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Research Article

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Correlation study of yield attributing traits in maize (*Zea mays* L.)

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ABSTRACT
Trial was led at College Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, India during *rabi* season of the years 2019-20 and 2020-21 to study the association of yield attributing traits in maize under INM treatments. Number of cobs per plant sowing highly significant positive correlation with the all-other traits under evaluation. Number of cobs per plant and Number of seeds per cob in the year 2019-20 showing positive significant genotypic correlation with the grain yield per plant whereas phenotypic correlation is non-significant. Evaluation of the maize with the same treatments for the two subsequent years and getting same result, suggesting efficacy of the experimental selection and validating the results. This study will provide early yield prediction by considering effect of INM treatments on yield attributes.
Keywords: Correlation, Maize, INM and Selection.

INTRODUCTION

Maize (*Zea mays* L.) is dominating as cereal crops in the global agricultural economy, together as a food for human and as a feed for farm animals. Because of its extreme yield potential (22 t/ha) and unique photosynthesis mechanism owing to the C_4 mechanism, it is known as a "Queen of cereals". As a miracle crop; it has an advanced level of industrial use because of its differentiated by products, yield potential and broad genetic base. It is being widely grown in tropics, sub-tropics and temperate regions under irrigated to semi-arid conditions across the world. Renowned Nobel Laureate, father of the green revolution Dr. N. E. Borlaug has declared maize as the crop of the prospect.

Maize is cultivated worldwide with most of soil types, climate and management practices that gives 36% (782 MT) global production. The USA is the chief producer of maize and supporting nearly about 35% of the total global production (Farmers Portal, 2022). Currently, nearly 1147.7 million tonnes of maize is being produced together by over 170 countries from an area of 193.7 million hectares with average productivity of 5.75 t/ha (World Maize Scenario, 2022).

After rice and wheat, maize has appeared as the third most vital cereal crop covering an area of 9.60 million ha with the production of 27.15 mt, having average productivity of about 2.8 t/ha. Major states cultivating maize are RJ, MH, GJ, UP, KA, MP, AP and J&K. In Gujarat, maize is grown in the districts of Panchamahal, Sabarkantha, Banaskantha and part of Vadodara and Kheda. *Rabi* maize is having an area of 13,2300 hectares with a production of 33,3600 million tonnes and productivity of 2521 kg/ha in Gujarat (Anon., 2021).

An evaluation of the correlation among different characters gives an idea of association that could be efficiently exploited to articulate selection strategies of appropriate INM treatment for improving yield attributes.

MATERIALS AND METHODS

Trial was led at College Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, India during *rabi* seasons of the years 2019-20 and 2020-21 to study the association of yield attributing traits in maize under INM treatments. The twelve integrated nutrient management treatments *viz.,* 100% RDF (T1), 100% RDF + NPK Consortium (Seed treatment) (T2), 100% RDF + NPK Consortium (Soil application) (T3), 75% RDF + 25% RDN through FYM (T4), 75% RDF + 25% RDN through Castor cake (T5), 75% RDF + 25% RDN through Vermicompost (T6), 75% RDF + 25% RDN through FYM + NPK Consortium (Seed treatment) (T7), 75% RDF + 25% RDN through Castor cake + NPK Consortium (Seed treatment) (T8), 75% RDF + 25% RDN through Vermicompost + NPK Consortium (Seed treatment) (T9), 75% RDF + 25% RDN through FYM + NPK Consortium (Soil application) (T10), 75% RDF + 25% RDN through Castor cake + NPK Consortium (Soil application) (T11) and 75% RDF + 25% RDN through

Vermicompost + NPK Consortium (Soil application) (T12) were applied in Randomized Block Design with three replications. Statistical analysis was performed using R software and variability package.

RESULTS AND DISCUSSION

Most of the soil parameters were positively correlated with grain yield (Kumar and Singh, 2021) as it regulates the healthy growth and potential yield of the plant. Correlation analysis revealed that phenotypic correlations were a little higher in amount than genotypic correlations indicating that expression was poor because of the effect of environment in both the years. All the yield attributing traits have positive significant correlation for grain yield. Indicating cumulative influence on the yield.

Number of cobs per plant in the 2019-20 showing positive significant genotypic correlation with the gain yield per plant whereas phenotypic correlation is non-significant (Table 1), indicating influence of environment on the interaction between yield and number of cobs, whereas in the year 2020-21 it's a highly significant correlation between number of cobs and yield per plant (Table 2). This variation in two years indicating influence of environment on expression of trait. Same pattern of relation was also observed between number of cob and number of seeds per cob in both years. Number of cobs per plant sowing highly significant positive correlation with the all-other traits under evaluation (Table 1 & 2). Similar result for Number of cobs per plant was also observed by Akshaya *et al.* (2022).

Cob length is important trait as it can directly correlate with the yield. In the study we observed positive significant correlation of cob length with the grain yield and all other attributing traits in both year 2019-20 and 2021-22 (Table 1 & 2). As the cob length increases number of seeds per cob will also increase and ultimately yield will increase as it is dependent trait. Similar result for Cob length was also observed by Jagadev *et al.* (2021) and Viveka *et al.* (2022).

Higher cob girth will accumulate a greater number of rows per cob that will ultimately increases number of seeds per cob and seed yield. Here in this study, we observed cob girth is showing positive highly significant correlation with the grain yield (Table 1 & 2). Cob girth is also showing positive significant correlation with number of cobs, cob length, number of seeds and seed index in both year 2019-20 and 2021-22. Similar result for cob girth was also observed by Jagadev *et al.* (2021), Krishna *et al.* (2021) and Viveka *et al.* (2022).

Number of seeds per cob is showing highly significant genotypic correlation with all the yield attributing traits under study whereas for phenotypic correlations it is showing non-significant correlation only for number of cobs per plant. Similar result for Number of seeds per cob was also observed by Jagadev *et al.* (2021), Krishna *et al.* (2021) and Viveka *et al.* (2022).

Seed index is the weight of 100 seeds which is also directly correlated with the yield. In our study we observe highly significant correlation with the all-attributing traits (Table 1 & 2). Similar result for Seed index was also observed by Jagadev *et al.* (2021), Krishna *et al.* (2021), Akshaya *et al.* (2022) and Viveka *et al.* (2022).

Table 1. Correlation of yields attributes in maize (Year 2019-20)

		Number of cobs/ plant	Cob length	Cob girth	Number of seeds per cob	Seed index	Grain Yield
NC	Rg	1 **	0.564 **	0.734 **	0.892 **	0.380 **	0.593 **
	Rp	1 **	0.524 **	0.470 **	0.280 NS	0.435 **	0.212 NS
CL	Rg		1 **	0.358 **	0.101 **	0.053 **	0.194 **
	Rp		1 **	0.674 **	0.856 **	0.805 **	0.646 **
CG	Rg			1 **	0.401 **	0.304 **	0.593 **
	Rp			1 **	0.621 **	0.604 **	0.402 *
NS	Rg				1 **	0.165 **	0.278 **
	Rp				1 **	0.821 **	0.627 **
SI	Rg					1 **	0.133 **
	Rp					1 **	0.756 **
GY	Rg						1 **
	Rp						1 **

Table 2. Correlation of yields attributes in maize (Year 2021-22)

		Number of cobs/plant	Cob length	Cob girth	Number of seeds per cob	Seed index	Grain Yield
NC	Rg	1 **	0.563 **	0.735 **	0.433 **	0.426 **	0.083 **
	Rp	1 **	0.451 **	0.333 *	0.435 **	0.350 *	0.339 *
CL	Rg		1 **	0.218 **	0.126 **	0.043 **	0.077 **
	Rp		1 **	0.778 **	0.770 **	0.838 **	0.565 **
CG	Rg			1 **	0.044 **	0.071 **	0.310 **
	Rp			1 **	0.780 **	0.842 **	0.523 **
NS	Rg				1 **	0.036 **	0.047 **
	Rp				1 **	0.894 **	0.659 **
SI	Rg					1 **	0.154 **
	Rp					1 **	0.709 **
GY	Rg						1 **
	Rp						1 **

CONCLUSION

Results of this experiment showing the considerable positive association of all the yield attributes of the maize towards the yield. Evaluation of the maize with the same treatments for the two succeeding years and receiving same result suggesting efficacy of the experiment and validating the result. As per the nutrient supplements in the soil cob number, girth, and seed index will change and affect final yield. This study will provide early yield forecast by considering effect of INM treatments on yield attributes and thereby selection of best INM for yield and its attributes.

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