



Pinus merkusii Jungh. et de Vriese is a native species of Indonesia producing products of important value both wood and its sap. Pine resin products are very promising to increase productivity through tree breeding programs. This study aims to analyze the genetic parameters of production based on phenotypes and genetic diversity of the offspring test and to determine the effect of internal factors and external factors in the vegetative regeneration of *P. merkusii* shoot cuttings. The research material was genetic parameters and genetic diversity using 4 sub-strain of *P. merkusii* half-sib descent 11 years old at West Banyumas KPH, while vegetative regeneration material from test plant descendants and tree clones plus pine trees with high resin yielded. The production of resin was measured by the drill method and equipped with height, diameter, and height of stem height free of branches. The genetic diversity was measured uses microsatellite markers with 4 primers. The results showed that in excepted the Sulawesi sub-line, there was a genetic variation in the production of resin with an estimated variance component of 4.48%, 15.77% and 3.80% for the KBS Sumedang, KBS Jember and East Java sub-lines, followed by family heritability are for all (0.451-0.551). Estimation of high individual heritability was found in the Jember KBS sub-line (0.658) and moderate value for the Sumedang KBS sub-line (0.182) and East Java sub-line (0.158). The phenotypic correlation of sap production with other parameters was very low (0.001-0.104), the genetic correlation of production of gums with medium diameter values for KBS Jember and East Java (0.526 and -0.434), while the genetic correlation of high-production low-value sap in all sub-lines. The value of genetic diversity with microsatellite markers in the four sub-lines was in the moderate category ($H_e = 0.392-0.425$), but it had a high inbreeding potential in the KBS Sumedang, East Java and Sulawesi sub-strain populations with an indication that the F_{is} value was relatively large (0.133-0.332). Between populations have a close genetic relationship, indicated F_{st} values in all sub-lines 0.006-0.012. Which means that sub-strains have the same origin of the source of genetic material used. Internal factors have a significant effect on rooted percent and some root growth parameters. Six parent plant clones have the potential for forestry with clones of > 70% root and high resin production. The age of 3-year-old parent plants succeeded in taking root better (56.67% and 73.33%) compared to ages 6 and 9 years. Clones from vegetative plants in the UK have very high rooted percent (96.25%) far better than other clones. External factors full cover provide the best environmental conditions (percent rooted 37%), the best ZPT dose is 8 g / L and the fertilizing dose 4.5 g / L have a significant effect with the best rooted percent (47.21%).

xxiii