Supattra Thueksathit 2006: Variation in Growth and Development of Teak Growing Outside the Natural Ranges in Thailand. Doctor of Philosophy (Forestry), Major Field: Forestry, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Suree Bhumibhamon, D. F. 156 pages.
ISBN 947-16-1918-9

The present study was carried out at various locations, including Teak International Provenance Trials in Lampang, Clone Bank in TPC Seed Center in Uthai Thani, Ladkrating Plantation in Chachoengsoa and Cha-am Teak Farm in Phetchaburi provinces. The objectives were to study provenance variation on teak growth characteristics and clonal variation in growth, annual growth, wood quality, and coppice growth in Teak Clone Bank. It was also aimed to study the relationship between growth characteristics and the quality of planting materials when planted outside the natural ranges. Study on clonal variation on the early growth performance and development of teak under the plantation condition are included.

Results indicated that national provenances of 29 years old teak performed the best as good as provenances originated from Indonesia whereas the Indian race showed the poorest growth in all cases.

In case of the annual growth of 19 years old teak, result showed that the average value of each clones varied considerably. The linear regression equations indicated that each clone responds differently to climatic factors and ring indices of all clones are also presented. Moreover result in heartwood formation showed the overall average heartwood area was 303.56 cm^2 (60.92%) and heartwood content within a tree decrease with height.

Most teak clones expressed the excellence in coppicing at the age of 19 years old and showed high coppicing abilities. Number of sprouts in all clones ranged from 3 (V72) to 41 sprouts $stool^{-1}$ (V100). The trend of growth increment in height, D_{10} and DBH increased slightly after the first month of coppicing. Highly significant difference in height growth between sprouts and ramets was found ($p<0.01$).

Results in 17 years old Clonal Seed Orchard in Uthai Thani showed the high significant differences among blocks on survival percentage, height, D_{10} and DBH of teak. 16 out of 25 clones have high teak fruit produced. Highly significantly differences on teak fruit production were found among blocks and clones. The total average value of damaged ramets was ralatively low, only 17%. In Clonal Seed Orchard established at Ladkrating Plantation, the analysis of variance showed that clonal variation in growth of height, D_{10} and DBH was insignificant in the early age with the exception of DBH growth at the age of 18 months when variation among blocks was found.

Cha-am Teak Farm in Phetchaburi was established with different kinds of planting materials. Results in this study indicated that quality of planting material when planted outside natural range did not influence growth performances at the age of 9 years. Significant differences in survival percentage, height, D_{10} and DBH were not found. In case of biomass, results showed that stump from Mae Tip seed production area and tissue culture (V33) produced remarkably good stem biomass while unimproved material such as stump from natural forest had low potential in stem biomass production. Teak raised from tissue culture materials can developed root length better than those raised from stumps.

The study displayed the sequence of tree improvement program. The repeating in the analysis of provenance variation would guarantee the right decision making in concentrating the work on local genetic materials. The teak clones study indicated the differences in the performance of selected clones. The coppice of teak clones was meant to study the differences in the performance of all selected clones. The study on morphological characteristics of clonal seed orchard of teak has provided the most suitable clones to plant in Uthai Thani (marginal area) and Chachoengsao (out of the native ranges). It is importance to note that any teak planting program should pay more attention to the quality of teak genetic materials used as it should be better to raise from teak improvement program.

_____ _____ ___ / ___ / ___

Student's signature Thesis Advisor's signature