Table 3. LER of inter cropping system of pearl millet and pigeonpea with and without coir dust

| Treatment PM + PP ratio | LER 1986 | 1987 | 1988 | Mean |
|---|---|---|---|---|
| Without coir dust | | | | |
| PM Pure | - | - | - | - |
| PP Pure | - | - | - | - |
| 1:1 | 1.71 | 1.78 | 1.48 | 1.66 |
| 1:2 | 1.42 | 1.87 | 1.41 | 1.57 |
| 2:1 | 1.42 | 1.59 | 1.38 | 1.46 |
| 1:3 | 0.99 | 1.79 | 1.42 | 1.40 |
| 3:1 | 1.49 | 1.60 | 1.36 | 1.48 |
| With coir dust | | | | |
| PM Pure | - | - | - | - |
| PP Pure | - | - | - | - |
| 1:1 | 1.24 | 1.25 | 1.73 | 1.41 |
| 1:2 | 1.01 | 1.69 | 1.52 | 1.41 |
| 2:1 | 1.07 | 1.24 | 1.41 | 1.24 |
| 1:3 | 1.06 | 1.35 | 1.37 | 1.26 |
| 3:1 | 1.05 | 1.36 | 1.19 | 1.20 |

PM : Pearl millet; PP : Pigeonpea

Table 4. Net return from pearl millet and pigeonpea in pure and intercropping system with and without coir dust

| Treatment PM + PP ratio | Net return Rs. $ha^{-1}$ 1986 | 1987 | 1988 | Mean |
|---|---|---|---|---|
| Without coir dust | | | | |
| PM Pure | 770 | -129 | -37 | 201 |
| PP Pure | 2000 | 4585 | 3587 | 3391 |
| 1:1 | 1948 | 3385 | 1876 | 2403 |
| 1:2 | 1472 | 4237 | 2078 | 2596 |
| 2:1 | 1478 | 2457 | 1342 | 1759 |
| 1:3 | 1186 | 4769 | 2447 | 2801 |
| 3:1 | 1353 | 2187 | 750 | 1430 |
| With coir dust | | | | |
| PM Pure | 1450 | 354 | -76 | 576 |
| PP Pure | 2167 | 3869 | 2645 | 2894 |
| 1:1 | 2207 | 2194 | 2785 | 2395 |
| 1:2 | 1680 | 4849 | 2510 | 3013 |
| 2:1 | 1388 | 2121 | 1287 | 1665 |
| 1:3 | 1767 | 3488 | 2120 | 2458 |
| 3:1 | 1772 | 2723 | 511 | 1635 |

PM : Pearl millet; PP : Pigeonpea

pigeonpea in the ratio of 1:2 with or without coir pith may be recommended under rainfed condition.

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(Received: November 1994 ,Revised: February 1995)

Madras Agric. J., 82(11): 573-576 November 1995
https://doi.org/10.29321/MAJ.10.A01266

# VARIABILITY AND CHARACTER ASSOCIATION OF METRIC TRAITS IN YELLOW GRAINED SORGHUM

MOHAMED ALIKHAN, M. SURESH and SUNDAR DANIEL PAULAS

School of Genetics
Tamil Nadu Agricultural University
Coimbatore 641 003

## ABSTRACT

Variability and character association were studied for ten characters in 18 yellow grained genotypes of sorghum. The study indicated that selection programme keeping plant height at a desirable level and making selection for number of leaves and leaf breadth is ideal for improving both grain and straw yields in the yellow grained sorghum.

KEY WORDS : Yellow Grained Sorghum, Grain and Fodder Yield, Heritability, Correlation, Path Analysis

Yellow grained types of sorghum of *Periya Manjal Cholam (Sorghum bicolor* L. Moench) are tall growing, photosensitive and inherently low grain yielders. But, these are extensively grown in certain pockets of Tamil Nadu, chiefly for their high fodder yield and drought resistant nature. The crop improvement programme would aim at improving the grain yield without any considerable

**Table 1. Mean, range, GCV, PCV, heritability and genetic advance for ten characters in yellow grained genotypes of sorghum**

| Character | Mean | Range | GCV | PCV | Heritability | Genetic advance as % of mean |
|---|---|---|---|---|---|---|
| Plant height (cm) | 249.1 | 120.5 - 342.5 | 21.8 | 23.4 | 86.1 | 44.4 |
| Stem thickness (cm) | 4.8 | 3.8 - 7.3 | 11.9 | 18.3 | 43.0 | 16.2 |
| Number of leaves | 8.6 | 6.5 - 10.4 | 12.2 | 13.4 | 82.7 | 22.8 |
| Leaf length (cm) | 68.9 | 56.0 - 78.0 | 7.4 | 10.5 | 51.4 | 11.1 |
| Leaf breadth (cm) | 6.7 | 4.2 - 9.0 | 13.8 | 17.8 | 60.0 | 22.1 |
| Earhead length (cm) | 18.1 | 10.1 - 26.5 | 24.8 | 25.6 | 93.8 | 49.4 |
| Earhead breadth (cm) | 9.3 | 7.3 - 11.4 | 16.3 | 20.4 | 64.1 | 26.9 |
| Earhead weight (cm) | 15.0 | 5.0 - 34.0 | 40.3 | 43.3 | 86.4 | 77.2 |
| Straw yield (g) | 129.0 | 36.0 - 289.5 | 46.4 | 51.0 | 82.7 | 86.9 |
| Grain yield (g) | 5.1 | 2.4 - 11.0 | 36.2 | 41.4 | 76.5 | 65.3 |

GCV : Genotypic coefficient of variation; PCV : Phenotypic coeffcient of variation.

loss in the existing fodder yield potential. The results of the study undertaken on variability and character association in the yellow grained types of sorghum are presented in this paper.

## MATERIALS AND METHODS

The study comprised of 15 yellow grained genotypes collected from germplasm accessions maintained at the Tamil Nadu Agricultural University, Coimbatore and three local land races grown in and around Coimbatore District. These accessions were raised in randomised block design with two replications during *kharif* 1991 at the Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar. At maturity, observations were recorded on five competitive plants in each replication on ten characters *viz.*, plant height, stem thickness, number of leaves, leaf length, leaf breadth, ear head length, earhead breadth, earhead weight, grain yield and straw yield. The mean data were subjected to compute genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability in broad sense (Burton, 1952) and genetic advance (Johnson *et al.*, 1955). Path analysis was carried out to partition the genotypic correlation into direct into direct and indirect effects (Dewey and Lu, 1959).

## RESULTS AND DISCUSSION

Significant differences were observed for all the characters studied. The mean, GCV, PCV, heritability and genetic advance are given in Table 1. The GVC was higher for straw yield, grain

**Table 2. Genotypic correlation coefficients for ten character is yellow grained types of sorghum**

| Character | Plant height | Stem thickness | Number of leaves | Leaf length | Leaf breadth | Earhead length | Earhead breadth | Earhead weight | Straw yield | Grain yield |
|---|---|---|---|---|---|---|---|---|---|---|
| Plant height | 1.000 | 0.174 | 0.692** | 0.821** | 0.051 | 0.591** | 0.110 | -0.178 | 0.634** | -0.130 |
| Stem thickness | | 1.000 | 0.783** | 0.540* | 0.747** | 0.158 | 0.927** | 0.941** | 0.456 | 0.807** |
| Number of leaves | | | 1.000 | 0.855** | 0.589* | 0.362 | 0.294 | 0.519* | 0.828** | 0.498* |
| Leaf length | | | | 1.000 | 0.490* | 0.366 | 0.447 | 0.346 | 0.839** | 0.455 |
| Leaf breadth | | | | | 1.000 | -0.141 | 0.616** | 0.929** | 0.513* | 0.883** |
| Earhead length | | | | | | 1.000 | 0.215 | -0.263 | 0.429 | -0.253 |
| Earhead breadth | | | | | | | 1.000 | 0.717** | 0.317 | 0.678** |
| Earhead weight | | | | | | | | 1.000 | 0.400 | 0.999** |
| Straw yield | | | | | | | | | 1.000 | 0.408 |
| Grain yield | | | | | | | | | | 1.000 |

*, ** : Significant at P = 0.05 and P = 0.01 respectively.

**Table 3. Path coefficient analysis showing direct and indirect effects of nine characters on grain yield in yellow grained genotypes of sorghum**

| Character | Plant height | Stem thickness | Number of leaves | Leaf length | Leaf breadth | Earhead length | Earhead breadth | Earhead weight | Straw yield | Correlation Grain yield |
|---|---|---|---|---|---|---|---|---|---|---|
| Plant height | -1.779 | 0.041 | 0.274 | 1.391 | 0.022 | 0.029 | 0.002 | 0.105 | -0.218 | -0.139 |
| Stem thickness | -0.309 | 0.239 | 0.310 | 0.915 | 0.335 | 0.007 | 0.020 | -0.544 | -0.157 | 0.807 |
| Number of leaves | -1.231 | 0.187 | 0.396 | 1.448 | 0.264 | 0.017 | 0.006 | -0.305 | -0.285 | 0.498 |
| Leaf length | -1.461 | 0.129 | 0.338 | 1.693 | 0.220 | 0.017 | 0.009 | -0.203 | -0.289 | 0.455 |
| Leaf breadth | -0.091 | 0.178 | 0.233 | 0.830 | 0.499 | -0.006 | 0.014 | -0.547 | -0.177 | 0.883 |
| Earhead length | -1.052 | 0.037 | 0.143 | 0.619 | -0.063 | 0.048 | 0.005 | 0.155 | -0.148 | -0.253 |
| Earhead breadth | -0.196 | 0.222 | 0.116 | 0.757 | 0.276 | 0.010 | 0.022 | -0.422 | -0.109 | 0.677 |
| Earhead weight | 0.318 | 0.225 | 0.205 | 0.586 | 0.416 | -0.013 | 0.015 | -0.588 | -0.138 | 0.999 |
| Straw yield | -1.128 | 0.109 | 0.328 | 1.421 | 0.230 | 0.021 | 0.007 | -0.235 | -0.345 | 0.407 |

Direct effects : Underlined; Residual effect : 0.652.

yield, earhead weight, earhead length and plant height while it was low for other characters. The high GCV is also reflected in the values of range observed for these characters.

The heritability estimates for plant height, number of leaves, earhead length, earhead weight, grain yield and straw yield were high ranging from 77 to 94 per cent indicating that these characters are less influenced by environment. As heritability in broad sense includes both additive and epistatic gene effects, it will be reliable only if accompanied by high genetic advance (Lerner, 1958; Ramanujam and Thirumalachari, 1967). In the present investigation, the characters, earhead weight, grain yield and straw yield which showed high heritability also exhibited high genetic advance as per cent of mean pointing out that these characters are controlled by additive gene effects. The other highly heritable characters *viz.*, plant height, number of leaves and earhead length, however, showed moderate genetic advance indicating the predominant influence of non-additive gene effects for their expression. The estimates of heritability and genetic advance were moderate for both leaf breadth and earhead breadth. Stem thickness and leaf length showed low heritability estimates and genetic advance indicating that these characters are highly influenced by environment.

The genotypic correlation coefficients and path analysis of genotypic correlation are presented in Tables 2 and 3. Grain yield was significantly and positively correlated with the plant characters such as stem thickness, number of leaves, leaf breadth, earhead breadth and earhead weight. The significant positive association of stem thickness with grain yield was predominately due to its indirect contribution through leaf length, leaf breadth and number of leaves, although its direct contribution is moderate. Number of leaves and leaf breath showed moderate direct effects, but much of their correlation with grain yield was due to their indirect effects through leaf length Stem thickness, number of leaves, leaf length and leaf breadth were significantly and positively associated among themselves.

Straw yield was significantly and positively correlated with plant height, number of leaves, leaf length and leaf breadth. Plant height was correlated with number of leaves and leaf length but not with stem thickness and leaf breadth. Since both straw and grain yields are important in yellow grained types of sorghum, the characters plant height, number of leaves, leaf breadth and leaf length may be relied upon for improvement of both grain and straw yields.

In the present study, though grain and straw yield showed high heritability and genetic advance, they did not correlate significantly with each other. Hence direct selection for grain yield would not result in simultaneous increase in straw yield.

Number of leaves and leaf breadth showed high heritability and genetic advance and also

exhibited significant association with grain and straw yields. Leaf length, though important due to the fact that the correlation of number of leaves and leaf breadth with grain yield were predominantly high due to their indirect effects through this character, can not be relied upon to a greater extent because of its low GCV, heritability and genetic gain. Therefore, a selection programme with due emphasis on number of leaves and leaf breadth, keeping the plant height constant at an optimum level is desired for developing superior genotypes with high grain yield coupled with high straw yield.

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(Received: November 1993 Revised: April 1995)

Madras Agric. J., 82(11): 576-578 November 1995

# CORRELATION AND PATH ANALYSIS IN RICE *(Oryza sativa)*

J.L. YOLANDA AND L.D. VIJENDRA DAS

Department of Agricultural Botany
Agricultural College and Research Institute
Tamil Nadu Agricultural University
Killikulam, Vallanad 627 252

## ABSTRACT

Three lines 12 testers and their 36 hybrids of rice were studied for correlation and path analysis for grain yield using ten characters. Grain yield was significantly and positively correlated with panicle length, spikelets per panicle, grains per panicle, 100 - grain weight and harvest index. Grains per panicle was the main component character affecting yield directly. High and positive indirect effects were contributed by panicle length and spikelets per panicle through grains per panicle.

KEY WORDS : Rice, Correlation, Path Analysis

Yield is a complex character being influenced by various component characters. A knowledge of the association of component traits with yield may greatly help in making selection precise and accurate. Path analysis is an important tool in determining the contribution of genotypic characters to yield and its components. The aim of this study was to estimate genotypic correlation coefficients and path-coefficients among different plant characters in rice.

## MATERIALS AND METHODS

Thirty six hybrids involving 12 male parents *viz.*, As 89044, As 90043, AD 90190, Kasturi, Pusabasmati, IR 50, ADT 39, IR 64, IR 72, TKM 9, ASD 16, CO 37 and 3 isogenic maintainer (B) lines *viz.*, V 20 B, IR 580025 B and IR 62829B of the CMS (A) lines of 'wild abortive' source were raised during *kharif* 1993 at the Agricultural College and Research Institute, Killikulam in a randomised block design with three replications. A spacing of 20 cm between rows and 15 cm between plants was adopted. Two rows of $F_1$s and one row of parents were raised in each replication with single seedling per hill. Observations were recorded on five random and competitive plants for days to flowering, plant height, panicles per plant, panicle length, spikelets per panicle, grains per panicle, spikelets fertility, 100- grain weight, grain yield per plant and harvest index. Mean values were utilised for statistical analysis. Genotypic correlations were computed among the characters. The path analysis was done as described by Dewey and Lu (1959).

## RESULTS AND DISCUSSION

The genotypic correlations are presented in Table 1. Panicle length, spikelets per panicle,