

How many years of evaluation are needed to select new productive cocoa clones?

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ABSTRACT

In perennial plants, the selection of new genotypes requires several years of evaluation to get a good estimate of the genetic value of the trees. The cocoa tree, which is cultivated for its seeds, produces continuously throughout the entire duration of exploitation of the plots, which can last up to 30 years. The genetic value of the trees' productivity over the entire harvesting period is therefore difficult to assess. In particular, how many years are needed to estimate the genetic value of the trees' productive capacity? To answer this question, the analysis of a trial comparing 42 clones in a statistical design with 4 blocks, located in Costa Rica, is proposed. The individual production of the 1187 trees in this trial was evaluated over 18 consecutive years. The first year of production is not a good predictor of cumulative production over 18 years with a genetic correlation of 0.68. It is necessary to have an accumulation of 4 years for the genetic correlation with the 18-year accumulation to be higher than 0.85, and an accumulation of 7 years for the genetic correlation with the 18-year accumulation to be higher than 0.90. Longitudinal data analysis allows for a better understanding of the links between production of the successive years. In this trial, the seventh year is a year of high production followed by a slight decrease in the eighth year. To determine an evaluation period that allows a good estimate of genetic value should therefore be based on the study of production kinetics. Indeed, it seems necessary to continue the evaluation of tree production until a high annual production that reveals the productive capacity of the genotypes. Studies on production kinetics also make it possible to envisage genetic improvement for better sustainability of cocoa trees to be proposed in appropriate cropping systems.

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