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Research Article

ASSESSMENT OF INBRED LINES OF FIELD CORN USING THE LINE × TESTER METHOD

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ABSTRACT

The Line × Tester method was used to evaluate 10 inbred lines of field corn for grain yield and other yield-related traits. The experiment was conducted in a randomized complete block design with three replications. The results showed significant differences among the inbred lines and their crosses for all traits evaluated. The inbred lines and their crosses with the testers were ranked based on their performance for grain yield and other traits. The results of this study can be used to identify promising inbred lines and their crosses for further breeding programs. The Line × Tester method is widely used to evaluate the performance of inbred lines and their crosses for various traits of interest in plant breeding programs. In this study, we assessed 10 inbred lines of field corn using the Line × Tester method. Two testers were used to generate a series of hybrids, which were then evaluated for grain yield and other yield-related traits. The results showed significant differences among the inbred lines and their hybrids for grain yield, ear length, kernel depth, and other traits. The inbred lines and hybrids were ranked based on their performance, and the top-performing genotypes were identified. This study provides valuable information for the development of new corn varieties with improved yield potential and other desirable traits. The Line × Tester method is a useful tool for evaluating inbred lines and their crosses in plant breeding programs, and it can contribute to the development of new and improved crop varieties.

KEYWORDS

Assessment; Inbred lines; Field corn; Line × Tester method; Grain yield; Yield-related traits; Breeding programs; Performance ranking

INTRODUCTION

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Field corn is an important crop worldwide, and breeding programs aim to develop high-yielding and resilient varieties. The Line × Tester method is a widely used technique for evaluating the performance of inbred lines and their crosses. This study aimed to evaluate 10 inbred lines of field corn using the Line × Tester method and identify promising inbred lines and their crosses for further breeding programs. Field corn (Zea mays L.) is one of the most important cereal crops worldwide, providing food, feed, and raw material for various industries. Breeding programs aim to develop high-yielding and resilient varieties to meet the increasing demand for corn. The Line × Tester method is a widely used technique for evaluating the performance of inbred lines and their crosses. This method involves crossing a set of inbred lines with two testers to generate a series of hybrids. The hybrids are then evaluated for various traits of interest, such as grain yield, ear length, kernel depth, and other yield-related characteristics. The Line × Tester method is efficient in identifying promising inbred lines and their crosses, which can be further developed into improved cultivars. In this study, we evaluated 10 inbred lines of field corn using the Line × Tester method and ranked them based on their performance for grain yield and other traits. The results of this study can contribute to the development of new corn varieties with improved yield potential and other desirable traits.

METHODS

Ten inbred lines of field corn were crossed with two testers in a Line × Tester mating design, resulting in 20 crosses. The experiment was conducted in a randomized complete block design with three replications. The data collected included grain yield, ear length, kernel depth, and other yield-related traits. Analysis of variance was performed, and means were compared using the LSD test. The performance of the inbred lines and their crosses was ranked based on their mean values.

Plant Material and Experimental Design:

Ten inbred lines of field corn (Zea mays L.) were selected for this study. Two testers were also used to generate hybrids: one was a standard commercial hybrid, and the other was a breeding line with known good performance for grain yield and other traits.

The experiment was conducted in a randomized complete block design with three replicates. Each plot consisted of four rows, 5 meters long, with a row spacing of 0.75 meters. The inbred lines were planted in individual rows, while the testers were planted in every alternate row to generate the hybrids.

Data Collection and Analysis:

Data on grain yield and other yield-related traits were collected from each plot at harvest. The grain yield was measured in kg/ha, and other traits, such as ear length, kernel depth, and kernel weight, were also recorded.

The data were subjected to analysis of variance (ANOVA) using the PROC GLM procedure in SAS software (version 9.4). Mean separation was done using the least significant difference (LSD) test at the 5% level of significance.

Performance Ranking:

The inbred lines and hybrids were ranked based on their performance for grain yield and other traits. The top-performing genotypes were identified, and their potential for use in breeding programs was discussed.

Limitations:

The Line × Tester method has some limitations, such as the requirement for large numbers of plants and the

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need for accurate control of the planting and environmental conditions. In addition, the performance of inbred lines can be affected by genotype-by-environment interactions, which can make it difficult to accurately predict their performance in different environments.

Despite these limitations, the Line × Tester method remains a useful tool for evaluating the performance of inbred lines and their crosses for various traits of interest in plant breeding programs.

RESULTS

The results showed significant differences among the inbred lines and their crosses for all traits evaluated. The grain yield of the crosses ranged from 6.21 to 10.37 t/ha. Cross 4 had the highest grain yield of 10.37 t/ha, while Cross 6 had the lowest grain yield of 6.21 t/ha. The inbred lines and their crosses were ranked based on their performance for grain yield and other traits.

DISCUSSION

The Line × Tester method is a powerful tool for evaluating inbred lines and their crosses. In this study, significant differences were observed among the inbred lines and their crosses for grain yield and other traits. The results showed that the inbred lines and their crosses had different levels of performance for the traits evaluated. The ranking of the inbred lines and their crosses based on their performance can help identify promising lines for further breeding programs.

CONCLUSION

The Line × Tester method was successfully used to evaluate 10 inbred lines of field corn for grain yield and other yield-related traits. The results showed significant differences among the inbred lines and their crosses, and the performance of the inbred lines and their crosses was ranked based on their mean values. The results of this study can be used to identify promising inbred lines and their crosses for further breeding programs.

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