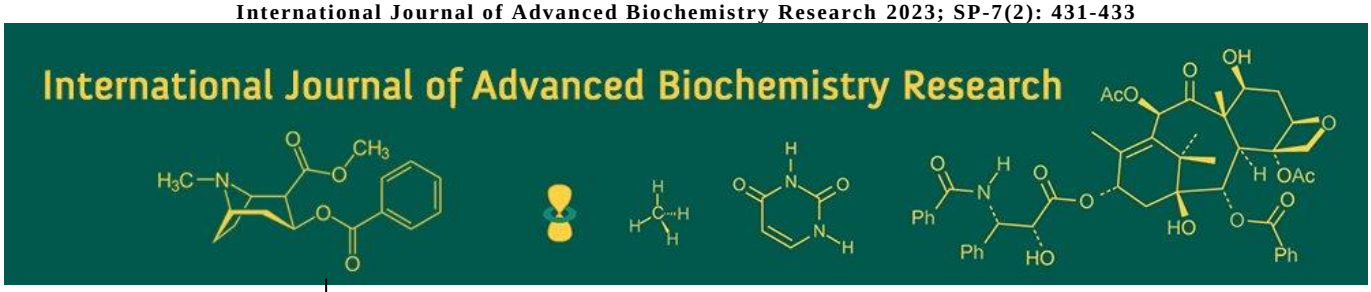

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Analysis of variance and estimation of variability parameters for different character of rice (*Oryza sativa* L.) germplasm

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Abstract
Estimation of variability suggested that due to higher magnitude of coefficient of variation were recorded for grain yield per plant (47.06%), 100 grain weight (26.53%) and number of effective tillers (23.18%), the germplasm contained sufficient amount of variability. This result depicted that there are scope for genetic improvement for choice of this character in the future breeding programme.

Keywords: Variability parameters, character of rice, *Oryza sativa* L.

Introduction
Rice (*Oryza sativa* L.) (2n=24) is the most important cereal crop that has been referred as "Global Grain" because of its use as prime staple food in about 100 countries of the world. In world, rice has occupied an area of 160.6 million hectares, with a total production of 738.20 million tonnes and productivity 3424.41 kg/ha. In India rice is cultivated round the year in one or the other part of the country in diverse ecologies spread over 43.38 million hectares with a production of 104.32 million tonnes during 2015-16. Chhattisgarh popularly known as "Rice Bowl of India" occupies an area around 37.73 lakh hectares with the production of 60.28 lakh tonnes and productivity 1597 kg/ha. In any crop, germplasm plays as an important role as a source and provides scope for wide variability. The knowledge about genetic variability of yield contributing characters, inter relationship among them and their relation with yield are necessary for an effective breeding programme (Nayak *et al*., 2016) [5].

Materials and Method
The accessions of rice were evaluated in the field during *kharif* 2017 at Research Cum Instructional Farm, Deptt. of Genetics & Plant Breeding, College of Agriculture, IGKV, Raipur. The field trials were conducted under irrigated transplanted condition. The plant materials were sown in raised bed nursery on 2nd July 2017. Twenty five days old seedlings were subsequently transplanted into the field in augmented design (only checks are replicated) in *kharif* - 2017. Each entry was transplanted in two rows with 20 cm of spacing between row to row and 15 cm between plants to plant. The check varieties were randomized within blocks. Fertilizer dose @ of 80 N: 50 P: 30 K kg/ha was applied. The entire dose of phosphorus and potassium along with half the dose of nitrogen was applied as basal dose before transplanting. The remaining dose of nitrogen was applied in two splits, first at the time of beginning of tillering and second one week after it. The standard agronomic practices were adopted for normal crop growth.

Results and Discussion
The analysis of variance for 8 yield related traits are presented in Table 1 and genotypic data and mean performance are presented in Table 2.
The differences among the varieties were significant and highly significant for most of the characters except number of effective tillers per plant and grain length width ratio. Block effect was found non- significant for most of the characters studied except for Panicle length and 100 grain weight and the differences among the checks varieties were significant for most of the characters like days to 50% flowering, number of effective tillers per plant, plant

height, days to maturity and grain yield per plant. This result is in agreement with the findings of Bhatti *et al*. (1998) [1] and Roy *et al*. (2017) [6].

Table 1: Analysis of variance for different quantitative characters

S. No.	Source of variation	Mean sum of square			
		Block DF=4	Genotype DF=49	Check DF=4	Error DF=12
1	Days to 50% flowering	10	168.18*	1.57*	2.53
2	No of effective tillers per plant	10	0.54	4.77*	1.66
3	Plant height	0.40	575.15*	2.37**	1.77
4	Panicle length	1.28*	17.64*	0.30	0.64
5	Days to maturity	0.02	169.13*	1.14*	1.64
6	Grain length width ratio	1.30	1.35	0.04	8.13
7	100 grain weight	3.82*	2.25**	0.28	4.66
8	Grain yield per plant	0.04	13.13*	5.32*	0.43

*at 5%significant **at 1% significant

Estimation of variability parameters for quantitative traits

Mean and variability parameters for different character are presented in Table 2.

Table 2: Mean and variability parameter for different quantitative traits

Variables	Mean	Standard Deviation	H^2	Coefficient of variation	Standard error	Variance	Maximum value	Minimum value
Days to	87.45	12.862	0.99	14.70	1.734	165.436	114.44	62.55
50% flowering Number of effective	6.17	1.430	0.26	23.176	0.193	2.046	12.44	4.17
Tillers								
Plant height (cm)	122.27	24.302	1	19.875	3.277	590.61	212.69	76.15
Panicle length (cm)	22.85	4.172	0.97	18.260	0.563	17.404	30.86	12.18
Days to maturity	117.35	12.787	0.99	10.896	1.724	163.507	143.88	93.10
Grain length width	2.99	0.434	0.64	14.471	0.059	0.188	3.91	2.00
Ratio (mm)								
100 grain weight (gm)	2.30	0.611	0.84	26.530	0.082	0.3733	3.78	1.16
Grain yield per plant (gm)	11.04	5.195	0.97	47.064	0.701	26.989	24.71	1.86

Days to 50% flowering

Days to 50% flowering showed a range of 62.55 days to 114.44 days with a mean of 87.45 days. The data for maximum days to 50% flowering recorded for Bal Keshar while lowest value showed by katuli. Standard deviation and standard error for observed data were 12.86 and 1.73 respectively. This parametric traits have a variance of 165.436 while coefficient of variation estimated was 14.70%.

Number of effective tillers

Number of effective tillers showed range from 4.17 to 12.44 with a mean of 6.17. The highest number of effective tillers exhibited by Bakiya and lowest for Khirasar. Standard deviation and standard error for observed data were 1.43 and 0.19 respectively. The variance for number of effective tillers was 2.05 while Coefficient of variation showed 23.18% variation.

Plant height

Plant height showed range from 76.15 to 212.69 cm with a mean of 122.27 cm. The maximum plant height exhibited by Bakiya while lowest value for plant height depicted by Koto. Standard deviation and standard error for the observed data were 24.30 and 3.28 respectively. The variance for plant height was 590.61 whereas Coefficient of variation showed a result of 19.87%.

Panicle length

Panicle length showed range from 12.18 to 30.86 cm with a mean of 22.85 cm. The maximum value for panicle length exhibited by Jodari Nadgi while lowest value showed by Koto variety. Standard deviation and standard error showed for panicle length were 4.17 and 0.56 respectively. Variance observed was 17.40 whereas Coefficient of variation showed a result of 18.26%.

Days to maturity

Days to maturity showed a range from 93.10 to 143.88 days with a mean of 117.35 days. Kachna had shorter maturity period (93.10 days) and Bakadi had longer maturity period (143.88) while standard deviation and standard error for observed data were 12.79 and 1.72 respectively. Variance showed for days to maturity was 163.51 whereas Coefficient of variation showed a result of 10.89%.

Grain length width ratio

Grain length width ratio showed range from 2.00 to 3.91 with a mean of 2.99. Bhatha Jhilli exhibited maximum value for grain length width ratio while Jodari Nadgi exhibited lowest value for this character. Standard deviation and standard error for grain length width ratio were 0.434 and 0.059 respectively. Variance observed 0.188 while Coefficient of variation showed a result of 14.47%.

100 grain weight

100 grain weight showed range from 1.16 to 3.78 g with a mean of 2.30 g. The lowest observed data showed by Lohadi while maximum value exhibited by Chhattisgarh Zinc Rice Standard deviation and standard error for this variable for were 0.611 and 0.082 respectively. Variance showed 0.373 for this data while coefficient of variation showed a result of 26.53%.

Grain yield per plant

Grain yield per plant showed range from 1.86 g to 24.71 g with a mean of 11.038 g. The lowest value exhibited by Jora

Mallo while highest value exhibited by Indira Barani Dhan 1. Standard deviation and standard error showed for this variable were 5.195 and 0.701 respectively. Variance was recorded 26.989 while Coefficient of variation showed a result of 47.064%.

In the present investigation higher magnitude of coefficient of variation was recorded for grain yield per plant (47.064%), 100 grain weight (26.53%) and number of effective tillers (23.18%). While moderates estimates recorded for grain length width ratio (14.471), days to 50% flowering (14.70%), panicle length (18.26%), plant height (19.87%) and days to maturity (10.89%).

The study suggested that due to higher magnitude of coefficient of variation which were recorded for grain yield per plant (47.064%), 100 grain weight (26.53%) and number of effective tillers (23.18%), the germplasm contained sufficient amount of variability. This result depicted that there are scope for genetic improvement for choice of this character in the future breeding programme. Similar type of results were depicted by Kulsum *et al*. (2011) [3] for grain yield per plant, Maji *et al*. (2012) [4] for number of effective tillers, Roy *et al*. (2017) [6] for days to 50% flowering and chuchert *et al*. (2018) [2] for grain yield per plant.

Conclusion

The germplasm contained sufficient variability, according to estimates of variability, because higher magnitudes of coefficients of variation were recorded for grain yield per plant (47.06%), 100 grain weight (26.53%) and number of effective tillers (23.18%). This finding indicated that there is room for genetic improvement in the future breeding programme for this feature.

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