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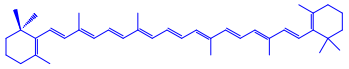
Sweetpotato research at the Natural Resources Institute

Andrew Westby (on behalf of colleagues and collaborating organisations and researchers)

History

- NRI has worked on sweet potato for several decades
- Focus is mainly on Africa but also elsewhere
- From farm to fork and almost all aspects of the value chain
- Work in partnership with collaborating organisations and donors

NRI Programme on Root and Tuber Crops in Development



- Programme develops strategies which are economically beneficial, environmental, culturally and socially appropriate and gender sensitive.

- Over 20 staff with experience and expertise in RTC- in value chain analysis, production, marketing, working with private enterprises, storage, processing, gender, socio-economics, consumer preferences and nutrition
- Funded by BMGF, Harvestplus, CGIAR and EU, DEFRA, DFID and others.

VALUE CHAIN

NRI work involves the whole value chain and includes technical, socio-economic and market inputs. The work is in partnership with many organisation and institutions .

FARM	PROCESSING	CONSUMER AND MARKETS

Improved resistance to weevils

Reducing losses of Vitamin A during processing & storage

Consumer preferences and behaviour

Commercialising informal supply of sweet potato vines

Improved storage systems

Value Chains and understanding markets

Better transportation – electronic sweet potato.

OUTCOMES
Better nutrition and health
Better markets
Higher yields and income
Reduced pest and disease

Partnerships worldwide: Donors & collaborators

Training and capacity building including early career scientists

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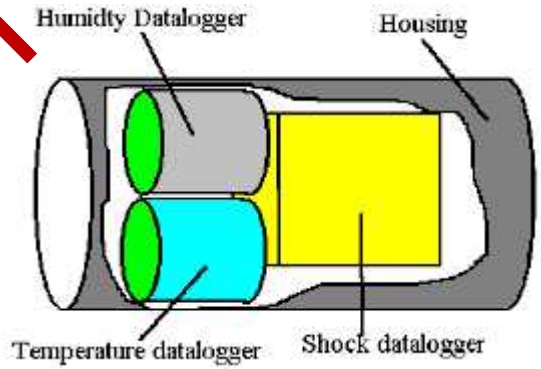
Transport – Electric SP

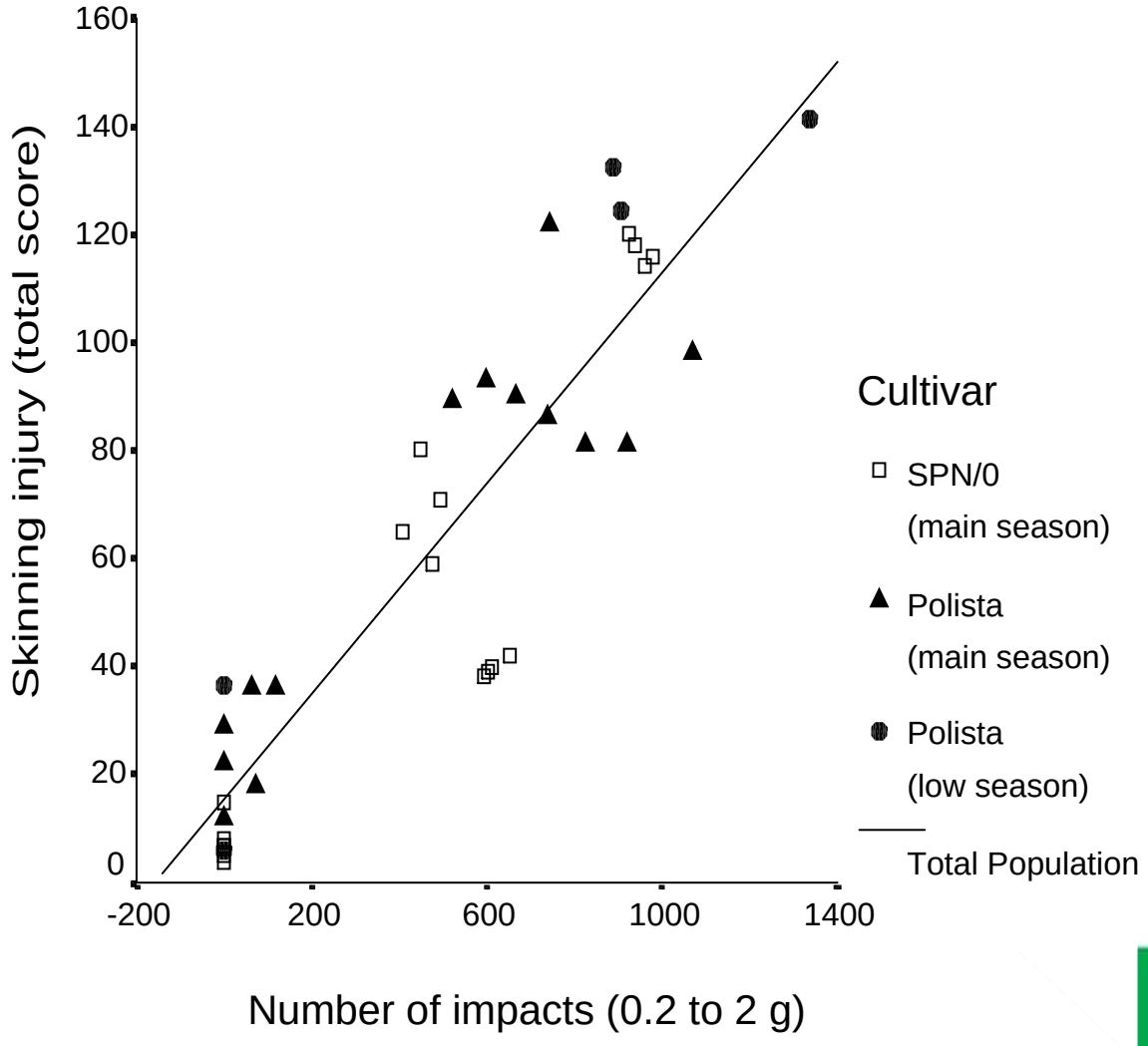


Electronic sweet potato

Market

Handling

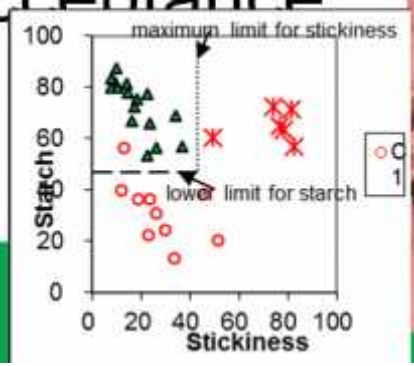
Sensor measurements and damage to sweet potato



- Is a relationship between sensor and damage
- Can track consignments over long distances
- **Reduced sack weight to 100kg in some markets**

Varietal selection – location and seasonal effects

- New varieties of sweet potato higher yields, better disease resistance, better nutritional and health benefits, etc..
- Tested varieties over range of locations and over two seasons in Tanzania
- Consumers reported wide variation in acceptance by variety, year and location
- Developed models to map acceptance by location and year.
- Can help plant breeders



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Consumer acceptability of orange-fleshed sweet potato in Uganda/Tanzania/Mozambique

Question	Result
Are changes in appearance, taste and texture of sweetpotato a barrier to consumer acceptance – especially if a primary staple?	Not for most consumers. However, 18% of consumers did not prefer orange to traditional (need alternative sources of vitamin A?)
Is orange colour an advantage for promoting a bio-fortified crop?	It is an advantage because the trait is visible. Good for branding
Does acceptance differ between rural and urban locations? What are the behavioural differences?	Yes, acceptance probably differs. Rural consumers have higher acceptance for all type of sweet potato (a staple). Urban consumers more discriminating.

Consumer acceptability of orange-fleshed sweet potato in Uganda/Tanzania

Question	Result
Is acceptance related to the provitamin A content?	Only for 23% of consumers tested (orange likers) and only weakly.
Will consumers pay more for OSP?	Yes if given nutrition information. But amount they would pay varied according to the way the experiment was conducted.

Impacts of processing and storage on provitamin A retention?

Roots

Drying

Dried chips

Storage

Dried & stored chips

Preparation

Food ready for consumption

Drying

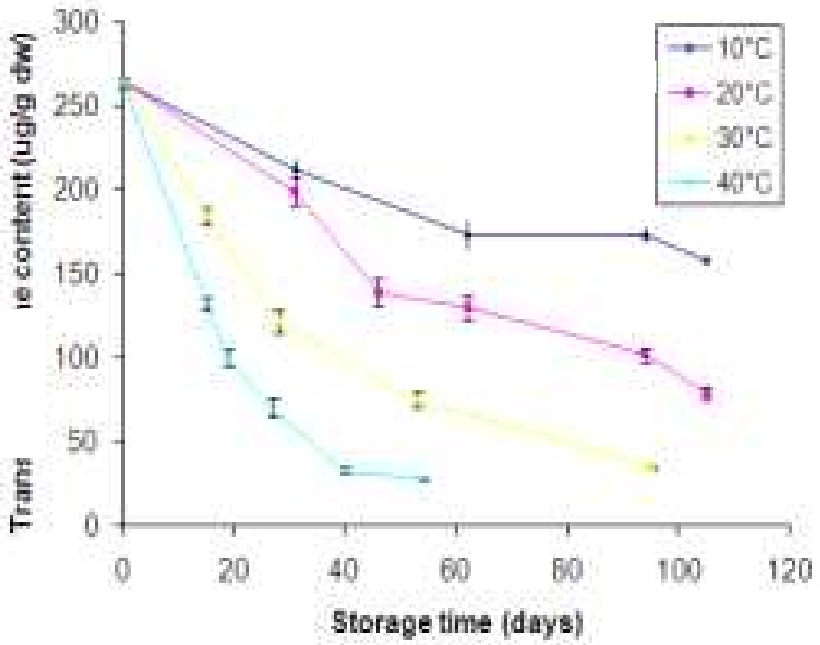
Losses after drying were low (9%). There were no differences between solar and sun dryers.

Storage of OSP chips

Losses highly influenced by storage temperature (and oxygen level)

75% loss after 4 months (ambient temperature 23ºC)

No simple technological solution. Control by limiting storage time (e.g. 2 months)



Experiences of OFSP Marketing in Mozambique and Uganda

OFSP Marketing Strategy

NGOs: Facilitate & develop existing SP market links

	via:	to:
Farmers (Market-oriented and selling surplus)	• Farmer marketing training • Linking producers to traders • Radio commercials & programmes • Trader database • Formation of marketing groups	**Create confidence; increase skills; reduce risk**
Sweet potato traders (Assemblers and retail)	• Trader training • Linking traders to producers • Radio commercials • Village road signs	**Raise awareness; increase profit**
Consumers (Rural & urban)	• Radio commercials with jingle & programmes • Promotion events, market signs and murals	**Raise awareness; increase consumption**

Lessons Learned: Generic

- Where marketing linkages made, traders trained and product promotion undertaken possible to create market for OFSP
- Main reason for planting OFSP was household consumption, but important that market exists so can sell surplus
- Traders vital in seeking out trading opportunities and were willing to embrace OFSP if given information about it
- High % of farmers expressed intention to increase OFSP production to take advantage of market opportunities
- >85% of consumers in both countries reported they would purchase OFSP in future
- Marketing not uniform because of different levels of market access
- Advantage to be market led rather than production led

Commercializing Clean Sweetpotato Seed Production in Areas with a Long Dry Season

- Project has had successes with promoting improved white & orange-fleshed varieties, use of fertilizer and compost, use of planting on the flat both for increased vine production and improved irrigation, record keeping and business planning and exploring new markets and new ways of marketing.
- Funded by the Bill and Melinda Gates Foundation

The effect of different rates of NPK fertilizer on the production of vines and profitability

Fertilizer rates (kg/ha)			Cost (/-) of fertilizer/ha *	Harvest of vines/ plot** (3 cuts)	Incremental vine yield/plot	Incremental vine yield/ha	Value (/-) of additional vines/ha***	Cost (/-) of additional fertilizer	Return on cost of fertilizer
N	P	K							
0	0	0	0	123±21					
50	25	25	340,000	196±21	73	608,176	10,199,119	340,000	x30
150	75	75	1,020,000	288±21	92	765,490	12,837,266	680,000	x19
250	125	125	1,700,000	297±21	9	75,840	1,271,836	680,000	x2

*Cost of 100kg of 20:10:10 NPK fertilizer was 136,000/-Tz
** Values are ± standard error of the mean; plot area harvested was 1.2m^2
*** The mean value of 1 vine was estimated to be 16.8/-Tz

Role of mobile phones in vine selling

We are investigating and promoting the role of mobile phones in vine selling:

- The benefits to multipliers in being able to contact their customers
- The benefits to town sellers of being able to order new supplies of vines when they want them and also to be contacted by their customers
- The benefits to transporters of being able to be phoned when transport is needed
- And mobile money helps all of them


The multipliers are starting to have mobile phones

Town sellers: their banner has a mobile phone number for customers to ring

The town sellers have mobile

Transporter: He of course has a mobile phone

Resistance to sweetpotato weevil

NRI, (Phil Stevenson)

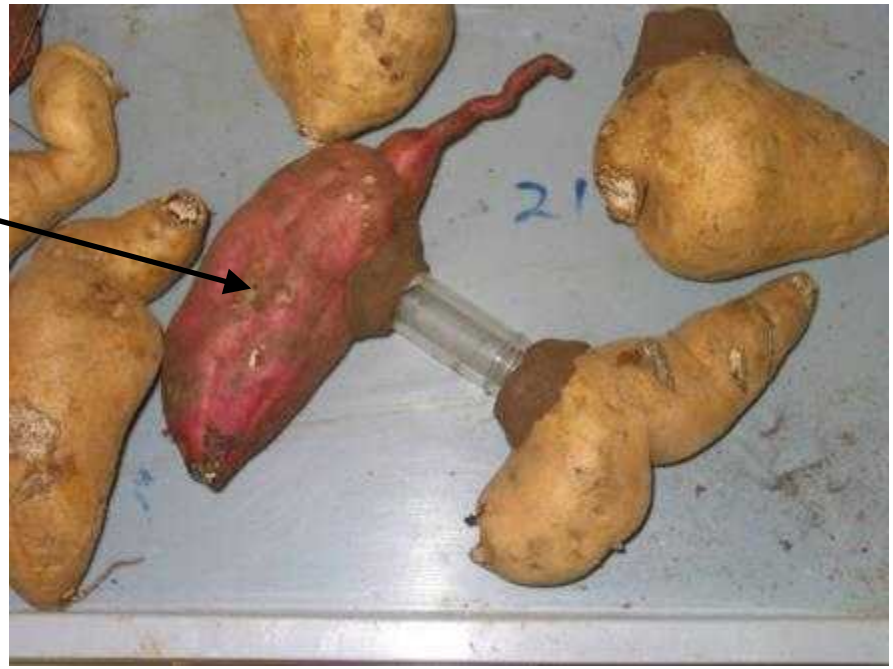
NaCCRI (Gorrettie Ssemakula/Benard Yada/Milton Otema Anyanga)

CIP (Robert Mwanga)

North Carolina State University (Craig Yencho)

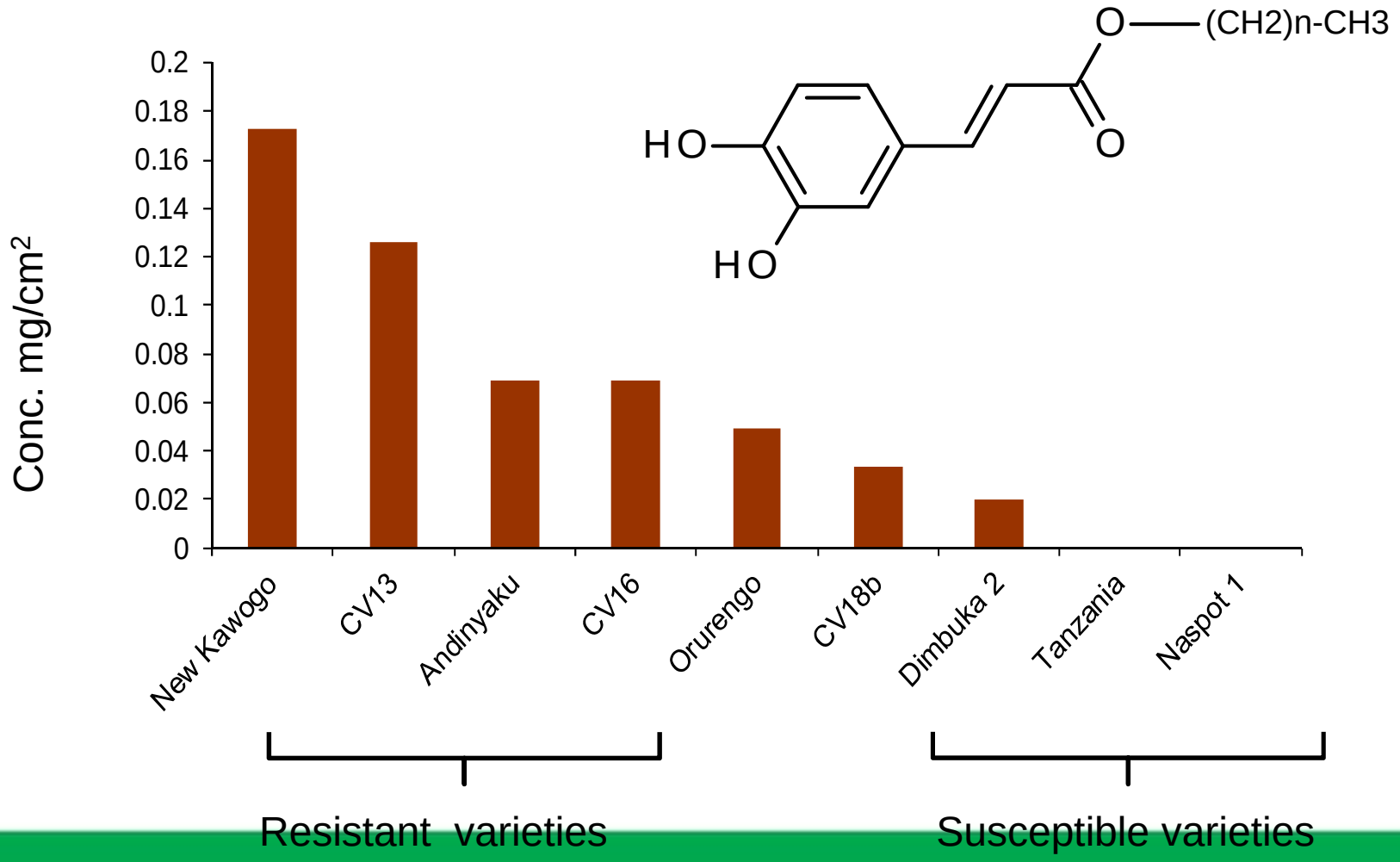
Laboratory bioassays

- Farmers report New Kawogo to be resistant.

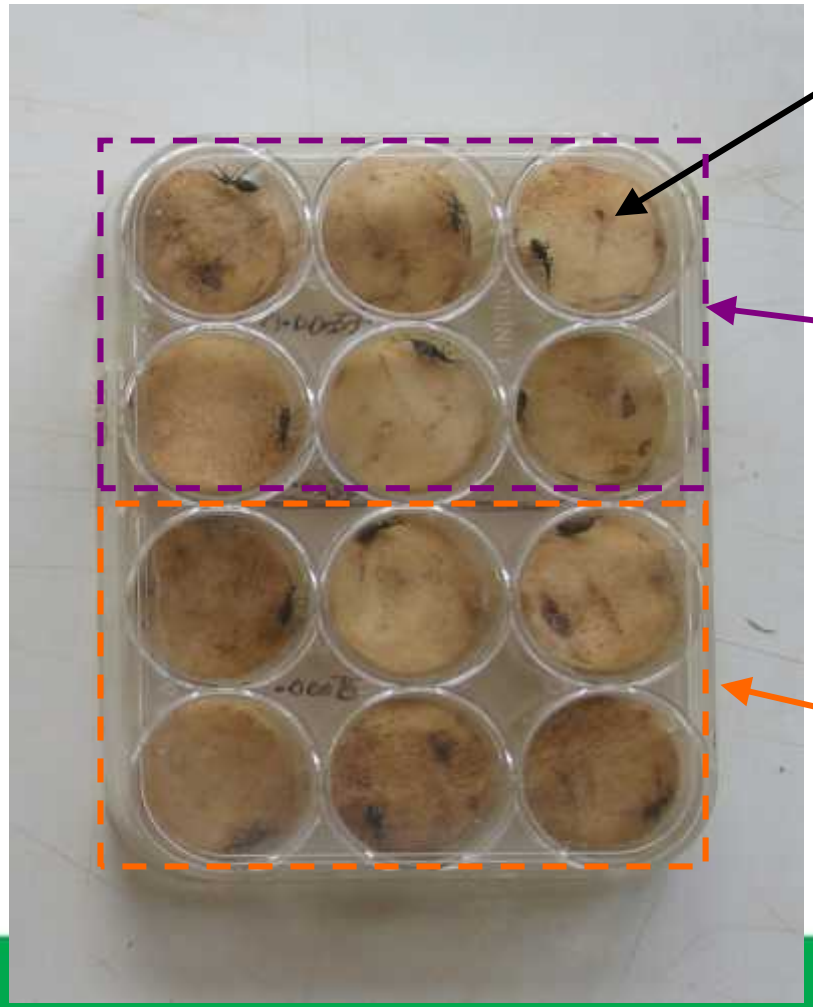


Laboratory experiments support field data.
Therefore resistance is not simply escape as suggested by Stathers et al., 2003

C16/C18 caffeic acid esters on the surface of different sweetpotato varieties.



Bioassay to evaluate the effect on ovipostion and feeding of *Cylas* spp. by hexadecylcaffeic and coumaric acid on root surface.

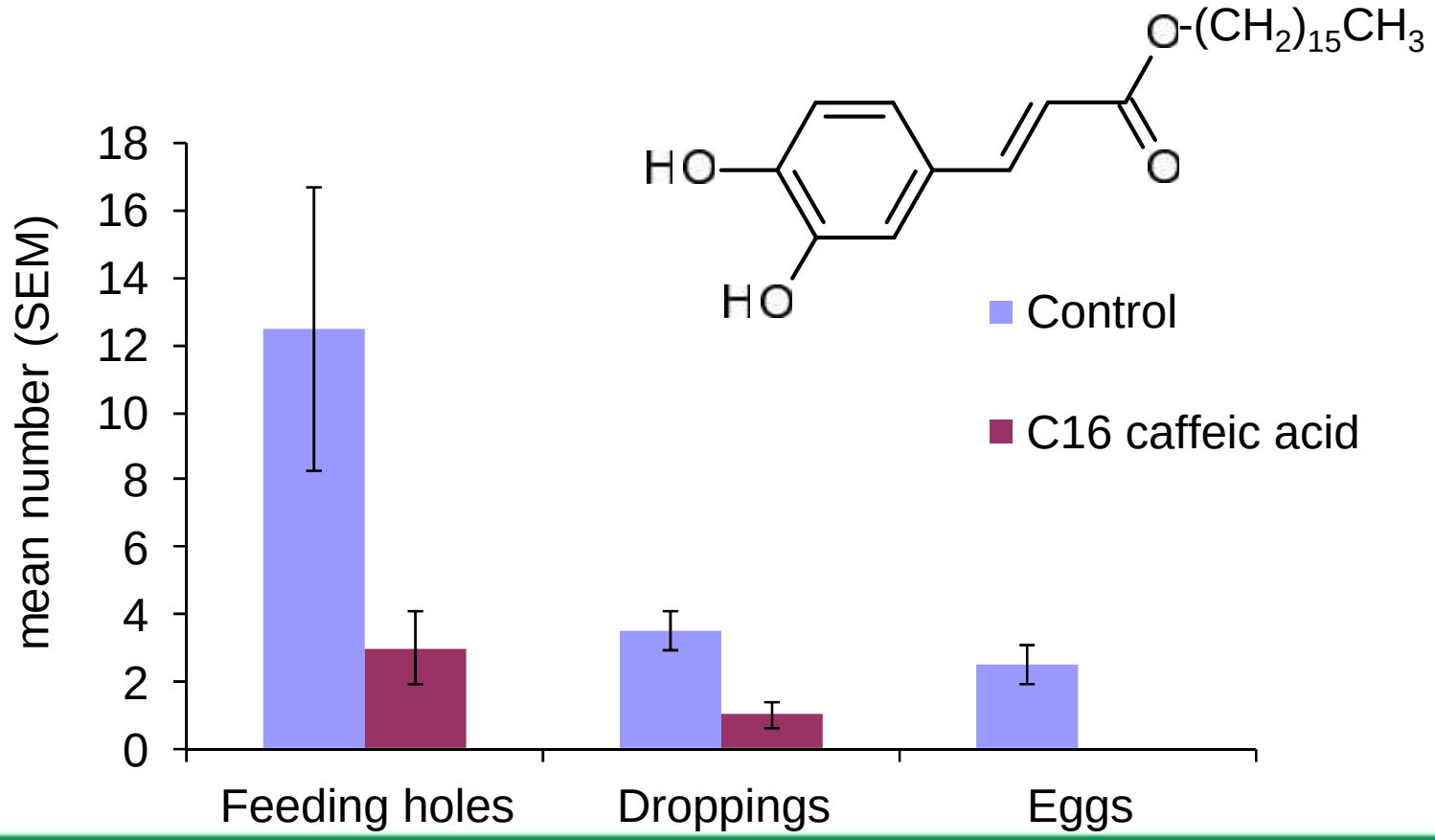


Root plugs (1.5cm diam) of Susceptible variety Naspot1 + one ♀ adult

50ul of compound (10mg/ml) applied to each well ≡ 0.5mg/cm^2

Control root plugs

Feeding and oviposition of *C. puncticollis* on Naspot (susceptible) periderms treated with hexadecylcaffeic acid (0.5mg/cm^2)



On going research - Mapping New Kawogo x Beuaregard (NKB)

NKB-Weevil resistance population, 287 progeny (NaCRRI, Uganda) to be screened for chemical differences corresponding to quantitative trait loci (QTLs).

Trait	New Kawogo	Beauregard
Dry matter (%)	30-34	18-20
Flesh color	White	Orange
SPVD resistance	Resistant	Susceptible
Weevil resistance	Resistant	Susceptible

Use trait loci for weevil resistance as a breeding tool to produce resistant varieties with other good agronomic and food quality trait

Conclusions for NRI work

- Diverse range of skills and expertise
- Collaboration with partners vital for our work to work along the value chain. Covering pests, markets, preferences, transport, storage, varietal selection and others.

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