



**Re-analysis of heterotic gain in Mozambique with clones derived from Ugandan inter- and intra- gene pool crosses**

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# Objective



Estimating **family means of inter genepool crosses**

8A x 8B (64 families) under water stress conditions

compared to **intra-genepool crosses**

8A x 8A (24 families) and 8B x 8B (24 families)

=> with other word heterosis increments in a sweetpotato hybrid population under water stress conditions

**Note:** this is material in early breeding stage in which **no** selection has been carried out before

# Parents selected



Population A			Population B		
Name	Code	SPVD resistance	Name	Code	SPVD resistance
Ejumula	A1	Susceptible	Resisto	B1	Susceptible
NASPOT1	A2	Moderate	Magabali	B2	Susceptible
Dimbuka-Buku	A3	Susceptible	NASPOT5	B3	Moderate
NASPOT5/58	A4	Susceptible	Wagabolige	B4	Moderate
NASPOT7	A5	Moderate	Mugande	B5	Moderate
SPK004	A6	Moderate	NASPOT11	B6	Moderate
NASPOT100	A7	Moderate	New Kawogo	B7	Moderate
NK259L	A8	Moderate	Huarmeyano	B8	HR SPFMV

# Original crossing scheme



A total of 16 parents used

8 parents from each gene pool (A & B) - separated by 18 microsatellites (SSR markers)

- a) INTER\_GENE POOL CROSSES: 8 X 8 factorial design
- b) INTRA\_GENE A CROSSES: 8 X 8 DIALLEL without self- and considering reciprocals
- c) INTRA\_GENE B CROSSES: 8 X 8 DIALLEL without self- and considering reciprocals

# Experimental material – common between 2015 & 2016

<b>Population</b>	<b>A</b>	<b>B</b>	<b>AxB</b>	<b>Checks</b>
Number of clones planted	500	700	1124	Delvia Gaba-Gaba Irene Namanga Resisto

- 1 m row plots, 2 plot replications, 2 treatments (irri and no irri)
- RCBD with checks
- A check was planted after every 50 clones (2015) & 10 clones (2016)

# Irrigation regimes



## Irrigated treatment

Dates of planting: 8 – 22 Sept 2014 & 10 -13 Aug 2015

- 60 mm water applied per each irrigation cycle
- Trials were irrigated 7 times, in 2014 and 15 times in 2015

## Not irrigated treatment

Dates of planting: 21 August – 5 Sept 2014 & 10 -13 Aug 2015

- Trials were irrigated 5 times from planting to a month after planting.
- The trial was not irrigated from a month after planting.
- In 2015, 5 additional irrigations was done between 60 & 130 DAP

# Weather conditions during the growing seasons



	Year: 2014				Year: 2015			
Month	Tmin (°C)	Tmax (°C)	Precipitation (mm)	ET (mm)	Tmin (°C)	Tmax (°C)	Precipitation (mm)	ET (mm)
Aug	13.1	28.3	49.1	114.9	16.3	29.3	0.0	118.3
Sept	14.9	29.8	0.0	134.3	16.5	29.3	0.0	130.2
Oct	17.0	30.4	80.7	121.4	18.9	32.3	16,8	144.1
Nov	19.3	30.1	148.1	106.6	19.4	31.9	13.1	133.7
Dec	20.7	29.8	304.1	109.2	22.5	34.8	9.1	124.5
<b>Mean</b>	<b>17.0</b>	<b>29.7</b>	-	-	<b>18.7</b>	<b>31.5</b>	-	-
<b>Total</b>			<b>582.0</b>	<b>586.4</b>			<b>39.0</b>	<b>650.8</b>

# Results

Drought Intensity Index (Fischer and Maurer 1978)

$$DII = 1 - (\text{Mean [NOIRRI]} / \text{Mean [IRRI]})$$

	Pop A	Pop AxB	Pop B
<b>DII (2015)</b>	0.49	0.47	0.46
<b>DII (2016)</b>	0.37	0.22	0.26

**NB:** All clones from the 3 populations were randomised and planted together



# Means and maximum performance of storage root yield (t/há)



## Population means

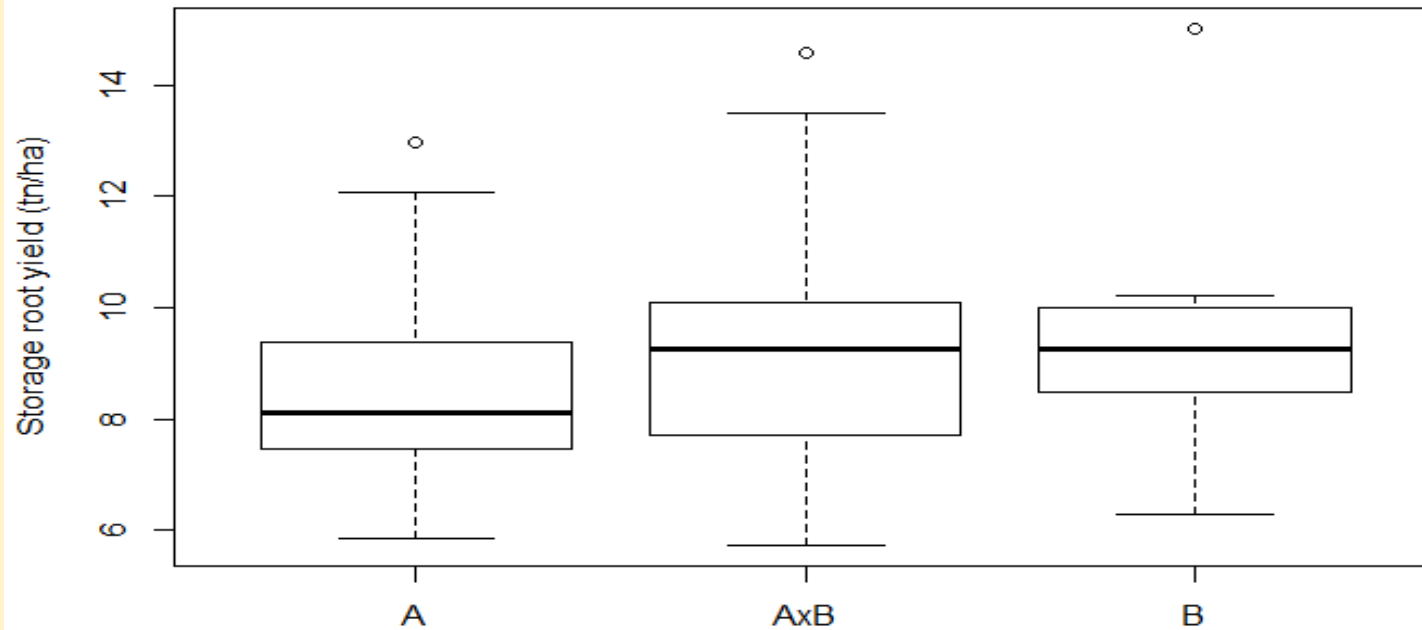
Year 2015	Pop A	Pop AxB	Pop B
IRR	15.19	16.16	17.19
NOIRR	7.73	8.51	9.21
Year 2016			
IRR	6.70	7.15	6.38
NOIRR	4.21	5.54	4.71

## Maxima

Year 2016	Pop A	Pop AxB	Pop B
IRR	25.11	27.30	27.38
NOIRR	17.04	20.99	19.27
Year 2016			
IRR	16.15	18.60	15.24
NOIRR	11.41	15.68	11.84

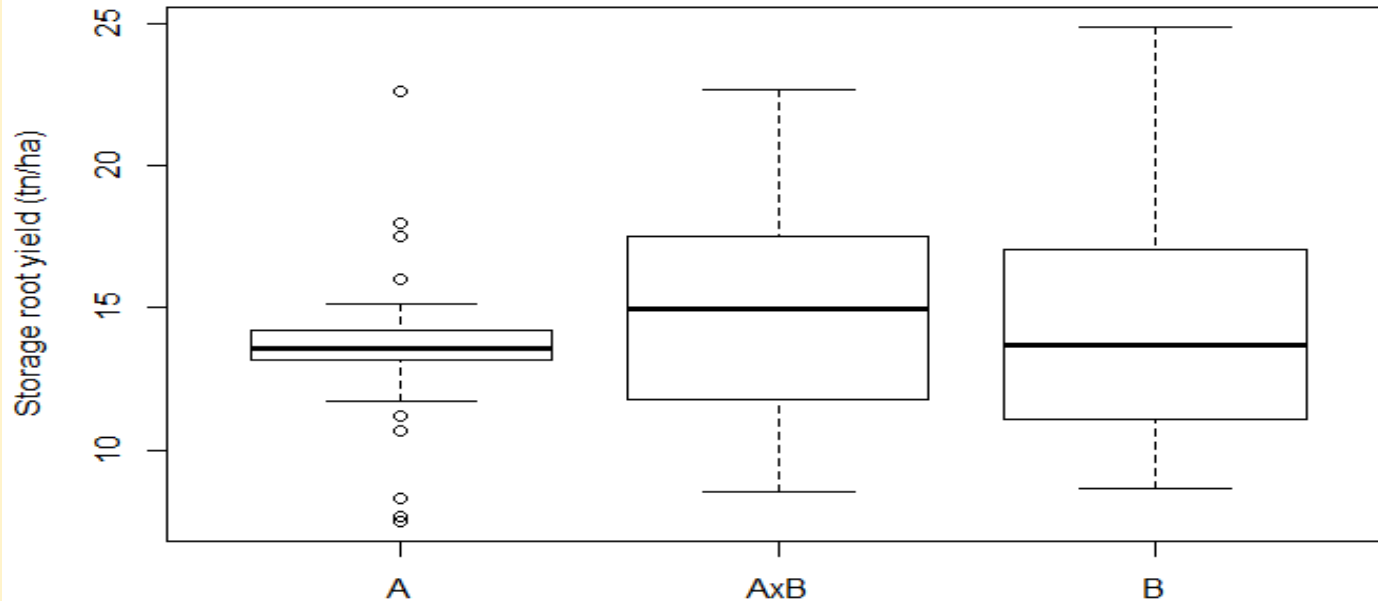
# Family means for root yield (tn/há)

**Boxplot of family means for storage root yield (tn/ha)**



# Maximum performance

Maximum genotype storage root yield for each family (tn/ha)



# Conclusions and perspectives



- We have not plant parents for mid-parent mid-offsprings heterosis estimations – we compared population means
- Please note Huarmeyano crosses (exotic clone which does not belong to pop A or B) were eliminated from analysis
- Please also note NASPOT 5 were eliminated from the analysis (it featured in pop B but its a pop A clone !!)
- Pop AxB is superior to pop A and pop B considering maximum performance for storage root yield – this was more pronounced in the 2nd year of testing
- Our results so far show that the hybrid population AxB had superior means under both drought and none drought conditions in 2016.

# What we do next?



- For sure we will select a larger number of clones for preliminary yield trials from families which were performing well under drought stress and which respond to water adequately (material entering into the on-going breeding program)
- We will also use the experiment to determine the variance components for efficiency studies of ABS
- Planning how to implement a heterosis exploiting breeding scheme in Mozambique – first step to cross Umbeluzi parents and Gurue parents on large scale and test the offsprings and discard “bad family makers” at Umbeluzi and Gurue crossing block target to come to populations in which there are more clones which are drought tolerant and which respond to rains adequately

# Acknowledgements



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