Distribution pattern and regeneration process in the dry evergreen forest.

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ABSTRACT

Study on the distribution patterns and regeneration process in the dry evergreen forest at Sakaerat, Amphoe Pak Thong Chai, Changwat Nakorn Rachasima were investigated during May, 1989 to October, 1993 by using the permanent sample plot of 100 X 100 m^2 which was laid out since 1990. Pattern of spatial distribution employing Morisita's index of index of dispersion (I_δ) and m* - m regression were employed for total individuals and the nine important species. Study on gap formation, turnover time of canopy tree and population dynamics were also investigated.

The results revealed that total individuals (for trees larger than 4.5 cm in DBH) showed random distribution. Seven important species showed contagious distribution while the rest showed random distribution

The statistical method was used for age determination from data of annual diameter increment in marked and number sample trees of different diameters during one year period, the study is based on nine important species. First order difference equation were developed to determine age (n) of tree species when DBH of each species (D_n) were known.

The age class distribution was discontinuous and four age groups (100, 100 - 200, 200 - 300 and 300 years) occurred in the study plot (50 x 50 m^2). The canopy layer was a mosaic of patches (81.46 - 417.3 m^2 patch area), which had different mean ages. The recruitment of canopy trees was carried out only by advance regeneration in the plot. The regeneration process derived from the analysis of the plot consisted of three phases leading to the development of even - age patch.

The number of gaps in 1 ha plot were 18 gaps. Gap area was 1,860 $m.^2$ (18.60% of total land area). The average size of gap was 115 $m.^2$ and the maximum size was 420 m^2. Gaps were made by 1 - 3 gap making trees. The concentration of gap formation in particular years was not observed. In average 0.48 canopy trees per hectare were died, and gap of 41.33 - 82.66 m^2 per hectare were

made annually. The turnover time of canopy tree which was calculated from four different methods was 100 - 230 years.

Three phase were distinguished and it took about 0 – 45, 45 – 100 and 100 – 200 years for gap, building and mature phase, which were describe by Watt (1974) and Whitmore (1978 , 1982).

The frequency distribution of relative light intensity at various height levels was closely approximated by the lognormal distribution, proving that the geometric mean was more reasonable than the arithmetical mean as the representative value of relative light intensity received by a certain height level under the leaf canopy. The mean value tended to decrease exponentially with decreasing height in each of the three layers 1 – 10, 10 – 20 and 20 – 30 m. above the ground. This suggested that the leaf area density was more or less homogeneously distributed in the vertical distributed within each of the three layers.

A simple model for diffused light conditions in canopy gaps is presented. The vertical of illuminance in gaps calculated from the model agreed with the changes observed in the study forest. The illuminance in a given size gap could be estimated from the model. Size distribution of gaps in the study forest suggested that most gaps were too small for the frequent occurrence of pioneer species.

The process and rate of revegetation in gap were studied by comparing the species composition, tree density, frequency distribution of tree height and relation between diameter at breast height and tree height among different aged stands. For estimating stand ages, the ages of gap indicators were very useful. It took about 100 years for gap to be filled by large fully – grown trees. Since mean residence time of the forest canopy was 200 years, the tree that attain the forest canopy were expected to be canopy trees for 100 years on the average. According to the frequency distributions of height of live and dead trees in different aged stands, it was suggested that shorter trees were more susceptible to dealth than taller trees. The self – thinning in revegetation process in gap approximately followed the 3/2 power law, although the power was large (-1.30) than expected from the law.

The relationship between size (D^2H) and growth rate of *Hopea ferrea* in different aged stands (10, 17, 31, 41 and 47 years) revealed that Absolute Growth Rate (AGR) in a recent one year period increase as the tree size increased with lower mortalities than the younger and smaller ones. By contrast Relative Growth Rate (RCR) did not show any distinct relationship with the size of the trees.