Harnessing Genomics of Edible African Solanaceae Plants For Improved Nutritional and Food Security

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OVERVIEW

- "African" Solanaceae" (Are natives to central and South America but may have been introduced to Africa either by the Spanish in 18thC or British in 19th C.
- Cultivated Solanaceae crops production has been hampered by abiotic and biotic stresses leading to production losses
- These African Solanaceae species have not been well characterized to determine their morphological, genomics characteristics and their potential to improve the already cultivated lines

OBJECTIVE

Characterize genetic diversity and metabolite compounds in African solanaceae crops of importance to smallholder farmers using existing Solanaceae genome resources and state-of-the-art technologies

METHODOLOGY

Collection of Accessions
74 Eggplant
60 tomato

Characterization under field & greenhouse & Selection of elite lines

Transcriptome & Metabolite analyses

Management of tomato Bacterial wilt using African eggplant rootstock

Anti Diabetic analyses

RESULTS

Fig 1. Phenotypic variations in fruit of African eggplant Accessions

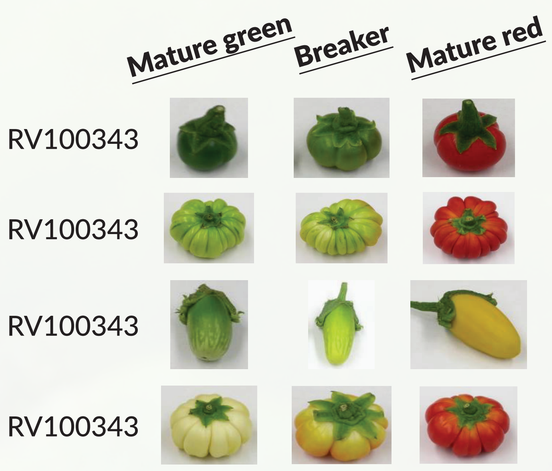
Plant with a purple flower

Plant with prickles

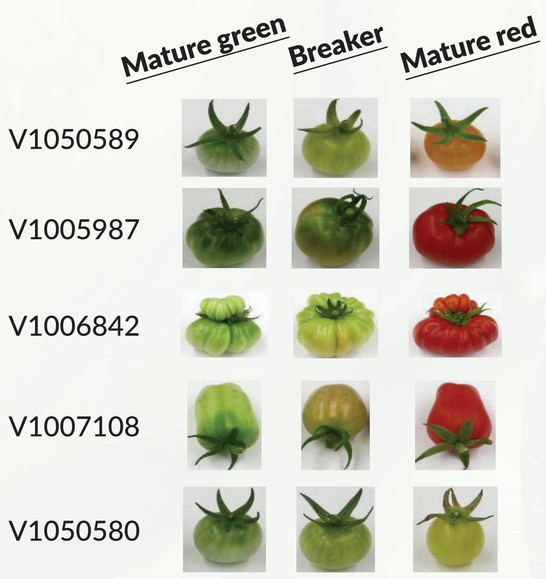
Small leaves &white flowers

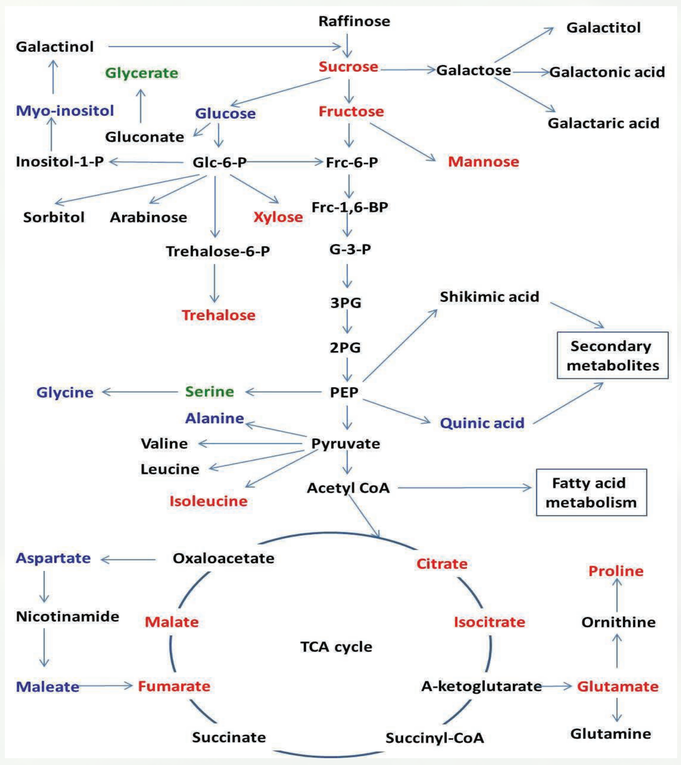
Fruit morphology

African eggplant



African tomato





BLACK - not detected;

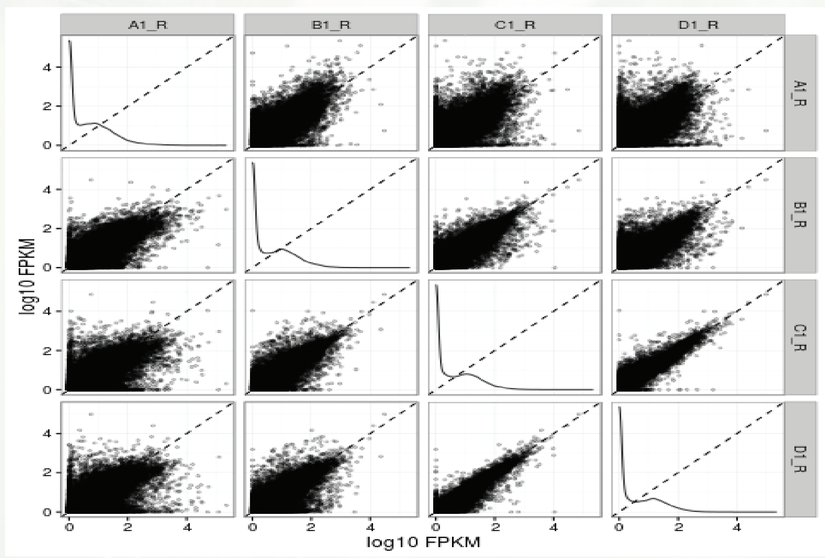
GREEN - detected but not significantly affected by drought stress;

RED - metabolites with greater relative response ratios (relative abundance) in drought conditions;

BLUE - metabolites with lower relative abundance in the stress.

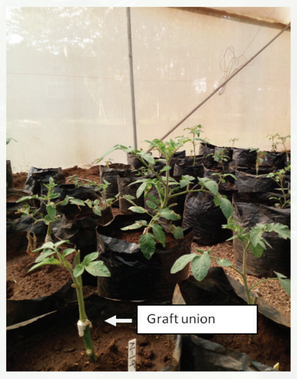
Fig. 2. The metabolic pathway indicating the metabolites associated with the metabolism of various identified sugars, amino acids and organic acids in the African eggplant accessions during stress and at different growth and development stages.

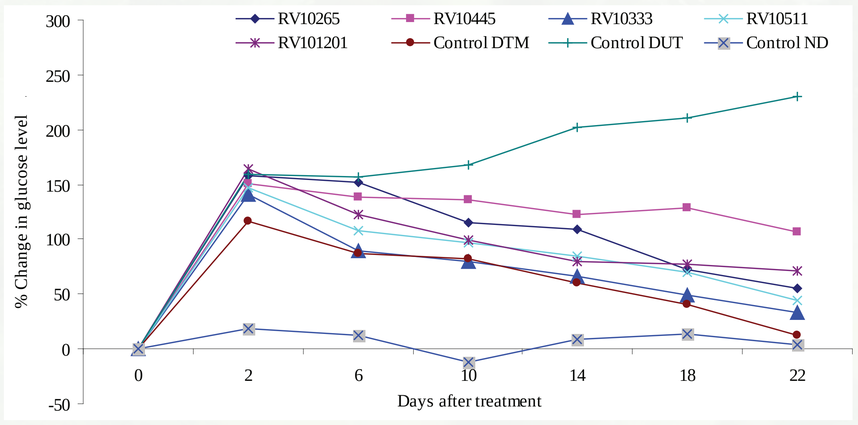
Fig. 3. Scatter matrix showing differential gene expression between the fruiting stages in tomato



African tomato fruit development stages.
A- before fruiting
B- Mature green
C- mature breaker
D- mature red

Fig. 4.Grafting of tomato onto African eggplant rootsock





- Elevation of blood glucose level after alloxan induction
- These levels were greater than for non-diabetic mice
- Normal mice maintained almost constant levels

Fig 5. Antidiabetic activity of selected African eggplant fruit tissues

CONCLUSIONS

Identified novel traits in the current study of African Solanaceae can impact on breeding of cultivated Solanaceae crops with respect to Nutrition (Ascorbic acid, carotenoid and lycopene content), disease and stress tolerance, and fruit quality traits

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