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Phenotypic and Genotypic Correlation in Bambara Groundnut (*Vigna subterranea* (L.) Verdc in Mubi, Adamawa State, Nigeria

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Abstract: Phenotypic and genotypic correlation were studied in yield components and other agronomic characters in twelve accession of bambara groundnut in 2004 and 2005 wet seasons in Mubi (10°3[1]N and 13°7[1]E at altitude 400 meters above sea level), Adamawa state, Nigeria. Results of the phenotypic and genotypic correlation coefficient, indicates clearly the different pattern of association between the 14 agronomic characters measured in the two years cropping season. Yield related characters which demonstrated a very high significant positive genotypic correlation with seed yield per hectare are pod yield per plant and seed yield per plant. The study revealed that a significant genotypic and phenotypic correlation coefficient was recorded in the association between pod length and pod width, seed length and seed width across years could be a good index for selecting high yielding accessions, as plump pods will compensate for an increase in the total yield through a relatively greater weight of seeds. The significant negative genotypic correlation coefficient between seed length and pod numbers, seed width and pod numbers for the pooled years of evaluation might be due to competition in the distribution and accumulation of photosynthates among the reproductive characters evaluated. The genotypic correlation coefficient was high and significant between seed yield per hectare with pod yield per plant and seed yield per plant, indicating that these characters could be invariably be useful for bambara improvement programme.

Key words: Bambara accessions · Genotypic correlation · Phenotypic correlation · Reproductive characters and seed yield

INTRODUCTION

Bambara groundnut (*Vigna subterranea* (L.) Verde) belongs to the Fabaceae, subfamily Papilionoideae [1, 2]. It is the third most important grain legume after groundnut (*Arachis hypogea* L.) and cowpea (*Vigna unguiculata* [L]. Walp) in Sub-Sahara Africa [3]. The annual world production is 330,000t, 45 – 50% of which are produced in West Africa (Nigeria, Niger, Burkina Faso, Chad, Cote d'Ivoire, Ghana and Mali) [2]. Bambara groundnut is cultivated primarily for its subterranean pods [4]; rich in protein which helps to alleviate nutritional disorders in human and livestock [5]. Immature seeds of bambara groundnuts are often boiled with salt and eaten as a snack; vegetable milk and fermented products such as (Parkia biglobosa (Jacq.) can be made from the seeds. Bambara groundnut fixes atmospheric nitrogen through symbiosis with Rhizobium bacteria and therefore beneficial in crop rotations and intercropping [6, 7]. Constraints in production of bambara groundnut in Nigeria includes poor quality seeds, low germination and poor nodulation, instability in fodder and seed yield among others.

In a study of twenty seven genotypes of bambara groundnut under optimum agronomic conditions, correlation analysis indicated that the number of stem/plant and weight of hundred seeds were positively correlated with grain yield and these characters could be of importance during selection for yield [8]. In another study using germplasm collection of bambara groundnut Goli *et al.*, [9], reported that number of leaves and pods/plant, shell thickness and weight of hundred seeds correlated positively with grain yield. Genetic studies in bambara groundnut is limited in sub Sahara Africa, this trend is associated with little preference for this crop among researchers in sub Sahara Africa, often termed 'Orphan crop'. Little attempts have been made to improve this crop through conventional breeding and selection, because the crop is an important staple and economic among farmers. Therefore, adequate knowledge of

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association that exists between yield and yield related characters is essential for the identification of selection procedure, which is important for seed yield. Correlation studies between character have been observe to be of great value in determining the most effective procedures for selection of superior agronomic traits in crops [10-12]. In genetic studies, characters with high genotypic coefficient of variation indicate the potential for an effective selection. Therefore this study intends to validate the relationship between yield characters and yield.

MATERIALS AND METHODS

Twelve accessions of bambara groundnut (Table 1) used in this evaluation were sourced from farmers collection in the north eastern Nigeria, they had been maintained in the Department of Crop Science and are true-to-type. Five cultivars namely BG7001BS, BG7006BS, BG7007BS, BG7009BS and BG70012BS were source from farmers' collection in Gwoza, Borno State, Nigeria. While BG7002AS, BG7003AS, BG7004AS, BG7005AS, BG7008AS, BG7001OAS and BG7001 1AS were sourced from farmers' in Mubi/Hong, Adamawa State. Field evaluation was carried out at the Teaching and Research Farm, Adamawa State University, Nigeria (10°3'N and 13°7'E), in July 2004 and 2005 cropping season. This period coincide with the planting season for bambara groundnut in this location. Field experiment was laid out in a randomised complete block design with three replications, each plot was 10 m^2 and a total experimental area was 595m^2. The experimental site was ploughed and harrowed, two seeds of each cultivar were sown at 50cm between plants, a total of 64 plants were established per plot.

Weeding was done manually using hand hoe at 4 and 8 weeks after sowing. Fertilizer application of 60 kg super phosphate per hectare was applied shortly after planting as recommended by Hepper [13], benlate (Benomyl) was sprayed at the rate of 30g/20L of water, at 5^{th} and 6^{th} weeks after sowing. Data was collected on all the plants within the two middle rows and the characters measured includes: plant emergence and emergence percentage at 2 weeks after sowing. Plant height (cm) at 8 weeks after sowing was measured on ten randomly selected plants within the two middle rows. Prior to harvest, the number of plants was estimated. The number of pods per plant was the mean number of pods of ten randomly selected plants and pod yield per plant was taken as the mean number of harvested pods of ten randomly selected plants after drying. Seed yield per plant was estimated as the average weight (g) of seeds of the ten randomly selected plants on each plot after winnowing. While weight of hundred seeds was estimated by weighing 100 clean and uniform seeds picked randomly from the bulk of seeds harvested per plot.

$$\text{Shelling percentage was computed} = \frac{Weight\ of\ dry\ seed(g)}{Weight\ of\ dry\ pods(g)} \times 100$$

While pod length and width (cm) were measured using venier callipers from ten randomly selected pods of bambara plants per plot. In the same both length and width of seeds were determined. The seed yield (kg/ha) was determined on plot basis and this was computed for seed yield per hectare.

Table 1: Description of the accessions used in the study

Accession (Acc)	Local name	Area of collection	L.G.A.	General characteristics
Acc 1	Danngwaji	Gwoza	Gwoza	Creamy colour, dominated by black stripes, smooth shiny seed coat with white eye
Acc 2	Gurlela	Mubi	Mubi	Creamy colour, oval shaped with smooth shiny seed coat and white-eye, which is surrounded by sky-blue colour.
Acc 3	Idon Kule	Mubi	Mubi	A creamy colour having few spotted light brown colour, smooth shiny seed coat with white-eye, surrounded by patches of light brown/black colour.
Acc 4	Bambwus	Mubi	Mubi	Creamy colour, having brown stripes, smooth shiny seed coat, white eye surrounded by sky blue colour
Acc 5	Tanyanyi	Mubi	Mubi	Light brown having dotted black colours, oval shaped, smooth shiny seed with white eye.
Acc 6	Kara Magdanda	Gwoza	Gwoza	Brown colour seed with creamy patches mostly surrounding the eye, oval shaped with white eye
Acc 7	Indara Ayaghayagha	Gwoza	Gwoza	Completely black, oval shaped, smooth seed coat with white-eye.
Acc 8	KwadaZwalang	Hong	Hong	Completely white, round shaped, smooth shiny seed with white-eye.
Acc 9	Wacha Ghagha	Gwoza	Gwoza	Creamy colour, having black stripes, smooth shiny seed coat, with white-eye that is surrounded by blue/brownish colour.
Acc 10	Kurvu	Hong	Hong	Completely dark red, oval shaped shiny smooth seed coat with white-eye.
Acc 11	Wada hoba shen	Hong	Hong	Light brown shiny seed coat with white-eye.
Acc 12	Achaghwaghwa	Gwoza	Gwoza	Creamy colour, round shaped with white eye surrounded by dark brown colour having few brown stripes.

The mean for each trait over three replication and two years was computed for each accession and submitted for statistic using PROC MEANS using PROC GLM procedure of SAS [14]. Genotypic and Phenotypic correlation coefficients were computed as explained by SAS [15].

RESULTS

Phenotypic correlation coefficient of fourteen characters of Bambara groundnuts pooled across the two years (2004 and 2005) is presented in Table 2. A significant positive phenotypic correlation coefficient was recorded in the association between plant emergence at 2 weeks and emergence percentage at 2 weeks (r = 1.00**) height at 8 weeks (r = 0.45), pod numbers/plant (r = 0.38), pod yield/plant (r = 0.10), seed yield/plant (r = 0.07) and seed yield/ha (r = 0.49). But a highly significant positive phenotypic correlation coefficients was found in the association of plant emergence at 2 weeks and stand count prior to harvest(r = 0.94**). Conversely, a negative significant phenotypic correlation coefficient was observed between plant emergence at 2 weeks and hundred seed weight (r = -0.58**). Other seed yield components i.e. shelling percentage (r = -0.35), pod width (r = -0.23), pod length (r = -0.34), seed width (r = -0.52*) and seed length (r = -0.49) recorded a negative phenotypic correlation coefficient with plant emergence at 2 weeks. Plant height at 8 weeks had positive phenotypic correlation coefficient with stand count (r = 0.32), pod numbers/plant (r = 0.47), pod yield/plant (r = 0.08), seed yield/plant (r = 0.12), shelling percentage (r = 0.28) and seed yield/ha (r = 0.33). All these correlation coefficients were not statistically significant. In furtherance, the number of pods/plant showed a positive phenotypic correlation with height at 8 weeks (r =0.47), stand count (r = 0.36), pod yield/plant (r = 0.37), seed yield/plant (r = 0.40), shelling percentage (r = 0.28) and seed yield per plant (r = 0.40). But the weight of hundred seeds (r = -0.72**), pod width (r = -0.57*) pod length (r = -0.63**), seed width (r = -0.80**) and seed length (r = -0.69**) all recorded a negative phenotypic correlation with pod numbers. Pod yield/plant recorded a very high estimate of phenotypic correlation coefficient with seed yield/plant (r = 0.95**) and a moderate phenotypic correlation coefficient values with seed yield/ha (r = 0.59**). As shown on Table 12, the weight of hundred seeds showed a negative phenotypic correlation coefficient with seed yield characters i.e. plant emergence at 2 weeks (r = 0.58*), emergence percentage at 2 weeks (r = 0.56*), stand count (r = -0.57*), pod number (r = -072**). These estimates were high in magnitude and statistically significant ($P<0.05$). In both years of evaluation, the weight of hundred seeds recorded a positive phenotypic correlation coefficient with pod length (r = 0.80**), pod width (r = 0.62**) seed width (r=0.94**) and seed length (0.87**). These estimates are statistically significant ($P<0.01$). Also pod length had a statistically significant phenotypic correlation coefficient with seed length (r = 0.84**) and seed width (r = 0.72**).

The study indicated that seed width showed significant positive phenotypic correlation with hundred seed weight (r = 0.94**), pod width (r = 0.62**), pod length (r = 0.72**) and seed length (r = 0.84**). But a negative phenotypic correlation was observed in the association between seed width and pod number (r = -0.80**). The Table further indicated that seed length recorded a positive phenotypic correlation coefficient with hundred seed weight (r = 0.87**), pod width (r = 0.60**), pod length (r = 0.84**).

Table 2: Phenotypic (upper) and Genotypic (lower) correlation coefficient of yield, yield components and other agronomic characters of the twelve (12) Bambara groundnut (*Vigna subterranea*) accession evaluated in 2004 and 2005

	PE2wk	EP2wk	Ht8wk	SC	PN/plt	PY/plt	SY/plt	100wt	SP	PW	PL	SW	SL	SY/ha
PE2wk		1.00**	0.45	0.94**	0.38	0.10	0.07	-0.58*	-0.35	-0.23	-0.34	-0.52	-0.49	0.49
EP2wk	1.00**		0.43	0.93**	0.35	0.10	0.07	-0.56*	-0.37	-0.20	-0.31	-0.52	-0.48	0.48
Ht8wk	0.53*	0.51		0.32	0.47	0.08	0.12	-0.27	0.28	-0.30	-0.05	-0.41	-0.11	0.33
SC	0.96**	0.96**	0.37		0.36	0.15	0.10	-0.57*	-0.44	-0.20	-0.31	-0.49	-0.37	0.49
PN/plt	0.40	0.37	0.57*	0.39		0.37	0.40	-0.72**	0.28	-0.57*	-0.63**	-0.80**	-0.69**	0.23
PY/plt	0.10	0.10	0.06	0.17	0.38		0.95**	0.18	-0.27	0.40	0.32	0.07	0.13	0.59*
SY/plt	0.08	0.08	0.16	0.12	0.40	0.95**		0.18	-0.11	0.24	0.23	0.05	0.07	0.57*
100wt	-0.59**	-0.57*	-0.34	-0.59**	-0.73**	0.18	0.19		-0.07	0.62**	0.80**	0.94**	0.87**	0.09
SP	-0.41	-0.43	0.27	0.50	0.24	-0.32	-0.13	0.07		-0.56	-0.31	-0.17	0.15	-0.13
PW	-0.24	-0.21	-0.36	-0.21	-0.59**	0.41	0.25	0.62**	-0.59**		0.87**	0.62**	0.60**	0.27
PL	-.035	-0.32	-0.05	-0.32	-0.65**	0.38	0.24	0.80**	-0.32	0.87**		0.72**	0.84**	0.29
SW	-0.59*	-0.52	-0.46	-0.51	-0.86**	0.07	0.04	0.96**	-0.17	0.63*	0.74**		0.84**	0.20
SL	0.49	-0.048	-0.13	-0.37	-0.74**	0.13	0.06	0.89**	-0.15	0.61**	0.85**	0.86**		0.04
SY/ha	0.49	0.48	0.37	0.49	0.24	0.65**	0.61**	0.09	-0.16	0.28	0.29	0.20	0.06	

PE2WK = Plant emergence at 2WAS, EP2WK = Percentage emergence at 2WAS, Ht8WK = Height at 8WAS, SC = Stand Count Prior to harvest, PN/plant = Pod number per plant, PY/plant = Pod yield per plant, SY/plant = Seed yield per plant, 100wt = 100 seeds weight, SP = Shelling Percentage, PW = Pod width, PL = Pod length, SW = Seed width, SL = Seed Length, SY/ha = Seed yield/ha

Table 3: Phenotypic (upper) and Genotypic (lower) Correlation coefficients for fourteen characters of Bambara groundnut evaluated in 2004

	GC2wk	GP2wk	Ht8wk	SC	PN/plt	PYplt	SY/plt	100 seed	SP	PW	PL	SW	SL	SY/ha
GC2WK		0.999**	0.66**	0.82**	0.40	0.02	-0.06	-0.54	0.05	-0.29	-0.37	-0.54	-0.55	-0.59**
GP2WK	1.00**		0.66**	0.82**	0.39	0.03	-0.06	-0.54	0.04	-0.27	-0.35	-0.54	-0.53	0.59**
Ht8WK	0.91**	0.90**		0.43	0.42	-0.22	-0.30	-0.76**	0.29	-0.51	-0.47	-0.84**	-0.58**	0.08
SC	0.86**	0.86**	0.60**		0.27	0.01	-0.07	-0.52	-0.20	-0.26	-0.31	-0.48	-0.36	-0.57*
PN/Plt	0.50	0.49	0.49	0.34		0.48	0.47	-0.64**	0.36	-0.32	-0.50	-0.57*	-0.67**	0.30
PY/plt	0.07	0.08	-0.22	0.04	0.49		0.95**	0.26	-0.24	-0.41	0.31	0.31	0.18	0.31
SY/plt	0.01	-0.01	-0.41	-0.03	0.45	0.98**		0.29	-0.04	0.31	0.29	0.38	0.21	0.29
100 seed	0.62**	-0.61**	-0.81**	-0.58*	-0.65**	0.28	0.32		-0.32	0.60**	0.76**	0.96**	0.89**	0.17
SP	0.11	0.09	0.33	-0.20	0.35	-0.23	-0.07	-0.34		-0.54	-0.40	-0.30	-0.36	-0.04
PW	-0.32	-0.30	-0.61**	-0.27	0.34	0.42	0.32	0.60**	-0.57**		0.89**	0.57*	0.56*	0.30
PL	-0.42	-0.40	-0.55*	-0.34	-0.52	0.32	0.31	0.77**	-0.43	0.85**		0.68**	0.79**	0.36
SW	-0.62**	-0.60**	-0.04	0.49	-0.62**	0.30	0.37	0.98**	-0.33	-0.40	0.58*		0.82**	0.05
SL	-0.62**	-0.64**	-0.72**	-0.38	-0.70**	0.19	0.21	0.90**	-0.40	0.60**	0.85**	0.82**		-0.13
SY/ha	0.65**	0.64*	0.19	0.56*	0.38	0.38	0.36	0.17	-0.02	0.27	0.25	-0.11	-0.13	

Table 4: Phenotypic (upper) and Genotypic (lower) correlation coefficient for fourteen characters of Bambara groundnut evaluated in 2005

	GC2wk	GP2wk	Ht8wk	SC	PN/plt	PY/plt	SY/plt	Seed 100	SP	PW	PL	SW	SL	SY/ha
GC2WK		0.999**	-0.07	0.99**	0.31	0.20	0.20	-0.60**	-0.58**	-0.13	-0.28	-0.48	-0.42	0.26
GP2WK	1.00**		-0.09	0.99**	0.26	0.19	0.19	-0.56*	-0.59**	-0.09	-0.25	-0.46	-0.41	0.25
Ht8WK	-0.04	-0.06		0.01	0.25	0.37	0.42	0.27	0.33	0.07	0.37	0.11	0.46	0.58**
SC	1.00**	1.00**	0.04		0.32	0.26	0.27	-0.58**	-0.55	-0.09	-0.24	-0.48	-0.40	0.35
PN/plt	0.36	0.31	0.25	0.38		0.27	0.33	-0.71**	0.35	-0.67**	-0.67**	-0.74**	0.51	0.13
PY/plt	0.20	0.19	0.40	0.28	0.26		0.92**	0.11	-0.14	0.36	0.27	-0.11	0.10	0.78**
SY/plt	0.22	0.21	0.53*	0.30	0.32	1.04**		0.06	-0.10	0.15	0.13	-0.23	-0.05	0.80**
100 Seed	-0.66**	-0.64**	0.31	-0.64**	-0.74**	0.10	0.03		0.10	0.62**	0.81**	0.85**	0.79**	0.16
SP	-0.68**	-0.71**	0.42	-0.65**	0.39	-0.17	-0.09	0.09		-0.43	-0.18	-0.03	0.04	-0.11
PW	-0.13	-0.08	0.07	0.09	-0.69**	0.38	0.20	0.64**	-0.45		0.89**	0.57*	0.56*	0.30
PL	-0.29	-0.25	0.41	-0.25	-0.70**	0.26	0.12	0.83**	-0.18	0.90**		0.68**	0.79**	0.36
SW	-0.51	-0.49	0.08	-0.50	-0.79**	-0.11	-0.29	0.88**	-0.04	0.58*	0.70**		0.82**	0.05
SL	-0.49	-0.49	0.57*	-0.48	-0.57*	0.12	-0.05	0.85**	-0.40	0.61**	0.85**	0.87**		0.22
SY/ha	0.32	0.30	0.77**	0.44	0.11	0.87**	0.91**	0.18	-0.13	0.38	0.41	0.07	0.32	

PE2WK = Plant emergence at 2WAS, EP2WK = Percentage emergence at 2WAS, Ht8WK = Height at 8WAS, SC = Stand Count Prior to harvest, PN/plant = Pod number per plant, PY/plant = Pod yield per plant, SY/plant = Seed yield per plant, 100wt = 100 seeds weight, SP = Shelling Percentage, PW = Pod width, PL = Pod length, SW = Seed width, SL = Seed Length, SY/ha = Seed yield/ha

Seed yield/ha recorded a statistically significant phenotypic correlation coefficient with pod yield ($r = 0.59^{**}$), seed yield/plant ($r = 0.57^{*}$) and this estimates were positive. Other characters such as plant emergence at 2 weeks (r = 0.49), emergence percentage at 2 weeks (r = 0.48), height at 8 weeks (r = 0.33), stand count (r = 0.49), pod number (r = 0.23), pod width (r = 0.27), pod length (r = 0.29), seed width (r = 0.20), 100 seed weight (r = 0.09) and seed length (r = 0.04) had a positive phenotypic correlation coefficient with seed yield per hectare.

For the genotypic correlation coefficient among the characters studied (Table 2), the plant emergence and emergence percentage both at 2weeks after sowing recorded a genotypic correlation coefficient of r = 1.00**. Subsequently the plant emergence and emergence percentage recorded a positive and significant genotypic correlation with stand count prior to harvest (r = 0.96**), but recorded a negative, significant genotypic correlation coefficient of -0.59** and -0.57* for 100 seed weight. Similarly, 100 seed weight recorded a negative, significant genotypic correlation with stand count of -0.59**. Plant height at 8 weeks had a positive and statistically significant genotypic correlation coefficient with pod numbers/plant (r = 0.57*). Pod yield/plant recorded a positive correlation coefficient with seed yield/plant (r = 0.95**) and seed yield/ha (r= 0.65**). Furthermore, the genotypic correlation coefficient between 100 seeds and pod width (r = 0.62**), pod length (r = 0.80**), seed width (r = 0.96**) and seed length (r = 0.89**) were significant, positive and high in magnitude. A negative genotypic correlation coefficient was recorded between shelling percentage and pod width (r=-0.59**). Also the genotypic correlation coefficient between pod width and pod length (r = 0.87**), seed width (r = 0.63**) and seed length (r = 0.61**) were positive and statistically significant. Pod length recorded a positive genotypic correlation coefficient with seed width (r = 0.74**) and seed length (r = 0.85**). Similarly, a positive genotypic correlation coefficient was recorded in the association between seed width and seed length (r = 0.86**). The genotypic correlation coefficient was high and significant between seed yield/ha with pod yield/plant (0.65**) and seed yield/plant (0.61**), but all the other characters recorded a positive non significant genotypic correlation coefficient with seed yield/ha with the exception of shelling percentage.

The phenotypic and genotypic correlation coefficient for the individual years for these trials is shown in appendix 1 and 2.

DISCUSSION

Correlation coefficient is important in plant breeding in that it measures the degree of association, genetic or non genetic between two or more characters. Adebisi *et al.* [12] reported that crop improvement depends upon the magnitude of genetic variability present in the base population and once genetic variability has been ascertained in a crop, improvement is possible by using an appropriate selection method. This involves the knowledge of correlation between traits and yield [16-18]. Correlation studies between traits have been of great value in the determination of the most effective procedures for selection of superior genotype [12]. The results of phenotypic and genotypic correlation coefficient (Table 2) indicate clearly the different patterns of association between the characters measured in the two years cropping season. In this study, it was observed that estimates of genotypic correlations were in most cases higher than their corresponding phenotypic correlations. This is in agreement with the findings of Johnson *et al.* [10], Paroda and Joshi [19], Kamboj and Mani, [11]. It also showed more significant genotypic association between the different pairs of character than the phenotypic correlation, indicating that the characters are more related genotypically than phenotypically. The seed yield per hectare genotypically correlated with plant emergence at 2weeks, emergence percentage at 2 weeks, height at 8 weeks, stand count, pod yield per plant, seed yield per plant, pod width, pod length, seed width and length when data was pooled across years, indicating that pod yield may be improved through selection of any of these characters. Yield related parameters demonstrating very high significant positive genotypic correlation with seed yield per hectare (Table 2) are pod yield per plant (r = 0.65**) and seed yield per plant (r = 0.61**). This agrees with the findings of Kadams and Sajo [20] in Bambara groundnut and Ariyo *et al.* [21] in okra (*Abelmoschus esculentus* [L.] Moench). Also 100 seeds weight recorded a highly significant positive genotypic correlation coefficient with pod width, pod length, seed width and length. Similarly, seed width and seed length recorded a significant genotypic correlation with pod width and pod length in the pooled effects for 2004 and 2005. Pod yield/plant recorded a significant phenotypic correlation coefficient with seed yield per plant for the pooled year's effect and therefore, its desirability as an important component for seed yield was evidence in this study.

The study indicated that most characters which are phenotypically correlated also were genotypically correlated in the pooled effects across the years of evaluation. Hence there is possibility that they will produce repeated estimates of inter-character association. Therefore any selection for genetic improvement for seed yield based on this relationship will produce reliable and enduring effects in Bambara groundnut. A significant negative genotypic correlation coefficient between seed length and pod number, seed width and pod number for the pooled years of evaluation might be due to competition in the distribution and accumulation of photosynthate among the reproductive characters evaluated (Adeniji and Aremu 2007). The study revealed that a significant genotypic and phenotypic correlation coefficient recorded in the association between pod length and pod width, seed length and seed width observed across years could be a good index for selecting high yielding accessions, as plump pods will compensate for an increase in the total yield through a relatively greater weight of seeds. Although a non significant phenotypic and genotypic correlation coefficient was recorded for pod length, pod width, seed length, seed width and seed yield/ha across years of evaluation, indicated that much success may not be expected in selecting for a high seed yield, since these characters do not record significant correlation coefficient with seed yield.

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