

Agronomic Performance and Trueness-to-type of *Coffea arabica* Hybrids Mass-propagated by Somatic Embryogenesis

H. ETIENNE, E. ALPIZAR, E. DECHAMP, B. BERTRAND

Centre de Coopération Internationale en Recherche Agronomique pour le Développement-Cultures Pérennes (CIRAD-CP), team IRD/CIRAD ‘Applied genomics for coffee sustainable production’, Genetrop, IRD, 911 avenue Agropolis, BP 5045, 34032 Montpellier, France

SUMMARY

In order to validate a mass propagation process of *Coffea arabica* based on the use of liquid nutrient media, the agronomic performance and trueness-to-type of regenerated trees (selected F1 hybrids) was assessed at a large scale. In a first trial representing 3,000 trees, we determined that the frequency of variants increased exponentially with age of the embryogenic suspension. For the five genotypes, somaclonal variation was low (1.3%) in trees produced from embryogenic callus or 3-month-old cell suspensions and increased in frequency with increasing suspension age (6, 10 and 25% in trees produced from cell suspensions aged 6, 9 and 12 months, respectively). Seven types of phenotypic variants were characterized. Based on vigour and productivity of the regenerated plants, it was possible to class the variants in order of severity of physiological disorders: "Colour of juvenile leaves", "Giant", "Dwarf", "Thick leaf ("Bullata")", "Variegata", "Angustifolia", "Multi-stem". The "Dwarf", "Angustifolia" and "Multi-stem" types were the most frequent among produced plants (1.4, 4.8 and 2.9%, respectively). In a second trial, the agronomic performances of 644 trees derived from somatic embryogenesis were compared with those of normal trees produced from microcuttings for the same four clones. Somaclonal variation has never been observed with microcutting-derived trees. The variant aside (2%), for all clones, the trees had vegetative characteristics, productivity, fertility, and biochemical, mineral and beverage characteristics that were identical to those of the controls. We conclude that propagation of coffee by embryogenic callus or young cell suspensions generated few variants. Moreover, detection of 70% of variants is possible at the nursery stage. Somatic embryogenesis can therefore be considered as a possible mass-propagation technique for coffee, for rapid multiplication of heterozygous structures that should lead to substantial genetic gains compared to traditional pedigree selection schemes.