

**UNIVERSITI TEKNOLOGI MARA**

**GENETIC VARIABILITY OF KULAI-  
NIGERIAN X URT-CALABAR OIL  
PALM POPULATION BASED ON  
MORPHOLOGICAL & MOLECULAR  
MARKERS FOR THE  
DEVELOPMENT OF SHORT  
HEIGHT INCREMENT DXP  
PROGENIES**

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## ABSTRACT

In breeding, progeny and individual palm selection are the most suitable approach for improvement of secondary traits in oil palm because their phenotypic expression strongly influenced by environment factors. Thus, progeny selection approach applied in this study for the selection of high fresh fruit bunch (FFB) and oil yield in short height progenies. The most crucial operation in oil palm plantation is harvesting the fresh fruit bunches. Tall palms difficult to harvest either to unavailability of skilled harvester, high cost or longer time needed for bunch harvesting. Shorter palms may help to solve those issues. Crosses between Kulai-Nigerian dura with URT-Calabar pisifera resulted into 8 full-sib DxP progenies with total of 108 palms in the progeny testing. Data were collected for four consecutive years on fresh fruit bunch yield and bunch components while vegetative traits were recorded 3 times at 5, 7 and 12 years old. Progenies performance of FFB varied significantly and it ranged from 193.8 kg/p/yr to 254.8 kg/p/yr. Mean progeny of palm height increment was below than 40.8 centimetres per year at age of 12 years old in KD-Nigerian x URT-Calabar population and this result showed that this population have slow height increment. Highest mean progeny of oil to bunch was recorded in KD-Nigerian x URT-Calabar population of 26%. Broad sense heritability ( $h^2_B$ ) was found very low (below than 47%) for all yield traits. Inbreeding coefficient values showed that Kulai-Nigerian x URT-Calabar progenies were highly outbreeding. 8 short height progenies produced moderate FFB yield (ranged from 185.7 to 233.3 kg/p/yr), moderate bunch weight (ranged from 9.3 to 11.8 kg/palm) and higher bunch number (ranged from 17 to 23 bunches/palm/year). In addition, selected short progenies possessed average annual palm increment of 32.9 cm/year with ranged of 30.4 to 37.3 cm/year at aged of 7 years old (mature age for oil palm) which was 28% shorter than the current planting material. These short palms also produced higher oil to dry mesocarp (O/DM) of 70.6 and oil to bunch (O/B) ratios of 26.0% that contributed to higher oil extraction rate (OER) indirectly. The results from fresh fruit bunch (FFB) yield performance, bunch components and vegetative traits showed that the Kulai-Nigerian dura and URT-Calabar pisifera has potential to be utilized as parental palms of short height materials in future commercial production.

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