

ABSTRACT

Cassava genetic transformation capacity is still mostly restricted to advanced laboratories in the USA, Europe and China; and its implementation and maintenance in African laboratories has remained scarce. The impact of transgenic technologies for genetic improvement of cassava will depend largely on the transfer of such capabilities to researchers in Africa, where cassava has an important socioeconomic niche. A major constraint to the development of genetic transformation technologies for cassava improvement has been the lack of an efficient and robust transformation and regeneration system. Despite the success achieved in genetic modification of few cassava cultivars, including the model cultivar 60444, transgenic cassava production remains difficult for farmer-preferred cultivars. In this study, a protocol for cultivar 60444 developed at ETH Zurich was successfully implemented and optimized to establish transformation of farmer-preferred cassava cultivars popular in east Africa. The conditions for production and proliferation of friable embryogenic calli (FEC) and *Agrobacterium*-mediated transformation were optimized for three east African farmer-preferred cultivars (Ebwanatereka, Kibandameno and Serere). Our results demonstrated transformation efficiencies of about 14-22 independent transgenic lines per 100 mg of FEC for farmer-preferred cultivars in comparison to 28 lines per 100 mg of the model cultivar 60444. The presence, integration and expression of the transgenes were confirmed by PCR, Southern blot analysis and histochemical GUS assay. This study reports the establishment of a cassava transformation platform at International Institute of Tropical Agriculture (IITA) hosted by Biosciences eastern and central Africa (BecA) hub in Kenya and provides the basis for transferring important traits such as virus resistance and prolonged shelf-life to farmer-preferred cultivars in east Africa. We anticipate that such platform will also be instrumental to transfer technologies to national agricultural research systems (NARS) in sub-Saharan Africa.