THE VIABILITY OF COMMERCIAL TEAK PLANTATION PROJECTS

A.N. CHATURVEDI

Tata Energy Research Institute, New Delhi

Several Companies have come up during the last couple of years advertising very high profits on investments in teak plantations. During 1981-90, similar such Companies based on Eucalypt plantations were advertised. The people who invested on these high density high profile Eucalypt plantations suffered heavy losses and practically all such companies have closed down. Forestry is largely a state subject in India and there are practically no private companies involved exclusively in forest plantations. No expertise is, therefore, available except in the Forest Departments. It is necessary for investors and the general public to understand the basic technical aspects of such plantation projects. The forest trees are long-lived. The felling age of trees is not governed by their physical age. The trees grow differently at different ages and the wood quality changes with age and rates of growth. The felling age called the rotation of harvest, therefore, depends on the rate of growth, quality of wood and the market demand.

Teak is India's best known timber and is used as a standard for comparing all other tree species for their timber quality. Regular teak plantations were started in India in the year 1842. Teak is amongst the best studied and researched tree species. Every aspect of its cultivation and harvest is known and well documented. During the last four years, large number of financial companies have grown up in India and crores of rupees have been invested by thousands of people who expect to reap huge benefits. The arguments in favour of teak investments advertised by these companies are, in general, on these lines :

(i) The plantations will be raised from seedlings which will be converted to stumps (root shoot cuttings).
(ii) 1500 stumps will be planted per acre i.e. a spacing of 1.65 m x 1.65 m.
(iii) The first thinning of 3 years age will reduce the number to 1250 i.e. a spacing of 1.80 m x 1.80 m.
(iv) The 2nd thinning at 6 year age will further reduce the number to 500 i.e. 2.83 m x 2.83 m.
(v) The 3rd thinning at 12 years age will bring down the number to 375 trees i.e. 3.30 m x 3.30 m.
(vi) 375 trees will be retained for final harvest at 20 years.

The Companies project to harvest 375 trees yielding 1.05 m^3 of timber per tree i.e. about 393.75 m^3 per acre. It is stated that the price of the harvested wood will be Rs. 62,500 per tree i.e. Rs. 60,000 per m^3. The present price of about Rs. 57,000 per m^3 is for first quality teak logs in sale depots and not for whole wood of standing tree.

Growth data on teak plantations in India have been collected for 80 years. These have been analysed and yield tables for plantation teak have been published by the Forest Research Institute. Teak plantations in India are divided into four site quality classes I, II, III and IV depending on growth which varies according to edapho-climatic conditions. The best quality is I and the poorest is IV. Intermediate classes I/II, II/III and II/IV are also recognized. Thus, 7 site quality tables are available. These tables give per acre figures of average diameter, average height, number of trees and volume from 5 to 80 years at five year intervals. After many trials, the most widely adopted spacings in forest plantations is 1.83 m x 1.83 m i.e. 1200 stems per acre. In I quality, this number is reduced to 539 in the 5th year. This also accounts for the seedlings which die naturally during this period. Thinnings are carried out at five yearly intervals and the number of trees left standing at 10 years is 256, at 20 years are 102, at 40 years 46, at 60 years 35 and at 80 years 31. The standing timber volume per acre at 20 years is 23.80 m^3 (0.24 m^3 per tree), at 40 years it is 72.80 m^3, at 60 years it is 1233.18 m^3 (3.22 m^3 per tree) and at 80 years, it is 4840 (4.37 m^3 per tree). The Companies project at 20 years 375 trees with average volume of 1.05 m^3 per tree i.e. 394 m^3 per acre. This volume at 20 years is 16 times more than that obtained in the best plantations raised in India. 1.05 m^3 volume of a tree corresponds to a tree of 1.53 m girth class or about 20 inches (50 cm) diameter. Average diameter of 20 inches in Ist quality teak is obtained in about 45 years at this age, the number of trees per acre is 41. Trees are measured for girth or diameter at 1.38 m above ground referred to as girth or diameter at breast height.

By increasing the inputs of irrigation and frequent thinnings, it is possible to increase the rate of diameter growth. The increase in diameter growth is, however, dependent on increasing the size of the crown i.e. decrease in the number of trees per acre. This will mean that the high expected volume in individual trees is possible only if the number of standing trees per acre is proportionately reduced. The increase in number of the trees per acre cannot be simultaneously increased along with the girth of trees. One can have either lesser number of trees of higher girth or larger number of trees of lower girth. The increase in both the number of trees per acre to 375 as well as yielding 1.05 m^3 per tree at 20 years is not feasible. Trial irrigated plantations of teak were carried out at several places in India during 1928 to 1930. It was found that these trees grew faster but the sapwood content of trees increased, the wood became weak and wind damage became quite serious. A phenomenon of water blisters was also noticed in several trees grown under irrigated conditions. Such trees appeared to be quite healthy from outside but the inner heartwood developed rot due to the storage of excess water that increased the spread of fungi. Teak does not grow well on degraded lands and water logged sites. Teak trees require reasonably fertile humus rich, well drained sites, for good growth.

It is also advertised that these trees are being fertilized and irrigated. Drip irrigation will induce surface roots and epicormic branching. Nitrogen fertilizers will increase the nitrogen content of leaves. Initially larger leaves will increase photosynthesis and faster growth. By about five years the dreaded defoliators and skeletoniser *Hyblaea puera* and *Hapalia machaeralis* would attack these plantations. These will drastically reduce the

photosynthesising leaf surface. These insects have about 14 life cycles in a year. The control through insecticides is not, therefore, possible. The damage incidence is higher when trees grow closer. During heavy attacks the loss of upto 65% of growth has been recorded in the past. The attack can reduce both diameter and height growth. The pests associated with trees always follow plantations and they cannot be wished away. In forest plantations, there are many natural enemies of these insects which live on trees of other species. Since these teak plantations are being raised far away from natural forest areas, it will take several decades by the time adequate populations of the parasites of these insects are built up.

The teak wood produced in these plantations is going to have a very high percentage of sapwood which is not durable. The quality of wood is going to be inferior. The faster growing teak grown in Kerala, therefore, fetches a lower price than the slower growing CP teak. The girth of sections of a tree reduces with height. The lowest butt portion of the tree produces the best timber of the highest size. This fetches the highest price. The per m^3 price of wood reduces from the thick to thin end. In the financial benefits, the promoters are considering the entire wood of the tree to be similar and of high timber quality. The timber quality portion of wood in a tree depends on size of the tree. It varies from 20 % in young trees to about 40 % in mature tree. The top portion and branches of trees are sold only as firewood which will fetch about Rs. 1000 per m^3 even in teak. Average price per m^3 for the total wood of the tree will not be more than about 20 % of the price of 1st class logs i.e. in a tree of 1.05 m^3 not more than 0.28 m^3 will be of timber quality. Thus even if the price of teak timber is Rs. 59,000 per m^3 the whole tree containing 1.05 m^3 will not fetch more than about Rs. 16,000/- against an expectation of Rs. 62,000. Rs. 1275/- per tree which the Companies are asking the investors to deposit will in 20 years become Rs. 12,299/- and Rs. 20,867/- at compound rate of interest of 12 and 15 per cent respectively. Nursery cost of a teak stump is about Rs. 2.50. The planting cost will be about Rs. 4.50. The land taken in the beginning remains as such at the end of the plantation. The investment of Rs. 1275 per tree is, therefore, disproportionate to the actual planting cost of Rs. 7/- per plant. The whole project is not technically sound. The investors may get back advertised returns on their investment but it cannot be from sale of teak wood produced in these plantations.

SUMMARY

The basic technical aspects of viability of commercial teak plantations are described in this paper.

सागौन की व्यापारिक रोपवन परियोजनाओं की जीवनशक्यता

ए०एन० चतुर्वेदी

सारांश

इस अभिपत्र में व्यापारिक सागौन रोपवनों की जीवनशक्यता के आधारभूत प्राविधिक पक्षों को वर्णित किया गया है ।