ABSTRACT

This study aimed to investigate the genetic variability and the genetic control of nitrogen use efficiency in cotton. A set of parental cotton genotypes and their F_1 progenies under two forms of nitrogen fertilizers were used. All studied genotypes, N treatment and genotype x N. treatment (G X N) interaction showed highly significant differences for nitrogen uptake efficiency, nitrogen utilization efficiency, nitrogen use efficiency and nitrogen translocation to seeds. Nitrogen use efficiency among cotton genotypes ranged from 9.7% to 13.2% and 10.2% to 13.5% under ammonium sulphate and calcium nitrate fertilizers, respectively. The non-additive effects had a considerable role in controlling N use traits in cotton, as confirmed by high estimates of broad sense heritability. The constant parent regression method for estimating dominance relations suggested negative dominance with arithmetic gene action for most N use traits under both N supply forms.

The AMMI analysis showed that both genotypes and environments were significant for all studied yield characters, revealing that enough differences existed among genotypes and providing a sufficient range of environments and validating the environmental requirements.

The AMMI analysis showed that the first IPCA accounted for about 67% to 97%. The contribution of IPC1 for G x E sum of squares was greater for seed cotton yield and followed by number of

bolls per plant, however boll weight was the least (67.8%). Lint yield and lint percentage were approximately similar showing 70.6% and 72.4%, respectively.

The highest contribution for the second IPCA2 was for boll weight (32.1%) followed by lint yield (29.3%) and lint percentage (27%), while seed cotton yield was at least having 2.3%. These results indicated that most of G x E sum of squares could be attributed to the IPC1 for all studied yield characters. The first AMMI principal component scores and Eigen values were used as absolute values for stability.

CONTENT

LIST OF ABBREVIATIONS

AMMI	Additive Main effect and Multiplicative Interaction analysis
ANUE	Agronomic Nitrogen use efficiency
BW	Boll weight
CP	Constant parent
CPR	Constant parent regression
E	Environment
E1	Ammonium sulphate treatment
E2	Calcium nitrate treatment
E3	No nitrogen fertilizer treatment (control)
G	Genotypes
IPCA	Interactive principal component axes
L %	Lint percentage
LY / P	Lint yield per plant
N	Nitrogen
NB / P	Number of open bolls per plant
NPE	Nitrogen uptake efficiency
NRI	Nitrogen response index
NSI	Nitrogen sufficiency index
NTE	Nitrogen utilization efficiency

NTS	Nitrogen translocated to seeds
NUE	Nitrogen use efficiency
PCA	Principal component analysis
PNB	Partial nitrogen balance
SCY/ P	Seed cotton yield per plant