AN ECONOMIC ANALYSIS OF POPLAR CULTIVATION

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Introduction

Due to increased pressure of population, need for food and wood is increasing enormously. Large forest areas have been diverted to non-forestry activities like agriculture, industries, urbanization, roads, etc. This caused great difficulty in meeting firewood, fodder and timber requirements. As such Agroforestry has received considerable attention during past years in the States of Uttar Pradesh, Punjab, Haryana, Gujarat and Karnataka with the object of integrating land use for agriculture and forestry to meet multifarious needs of society and provide additional employment and income to rural population.

In Haryana, Poplar is the most important tree planted particularly in irrigated land of semi-arid region with high water table. Poplars increase productivity of land and its wood is used for forming well crabs, lacquer work, turnery, match splints, plywood, cheap cricket bats, shoe heels, wood wool, pencils, artificial limbs, bobbins etc. Crops which can be produced along with Poplar plantation are sugarcane, wheat, pea, rapeseed, berseem, potato, sunflower, lentil, barley and oats. Keeping in view the utility of poplars in Agroforestry, this study was undertaken to analyse the cost-benefit ratio of Poplar plantation.

Material and Methods

Plantations for this study were sampled with multi-stage random sampling. Yamunanagar District was selected having maximum area under poplars in Haryana. In second stage selection, Chhachhrauli block was selected randomly. From the selected block, five villages were randomly selected and villages having concentration of Poplar plantation were kept for the study. Finally, fifty farmers were selected randomly out of selected villages. Data was collected from farmers selected regarding inputs applied and income generated by Poplar plantations, crops cultivated along with Poplar during the year 1997-98 were considered for the study under report. Simple tabular analysis was done to calculate cost and return. The Net Present Value (NPV) of both cost incurred and return obtained over years was calculated using the formula :

$$NPV = \sum_{t=1}^{N} \frac{Ct}{(1+r)^t}$$

Where

Ct = net returns present
r = prevailing rate of interest
n = number of years.

Results and Discussion

Cost and return of Poplar plantation were calculated to have net return as under :

Costs : Establishment cost of Poplar is give in Table 1. The cost of plant material accounted for about 34 per cent of the total establishment cost followed by cost of inputs (23%) and cost of digging and filling of pits (13%). Remaining cost was attributed to irrigation, watch and ward and tools. Table 2 shows operational cost per annum which remained almost constant i.e. Rs. 2,800 per annum per acre till 6 years of age of plant. But after 6 years of plantation, cost increased due to cost of harvesting trees. Manures and fertilizers were applied uniformly during first three years. Interculture, hoeing and irrigation costs remained constant while use of insecticides and fungicides reduced with age.

Total annual cost of Poplar cultivation did not vary much with age of trees (Table 3). Marginal increase in annual cost from Rs. 14,069 of first year to Rs. 20,448 of seventh year was due to increase in land rent and addition of harvesting cost. Moreover, land rent accounted maximum of total annual cost. The net returns from Poplar plantation worked out Rs. 1,51,923 in seventh year, whereas it was Rs. 3,898 for first year from intercropping, which increased to Rs. 6,939 during second and third years. For the remaining years, net

Table 1

Establishment cost of Poplar plantation

Item	Cost/ acre (Rs.)	Percentage of establishment cost
Layout and digging of pits	440	13.53
Cost of irrigation	500	15.38
Cost of inputs (manures, fertilizers & insecticides/fungicides)	750	23.07
Cost of plants	1100	33.84
Plantation cost	110	3.38
Cost of tools	250	7.69
Miscellaneous	200	7.15
Total establishment cost	3250	100.00

Table 2

Operational cost of Poplar plantation on sample farms

(Rs/acre)

Item	Year						
	1	2	3	4	5	6	7
Manures and fertilizers	350	350	300	-	-	-	-
Interculture and hoeing	350	350	350	400	400	400	400
Irrigation	400	400	400	400	400	400	400
Insecticides and fungicides	900	750	500	100	100	-	-
Watch and ward	1200	1200	1450	1600	1800	2000	2000
Harvesting of trees	-	-	-	-	-	-	8000
Total	3150	2700	3000	2500	2700	2900	10800

Table 3

Costs and returns of Poplar plantation on sample farms

(Rs/acre)

Item	Year						
	1	2	3	4	5	6	7
Production (q)	-	-	-	-	-	-	700
Gross return (GR)	-	-	-	-	-	-	245640
Land rent	7000	7200	7500	7800	8000	8500	9000
Operational cost	3150	2700	3000	2500	2700	2900	2800
Expected depreciation on fixed investment	250	250	250	250	250	250	250
Interaction expenditure							
(a) On fixed investment less depreciation @12%	230	230	230	230	230	230	230
(b) On operational cost for half period @ 12%	189	162	180	150	162	174	168
Establishment cost	3250	-	-	-	-	-	-
Harvesting cost	-	-	-	-	-	-	8000
Total annual cost (TC)	14069	10544	11160	10930	11342	12054	20448
Marketing cost (MC)	-	-	-	-	-	-	6456
Net return (GR-TC-MC)	-	-	-	-	-	-	151923
Net return from intercropping	3898	6939	6939	4782	4782	4782	4782
Total net returns	-	-	-	-	-	-	188827

returns worked to Rs. 4,782 per annum. Total returns from intercropping along with Poplar plantation was calculated as Rs. 1,88,827.

Discounted cash flows of Poplar plantation: For comparison with other annual crops grown in the locality, it was necessary to estimate deferred returns by discounting future returns. The present worth of future returns was obtained by discounted both costs as well as returns at the minimum acceptable returns on prevailing rate of interest i.e. 12 per cent per annum. The net present values computed of Poplar without intercropping and with intercropping are depicted in Table 4. This table indicates that net present values of net returns per acre works to be Rs. 53,476 and Rs. 88,749 for Poplar trees without intercropping and with intercropping respectively for one rotation of 7 years. The annual return per acre per year worked to Rs. 22,156 and Rs. 29,332 without intercropping and with intercropping respectively (Table 5). The benefit-cost ratio worked out were 1:1.92 and 1:2.13 for Poplar without intercropping and with intercropping respectively. Thus, it indicated that cultivation of Poplar with or without intercropping is quite remunerative and pays much more than the opportunity cost of investment. The

Table 4

Net present value without intercropping and with intercropping of Poplar plantation

Year	Without intercropping					With intercropping				
	Cost (Rs.)	Returns (Rs.)	Discounted coefficient^{-1} $(1+r)^n$ (12%)	Present value Cost (Rs.)	Return (Rs.)	Cost (Rs.)	Returns (Rs.)	Discounted coefficient^{-1} $(1+r)^n$ (12%)	Present value Cost (Rs.)	Return (Rs.)
1	14069	-	0.8929	12562	-	19369	15278	0.8929	17295	13641
2	10544	-	0.7972	8406	-	14644	15976	0.7972	11674	12667
3	11160	-	0.7118	7944	-	18197	15976	0.7118	12953	11371
4	10930	-	0.6335	6924	-	14778	8630	0.6353	9388	5484
5	11342	-	0.5674	6435	-	15190	8630	0.5674	8619	4896
6	12054	-	0.5066	6107	-	15586	8630	0.5066	7896	4371
7	20448	245640	0.4523	9249	111103	24296	254270	0.4523	10989	115133
Total	90547	245640		57627	111103	122060	327390		78814	167563

The net discounted returns at 12 % for one acre Poplar field came to be Rs. 53,476 (1,11,103-57,627) without intercropping and Rs. 88,749 (1,67,563-78,814) with intercropping, respectively for the entire expected life for 7 years.

higher returns in case of Poplar with intercropping were mainly due to higher productivity of Poplar with intercropping than Poplar without intercropping. However, farmers favoured Poplar without intercropping because of sustained returns due to better quality of its timber and longer interval between harvesting. The cost benefit ratios indicated that both Poplar without intercropping and with intercropping were quite remunerative propositions in the region.

Table 5

Benefit cost ratio, pay back period and average net return per acre per annum

Item	Poplar	With intercropping
Benefit cost ratio	1:1.92	1:2.13
Pay back period (yrs)	7	7
Annual average net return (Rs.)	22156	29332

Conclusion and policy implications

The above analysis, indicates that Poplar without intercropping and with intercropping are quite remunerative. The higher rate of return in case of Poplar with intercropping are mainly due to higher productivity of Poplar with intercropping. The benefit-cost ratio also indicated that cultivation of Poplar is quite remunerative proposition in the region. It is suggested that Government may initiate programme of cultivation of Poplar particularly in semi-arid region with high water table. The credit and marketing facilities may also be strengthened in the region.

SUMMARY

Poplars have an important role in both increasing the productivity of land and in afforestation programme. Moreover, the wood is used for forming well crabs, lacquer work, turnery, plywood, etc. Poplar plantation also increased opportunities of employment in rural sector. With this view, the study was conducted to analyse cost of returns from Poplar plantations in Yamunanagar District. The analysis indicated that cost of plant material accounted to maximum i.e. 34 per cent of total establishment cost. The operational cost was Rs. 2,800 per annum per acre during first six years. The total annual cost also did not vary much with age of trees. The discounted cash flow of Poplar plantation results in constant annual net returns per acre over the entire rotation were Rs. 22,156 and Rs. 29,332 without intercropping and within intercropping, respectively. The cost-benefit ratio also favoured plantation of Poplars in the region.

पोपलर की खेती करने का अर्थशास्त्रीय विश्लेषण

अशोक ढिल्लो, विनोद संगवान, डी०पी० मलिक व एम०एस० लुहाच

साराशं

भूमि की उत्पादकता बढ़ाने और वनीकरण कार्यक्रमों को सम्पन्न कराने में पोपलरों की भूमिका महत्वपूर्ण है । इसके अतिरिक्त, इसकी लकड़ी कुओं के नीमचक बनाने, लाक्षाकाष्ठ कार्य, खराद कार्य, स्तरकाष्ठ आदि में भी काम आती हैं । पोपलर की खेती ने ग्रामीण क्षेत्रों में रोज़गार के अवसर भी बढ़ाए हैं । इसे दृष्टि में रखकर यमुनानगर जिले में लगाए पोपलर रोपवनों से मिलने वाली प्रत्याय की लागत का विश्लेषण करने का यह अध्ययन किया गया । विश्लेषण ने संकेत दिया कि रोपण-सामग्री की लागत रोपवन स्थापना पर आने वाली कुल लागत का अधिकतम 34% तक रहती है । कार्यचालन लागत पहले छह वर्षों में 2800 रु० वार्षिक प्रति एकड़ आती है । कुल वार्षिक लागत में वृक्षों की उम्र बढ़ने के साथ कोई खास अन्तर पड़ता नहीं पाया गया । बट्टा निकालकर मिली नकद राशि का प्रवाह पूरी आवर्तन अवधि में अन्तर्फसलन किए बिना और अन्तर्फसलन करते हुए क्रमशः 22156 रु० और 29332 रु०, शुद्ध प्रति एकड़ वार्षिक (प्रत्याय) पर स्थिर बना रहता है । लागत-लाभ अनुपात भी इस क्षेत्र में पोपलर रोपवन लगाने के पक्ष में जाता है ।

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