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POSSIBLE USE OF CERTAIN PHYSIOLOGICAL CHARACTERISTICS OF YOUNG *HEVEA* PLANTS IN PREDICTING YIELD AT MATURITY

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CO_2 assimilation rate (A), leaf area (LA) and dark respiration rate (Rd) were determined in ten *Hevea brasiliensis* Muell. Arg. genotypes, with contrasting yield potentials using juvenile plants (ca. one year old) grown under field conditions. Trees (ca.12 years old) belonging to two of these genotypes were used to examine the same parameters. The parameters of juvenile plants were compared with those of the mature plants, together with their yield potential. The total leaf area per whorl (La) and the mean daily A and Rd of juvenile plants significantly varied amongst the ten genotypes. These parameters, together with the water use efficiency (WUE), determined at leaf level of juvenile plants, were partially correlated with the ranking of clones for their yield, whilst the apparent quantum yield was significantly correlated (rs=0.65) with the same. The CO_2 assimilation capacity of a whorl [(A-Rd)La], and the daily gross photosynthetic integral of mature plants, predicted from the parameters of juvenile plants also appear to be high in the high yielding genotypes, with the exception of RRIM 600. Possible reasons for this exception are discussed. It is apparent that genotypic differences in the parameters related to yield determinants and the canopy photosynthesis of mature plants could be predicted using their juvenile counterparts. Juvenile plants could be used to predict the genotypic differences in parameters related to yield determinants in the mature plants and these juvenile parameters can be used for screening new genotypes at an early stage of their growth. Establishing genotype environment interactions, if any, for yield determinants of juvenile plants will further improve the possibility of using them for screening genotypes for yield.

Key words : *Hevea brasiliensis*, Gas exchange characteristics, Water use efficiency, Genotypes, Economic yield screening, Selection index.

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INTRODUCTION

The time taken for improvement of tree crops through breeding programmes is alarmingly long compared to that in annual crops. The reason is obviously the long immature phase of tree crops. Thus one of the most needed innovations in tree breeding is a technique for predicting the breeding value of material in the juvenile stage (Gordon and Promnitz, 1976; Ledig, 1975; Varghese, 1992) . Attempts have been made with varying degrees of success to predict production performance in the field for different plant species based on gas exchange variables measured in the laboratory. No single variable was capable of predicting the growth of larch and sycamore seedlings (Ledig and Botkin, 1974) or poplar clones (Ceulemans *et al.*, 1980). However, Ledig and Botkin (1974) showed