

杉木第3代种质杂交子代测定及选择*

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摘要:为了挖掘高世代种质杂种优势, 充实杉木高世代轮回育种的育种群体。利用杉木第3代种质资源库中48份种质单对交配制种, 进行杂交子代测定及选择。依据35个杂交组合群体9a林龄时主要生长和材性性状的遗传参数, 开展优良杂交组合及单株选择。杂交子代测定林9a林龄时平均树高、胸径和单株立木材积分别为8.71m、13.5cm和0.07521m³, 杂交组合间遗传变异系数分别为6.40%、8.90%和20.33%, 狭义遗传力分别为0.4349、0.3999和0.4166, 广义遗传力分别为0.7427、0.7438和0.7567。心材率和木材基本密度在杂交组合间的遗传变异系数分别为10.31%和4.70%, 广义遗传力分别为0.6199和0.7035。单株立木材积与心材率的遗传相关系数为0.95, 与木材基本密度的遗传相关系数为-0.45。筛选的8个速生优良杂交组合, 单株立木材积遗传增益12.99%, 心材率比红心杉种子园良种提高11.86%。筛选的20株第4代(轮)育种个体, 单株立木材积遗传增益53.00%, 心材率和木材基本密度分别比红心杉种子园良种提高29.13%和6.53%。筛选的8株高心材率速生无性繁殖原株, 心材率、单株立木材积、木材基本密度遗传增益分别为30.78%、71.70%、7.61%。筛选的7株高木材基本密度速生无性繁殖原株, 木材基本密度、单株立木材积、心材率遗传增益分别为14.93%、70.66%、16.85%。

关键词: 杉木; 第3代种质; 杂交组合; 子代测定; 遗传力; 遗传增益; 选择

Hybrid Progeny Test and Selection of the Third Generation on Germplasm in *Cunninghamia lanceolata*

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Abstract: To harness the heterosis of high-generation germplasm and bolster the breeding population for high-generation recurrent breeding of *Cunninghamia lanceolata*. Forty-eight germplasms from the third-generation germplasm resource bank were used for crossbreeding by single-pair mating design, and hybrid progeny test was established for selection. Utilizing genetic parameters for key growth and wood properties from 35 combinations at the age of 9, the selection of excellent combinations and individuals carried out. The study found the average tree height(H), diameter at breast height(D), and volume(V) of the hybrid offspring were 8.71m, 13.5cm, and 0.07521m³ at the age of 9a in the test stand. The genetic variation coefficients for H , D and V were 6.40%, 8.90%, and 20.33%

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among the combinations respectively. And the narrow-sense heritabilities were 0.4349, 0.3999, and 0.4166, respectively, while the broad-sense heritabilities were 0.7427, 0.7438, and 0.7567, respectively. The genetic variation coefficients for heartwood rate and basic wood density among combinations were 10.31% and 4.70%, respectively, with the broad-sense heritabilities being 0.6199 and 0.7035, respectively. The genetic correlation coefficient between V and heartwood rate was 0.95, and with respect to basic wood density, it was -0.45. The 8 selected fast-growing combinations achieved a genetic gain of 12.99% in V and a 11.86% increase in heartwood percentage compared to the variety of red-heart *C. lanceolata* seed orchard red-heart *C. lanceolata* seed orchard. The 20 selected 4th generation (cycle) breeding individuals demonstrated a genetic gain of 53.00% in V , with a 29.13% increase in heartwood percentage and a 6.53% increase in wood basic density compared to the variety of red-heart *C. lanceolata* seed orchard. The 8 selected fast-growing ortets with high heartwood rates exhibited genetic gains of 30.78% in heartwood percentage, 71.70% in V , and 7.61% in wood basic density. The 7 selected fast-growing ortets with high wood basic density showed genetic gains of 14.93% in wood basic density, 70.66% in V , and 16.85% in heartwood percentage.

Key words: *Cunninghamia lanceolata* (Lamb.)Hook.; third-generation germplasm; hybrid combination; heritability; genetic gain; selection