area still bear the isolated patch of Sal and miscellaneous species. At places Khair bushes are also visible. At places *Flacourtia* is abundant which is indicator of heavily grazed area.

Species to be planted : *Acacia auriculaeformis*, Khair, *Sesbania*, Misc. (Chakundi, Babul, Kahua etc).

Area of plantation : The net area of the plantation was 240.00 acres. Some sector were planted at 2 m × 2 m and some at 3 m × 3 m. The unit of one acre was fixed on the basis of 436 pits per acre. Thus total number of seedlings planted was 1,04,640—out of which *Acacia* constituted 69,600.

Fencing : Total patch was fenced with trench fencing of 1.8×1.2×1.2 m size and barbed wire fencing. Total fencing was 400 chains—6 chains by trench fencing and 394 chains by barbed wire.

Nursery technique : The seedlings were raised in polythene tubes. The specieswise break up was as following :

(1) <i>Acacia auriculaeformis</i>	87,000
(2) <i>Acacia catechu</i>	16,000
(3) <i>Sesbania</i> species	17,500
(4) Miscellaneous species	9,500
	<u>1,30,000</u>

Planting and Post Planting : The plantation started on 1-7-73 and was completed on 14-8-73. The planting was stopped for 14 days due to a long stretch of drought in three weeks of July. Three Weeding hoeing was done in the plantation in the first year itself.

Analysis

Table I
Yearwise breakup of expenditure on Plantation and Exploitation

Item of work	Amount spent (Rs.)
1973	
Clearance and Survey	2345.00
Soil Work	7200.00
Labour cost of making fencing post and fixing of wire	2086.80
Cost of 2,955 m barbed wire	7582.53
Nursery work (only of <i>Acacia</i> Spp.)	2883.07
Planting	4181.50
1st Hoeing and weeding	2,85.35
2nd Hoeing and weeding	801.00
Say	<u>29,665.25</u>
1974	200.00
Repair of fencing	701.85
3rd hoeing and weeding	901.85
or say	902.00
1988	29415.00
Cost of exploitation and transportation etc.	

Table 2

Break up of revenue realised during 1989 from the harvest of Ghagar 1973 plantation

Details of Forest produce	Quantity	Revenue realised (Rs)
Timber	1853 nos.	74,120.00
Timberline sleepers	1573 nos.	14,168.00
Logging sleepers	1818 nos.	18,180.00
Splicing posts	13539 nos.	1,08,312.00
Firewood	206 qtl.	24,720.00
		<u>2,39,500.00</u>

Total No. of trees marked for exploitation and given to State Trading Division, Gaya was 14,109 trees of only *Acacia auriculaeformis*.

Conclusion

It is worthwhile to mention that when this plantation was taken up for making, it was found to contain only 14,109 trees of *Acacia auriculaeformis* species. Thus, the survival percentage was only 20.27. Second factor which is also going to affect the economic analysis is inordinate delay in the exploitation of *Acacia* species. In this case it has been exploited after 15 years whereas the normal period of its exploitation varies from 8-10 years. In spite of such a low survival percentage i.e. 20.27%, the IRR is 12.81% which means that this will earn back all cost invested on its plantation and exploitation and will pay us 12.81% interest for the use of one's money. It is not desirable to go into

Table 3
Benefit cost analysis

At 12% discount factor

Year	Plantation cost (Rs)	Exploitation cost (Rs)	Total cost (Rs)	Benefit (Income) (Rs)	Net benefit (Rs)	Discount factor at 12%	Present worth of costs (Rs)	Present worth of benefits (Rs)
73 (t)	29,665	—	29,665	—	(29,665)	0.892	26,461	—
74 (nd)	902	—	902	—	(902)	0.797	719	—
88 (5th)	—	29,415	29,415	—	(29,415)	0.163	4,795	—
89 (7th)	—	—	—	2,39,500	2,39,500	0.145	—	34,728
							31,975	34,728

$$(1) \text{ B.C. Ratio} = \frac{\text{Present worth of benefits}}{\text{Present worth of costs}}$$

$$\frac{34,728}{31,975} = 1.09$$

$$(2) \text{ N S W} = \text{Present worth of benefits} - \text{Present worth costs}$$

$$= 34,728 - 31,975 = 2,753$$

Table 4
Cost/Benefit analysis

Year	Plantation cost (Rs.)	Exploitation cost (Rs.)	Total cost (Rs.)	Benefit (Income) (Rs.)	Net benefit (Rs.)	Discount factor 15%	Present worth (Rs.)
1973 (1st year)	29,665	—	29,665	—	29,665	0.87	25,808
1974 (2nd year)	902	—	902	—	902	0.756	682
1988 (16th year)	—	29,415	29,415	—	29,415	0.107	3,147
1989 (17th year)	—	—	—	2,39,500	2,39,500	0.093	—
							29,638

$$1. \text{ B.C. Ratio} = \frac{\text{P.W. Benefits}}{\text{P.W. Costs}} = \frac{22,273}{29,638} = 0.75$$

$$2. \text{ Net Present worth} = \text{Present worth of benefit} - \text{Present worth costs}$$

$$= 22,273 - 29,638$$

$$= (7,365)$$

Calculation of IRR

$$\text{I.R.R.} = \text{Lower discount rate} + \frac{\text{Difference between the discount rate at which its NPW changes sign}}{\left\{ \begin{array}{l} \text{NPW at lower discount rate} \\ \text{Absolute difference between two NPW} \end{array} \right\}}$$

$$= 12 + (15 - 12) \times \frac{2753}{2753 - (-7365)}$$

$$= 12 + 3 \times \frac{2753}{10,118}$$

$$= 12 + 0.816$$

$$= 12.816\%$$

$$= \text{or Say } 13\%$$

causes of such low survival percentage here. It is not difficult to keep the survival percentage of this species in the vicinity of 70 to 80%. Thus

one can easily conclude that even *auriculiformis* plantation, which is economically one of the poorest, can be an economically viable scheme.

SUMMARY

One of the 1973 plantation of Gaya Afforestation Division has been taken up for economic analysis. The plantation was a predominantly *Acacia auriculaeformis* plantation. In the year 1988 this plantation was departmentally exploited. At the time of exploitation, only 14,109 trees of *Acacia* species was surviving out of total of 69,600 trees of *Acacia* planted in 1973. Thus the survival rate was only 20.27%. Still the Internal Rate of Return of the plantation was found to be 12.816%. *Acacia auriculaeformis* is not a very economic species as it has got very limited timber value. Thus even after such a low survival percentage, the plantation of *Acacia auriculaeformis* is found to be economically viable scheme.

गया जिला, बिहार में हुए एकेसिया औरिकुलीफोर्मिस वनरोपण का अर्थ-विश्लेषण

ए०एन० प्रसाद

सारांश

गया वनरोपण प्रमडल द्वारा वर्ष 1973 में किये गये एक वनरोपण को अर्थ-विश्लेषण के लिये चुना गया। यह मुख्यतः एकेसिया औरिकुलीफोर्मिस का वनरोपण था। वर्ष 1988 में इस वनरोपण का विभागीय विदोहन किया गया। विदोहन के समय एकेसिया प्रजाति के मात्र 14,109 वृक्ष बचे हुये थे जबकि वहाँ वर्ष 1973 में कुल 69,600 एकेसिया के वृक्ष रोपे गये थे। अतः इस वनरोपण में जीवित पौधों का प्रतिशत मात्र 20.27% था। फिर भी वनरोपण का आन्तरिक दर 12.816% पाया गया। एकेसिया औरिकुलीफोर्मिस आर्थिक रूप से बहुत उपयोगी वृक्ष नहीं माना जाता है क्योंकि इसकी लकड़ी का इमारत लकड़ी के रूप में उपयोग नहीं हो सकता है। अतः यह कहा जा सकता है कि एकेसिया औरिकुलीफोर्मिस का वनरोपण का भी आर्थिक रूप से लाभदायक योजना है।