XII Meeting of Southern and Eastern Africa Cotton Forum (SEACF)
Maputo, Mozambique, 17 –18 June 2014

Application of mixed models to assess genotype and environment interactions in cotton (*Gossypium hirsutum*) cultivars in Mozambique

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I. INTRODUCTION

The Mozambique Cotton Breeding Programs have focused mainly

cottonseed and fiber yield

CA 324 and REMU 40 cultivars are widely used by farmers

I. INTRODUCTION

In current studies the genetic effect has been referred as random

-Estimation of variance components,

-Obtainment of genotypic values or Breeding Value

I. INTRODUCTION

The interaction of genotype and environment interferes significantly in breeding programs

An ideal cultivar should be adapted to a broad cultivation environment

I. INTRODUCTION

The REML/BLUP Methodology and the HMRPGV *(Harmonic Mean of the Relative Performance of the Genotypic Value)*

Method can be used in studies with

unbalanced data,

non-orthogonal design,

and heterogeneity of variance.

I. INTRODUCTION

This type of evaluation for commercial cotton cultivars is scarce in Mozambique.

Objective

Evaluate the interaction between genotypes and environments, productivity, genotypic adaptability and genotypic stability of cotton cultivars in Mozambique, using the Mixed Models (REML/BLUP).

II. MATERIAL AND METHODS

From growing season 2003/04 to 2009/2010
Municipality of Montepuez,

the Namialo and Namapa Villages,

From growing season 2005/06 to 2009/2010

In Morrumbala Village

All the locations (**19 environments**) are situated in agro-ecological Regions 6, 7, 8

II. MATERIAL AND METHODS

Table 1. List of cultivars assessed, origin, year of introduction, tolerance characteristics to *E. fascialis*, lint outturn, growing season.

Cultivar	Origin	Year of introduction	Tolerance to *Empoasca fascialis*	Lint outturn-GOT (%)	Growing season (days)
ALBAR SZ9314	Zimbabwe	1999	High	>42	>150
ALBAR FQ902	Zimbabwe	1999	High	41	130-150
ALBAR BC853	Zimbabwe	1999	High	37	<130
STAM 42	Senegal	1999	Low	40	130-150
CA 222	Ivory Coast	1994	Medium	39	130-150
CA 324	Ivory Coast	1994	Medium	38	130-150
IRMA 12-43	Cameron	1994	High	39	130-150
ISA 205	Ivory Coast	1994	High	39	130-150
REMU 40	Mozambique	1980	High	37	130-150

II. MATERIAL AND METHODS

Statistical analysis

The experimental data were test for normality and homogeneity of the errors using the SAS 9.2 software.

The adaptability and stability were analyzed by the REML/BLUP Methodology (Henderson, 1975),

$$Y = Xr + Zg + Wgl + \varepsilon$$

II. MATERIAL AND METHODS

$$E\begin{bmatrix} y \\ g \\ gl \\ \varepsilon \end{bmatrix} = \begin{bmatrix} Xr \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\mathbf{var}\begin{bmatrix} \mathbf{g} \\ \mathbf{gl} \\ \boldsymbol{\varepsilon} \end{bmatrix} = \begin{bmatrix} \mathbf{I}\sigma_g^2 & 0 & 0 \\ 0 & I\sigma_{gl}^2 & 0 \\ 0 & 0 & I\sigma_\varepsilon^2 \end{bmatrix}$$

III. RESULTS AND DISCUSSION

Table 5. Adaptability of genotypic values (RPGV and RPGV*GM), stability and adaptability of genotypic values (HMRPGV and HMRPGV*GM) for cultivars evaluated in 19 environments from 2003/2004 to 2009/2010 growing season.

Cultivar	Genotypic value			
	RPGV	RPGV*GM	HMRPGV	HMRPGV*GM
CA-222	1.03	1,568.46	1.02	1,562.43
STAM 42	1.02	1,561.87	1.02	1,558.81
ISA 205	1.02	1,561.39	1.02	1,556.90
REMU 40	1.02	1,556.23	1.02	1,551.95
RMA 12-43	1.00	1,526.87	0.99	1,517.62
ALBAR SZ9314	0.99	1,520.04	0.99	1,513.91
ALBAR FQ902	0.99	1,517.89	0.99	1,511.97
CA 324	0.99	1,516.96	0.99	1,509.30
ALBAR BC853	0.93	1,428.64	0.93	1,423.08

III. CONCLUSIONS

1) The genotypic values were higher in overall environments for CA 222 and STAM 42 cultivars.

2) The cultivars ISA 205, STAM 42 and REMU 40 showed the highest values of the cottonseed yield when selected by the HMGV method,

while the lowest values were for the CA 324 and ALBAR BC853 cultivars.

III. CONCLUSIONS

3) In relation to the stability and adaptability (HMRPGV) and adaptability (RPGV), the cultivars CA 222, STAM 42 and ISA-205 were superiors.

4) The cultivars CA 222, STAM 42 will be the most recommended for farmers in cotton-growing regions and for a cotton breeding program of Mozambique.

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To all....

Khanimambo!!!

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