

## Abstract

# Developing Plantain for Resistance to Banana Aphids by RNA Interference <sup>†</sup>

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**Abstract:** Banana bunchy top virus (BBTV) is one of the world's invasive species. Banana aphid (*Pentalonia nigronervosa*) is found in all banana producing areas and it is the insect pest known to transmit BBTV causing banana bunchy top disease (BBTD) in bananas and plantains (*Musa* spp.) and can cause a significant yield loss of up to 100% in severe cases. Controlling the spread of BBTD has been very challenging since there is no known endogenous gene in the *Musa* germplasm that could confer resistance to BBTV. Excessive dependence on insecticides for disease control is detrimental to the environment and off-target-organisms. The objective of this study was to use RNA interference (RNAi) targeting the *acetylcholinesterase* (AChE) gene in banana aphid to develop resistance against aphids in farmer preferred plantain cultivars. This could help sustain smallholder farmers in areas where BBTD is an epidemic. To achieve this, plantain cultivars were initiated using plant tissue culture techniques and rapidly multiplied using Temporary Immersion Bioreactor. This was followed by generation of embryogenic cell suspension (ECS), *Agrobacterium*-mediated transformation of banana and plantain ECS using a RNAi plasmid construct and molecular characterization of putative transgenic lines. Agro-infected ECS of banana and plantain cultivars were regenerated on selective medium and produced several transgenic lines. Molecular characterization confirmed the presence of transgene in about 80% transgenic lines. Preliminary glasshouse screening of transgenic lines showed reduction in population of banana aphids in comparison to control non-transgenic plants. This is the first report on using RNAi targeting AChE gene for developing transgenic plantain that are resistant to banana aphids.

**Keywords:** banana bunchy top disease; aphids; plantain; embryogenic cell suspension; acetylcholinesterase; RNA interference

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