VALUE OF A 20-YEAR OLD IRRIGATED TEAK PLANTATION

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Several firms/financial companies have, in the last few years, initiated projects asking people to invest Rs. 500 to Rs. 1000 in a teak tree that will give them a return of Rs. 50,000 to Rs. 1,00,000 in 20 years. The projects claim to use improved planting stock, drip irrigation and fertilizers that will give their plantations a high rate of growth. These claims need to be investigated. In this paper, growth and yield data available for teak plantations and price and price-trends for teak wood have been used to estimate the value of a 20-year old irrigated teak plantation.

The growth and yield of teak plantation has been thoroughly studied by the Forest Research Institute. A large number of permanent sample plots have been laid out in teak plantations in different sites/zones of the country. On the basis of data recorded at these plots, "Yield and Stand Tables for Teak" was published by Forest Research Institute in 1959. However, this and other publications on teak are for plantations raised under rainfed conditions and no long term growth data are available for irrigated teak plantations. Irrigation and other inputs to a plantation are likely to give it a better survival rate and a higher initial growth. For the sake of analysis, it is reasonable to assume that in 5 years time such plantations may attain growth observed in a 10-year old plantation raised under rainfed conditions. Once the trees are established they generally do not respond significantly to irrigation and fertilizers. Thus, an irrigated plantation has been assumed to attain a growth in 20 years which is attained by a normal plantation in 25 years. In other words, the value of a 25-year old plantation obtained from our analysis can be said to represent the value of a 20-year old irrigated crop of teak.

The steps involved in this study consist of estimating yields, prices and, consequently, values of wood output from the teak plantation. The published yield data usually give volume of timber (for logs of girth over 60 cm) and small-wood. However, the price of teak wood has been found to vary appreciably with the size of stem. Therefore, for a proper valuation of teak trees and stand, further categorization of timber is necessary. Thus, modified volume table for teak was constructed showing separate volumes of timber obtained from logs between 60 to 90 cm girth, 90 to 120 cm girth and for girths greater than 120 cm.

To begin this exercise, the stand table developed for teak (Anon, 1959), part of which is shown in Table 1 was used to obtain a clearer picture of standing crop. It has been shown that the distribution of trees by diameter classes is largely independent of site quality and is primarily a function of average crop diameter.

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Table 1

Stand table for plantation Teak

Crop Dia	Per cent of trees within diameter class (cm)									
	>5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50	Total
20	0	6	36	45	11	2	0	0	0	100
25	0	1	9	36	38	13	2.5	0.5	0	100
30	0	0	2	11	32	33	17	4	1	100

Table 2

Modified Volume Table for Teak

DBH (cm)	Timber volume under-bark for girths				Small wood over-bark (m^3)
	60-90 cm (m^3)	90-120 cm (m^3)	over 120 cm (m^3)	Total (m^3)	
15	0	0	0	0	0.110
20	0.042	0	0	0.042	0.201
25	0.154	0	0	0.154	0.185
30	0.376	0	0	0.376	0.170
35	0.419	0.254	0	0.673	0.154
40	0.366	0.450	0.200	0.015	0.139
45	0.305	0.490	0.608	1.403	0.123
50	0.238	0.534	1.064	1.837	0.107

Detailed volume data of about 100 trees harvested in the sample plots distributed all over the country were used to develop relationships between volumes and diameter at breast height (DBH). These were used to construct the modified volume table for teak (Table 2).

The past and current prices of teak timber were obtained from various forest depots and timber markets. It was observed that the timber price in Gujarat increased at the rate of 17 per cent per annum during 1975-87, in Kerala by 13 per cent per annum during 1990-1991, in Andhra Pradesh by 20 to 22 per cent per annum during 1973-89, in Maharashtra by 12 per cent per annum during 1982-85, in Uttar Pradesh by 18 per cent per annum during 1980-90 and in Orissa by 14 per cent per annum during 1968-84. Thus, we find that the teak timber prices have increased at annual rates 12 to 18 per cent or say 15 per cent per annum during the last decade. Since our aim is to estimate the value of teak crop, planted today, 20 years from now, we have to estimate the teak prices that will be prevalent at the end of 20 years. For this, we have to forecast the price trend or the annual rate at which price is likely to increase in future. For want of any econometric study on this subject, we may assume that the price trend will be nearly

same as in the past, i.e. an increase of 15 per cent per annum. But, there are greater chances of it to be lower than 15 per cent per annum due to (i) greater anticipated supply of teak wood in future (likely to be obtained from social forestry plantations raised during the 1980s), and (ii) the increased availability of substitute furniture and construction materials such as medium density fibreboard. Thus, a lower rate of escalation, say at 10 per cent or 12 per cent per annum, keeping pace with the general rate of inflation, is more likely. However, in this analysis, value projections have been made for all the three price escalation trends.

The current prices of teak timber vary to some extent from region to region and from depot to depot. However, a reasonable average price of Rs. 10,000 per m^3 for a log of 60-90 cm girth, Rs. 11,000 per m^3 90-120 cm girth, Rs. 12,500 for logs greater than 120 cm girth and Rs. 2,500 per m^3 for small-wood (containing poles and small timbers etc.) can be taken as the base price. These prices and prices anticipated 20 years from now at different rates of price escalation are presented in Table 3.

Based on the above prices value table for teak has been developed and presented in Table 4. It shows the value of a teak tree of a given DBH at current and future anticipated prices.

Data of age, crop diameter, average

Table 3

Price of Teak wood (Rs / m^3)

Category	Average current price	Price estimated for 20 years from now @ price escalation		
		10%	12%	15%
Small wood	2,500	16,800	24,100	40,900
Girth 60-90 cm	10,000	67,300	96,500	163,700
Girth 90-120 cm	11,000	74,000	106,100	180,000
Girth over 120 cm	12,500	84,100	120,600	204,600

Table 4

Value table for Teak ('000 Rs / Tree)

DBH (cm)	At average current prices	At prices estimated for 20 years from now @ price escalation		
		10%	12%	15%
15	0.3	1.9	2.7	4.5
20	0.9	6.2	8.9	15.1
25	2.0	13.5	19.3	32.7
30	4.2	28.2	40.4	68.5
35	7.4	49.6	71.1	120.6
40	11.4	77.0	110.4	187.3
45	16.3	110.0	157.7	267.6
50	21.8	146.9	210.6	357.3

height, density of stocking and site quality for different regions of the country were obtained from the permanent sample plots existing in these regions. Data were taken from the records of sample plots in Buxa Division (West Bengal), Wynaad Division (Kerala), South Chanda Division (Maharashtra), South Coimbatore Division (Tamil Nadu), North Raipur Division (Madhya Pradesh) and Forest Research Institute, Dehra Dun (Uttar Pradesh). These plots belong to the sites of Quality II and III, the type of sites that are generally available for teak plantations and are likely to be used for teak projects. These data, in combination with stand table, modified volume table and price/volume table, helped in providing relationship between value (VAL) of teak crop as a function of age (T) and density (N). A total of 35 observations were used where T ranged between 11 and 54 years and N ranged between 140 trees/ha and 924 trees/ha. The estimated regression equations are given below (All the coefficients were significant at 95 per cent confidence level, coefficient of determination was 0.71 and there were 32 degrees of freedom).

At current prices: (1n : log natural)

$$\ln(VAL) = 7.537 + 0.887 \ln(T) - 0.719 \ln(N)$$

At prices 20 years from now with rate of price escalation as :

(i) 15 per cent per annum :

$$\ln(VAL) = 10.333 + 0.887 \ln(T) - 0.719 \ln(N)$$

(ii) 12 per cent per annum :

$$\ln(VAL) = 9.445 + 0.887 \ln(T) - 0.719 \ln(N)$$

(iii) 10 per cent per annum :

$$\ln(VAL) = 9.805 + 0.887 \ln(T) - 0.719 \ln(N)$$

Table 5

Value of 20-year old irrigated teak plantation ('000 Rs)

Density at 20 yrs (trees/ha)	Value item	At current prices	At prices estimated for 20 yrs from now @ price escalation		
			10%	12%	15%
250	Crop/ha	615	4,137	5,933	10.066
	avg. tree	2.5	16.6	23.7	40.3
300	Crop/ha	539	3,628	5,203	8,829
	avg. tree	1.8	12.1	17.3	29.4
350	Crop/ha	483	3,247	4,657	7,902
	avg. tree	1.4	9.3	13.3	22.6
400	Crop/ha	439	2,950	4,231	7,178
	avg. tree	1.1	7.4	10.6	18.0
450	Crop/ha	403	2,710	3,887	6,595
	avg. tree	0.9	6.0	8.6	14.7
500	Crop/ha	374	2,512	3,603	6,114
	avg. tree	0.8	5.0	7.2	12.2

The lower densities give higher value of the crop because of greater size of trees. However, densities below 250 trees/ha at age 20 years is not likely to completely cover the canopy. The above relationships were used to estimate the value of 25-year old crop for various final densities and different rates of anticipated price escalation (It may be noted that yield/value estimated at age 25 years was presumed to represent yield/ value from a 20-year old irrigated plantation). The expected values are given in Table 5.

It is found that the highest value of average teak tree (obtained for density of 250 trees/ha and anticipated price escalation of 15 per cent per annum) is only Rs. 40,000. At a reasonable rate of price escalation, the value of average tree will be below Rs. 25,000.

It may be noted that this analysis does not study the economics of teak planting. The latter will involve the cost of planting, land cost, cost of supervision and management, choice of discount rates, intermediate returns (from thinnings and other uses of plantation area, such as recreation, camping and wildlife), choice of optimal rotation age, etc.

SUMMARY

In this paper, growth and yield data available for teak plantation and price and price trends for teak wood have been used to estimate the value of a 20-year old irrigated teak plantation are given.

बीस वर्ष में सिंचित सागौन रोपवन का मूल्य

जे०के० रावत

सारांश

इस अभिपत्र में एक 20 वर्षीय सिंचित सागौन रोपवन के मूल्य का अनुमान लगाने के लिए सागौन रोपवनों के वृद्धि और प्राप्ति आंकड़ों तथा सागौन काष्ठ के मूल्य और मूल्य प्रवृतियों को उपयोग में लाया गया है ।

Reference

Anon. (1959). Yield and stand tables for plantation teak. *Indian For. Rec.* **9** (4). 151-216. Forest Research Institute, Dehra Dun.