

POSTER SUMMARY

**IMPROVING NITROGEN USE EFFICIENCY IN SUGARCANE
VIA A GENETIC MODIFICATION APPROACH**

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Abstract

Plant nitrogen (N) nutrition has been a focus of recent efforts in crop improvement via genetic engineering. Notably, improved N use efficiency (NUE) by overexpression of a barley alanine aminotransferase (AlaAT) gene in canola and rice increased biomass and grain yield when plants were supplied with low N in pot-based hydroponic trials and in the field. The South African Sugarcane Research Institute entered into a licence agreement with Arcadia Biosciences (USA) that will ultimately enable the Industry to commercialise a genetically modified (GM) sugarcane plant with improved NUE using a construct containing the AlaAT transgene. Initial proof-of-concept genetic transformation of NCo376, a low NUE-type cultivar, demonstrated significant increases in biomass (38-93%), plant N content and overall NUE in a 4-month screening pot trial under low N (1.2 mM) compared with non-transgenic controls. N41, the recipient cultivar of the AlaAT gene for possible commercialisation, is being assessed for transgene copy number and expression. The phenotypic response of these transformed lines is being screened in pot trials with low N. Ultimately, NUE will have to be considered under field conditions and different N regimes, where general agronomic attributes and yield parameters such as sucrose in a mature crop (12-18 months old) can be determined. This work is ongoing and it is anticipated that modifications in NUE may result in a lower input system for sustainable agriculture into the future.

Keywords: pot trials, alanine aminotransferase, N utilisation, N uptake, phenotypic assessment