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INTRODUCTION

The Mixed Linear Models provides advantages compared to ordinary linear models. One is the ability to consider variables as random and other variables as fixed.

The objective of this analysis is for the selection of superior genotypes. As the genotypes are a random sample of the hybrids within the trial, the genotypic effects are assumed as random and the consequent use of Best Linear Unbiased Predictor (BLUP) is justified.

OBJECTIVES

To predict the genetic value of tobacco hybrids through their BLUP, using Mixed Linear Models and parameters estimation by the Restricted Maximum Likelihood method (REML), for purposes of selection.

MATERIAL AND METHODS

- 14 FC-Virginia tobacco hybrids developed by Alliance One International;
- 4 commercial checks: AOV 405; AOV 413; AOV 815; K 326;
- Evaluated traits: Yield, Nicotine, Sugar and Quality Index Grade;
- Environments: 11 environments in the southern region of Brazil;
- Statistical design: Randomized Complete Blocks (RCBD), with 3 replications;
- Statistical analyzes were performed in the JMP software program (SAS Institute Inc.);
- Linear Mixed Model (LMM) approach using the Restricted Maximum Likelihood method (REML);
- Genetic parameters were estimated via REML, with genotypic means adjusted and estimated using the Best Linear Unbiased Predictor (BLUP) procedure;
- The likelihood ratio test (LRT) was performed and the significance was verified by the Wald test.

RESULTS

Table 1. Wald test for Yield (kg.ha⁻¹), Nicotine (%), Sugar (%) and Quality Index Grade (%) traits referring to the evaluation of 14 FC- Virginia hybrids in 11 different environments in the southern region of Brazil.

Effects	DF	Yield	Nicotine	Sugar	Quality Index
Genotype	17	55356.504**	0.0637281**	3,1339826 ^{ns}	3.1339826**
G x E	10	18929.267**	0.019325**	6,3013364 ^{ns}	6.3013364*
Residual	10	10959185	0.1203052	13,417364	13.417364

^{ns}, **, * Wald test not significant and significant at 1% and 5% respectively, by Chi Test Square

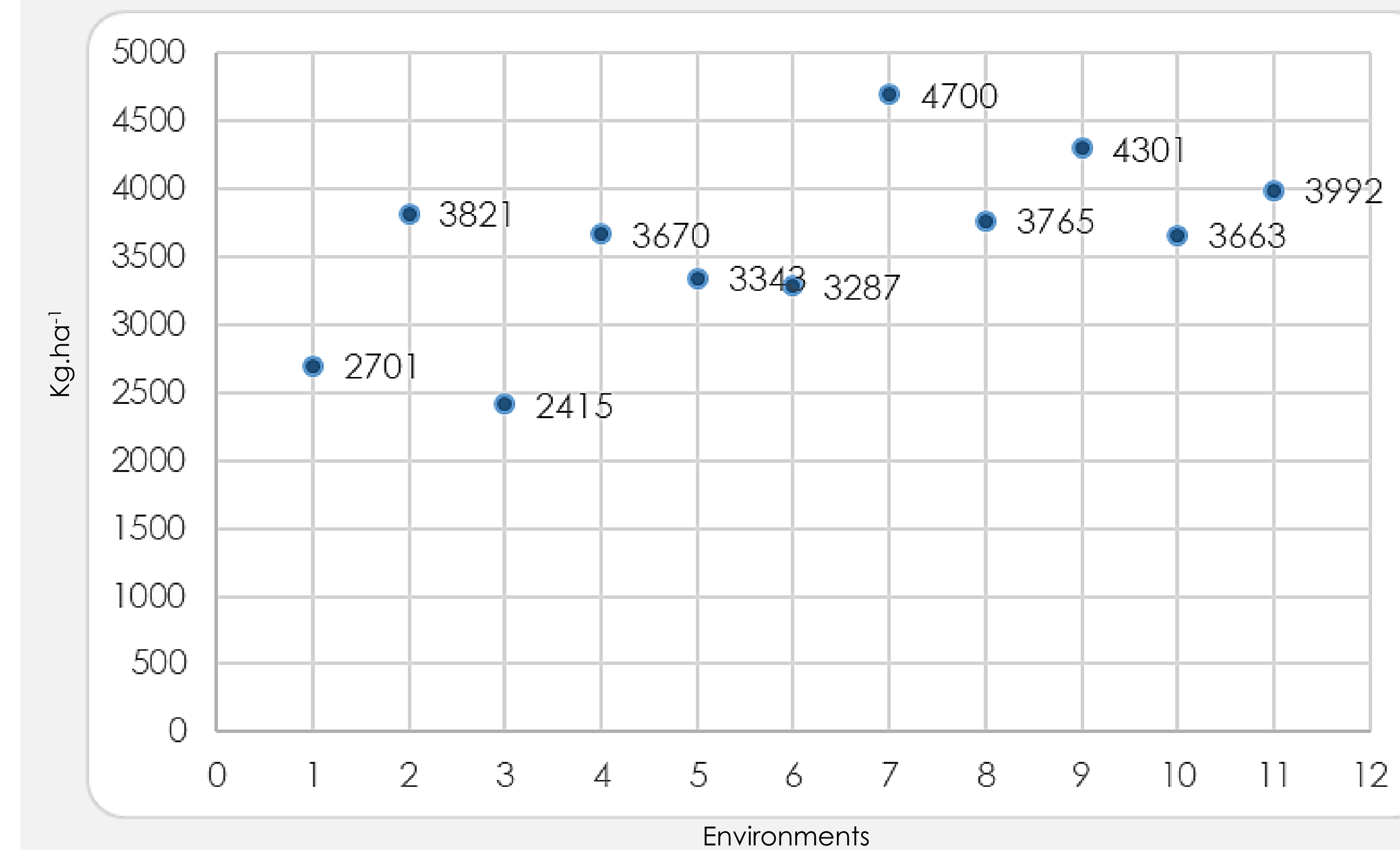
Table 2. Predicted average values (BLUP) for the Yield (kg.ha⁻¹), Nicotine (%), Sugar (%) and Quality Index Grade (%) traits referring to the evaluation of 14 FC-Virginia hybrids in 11 different environments in the southern region of Brazil.

Genotype	BLUP			
	Yield	Nicotine	Quality Index	Sugar
AOV 815	3909	3.14	79.58	19.82
67G	3906	2.99	79.37	20.23
81G	3846	3.24	79.05	20.04
28H	3774	3.68	75.53	19.77
19H	3744	3.46	80.11	19.48
09H	3703	3.34	79.52	20.08
AOV 413	3690	3.34	77.91	20.21
67 G	3677	3.45	79.40	19.86
70 G2	3675	3.31	79.80	19.27
37I	3646	3.98	76.71	19.73
05I	3611	3.17	77.75	19.56
46I	3600	3.48	79.67	19.61
94F	3524	3.25	78.64	20.48
AOV 405	3434	3.50	80.49	19.79
21H	3418	3.33	78.91	19.53
24H	3357	3.60	82.35	19.64
37J	3333	3.53	79.11	19.84
K 326	3051	3.73	79.25	19.73

Table 3. Broad-sense heritability- h^2 (%) and selective accuracy- rgg' (%) estimates for the traits Yield (kg.ha⁻¹), Nicotine (%), Sugar (%) and Quality Index Grade (%).

Trait	h^2	rgg'
Yield	30.1	54.8
Nicotine	31.3	55.9
Sugar	3.33	18.2
Quality Index	13.7	37.0

Figure 1. Average performance of 14 FC- Virginia tobacco hybrids in the 11 environments evaluated.



CONCLUSIONS

- The use of the statistical approach of Mixed Linear Models showed to be effective in the selection of superior genotypes;
- It was possible to identify genotypes adapted to certain regions of the study, as well as widely adapted;
- It was possible to identify the environments that provided better performance in terms of the Yield trait based on the productivity obtained;
- This statistical analysis methodology allowed a better estimate of the genotypic values, making the selection and decision-making process more efficient on the part of the breeders.