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## Effective method of acclimatisation for *in vitro* propagated hybrid coffee seedlings (*Coffea arabica* L.) at Jimma, southwest Ethiopia

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### Abstract

Coffee is an important crop and a major source of foreign currency in Ethiopia. The majority of smallholders, who normally hold the lion's share of coffee production in the country, rely on the crop for their livelihood. Coffee productivity does not improve despite increasing production, consumption, and marketing. Despite of major emphasis given, Ethiopia's coffee sector has not transformed and according to the central statistic authority, the national average productivity is around 7 kg ha<sup>-1</sup>. This can be improved by adopting climate adaptive, disease resistant high yielder and superior quality coffee varieties of hybrids along with their improved agronomic practices. However, its availability has been a limitation to producers. JARC plant tissue culture laboratory therefore optimising a protocol for mass propagation and dissemination of F1 hybrid coffee clones. Following successive somatic embryogenesis processes, *in vitro*-produced plantlets need to be hardened under greenhouse conditions before it's dispatched to the field. To this effect, we evaluated different soil substrates under room temperature as the requirement for primary and secondary acclimatisation. The experiment was composed of three treatments, including top soils, sand soils, & the mixture (top soils + sand+compost), at ratios 100, 100 & 67:33:33 respectively. The results show that there is a significant difference among the treatments in terms of plant survival and overall seedlings performances. Using sand gave the best result in all materials being applied such as bricks had a survival rate (of 85%), metal boxes (90%) & plastic pots (>95%), while using only top soils it was 70% survival and their mixtures i.e. substrate with 2:1:1 had a survival ranged between 74–87% depending on the materials applied for hardening off. From this greenhouse experiment, it is possible to optimise an *ex-vitro* condition for proper coffee seedling hardening and handling using locally available resources. Thus, sand appears to be the best substrate for the primary acclimatisation of somatic seedlings. Applying proper soil mixtures could increase the efficiency of hybrid coffee multiplication through tissue culture techniques.

**Keywords:** Acclimatisation, arabica coffee, somatic embryogenesis, tissue culture