YIELD STABILITY OF NINE COTTON GENOTYPES

A. Palomo and S. Godoy
Campo Experimental de la Laguna
CIRNOC-INIFAP-SAGAR
Torreón, Coahuila, México

Abstract

The yield performance and yield stability of six cotton experimental lines and three cotton cultivars were evaluated on eight environments of the Comarca Lagunera, México. Eberhart and Russell stability parameters were used to measure the genotypes yield stability. The combined analysis of variance showed significant differences in the mean lint yield of the genotypes, but there were not significant genotype x environment interaction. According to the genotypes yielding potential and the stability indexes, the most desirable genotypes were the experimental lines, D. 2782-3 and D. 2784-1, and the cultivar Laguna 89.

Introduction

Many stability statistics have been proposed to analyze and to know the magnitude of the genotype x environment interaction, and to measure cultivar stability. By example, Finlay and Wilkinson (1963) suggested that the mean yield and the regression of yield on environments provide information for selecting cultivars with broad adaptability. Eberhart and Russell (1966) proposed a method in which the cultivars yields in the respective environments are regressed upon the environmental indexes that are obtained by subtracting the mean yield of all cultivars in all environments from the mean yield of each cultivar in each environment. They defined a stable cultivar as one with a regression coefficient (b) equal to 1.0 and with mean square deviations from regression (S^2d) equal to zero. In this study we used the later method to know the yield performance, stability, and adaptation of nine cotton genotypes.

Materials and Methods

The performance data of nine cotton genotypes on eight environments were analyzed in this study. The cotton genotypes were six experimental lines and three cultivars (Laguna 89, CIAN 95, and Deltapine 80. Environments comprised two locations of the Comarca Lagunera, México, and four years (1984-1987). Within a year and location a randomized complete block design with three replications was employed. The stability parameters proposed by Eberhart and Russell (1966) were used to know the genotypic stability.

Results and Discussion

The combined analysis of variance showed statistical differences in the lint mean yield of the genotypes but there were not significant genotype x environment interaction. Four experimental lines and the cultivar Laguna 89 showed the highest lint cotton yields and Deltapine 80, the lowest, Table 1. The absence of significant genotype x environment interaction means that the nine genotypes have a broad adaptability. In this conditions, the most desirable genotype will be selected in base to its yielding potential and the mean square deviations. Four of the nine genotypes showed mean square deviations significantly different from zero so they have an unstable and unpredictable performance. From the five highest yielding genotypes, we selected to D.2782-3, Laguna 89 and D.2784-1 as the most desirable according to the stability parameters.

Literature Cited

Eberhart, S.A. and W.A., Russell. 1966. Stability parameters for comparing varieties. Crop Sci. 6:36-40.

Finlay, K.W. and G.N., Wilkinson. 1963. The analysis of adaptation in a plant breeding programme. Aust. J. Agr. Res. 14:742-754.

Table 1. Mean lint yield and stability parameters of nine cotton genotypes on eight environments of the Comarca Lagunera. México.

Genotype	Lint yield (kg/ha)	Regression coefficient (b_i)	Regression deviation (S^2d_i)
D. 2782-3	1844	1.030	8306
Laguna 89	1784	0.970	17201
D. 2784-1	1749	1.072	-3489
NM-3	1699	0.914	18564*
NM-28	1685	1.131	8664
CIAN 95	1666	0.956	-3659
NM-6	1651	1.088	23518*
DP80-8	1634	0.832	25210*
Deltapine 80	1572	1.007	39162**

LSD 5% = 167 kg
* Significantly different from zero at P=0.05
** Significantly different from zero at P=0.01

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