Genetic engineering weevil resistance in sweetpotato

Bt-sweetpotato:

- Use of 4 *cry* genes to express CRY proteins known by in-vitro assays to kill weevils – *cry7Aa*, *cry3Ca*, *cryET33* & *cryET34*
- Bio-assays achieved on at least two good storage roots of 132 transgenic events = 12 with apparent differences / non-transgenic storage roots.

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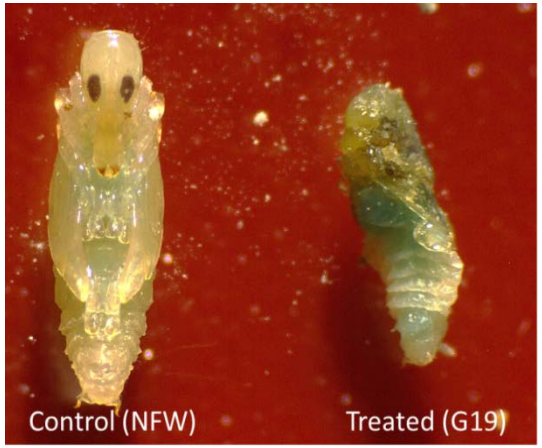
RNAi sweetpotato:

- Use of hairpin RNA genes to produce dsRNA targeting 3 essential genes of weevils resulting in their death (University of Ghent).

3 essential genes repeatedly the best target (soaking, artificial diet with synthetic or bacterial produced dsRNA)

Transgenic sweetpotato or **bio-pesticide**

dsRNA	Gene
G1	Vha68-2 F1 ATP synthase β subunit
G2	V/A-type ATP synthase catalytic subunit A
G3	Synaptobrevin, isoform A
G4	Pfk phosphofrutokinase
G5	adenylate kinase-2
G6	Focal adhesion kinase isoform D
G7	gamma-coatomer protein, isoform C
G8	delta-coatomer protein, isoform A
G9	alpha-coatomer protein, isoform D
G10	TBP-associated factor 1, isoform D
G11	lethal (2) NC136, isoform B
G12	Proteasome 20 kD subunit
G13	DNA pol interact tpr cont. prot. 47 Kd
G14	alpha-Adaptin, isoform A
G15	Mad1
G16	Ubiquitin conjugating enzyme E2
G17	RNA pol beta subunit
G18	RNA helicase
G19	ribosomal protein S13e
G20	DNA polymerase alpha 50 kD
G21	vATPase A
G22	vATPase D
G23	RPL19
G24	Snf7



(Left) Normal pupal development. **(Right)** Dead pupae after 14 days treated with dsRNA against Ribosomal protein s13e (G19)

Issues of GE WR sweetpotato

Product concept is a 100% resistant GE sweetpotato that is an existing popular variety

- **Bio-assay is more qualitative than quantitative, needs to be repeated (new weevils, new storage roots) – Bt-SP completed end of this year December 2016.**
- **5 RNAi gene constructs but likely only one tested by the end of the project July 2017 (=Stage gate)**
- **Best of Bt-sweetpotato and best RNAi-sweetpotato combined for higher level and insect resistance management (new gene construct, transformation of popular African varieties) – 2020?**