Sunis Yodnam 2009: The Second Generation Test of *Eucalyptus camaldulensis* Dehnh. at Wang Nam Khiao Forestry Student Training Station, Nakhon Ratchasima Province. Master of Science (Silviculture Technology), Major Field: Silviculture Technology, Department of Silviculture. Thesis Advisor: Mr. Chongrak Wacharinrat, Ph.D. 134 pages.

The study examined the growth and desirable traits of the second generation test of *Eucalyptus camaldulensis* Dehnh. at Wang Nam Khiao Forestry Student Training Station, Wang Nam Khiao district, Nakhon Ratchasima province. Latinized row-column design was applied with 120 half-sib families from selected 21 provenances in the first generation seed orchard established by the Royal Forest Department, one improved seed source and one unimproved seed source in Thailand as control. The results showed that the survival rate of 24-month-old *E.camaldulensis* varied between 45-100 %. Families originated from Walsh-Mitchell River, Queensland Region in the first generation seed orchard had superior growth especially families 187 and 188 from Healeys Yard. Families originated from the improved seed source of Thailand were also ranked in the superior group and significantly outperformed those from control, the finding suggest a key success of tree improvement program of *E.camaldulensis* in Thailand. The desirable traits were significantly different among provenances, but not among families, while the resistance to *Leptocybe invarsa* was not significantly different neither among provenance no families. In addition, families selected from seed orchard showed better characteristics e.g. complete persistance, vertical stem, straight, stem small branches and good natural pruning than those from control. For narrow sense heritability estimates, tree growth of *E.camaldulensis* was strongly influenced by genetics but the desirable traits were moderately correlated with environments factors.

Twenty two families with superior growth performance of twenty two provenances were used to study on genetic variation was undertaken using AFLP technique with sixteen AFLP primers combinations between *Taq*I and *Mse*I, *Bfa*I and *Mse*I primer to generate total 315 bands. Similarity index ranging from 0.698-0.848. The cluster analysis was applied using UPGMA and the genetic similarity can be classified 5 groups with the 1st, 3rd and 4th groups were superior in tree growth while the 2nd was intermediate in tree growth and the 5th groups were inferior. Nevertheless, the family no. 71 (Petford Bridge) and no. 99 (Emuford) were genetically distinguished from other families studied.

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