

XI. SUMMARY

This study was carried out at the *Pichilingue* Tropical Experimental Station (EETP) of the Autonomous National Institute of Agricultural Research (INIAP), located at km 5,5 of the Quevedo-El Empalme highway, in the Mocache canton (Los Ríos province). The general objective was to study the genetic variability of the EETP collection of the *Nacional* type in cacao (*Theobroma*), and to determine the capacity of the collection for future breeding research. The specific objectives of the study were (i) to characterize 57 accessions of *Nacional* type cacao (known as “de arriba”) in the field using a standardized morphological and agronomic descriptors list; (ii) to identify the key discriminating qualitative and quantitative characters for determining genetic relationships between groups of accessions; and, (iii) to identify elite clones in the collection for further genetic study, breeding and production.

Ecuador possesses an ample genetic diversity in cacao, which has been collected and maintained by INIAP for decades. This diversity requires wide characterization of its genetic relationships to proceed with breeding research in an appropriate manner. The lack of knowledge concerning the qualitative and quantitative attributes of the accessions forming the collection under study represent one of the principal obstacles for improving the quality of the crop and for its subsequent production. As a result, it is necessary to conduct studies which complement previous research and which offer viable alternatives to geneticists, peasant producers and diverse users who focus their efforts toward the generation of income and dividends.

After morphoagronomic characterization, a distance matrix was generated for the accessions using 32 qualitative and 40 quantitative characters, which served

additionally for an analysis of hierarchical grouping, employing Ward's method (1963). The distances between groups were analyzed for the characters of major discriminating "D" value.

This methodology identified four genetic groups. A first group comprised 27 accessions related in different grades of similarity with respect to their morphological features; this material was collected from the provinces of Guayas (22 accessions), Manabí (3) and Los Ríos (2). A second group comprised 14 accessions from Guayas (7), El Oro (1), and Los Ríos (6). The third group included seven accessions with a relatively high degree of similarity, originating from El Oro (1), Guayas (4) and Los Ríos (2). Finally, a fourth group united genetically nine accessions collected in Los Ríos (8) and Guayas (1).

Between the groups, eight qualitative and six quantitative characters were identified with major discriminatory power. In order of importance, the qualitative characteristics were: color of the floral peduncle, intensity of floration, presence of anthocyanin on the exterior of the sepal, apical form of the fruit, intensity of anthocyanin in the ridges of the immature fruit, presence of anthocyanin in the stamen filament, color of the young leaf and plant architecture. With respect to the quantitative descriptors, those with major discriminating value were: length of the leaf, length from the base to the major width of the leaf, length of the sepal, thickness of the primary groove, number of seeds per fruit and dry mass of the seed. In summary, these descriptors indicate the importance of the plant structure in the taxonomic classification of the species.

Finally, using the morphological characterization and based on the calculated selection indices, five promissory materials were identified for production, corresponding to accessions ECU-10651, ECU-10771, ECU-10738, ECU-10716 and ECU-10710. Additionally, materials showing desirable characteristics for continued breeding research were ECU-10713, ECU-10742, ECU-10748 and ECU-10763. An additional utility of this study was the confirmation of the technical and economic value of the materials which the Program of Cacao and Coffee of EETP have recommended for commercialization (such as accessions ECU-10279, ECU-10293 and ECU-10334), as well as the clones considered to be promissory (ECU-10627, ECU-10653, ECU-10659, ECU-10661 and ECU-10713).

Based on these conclusions, formed through the process of agromorphologic characterization conducted in experimental field and laboratory, it is recommended to continue plant breeding activities with a phase of participatory research with farmers of the zone using the elite materials which were identified.