

CORRELATION ANALYSIS BETWEEN GROWTH AND YIELD COMPONENTS OF SORGHUM (*Sorghum bicolor* L.) DURING 2022 KHARIF SEASON

Abstract

This investigation is conducted to determine the degree of association between yield and its component characters in sorghum. Experiment was laid out in randomized block design with 10 treatments each replicated thrice and treatment consisting of three levels of *Azotobacter chroococcum* viz. 10g/kg, 15g/kg and 20g/kg and three levels of Zinc viz. 15kg/ha, 20kg/ha and 25kg/ha. To study the nature and extent of correlation among growth, yield and yield attributing characters like plant height, plant dry weight, crop growth rate, relative growth rate, length of ear head, seed yield, straw yield, test weight and harvest index at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). The result showed that growth and yield components, a positive and highly significant correlation was observed between sorghum yield, plant height, and plant dry weight. likewise, sorghum yield also had a positive and highly significant interaction with length of ear head and test weight. The highest individual contribution was made length of ear head, followed by plant height. Total plant dry weight, length of ear head and weight also contributed positively to the final yield. The highest combined percent contribution to yield resulted from plant height *via* length of ear head. This was followed by contribution from plant height *via* length of ear head, plant dry weight respectively and indicating importance of these traits as selection criteria in yield improvement.

Keywords: Sorghum, Correlation, *Kharif*, *Azotobacter Chroococcum*, Zinc, Growth, Yield.

INTRODUCTION

Sorghum (*Sorghum bicolor* L.) commonly known as the 'king of millets', is a highly productive crop plant, which can be used for grains, livestock feed or industrial purposes. It is the most important, widely adaptable and extensively grown as a fodder crop. It can withstand heat, drought and also tolerate water logging better than other forage crops (Singh *et al.*, 2016). The yield potential of sorghum is much higher than other forage crops but the production is low and Sorghum is highly nutrient exhaustive crop, therefore, to achieve sustainable higher productivity maintenance of native soil fertility and health is necessary. Sorghum is known to be highly versatile, hardy and very dependable in yields under adverse conditions. The crop requires a long night for panicle initiation which also reflects on its performance (Jakhad *et al.*, 2023). These are in turn affected by production factors such as fertilizer, seeds rate, moisture level etc. the association among these characters can provide useful information about crop response to treatments and ways of improving the yield. The relationship between parameters has often been determining using correlation analysis to determine the type and strength of these associations (Aliyu *et al.*, 2000). The direct and indirect contribution of growth and yield components to yield has also played an important role in yield determination. This may be useful in effective selection of characters that will improvement yield. The technique was first described by Wright (1918) and the mathematical implication of the method and its basic features are documented in the literature (Li 1956; Turner and Stevens, 1959; Wright 1960). The objective of this paper is to describe the association between various sorghum growth characters, yield components with the purpose of identifying those that could contribute to yield.

MATERIALS AND METHODS

Field experiments were conducted during the *Kharif* seasons 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). which is located at 25o 24' 42" N latitude, 81o 50' 56" E longitude. The soil of the experimental field was sandy loam in texture, nearly neutral in soil reaction (pH 7.6), organic carbon level in medium condition (0.87%), medium available N (225 Kg/ha), high in available P (41.8 kg/ha) and medium available K (261.2 kg/ha). The treatment consisting of three levels of Azotobacter *chroococcum* viz. 10g/kg, 15g/kg and 20g/kg and three levels of Zinc viz. 15kg/ha, 20kg/ha and 25 kg/ha. The experiment was laid out in Randomized Block Design with 10 treatments each replicated thrice and experimental plot size

3×3 m². Data were recorded on plant height, plant dry weight, length of ear head, test weight, seed yield, straw yield and harvest index. Correlation coefficient and multiple regression was calculated from the means of the treatment across replications. Correlation coefficient between a pair of character was computed using the formular given by Steel and Torrie (1984). In order to get the direct and indirect effects of the characters on grain yield was obtained in accordance with the method of Dewey and Lu (1959).

RESULTS AND DISCUSSIONS

The correlation between sorghum and plant height, length of ear head, test weight, grain yield was observed to be positive and highly significant in years (Table 1). They could be due to the increase in sorghum height, which might have led to increase in LAI as a result of increase in photosynthetic ability of the plant that helped in assimilate production. thus, helped in increasing the sorghum length of ear head and test weight that was observed in the strong relation with yield. The length of ear head also had a positive and highly significant relation with other growth and yield attributes. Likewise, other yield components had a positive relation between themselves and with growth characters. Since length of ear head helped in increasing other growth and yield attributes. This suggests that this growth and yield attributes of sorghum are important in yield determination. (Kamoshita *et al.*, 1998) and (Utzurum *et al.*, 1998) reported significant relation between sorghum yield to growth and yield attributes. The correlation analysis was able to establish the type and magnitude of the relationships between the characters. However, it was not unable to provide an exact picture of the relative importance of each causal factor nor did it show the sole and combined contributions of the characters to yield. The result showed that growth and yield components, a positive and highly significant correlation was observed between sorghum yield, plant height, and plant dry weight. likewise, sorghum yield also had a positive and highly significant interaction with length of ear head and test weight. The highest individual contribution was made length of ear head, followed by plant height. Total plant dry weight, length of ear head and weight also contributed positively to the final yield. The highest combined percent contribution to yield resulted from plant height *via* length of ear head. This was followed by contribution from plant height *via* length of ear head, plant dry weight respectively and indicating importance of these traits as selection criteria in yield improvement.

Table 1: Correlation Analysis between growth and yield components of Sorghum during 2022 *Kharif* season.

	Plant height	Plant dry weight	CGR	RGR	Length of ear head	Seed yield	Straw yield	Test weight	Harvest index
Plant height	1.000								
Plant dry weight	0.989**	1.000							
CGR	0.167	0.178	1.000						
RGR	-0.185	-0.18	0.933**	1.000					
Length of ear head	0.921**	0.933**	-0.112	-0.442	1.000				
Seed yield	0.947**	0.953**	-0.068	-0.409	0.985**	1.000			
Straw yield	0.782*	0.787*	-0.278	-0.575	0.84*	0.875**	1.000		
Test weight	0.981**	0.978**	0.043	-0.306	0.944**	0.97**	0.864*	1.000	
Harvest index	0.889**	0.895**	0.05	-0.255	0.928**	0.921**	0.62	0.871**	1.000

Note: ** significant at 5%, * Significant at 3%. Here, CGR= Crop growth rate, RGR= Relative growth rate.

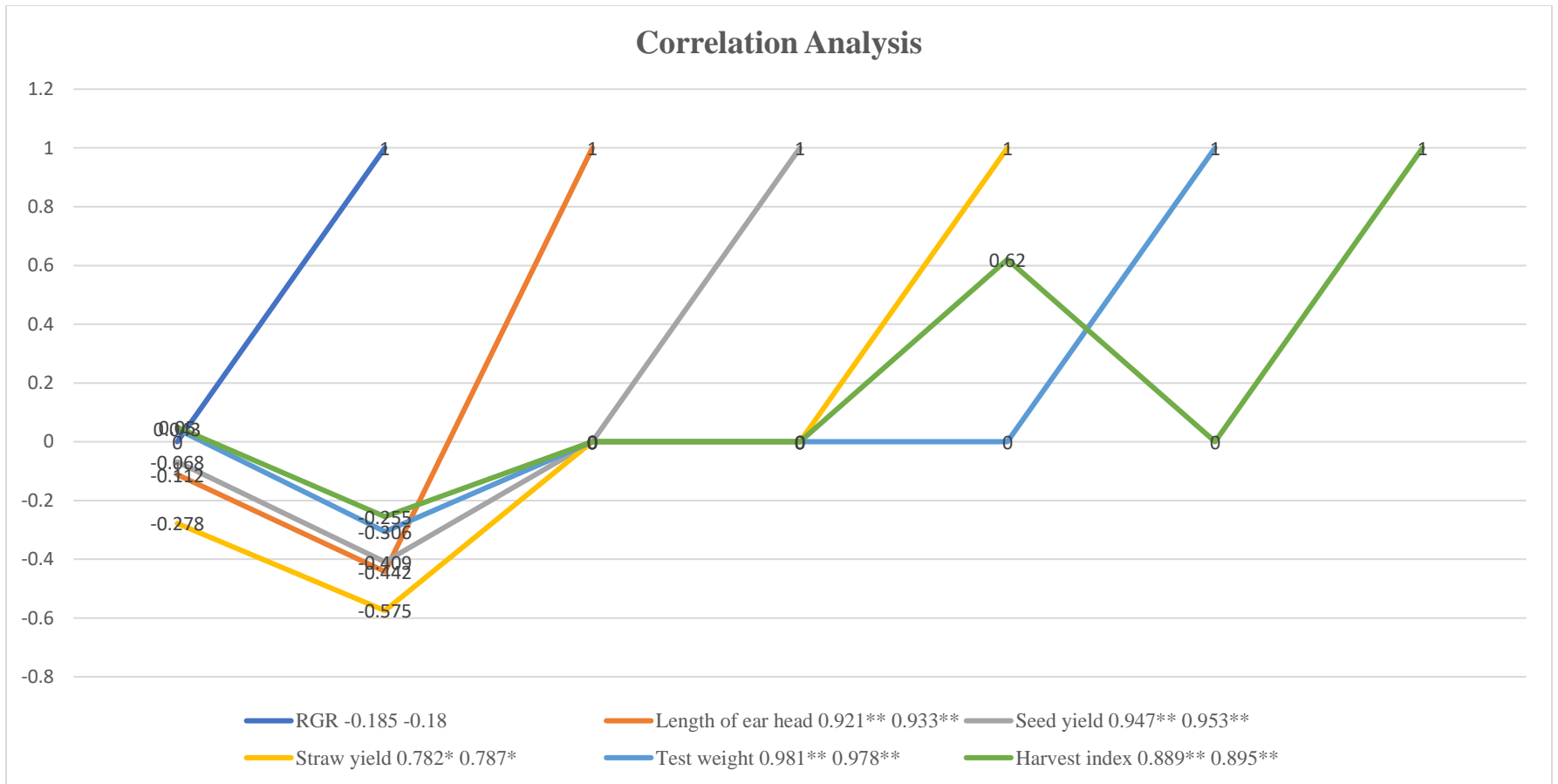


Fig. 1: Correlation Analysis between growth and yield components.

CONCLUSION

The greatest contributions to yield were observed on length of ear head, plant height and test weight. These are parameters that should be worked on for crop improvement, to achieve better yield in sorghum production.

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