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Character Association of Yield and other Traits in Little millet (*Panicum sumatrense* L.) Genotypes

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ABSTRACT

The present investigation was carried out to assess the nature and magnitude of genetic variability parameters of sixteen yield attributing traits in 35 little millet germplasm collection. Results of the correlation studies indicated that days to 50% flowering, flag leaf length, leaves per main tiller, tillers per plant, productive tillers per plant and test weight had significant positive association with grain yield per plant whereas, plant height, flag leaf width, panicle length, days to maturity and grain protein content exhibited non significant positive association with grain yield per plant. Grain iron content and grain copper content showed significant negative correlation and grain zinc and grain manganese contents exhibited non significant negative association with grain yield per plant. It can be inferred that the traits which show significant positive association can be considered as the important traits in any selection programme for selecting high yielding genotypes in little millet.

Keywords: *Character association, Grain yield and Little millet*

Little millet (*Panicumm sumatrense* L.) (2n = 4x = 36) is an autogamous and a member of the family *Poaceae*. Locally, it is known as samalu, kutki and mejhari. It is grown mostly in the tropics by tribal farmers and consumed by all age groups in several forms after cooking. It is indigenous to India with the luxuriant presence of its wild ancestor *Panicum psilopodium* throughout India (Selvi *et al.*, 2014). In India, little millet is cultivated in 2.91 lakh hectares with 1.02 lakh tonns of production and 349 kg/ha of productivity. The major little millet growing states are Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Odisha, Tamil Nadu, Karnataka, Jharkhand and Gujarat (Anuradha *et al.*, 2021).

A study on the nature and degree of association of yield contributing traits with grain yield has much importance for fixing up characters that play an important role in influencing the grain yield. The knowledge of interrelationship between yield and its components may be useful, if selection for simultaneous improvement in these characters is to be effective. Therefore, the present study was conducted to study the correlation coefficients among different little millet genotypes.

MATERIAL AND METHODS

The current experiment was laid out during *kharif*, 2021 at Agricultural College farm, Bapatla, Andhra Pradesh. The experimental material in the present investigation consists of 35 little millet genotypes and were evaluated in Randomized Complete Block Design. Each entry was represented by two rows of 3m length. The spacing of 22.5 cm x 10cm was followed. Observations were recorded for sixteen traits *viz.*, days to 50% flowering, plant height (cm), flag leaf length (cm), flag leaf width (cm), leaves per plant, panicle length (cm), tillers per plant, productive tillers per plant, days to maturity, test weight (g), grain iron content (mg/100g), grain zinc content (mg/100g), grain manganese content (mg/100g), grain copper content (mg/100g), grain protein content (%) and grain yield per plant (g). Among them, data for days to 50% flowering and days to maturity were recorded on plot basis and the remaining traits observations were recorded on five randomly chosen plants from each plot. For the estimation of grain iron, zinc, manganese and copper contents, grains were ground into flour. Grain iron content was estimated as per the procedure given by Tandon (1999); the

nitrogen content (%) in each sample was estimated by Micro kjeldahl method and protein content (%) of each sample was estimated as described by Sadasivam and Manickam (1996).

The correlation coefficients were worked out to determine the degree of association of a character with yield and also among the yield components by using covariance technique as per Falconer (1964).

RESULTS AND DISCUSSION

Correlations among grain yield per plant and yield component characters in little millet presented in table 1.

Days to 50% flowering had significant positive association with days to maturity (0.8483), flag leaf length (0.4598), flag leaf width (0.3981), plant height (0.3510), panicle length (0.3106) and grain yield per plant (0.2454). Similar positive association was reported by Suryanarayana and Sekhar (2018) in little millet for days to maturity; Pallavi *et al*. (2020) in foxtail millet for flag leaf length; Selvi *et al*. (2014) in little millet for flag leaf width and Madhavilatha *et al*. (2020) in little millet for plant height and grain yield per plant. This trait also showed non significant positive association with seed protein content (0.1015), productive tillers per plant (0.071), tillers per plant (0.0561), test weight (0.055), leaves per main tiller (0.0163), and copper content (0.0097). Similar results were reported by Reddy and Lakshmi (1991) in foxtail millet for seed protein content; Madhavilatha *et al*. (2020) in little millet for productive tillers per plant; Ashok *et al*. (2016) in little millet for tillers per plant; and Anuradha *et al*. (2020b) in little millet for leaves per main tiller and copper content.

Plant height recorded significant positive association with panicle length (0.6178), flag leaf length (0.4409), flag leaf width (0.4291) and days to maturity (0.3561). These findings were in agreement with results of Madhavilatha *et al*. (2020) in little millet for panicle length, flag leaf length and days to maturity and those of Pallavi *et al*. (2020) in foxtail millet for flag leaf width. However, the characters grain yield per plant (0.1186), grain copper content (0.0514), productive tillers per plant (0.0339) are in non significant positive association with this trait. Similar findings were earlier reported by Suryanarayana and Sekhar (2018) in little millet for grain yield per plant; Kumar *et al*. (2019) in foxtail millet for grain copper content and Anuradha *et al*. (2017) in little millet for productive tillers per plant.

The trait, flag leaf length showed significant positive association with panicle length (0.4533), days to maturity (0.4333), flag leaf width (0.4060) and grain yield per plant (0.3485). Similar results were reported by Madhavilatha *et al*. (2020) in little millet for flag leaf width and panicle length; Kumar *et al*. (2019) in fox tail millet for days to maturity and Sasamala *et al*. (2015) in littlemillet for grain yield per plant. This trait showed non significant positive association with tillers per plant (0.1236), productive tillers per plant (0.0811) and leaves per main tiller (0.0138). Similar results were found by Selvi *et al*. (2014) in little millet for tillers per plant; Vikram *et al*. (2020) for productive tillers per plant and Anuradha *et al*. (2020b) in little millet for leaves per main tiller. Flag leaf width exhibited significant positive association with panicle length (0.408) and days to maturity (0.3156). Similar findings were reported by Madhavilatha *et al*. (2020) in little millet for panicle length and Pallavi *et al*. (2020) in foxtail millet for days to maturity. The traits, productive tillers per plant (0.0411) and grain yield per plant (0.028) showed non significant positive association with this trait. These results are in accordance with the findings of Anuradha *et al*. (2020a) in browntop millet for productive tillers per plant and Madhavilatha *et al*. (2020) in little millet for grain yield per plant.

Leaves per main tiller found to be significantly and positively associated with grain protein content (0.2363), grain yield per plant (0.2358) and productive tillers per plant (0.2713). The traits, tiller per plant (0.1784) and test weight (0.0658) had non significant positive association with this trait. These results were in agreement with results of Dhanalakshmi *et al*. (2019) in barnyard millet for productive tillers per plant and test weight. Panicle length showed significant positive association with days to maturity (0.2503) which is in accordance with the findings of Pallavi *et al*. (2020) in foxtail millet. The traits, grain yield per plant (0.1487) and grain protein content (0.0003) showed non significant positive association with this trait. Similar findings were earlier reported by Vikram *et al*. (2020) in barnyard for grain yield per plant.

Tillers per plant showed significant positive association with productive tillers per plant (0.7515)

and grain yield per plant (0.2814). The traits test weight (0.0664), grain iron content (0.0422), grain manganese content (0.0347), days to maturity (0.0036) showed non significant positive association with this trait. These findings are in accordance with findings of Ashok *et al*. (2016) in little millet for days to maturity, Pallavi *et al*. (2020) in foxtail millet for test weight. Productive tillers per plant exhibited significant positive association with grain yield per plant (0.282). This trait also exhibited non significant positive association with test weight (0.1322), grain protein content (0.0173). These findings were in agreement with reports of Madhavilatha *et al*. (2020) in little millet for grain yield per plant; Kumar *et al*. (2019) in fox tail millet for test weight and Srilatha (2020) in foxtail millet for grain protein content.

In the present study, days to maturity had non significant positive association with grain yield per plant (0.1383), grain copper content (0.0552), test weight (0.0370), grain protein content (0.0216) and grain iron content (0.0181). The present findings are in consonance with the earlier findings of Kumar *et al*. (2019) in fox tail millet for grain copper content, grain protein content, grain iron content; Dhanalakshmi *et al*. (2019) in barnyard millet for test weight and Ashok *et al*. (2016) in little millet for grain yield per plant. Test weight had significant positive correlation with grain yield per plant (0.2178) and non significant positive correlation with grain copper content (0.0437). Similar associations were also observed by Sasamala *et al*. (2015) in little millet for grain yield per plant and Srilatha (2020) in foxtail millet for grain copper content.

Grain iron content exhibited significant positive association with grain manganese content (0.4179), grain zinc content (0.4008) and grain copper content (0.1947). However, the trait grain protein content showed non significant positive association with this trait. Similar findings were reported by Kumar *et al*. (2019) in fox tail millet for grain manganese content, grain copper content and Asungre *et al*. (2021) in pearl millet for grain zinc content. Grain zinc content showed non significant positive association with grain copper content (0.1398), grain manganese content (0.0645) and grain protein content (0.0336). Similar findings were reported by Kumar *et al*. (2019) in fox tail millet for grain protein content. Grain manganese content showed non significant positive association with grain copper content (0.1685). Grain copper content exhibited significant positive association with grain protein content (0.1784). Grain protein content exhibited non significant positive association with grain yield per plant (0.0299)and this result is in accordance with Ayesha *et al*. (2019) in fox tail millet.

A perusal of the results obtained from character association analysis revealed that days to 50 % flowering, flag leaf length, leaves per main tiller, tillers per plant, productive tillers per plant and test weight showed true relationship with grain yield per plant by establishing significant positive association and thus they could serve as important traits in any selection programme for selecting high yielding genotypes in little millet.

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Table 1: Phenotypic correlations among grain yield and other characters in little millet

	DFF	PH	FLL	FLW	LMT	PL	TP	PTP	DM	TW	Fe	Zn	Mn	Cu	Prt	GY/P
DFF	1.0000**	0.3510**	0.4598**	0.3981**	0.0163	0.3106**	0.0561	0.071	0.8483**	0.055	-0.01	-0.1961*	-0.0933	0.0097	0.1015	0.2454*
PH		1.0000**	0.4409**	0.4291**	-0.1332	0.6178**	-0.0045	0.0339	0.3561**	-0.0384	-0.2916**	-0.3056**	-0.1452	0.0514	-0.0715	0.1186
FLL			1.0000**	0.406**	0.0138	0.4533**	0.1236	0.0811	0.4333**	-0.0631	-0.2672**	-0.3609**	-0.1483	-0.2928**	-0.0713	0.3485**
FLW				1.0000**	-0.0239	0.408**	-0.1232	0.0411	0.3156**	-0.1792	-0.3012**	-0.2814**	-0.1398	-0.0551	-0.0148	0.028
LMT					1.0000**	-0.0229	0.1784	0.2713**	-0.1437	0.0658	-0.1109	-0.0016	-0.1138	-0.1282	0.2363*	0.2358*
PL						1.0000**	-0.0109	-0.051	0.2503*	-0.1595	-0.2543**	-0.2984**	-0.2038*	-0.1428	0.0003	0.1487
TP							1.0000**	0.7515**	0.0036	0.0664	0.0422	-0.0866	0.0347	-0.2931**	-0.0362	0.2814**
PTP								1.0000**	-0.0401	0.1322	-0.0696	-0.0593	-0.0667	-0.1791	0.0173	0.282**
DM									1.0000**	0.037	0.0181	-0.1235	-0.0334	0.0552	0.0216	0.1383
TW										1.0000**	-0.1411	-0.0407	-0.0147	0.0437	-0.057	0.2178*
Fe											1.0000**	0.4008**	0.4179**	0.1947*	0.1343	-0.2775**
Zn												1.0000**	0.0645	0.1398	0.0336	-0.1524
Mn													1.0000**	0.1685	-0.0844	-0.1842
Cu														1.0000**	0.1784	-0.2831**
Prt															1.0000**	0.0299
GY/P																1.0000**

* Significant at 5% level ** Significant at 1% level

DFF= Days to 50% flowering, PH= Plant height, FLL= Flag leaf length, FLW= Flag leaf width, LMT= Leaves per main tiller, PL= Panicle length, TP= Tillers per plant, PTP= Productive tillers per plant, DM= Days to maturity, TW= Test weight, Fe= Grain iron content, Zn= Grain zinc content, Mn= Grain manganese content, Cu= Grain copper content, Prt= Grain protein content, GYP= Grain yield per plant

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