**Assessment of Genetic Variability, Correlation and Path Analysis among Rice (*Oryza sativa* L.)Landraces Genotypes for Grain Yield Characters under Irrigated Conditions**


**Abstract**

The current study's objective was to analyze the genetic variability components, correlations, and path analysis in 24 rice genotypes for 13 quantitative aspects, including Days to 50% Flowering, Days to Maturity, Flag Leaf Length (cm), Flag Leaf Width (cm), Plant Height (cm), Number of Total Tillers, Panicle Length (cm), Number of Spikelets per Panicle, Number of Panicles per Hill, Test Weight (g), Biological Yield per Hill (g), Harvest Index (percent), & Grain Yield per Hill (g) in Randomized Block Design with three replications in Kharif season of 2022 in experimentation field, Department of Department of Genetics andPlantBreeding,NainiAgriculturalInstitute,SamHigginbottomUniversityofAgriculture Technology and Sciences, Uttar Pradesh. Analysis of Variance revealed that high significant differences among the genotypes of all traits. GenotypesSHUATS DHAN-6,SHUATSDHAN-2, SHUATS DHAN-3 and MTU 1281 depicted highest Grain Yield per Plant. All the characters had expressed high estimates of heritability.Grain Yield per Hill had the highest Heritability followed byNumber of Spikelets per Panicle, Number of Total Tillers, Panicle Length, Plant Height and Flag Leaf Width. According to research on GCV and PCV, these qualities are highly variable and that the environment plays a part in how they manifest. The yield and yield-attributing characteristics were shown to be positively and significantly correlated at both the genotypic and phenotypic levels, with grain yield per plant per plant. In Phenotypic and Genotypic Path Analysis, a thorough examination of diagonal values revealed a favorable direct effect on Grain Yield.



Key Words: Genetic Variability, Path analysis, character association, Rice


## 1. INTRODUCTION

The most extensively consumed crop in the world, rice directly feeds more people than any other. It is the most significant food crop in the world both commercially and culturally, and its production is regarded as the most significant economic activity on the planet. The earliest crop to be grown in Asia is regarded as rice. In China, preserved rice grains were found to have been present around 3000 B.C. The world's oldest cereal is paddy, which was discovered in Hastinapur, India, during an excavation between 1000 and 750 B.C.

Rice is a crop that self-pollinates and has a short-day length. The crop needs a hot, humid climate with average temperatures between 2 and 370 C for the duration of its life cycle. In India, rice is predominantly a Kharif crop and is commonly grown in regions that receive a lot of rain each year. In areas with little rainfall, it is also grown using irrigation. In eastern and southern India, rice is a common ingredient in food.

According to **N.I. Vavilov**, India, is the main center of origin and diversity of rice. India has got wide variability in the rice germplasm collections for various qualitative and quantitative traits and sources of resistance to different biotic and abiotic stresses. In the long domestication process, through the selection process, agricultural groups have made significant contributions to the origin, evolution, and accumulation of the remarkable variability in several of our local varieties **(Pandravada et al. 2017).**

Riceisfarmedon162.50millionhectaresaroundtheworld,withanannualproduction of 495.49 million metric tonnes and an average yield of 4.55 metric tonnes perhectare.Riceisgrownon43.79millionhectaresinIndia,withanannualproductionof 112.91 million tonnes. Rice is grown in three major states: West Bengal, Punjab, and UttarPradesh. Rice accounts for around 45 percent of India's cereal production and is the primarysourceofnutritionformorethan60percentofthecountry'spopulation.Despitelong-standinghumanconcernsaboutpopulationandfoodsecurity,theworldpopulationisanticipated tocontinue to rise, reaching 9-11 billion people sometime between 2030 and2050.With the presentpopulation and agriculturalgrowth trends**, (Bisne*et al*., 2009).**

About 90% of the world's rice is cultivated and consumed in Asia (IRRI, 2013). "In Bangladesh, rice is mainly grown in three seasons namely Boro (post-monsoon) from December to April, Aus (pre-monsoon) from April to July and Aman (monsoon) from July to December"**(Deshapriya et al., 2014**).

As the inheritance of foremost trait yield is controlled by polygenes and highly influenced by component traits, direct selection for yield is always a paradox in crop improvement. Correlation is an index that measures the degree of association between two features that work simultaneously **(Hays et al. 1995).**

Hence, the knowledge on character association will be useful in the identification of the relative contribution of component traits for yield improvement. Phenotypic correlation gives only the simple relationship between two characters. As the expression of a character is a result of the interaction of genotype with the environment, estimation of genotypic and phenotypic association among traits will be valuable for breeding programs besides phenotypic variation **(Johnson et al. 1955**).

The inter-relationship among yield components and components associated with yield can be determined using path analysis **(Dewey and Lu, 1959)** to choose traits that contribute indirectly to yield. Keeping this in view, the present investigation was undertaken to study the variability, correlation, and path analysis in a set of rice landraces for various quantitative traits.

### 1.1 Objectives

1. To estimate genetic variability, heritability and genetic advance for yield and itsrelatedtraits in ricecultivars
2. To study the nature of character association among yield and yield per attributingtraits among ricegenotypes
3. To estimate direct and indirect effects of yield contributing traits of rice on GrainYield perPlant

## 2. MATERIALS AND METHODS

The current study was conducted during the Kharif of 2022 at the Field Experimentation Center of the Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj (Allahabad), U.P. About 5 km from Prayagraj city, the university is located on the left side of the Allahabad Rewa National Highway. The Department of Genetics and Plant Breeding at the Sam Higginbottom University of Agriculture, Technology, and Sciences in Prayagraj (Allahabad), Uttar Pradesh, supplied all types of facilities necessary for the development of a good crop, including land preparation inputs and irrigation facilities.

The 24 rice genotypes were grown in *Kharif*-2022 in Randomized Block Design with threereplications each under lowland conditions. In *Kharif*-2022 nursery sowing for all the genotypes ofrice was done on 21 June 2022 and transplanted in field after 26 days i.e., on 17 July 2022. Eachgenotype was planted in a row of 2 meter in length with 3 replications. A spacing of 20 cm betweenrowsand15cmbetweenplantsweregivenandthe crop was raised using the suggested set of procedures.To examine the impact of several attributes for heritability, correlation, and path analysis on Grain Yield per Hill through time, 24 genotypes were grown during Kharif 2022.

## Experimental Material

The experimental materials for this research were obtained from the **Uttar BangaKrishiVishwavidyalaya and Department of Genetics and Plant Breeding**, SHUATS in Prayagraj. The details of the experimental materials are mentioned below in table.

**Table 1.List of 24 different genotypes.**

| Sr. No | NameOfGenotypes | Sr. No | NameOfGenotypes |
|---|---|---|---|
| 1 | KAGEY | 13 | C.SEL-3 |
| 2 | JALDHY APA | 14 | PAHARI BOICHI |
| 3 | PLUE | 15 | CHAPKA CHAKLAO |
| 4 | BARCONSHAL | 16 | AGNISAL |
| 5 | B.D.O. NAGRA | 17 | BOICHI |
| 6 | DESHI MASURI | 18 | JHARA SEL |
| 7 | RANGOKOMAL | 19 | SHUATS DHAN 2 |
| 8 | MTU 1281 | 20 | SHUATS DHAN 3 |
| 9 | SUNGABORU | 21 | SHUATS DHAN 4 |
| 10 | SITAL KUCHI-6 | 22 | SHUATS DHAN 6 |
| 11 | KAKRI | 23 | SHUATS DHAN 7 |
| 12 | BINNI | 24 | NDR-359 (CHECK) |

**2.1 Statisticalanalysis**

**1.** Analysisofvariance(**Fisher,1935**)

**2.** Coefficientofvariation**(BurtonandDevane,1952)**

**a.** Genotypiccoefficientofvariation**(GCV)**

**b.** Phenotypiccoefficientofvariation**(PCV)**

**3.** Heritabilitybroadsense**(BurtonandDevane,1953)**

**4.** Geneticadvance **(Johnson *et al.*,1955)**

**5.** Correlationcoefficientanalysis **(AlJibouri*etal.*,1958)**

**6.** Pathcoefficientanalysis**(DeweyandLu,1959)**

## 3.RESULTS

### 3.1 Analysis of Variance

The results of the analysis of variance showed a substantial difference between all of the genotypes for each characteristic. This suggests that there was sufficient room in the current gene pool to choose promising lines for yield and its component qualities. The presence of a significant level of variability may result from the use of several sources of data as well as environmental factors that alter the phenotypes.

The rice genotypes SHUATS DHAN-6 (62.13gm), SHUATSDHAN-2(51.47gm), SHUATS DHAN-3(45.33gm) and MTU 1281(42.33gm) were determined to have the maximum Grain Yield per Plant based on mean performance. In the current study, the PCV was more than the comparable GCV for all of the features, demonstrating that the GCV (percent) values ranged from lowest for Days to Maturity (5.44) to greatest for Grain Yield per Hill (51.36). Similar to this pattern, PCV (percent) ranged from the lowest value of Days to Maturity (6.28) to the highest value of Grain Yield per Hill (52). Similar results were seen in (**Anwar etal. 2021)**

### 3.2 Heritability

The highest heritability was seen in grain yield per hill (97.5%), followed by grain yield per plant (97.1%), total tillers (94.3%), and panicle length (94.3%). (94.1%). Flag Leaf Width (88.3), Biological Yield per Hill (85.2), and Days to 50% Flowering (82.1) of all these variables show moderate range heritability, whereas Flag Leaf Length show low range heritability (66.2%). The high heritability values of the traits that were taken into consideration in this study showed that those were less influenced by the environment, which helped in the selection of the traits based on phenotypic expression by using a simple selection method and suggested the potential for genetic improvement.Similar results were seen in (**Anwar etal. 2021)**

### 3.3 Genetic Advance as Percentage of Mean

Except for Days to Maturity, Number of Panicles per Hill, Days to 50% Flowering, and Plant Height, all characters in the current investigation exhibited the largest genetic advance as a percentage of mean.Grain Yield per Hill showedhighestgeneticadvanceaspercentageofmean,followed by, Number of Spikelets per Panicle (64.6), Biological Yield per Hill (58.8) and Number of Total Tillers(57.1). While moderate genetic advance as a percent of mean was observed in Panicle Length(53.3) and Harvest Index (46.6) and low genetic advance was seen in Days to Maturity(9.17).Every character under research displayed great heritability and high genetic advance as a percentage mean (except plant height, Days to Maturity and Number of Grains per Plant) which indicates that the characters mostly governed by additive gene action. Therefore, due to the accumulation of more additive genes leading to further development, direct selection of these traits based on phenotypic expression by a simple selection procedure would be efficient.Similar results were seen in **Anwar etal.(2021)** and **Pushkarnath et al. (2021).**

### 3.4 Phenotypic Correlation Coefficient

The currentinvestigation found that Grain Yield per Hillshowed positivesignificantassociation with Flag Leaf Width (0.488**), Number of Total Tillers (0.690**), PanicleLength(0.620**), Number of Panicles per Hill (0.448**), Number of Spikelets perPanicle(0.526**), Biological Yield per Hill (0.824**) and Harvest Index (0.682**). Negativeandsignificant association showed with Days to 50% flowering (-0.597**),Days to Maturity(-0.520**), Plant Height (-0.522**) and Flag Leaf Length (-0.268*). While negative and non-significant association showed with Test Weight (-0.1302) only.Similar results were seen in **Anwar etal.(2021)**

### 3.5 Genotypic Correlation Coefficient

The correlation between the yield and yield attributing characters ed that Grain Yield per Hill waspositivelyandsignificantlyassociatedwithFlag Leaf Width(0.533**), PanicleLength(0.646*), Number of Total Tillers (0.721**), Number of Panicles per Hill (0.538**),NumberofSpikeletsperPanicle(0.544**), Biological Yield per Hill (0.889**) and Harvest Index (0.802**).Negativeandsignificantassociated with Days to 50% flowering (-0.674**), Days to Maturity (-0.618**), Plant Height (-0.562**) and Flag LeafLength(-0.325**). Negativeand non-significantassociated with Test Weight (-0.1525).Similar results were seen in **Anwar etal.(2021)**

### 3.6 Phenotypic Path coefficient analysis

A thorough examination of diagonal values revealed positive direct effect of Days to 50% flowering (0.1181), Number of Total Tillers (0.0779), Number of Spikelets per Panicle (0.0353), Biological Yield per Hill (0.7023) and Harvest Index(0.5022). Negative direct effects were exhibited by Days to Maturity (-0.1631), Plant Height (-0.0309), Flag Leaf Length (-0.0044), Flag Leaf Width (-0.0294), Panicle Length (-0.0372), Number of Panicles per Hill (-0.0359) and Test Weight (-0.0062). Similar results were seen in **Anwar etal.(2021)** and **Pushkarnath et al. (2021).**

### 3.7 Genotypic path coefficientanalysis

An examination of the yield and yield component genotypic path coefficient results reveals that they are generally of similar magnitude and direction. Additionally, it was noted that the genotypic path coefficient was larger than the phenotypic path coefficient, demonstrating the environment's masking influence. A thorough examination of diagonal values revealed positive direct effect of Days to 50%flowering (0.5141), Biological Yield per Hill (0.7894) and Harvest Index (0.8536).NegativedirecteffectwasshowedbyDaystoMaturity(-0.4402), Plant Height (-0.2563), Flag Leaf Length (-0.1340), Flag Leaf Width (-0.0834), Panicle Length (-0.1295), Number of Total Tillers (-0.1786), NumberofPanicles perHill(-0.2509),NumberofSpikeletsper Panicle(-0.2059) and Test Weight (-0.1026)Similar results were seen in **Anwar etal.(2021)** and **Pushkarnath et al. (2021).**

**Table-2: Analysis of Variance (ANOVA) among 24 rice genotypes for 13 quantitative traits**

| Source | Mean Sum of Squares (MSS) | | |
|---|---|---|---|
| | Replication | Treatment | Error |
| Degrees of freedom | 2 | 22 | 44 |
| Days To 50% Flowering | 14.62 | 287.68** | 19.20 |
| Days To Maturity | 1.93 | 189.15** | 19.23 |
| Plant Height | 77.65 | 1155.02** | 45.97 |
| Flag Leaf Length | 50.69 | 246.85** | 38.07 |
| Flag Leaf Width | 0.002 | 0.15** | 0.01 |
| Panicle Length | 0.17 | 18.97** | 0.45 |
| Number of Tillers Per Hill | 0.16 | 20.23** | 0.40 |
| Number of Panicles Per Hill | 0.96 | 18.37** | 1.98 |
| Number of Spikelets Per Panicle | 821.4** | 10728.88** | 101.61 |
| Biological Yield | 82.72 | 1674.40** | 94.49 |
| Harvest Index | 10.95 | 345.46** | 7.87 |
| Test Weight | 8.57 | 46.10** | 4.06 |
| Grain Yield Per Plant | 14.94 | 645.24** | 7.51 |

** Significant at 1 percent level of significance

**Table -3Genetic Parameters For 13 Quantitative Characters in Rice Genotypes**

| Characters | GCV | PCV | $h^2$ (Broad Sense) | GA | GA % of Mean |
|---|---|---|---|---|---|
| Days To 50% Flowering | 8.79 | 9.68 | 82.34 | 17.68 | 16.42 |
| Days To Maturity | 5.47 | 6.33 | 74.65 | 13.40 | 9.74 |
| Plant Height | 11.84 | 12.55 | 88.94 | 37.35 | 22.99 |
| Flag Leaf Length | 17.28 | 21.49 | 64.64 | 13.82 | 28.62 |
| Flag Leaf Width | 20.21 | 21.84 | 85.63 | 0.42 | 38.53 |
| Panicle Length | 25.19 | 26.08 | 93.25 | 4.94 | 50.10 |
| Number of Tillers Per Hill | 27.86 | 28.70 | 94.25 | 5.14 | 55.72 |
| Number of Panicles Per Hill | 8.89 | 10.37 | 73.43 | 4.13 | 15.69 |
| Number of Spikelets Per Panicle | 32.61 | 33.08 | 97.21 | 120.89 | 66.23 |
| Biological Yield | 30.51 | 33.14 | 84.79 | 43.53 | 57.88 |
| Harvest Index | 29.42 | 30.43 | 93.46 | 21.13 | 58.59 |
| Test Weight | 18.57 | 21.09 | 77.55 | 6.79 | 33.69 |

| | | | | | |
|---|---|---|---|---|---|
| **Grain Yield Per Plant** | 51.85 | 52.76 | 96.59 | 29.52 | 104.98 |

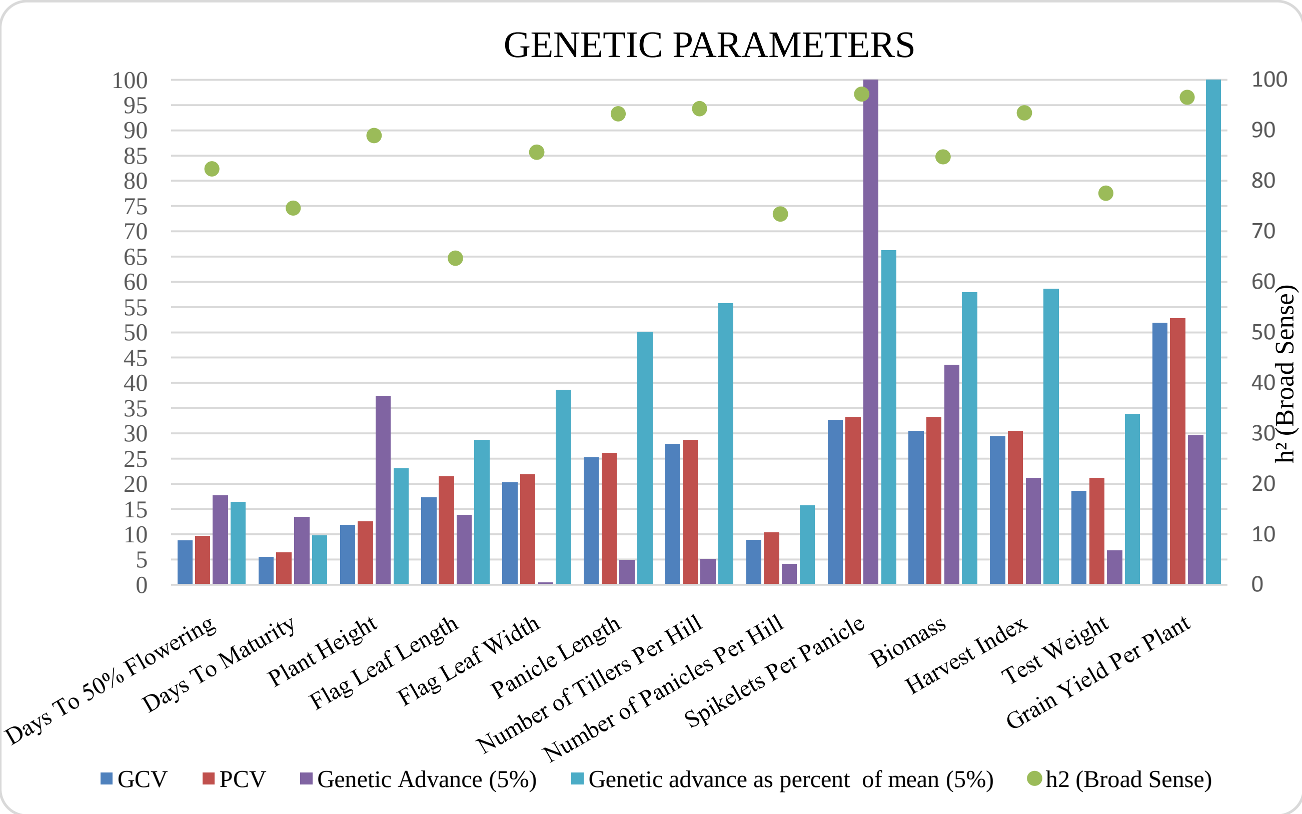


**Fig 1. Bar diagram depicting GCV, PCV, heritability and genetic advance for 13 quantitative characters of rice.**

**Table -4: Correlation Coefficient Analysis**

| Traits | | DF50 | DM | PH | FLL | FLW | PL | NTH | NPH | NSPP | BY | HI | TW | GY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DF50** | P | 1 | 0.934** | 0.395** | 0.407** | -0.43** | -0.475** | -0.55** | -0.473** | -0.351* | -0.343* | -0.593** | 0.300* | -0.597** |
| | G | 1 | 0.961** | 0.412** | 0.564** | -0.500** | -0.563** | -0.637** | -0.648** | -0.400** | -0.441** | -0.800** | 0.260* | -0.674** |
| **DM** | P | | 1 | 0.377* | 0.364* | -0.52** | -0.493** | -0.53** | -0.370* | -0.381** | -0.246* | -0.541** | 0.2195 | -0.520** |
| | G | | 1 | 0.402** | 0.533** | -0.584** | -0.607** | -0.649** | -0.494** | -0.445** | -0.302* | -0.816** | 0.2049 | -0.618** |
| **PH** | P | | | 1 | 0.231 | -0.49** | -0.700** | -0.67** | -0.23 | -0.449** | -0.353* | -0.414** | -0.0621 | -0.522** |
| | G | | | 1 | 0.290* | -0.577** | -0.760** | -0.752** | -0.381** | -0.472** | -0.386** | -0.563** | -0.0987 | -0.562** |
| **FLL** | P | | | | 1 | -0.264* | -0.1836 | -0.188 | -0.413** | -0.274* | -0.1623 | -0.271* | 0.0035 | -0.268* |
| | G | | | | 1 | -0.371* | -0.1843 | -0.232* | -0.534** | -0.345* | -0.1469 | -0.427** | -0.0643 | -0.325* |
| **FLW** | P | | | | | 1 | 0.527** | 0.541** | 0.329* | 0.547** | 0.307* | 0.442** | 0.0598 | 0.488** |
| | G | | | | | 1 | 0.567** | 0.576** | 0.335* | 0.585** | 0.336* | 0.638** | 0.1002 | 0.533** |
| **PL** | P | | | | | | 1 | 0.934** | 0.283* | 0.2225 | 0.407** | 0.536** | -0.0554 | 0.620** |
| | G | | | | | | 1 | 0.999** | 0.316* | 0.235* | 0.453** | 0.662** | -0.0852 | 0.646** |
| **NTH** | P | | | | | | | 1 | 0.414** | 0.2072 | 0.469** | 0.590** | -0.0561 | 0.690** |
| | G | | | | | | | 1 | 0.453** | 0.2151 | 0.515** | 0.749** | -0.0636 | 0.721** |
| **NPH** | P | | | | | | | | 1 | 0.245* | 0.321* | 0.446** | -0.1105 | 0.448** |
| | G | | | | | | | | 1 | 0.301* | 0.325* | 0.792** | -0.1388 | 0.538** |
| **NSPP** | P | | | | | | | | | 1 | 0.367* | 0.424** | -0.1319 | 0.526** |
| | G | | | | | | | | | 1 | 0.403** | 0.529** | -0.1546 | 0.544** |
| **BY** | P | | | | | | | | | | 1 | 0.1918 | -0.1071 | 0.824** |
| | G | | | | | | | | | | 1 | 0.469** | -0.1704 | 0.889** |
| **HI** | P | | | | | | | | | | | 1 | -0.0905 | 0.682** |
| | G | | | | | | | | | | | 1 | -0.0862 | 0.802** |
| **TW** | P | | | | | | | | | | | | 1 | -0.1302 |
| | G | | | | | | | | | | | | 1 | -0.1525 |
| **GYP** | P | | | | | | | | | | | | | 1 |
| | G | | | | | | | | | | | | | 1 |

**DF50**: Days to 50% Flowering, **DM**: Days to Maturity, **PH**: Plant Height, **FLL**: Flag Leaf Length, **FLW**: Flag Leaf Width, **NTH**: Number of Total Tillers per Hill, **NPH**: Number of Panicles per Hill, **PL**: Panicle Length, **BY**: Biological yield, **H.I**: Harvest Index, **NSPP**: Number of Spikelets per Panicle, **TW**: Test Weight, **GYP**: Grain Yield per Plant, **P**: Phenotypic, **G**: Genotypic

**Table-5: Path Coefficient Analysis**

| Traits | | DF50 | DM | PH | FLL | FLW | PL | NTH | NPH | NSPP | BY | HI | TW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DF50** | P | **0.1181** | 0.1103 | 0.0466 | 0.048 | -0.0512 | -0.056 | -0.065 | -0.0558 | -0.0415 | -0.0405 | -0.0701 | 0.0354 |
| | G | **0.5141** | 0.4942 | 0.2116 | 0.2901 | -0.2573 | -0.2893 | -0.3275 | -0.3333 | -0.2054 | -0.2265 | -0.4111 | 0.1338 |
| **DM** | P | -0.1524 | **-0.1631** | -0.0615 | -0.0595 | 0.0854 | 0.0804 | 0.0876 | 0.0603 | 0.0621 | 0.0401 | 0.0883 | -0.0358 |
| | G | -0.4232 | **-0.4402** | -0.1770 | -0.2346 | 0.2569 | 0.2672 | 0.2855 | 0.2176 | 0.1959 | 0.1330 | 0.3592 | -0.0902 |
| **PH** | P | -0.0122 | -0.0117 | **-0.0309** | -0.0071 | 0.0152 | 0.0217 | 0.0208 | 0.0071 | 0.0139 | 0.0109 | 0.0128 | 0.0019 |
| | G | -0.1055 | -0.1031 | **-0.2563** | -0.0743 | 0.1478 | 0.1949 | 0.1928 | 0.0978 | 0.1211 | 0.0988 | 0.1444 | 0.0253 |
| **FLL** | P | -0.0018 | -0.0016 | -0.001 | **-0.0044** | 0.0012 | 0.0008 | 0.0008 | 0.0018 | 0.0012 | 0.0007 | 0.0012 | 0 |
| | G | -0.0756 | -0.0714 | -0.0388 | **-0.1340** | 0.0497 | 0.0247 | 0.0311 | 0.0716 | 0.0463 | 0.0197 | 0.0572 | 0.0086 |
| **FLW** | P | 0.0127 | 0.0154 | 0.0144 | 0.0077 | **-0.0294** | -0.0155 | -0.0159 | -0.0097 | -0.0161 | -0.009 | -0.013 | -0.0018 |
| | G | 0.0417 | 0.0487 | 0.0481 | 0.0309 | **-0.0834** | -0.0472 | -0.0480 | -0.0279 | -0.0488 | -0.0280 | -0.0532 | -0.0084 |
| **PL** | P | 0.0177 | 0.0183 | 0.0261 | 0.0068 | -0.0196 | **-0.0372** | -0.0347 | -0.0105 | -0.0083 | -0.0151 | -0.0199 | 0.0021 |
| | G | 0.0729 | 0.0786 | 0.0984 | 0.0239 | -0.0734 | **-0.1295** | -0.1293 | -0.0409 | -0.0304 | -0.0587 | -0.0856 | 0.0110 |
| **NTH** | P | -0.0429 | -0.0418 | -0.0523 | -0.0147 | 0.0422 | 0.0728 | **0.0779** | 0.0322 | 0.0162 | 0.0366 | 0.0459 | -0.0044 |
| | G | 0.1138 | 0.1159 | 0.1344 | 0.0414 | -0.1029 | -0.1784 | **-0.1786** | -0.0809 | -0.0384 | -0.0920 | -0.1338 | 0.0114 |
| **NPH** | P | 0.0169 | 0.0133 | 0.0082 | 0.0148 | -0.0118 | -0.0101 | -0.0148 | **-0.0359** | -0.0088 | -0.0115 | -0.016 | 0.004 |
| | G | 0.1627 | 0.1240 | 0.0957 | 0.1339 | -0.0839 | -0.0793 | -0.1136 | **-0.2509** | -0.0754 | -0.0814 | -0.1987 | 0.0348 |
| **NSPP** | P | -0.0124 | -0.0134 | -0.0158 | -0.0097 | 0.0193 | 0.0078 | 0.0073 | 0.0086 | **0.0353** | 0.013 | 0.015 | -0.0047 |
| | G | 0.0823 | 0.0916 | 0.0972 | 0.0710 | -0.1204 | -0.0484 | -0.0443 | -0.0619 | **-0.2059** | -0.0829 | -0.1090 | 0.0318 |
| **BY** | P | -0.2408 | -0.1724 | -0.2477 | -0.114 | 0.2153 | 0.2858 | 0.3295 | 0.2252 | 0.2579 | **0.7023** | 0.1347 | -0.0752 |
| | G | -0.3478 | -0.2385 | -0.3044 | -0.1160 | 0.2652 | 0.3578 | 0.4065 | 0.2561 | 0.3177 | **0.7894** | 0.3699 | -0.1345 |
| **HI** | P | -0.298 | -0.2717 | -0.2081 | -0.1362 | 0.2218 | 0.269 | 0.2961 | 0.224 | 0.2129 | 0.0963 | **0.5022** | -0.0455 |
| | G | -0.6827 | -0.6966 | -0.4809 | -0.3644 | 0.5448 | 0.5646 | 0.6395 | 0.6760 | 0.4518 | 0.4000 | **0.8536** | -0.0736 |
| **TW** | P | -0.0019 | -0.0014 | 0.0004 | 0 | -0.0004 | 0.0003 | 0.0003 | 0.0007 | 0.0008 | 0.0007 | 0.0006 | **-0.0062** |
| | G | -0.0267 | -0.0210 | 0.0101 | 0.0066 | -0.0103 | 0.0087 | 0.0065 | 0.0142 | 0.0159 | 0.0175 | 0.0088 | **-0.1026** |
| **GYP** | P | -0.59** | -0.52** | -0.522** | -0.268* | 0.488** | 0.620** | 0.690** | 0.448** | 0.526** | 0.824** | 0.682** | -0.1302 |
| | G | -0.67** | -0.61** | -0.562** | -0.325* | 0.533** | 0.646** | 0.721** | 0.538** | 0.544** | 0.889** | 0.802** | -0.1525 |

**DF50**: Days to 50% Flowering, **DM**: Days to Maturity, **PH**: Plant Height, **FLL**: Flag Leaf Length, **FLW**: Flag Leaf Width, **NTH**: Number of Total Tillers per Hill, **NPH**: Number of Panicles per Hill, **PL**: Panicle Length, **BY**: Biological yield, **H.I**: Harvest Index, **NSPP**: Number of Spikelets per Panicle, **TW**: Test Weight, **GYP**: Grain Yield per Plant, **P**: Phenotypic, **G**: Genotypic

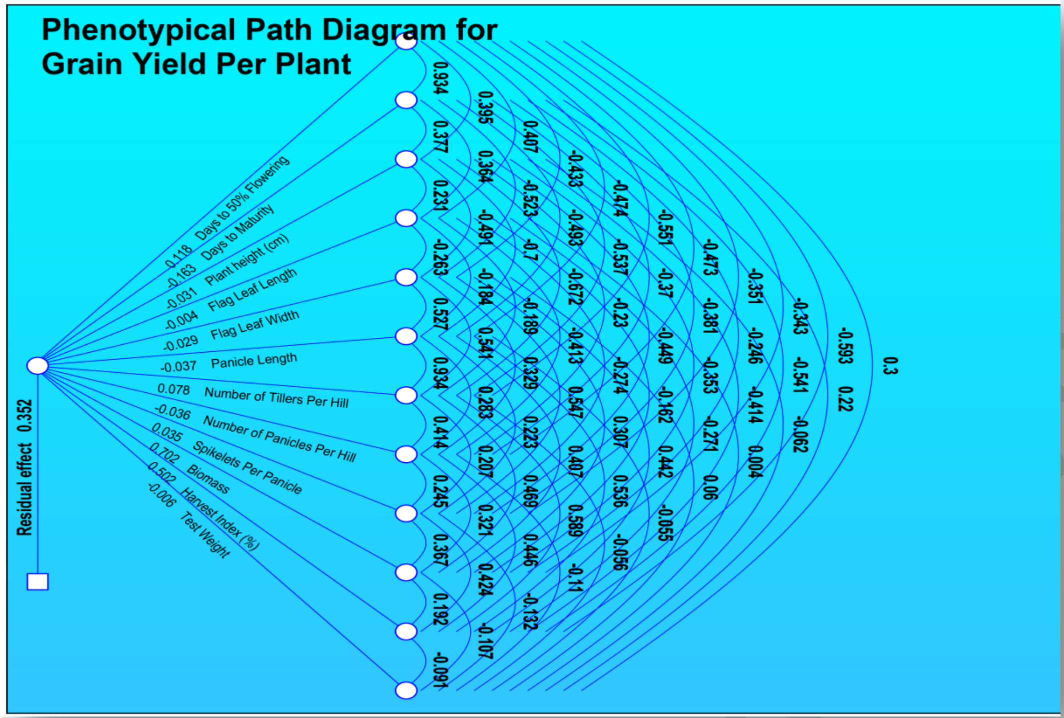


Fig. 2.Phenotypical Path Diagram

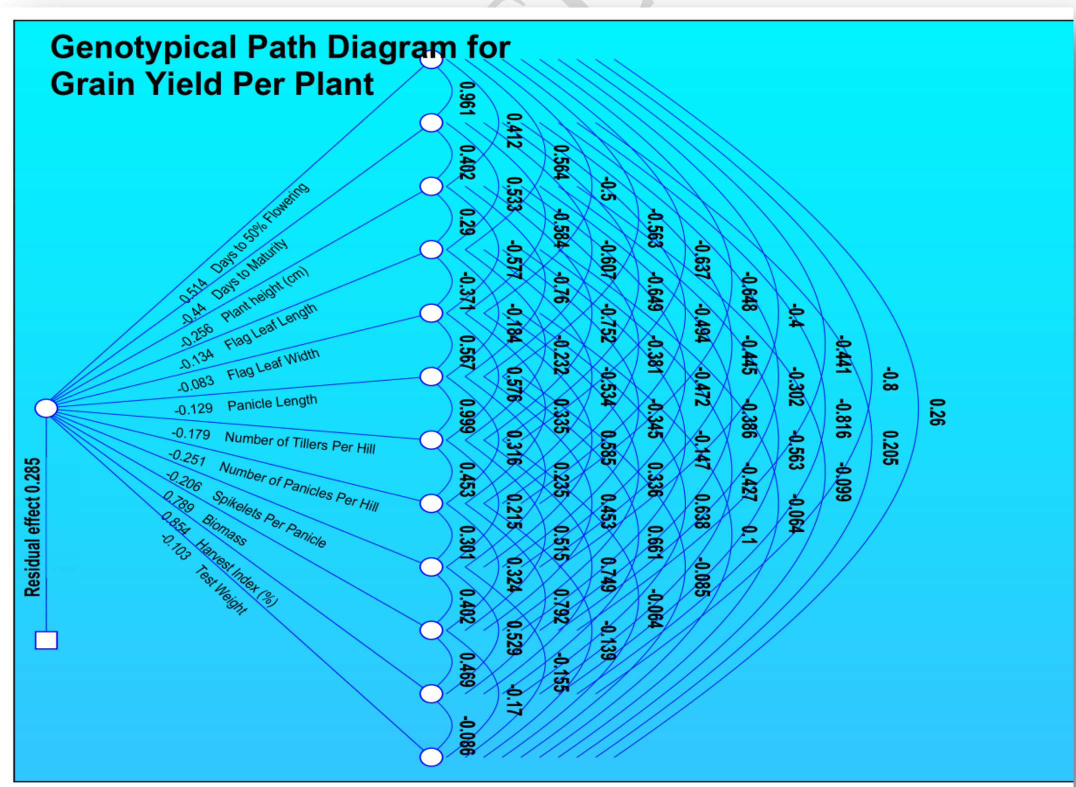


Fig. 3.Genotypical Path Diagram

## 4. CONCLUSION

Considerable variability existed in the genotypes for all the characters studied. Thesewere the genotypeswithhighmeanvaluesin desirable directioni.e., Fromthe presentinvestigation it is concluded that among 24 genotypes of rice, SHUATS DHAN-6 showed both earlyflowering (92 days) and had characters like early maturity (121 days), Rangokomalshowed high plant height (189.5 cm), SHUATSDHAN-6 showed high Panicle Length (15.06 cm), SHUATSDHAN-6 is showing both high Biological Yield per Hill (123.6 g), and Grain Yield per Hill (62.13 g).Highest GCV were depicted for Grain Yield per Hill, Number of Spikelets perPanicle, Biological Yield per Hill, Number of Total Tillers and Harvest Index. The highest Heritability was observed for Grain Yield per Hill followed byNumber of Spikelets per Panicle, Number of Total Tillers, Panicle Length, Plant Height and Flag Leaf Width. In the present investigation Grain Yield per Hill showed positive andsignificant association with Flag Leaf Width, Panicle Length, Number of Total Tillers, Number of panicles per Hill, Number of Spikelets per Panicle, Biological Yield per Hill and Harvest Index. Recorded positive direct effecton Grain Yield per Hill at both genotypic and phenotypic levels with Days to 50% Flowering, Biological Yield per Hill,Harvest Index, Number of Total Tillers and Number of Spikelets per Panicle.

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