COMPONENT COMPLEMENTATION IN OIL PALM BUNCH YIELD IMPROVEMENT: THE NIFOR EXPERIENCE

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ABSTRACT

Productivity in the oil palm is determined by the production of fresh fruit bunch (FFB) which is the product of two components: number of bunches produced annually (BN) and the average weight of the bunch (SBW). Conventionally, the thin-shelled *tenera* palms and the shell-less *pisiferas* produce many smaller bunches compared to the thick-shelled *dura* / Deli *dura* palms. The modified reciprocal recurrent selection (RRS) breeding strategy adopted by the Nigerian Institute for Oil Palm Research (NIFOR) and major oil palm varietal development programmes for the development of elite hybrid *tenera* commercial planting materials was geared towards improving FFB yield on the basis of performance of the components. The success of this breeding method depends on the effectiveness of selecting parents whose yield components will complement each other in their offspring to produce higher bunch yield from one generation to the next. The outcome of the application of this breeding principle in two generations of breeding in the oil palm at NIFOR is the subject of this presentation.

Analysis of variance for the 4 years yield data was carried out for each trial on the yield of fresh fruit bunch and the two components, bunch number and single bunch weight. The mean performance for the three yield traits of each progeny was ranked and the performance of each progeny rated high, average or low for each bunch yield trait. These ratings were used as a basis to classify their parents for the two bunch yield components. A parent is given the rating most frequent for its progenies. Each parent was classified based on a minimum of 4 progenies. 4 Deli, 3 *dura*, 10 *tenera* parents of the second cycle breeding programme were classified for the two yield components. The parental classification for the two bunch yield components was compared with their performance in specific crosses.

The result of the analysis showed that progeny differences were highly significant for all the traits. The mean bunch number (BN) of the Deli x *tenera* progenies was similar to that of the *dura* x *tenera* progenies. Mean SBW of the *dura* x *tenera* progenies was higher than the Deli x *tenera* progenies. Mean FFB yield did not differ between the two progeny types. The result of the classification of parents based on the performance of their progenies for the two bunch yield components was not dependent on fruit form. Six of the eleven-tenera parents evaluated produced high bunch weight progenies, while three parents produced high bunch number progenies. Similarly, the two Deli parents produced high bunch weight progenies, while two parents produced high bunch number progenies. Two of the three *dura* parents evaluated produced average bunch number progenies, while only one parent produced high bunch weight progeny. The classification for the two bunch yield components of the parents of the best and poorest yielding progenies revealed that in the two highly productive progenies; one of the parents was classified as producing offspring with high BN and the other high SBW. Their two Deli parents produced average SBW progenies. On the contrary, parents classified low for BN, but low to high for SBW produced the lowest yielding progenies.

The results obtained from the classification of parents into the two bunch yield component groups, carried out in this study, more or less estimates of the general combining ability of the parents for the two yield traits. The analysis of the most productive and least productive progenies showed that a parent classified as high for a component confers high values of that component to its progenies and vice-versa. For an offspring to be productive in FFB yield, it must inherit from one parent high BN and from the other high SBW genotypes. The conferment of these genotypes to the offspring has been shown to be additive (general combining ability). The maintenance of high level of combining ability in one component and high to average for the other in a parent therefore is the selection objective to ensure the production of very high yielding progenies in inter-population D x T crosses. The exploitation of new genotypes derived from highly variable inter-origin cross provides a very useful way forward in the development of novel varieties to break the present levels of yield ceiling in breeding populations and commercial planting materials. With the application of high heritability for the two bunches yield components in the determination of FFB yield, genetic yield improvement will only be limited by the nature of the parents selected for the inter-population crosses.

Key words: bunch yield, reciprocal recurrent selection, inter origin crosses, combining ability, component complementation