*Int.J.Curr.Microbiol.App.Sci* (2020) Special Issue-11: 2192-2208

*International Journal of Current Microbiology and Applied Sciences*
*ISSN: 2319-7706* **Special Issue-11 pp. 2192-2208**
Journal homepage: http://www.ijcmas.com

**Original Research Article**

# Evaluation of Aromatic and Non-Aromatic Rice (*Oryza sativa* L.) Genotypes for Morphological and Yield Contributing Characters in Konkan Region of Maharashtra

**V. J. Gimhavanekar[1*], A. K. Shinde[1], M. M. Burondkar[1], V. V. Dalvi[1], S. G. Bhave[2], S. G. Mahadik[1], S. S. Chavan[1] and S. S. Desai[1]**

[1]Department of Agricultural, Botany, College of Agriculture, Dapoli, India
[2]Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, India
**Corresponding author*

**Keywords**

Aromatic rice, Morphological characters, Yield and attributes

**A B S T R A C T**

A study was undertaken to evaluate the growth performance and grain quality of fifty eight aromatic and non-aromatic rice genotypes grown under rainfed conditions during *kharif*, 2017 & 2018 in Konkan region. The rice genotypes differed significantly (P<0.05) with respect to plant height, number of tillers, number of leaves, thousand grain weight, grain yield, straw yields and harvest index. Genotypes differed in morphological and yield contributing characters. Non-aromatic rice genotypes Karjat-9, Karjat-8, Karjat-7, Karjat-2 and Karjat-3 and in aromatic rice genotypes Belgaum Basmati, Paras Sona and PhuleMaval showed maximum number of tillers, leaves, total number of filled spikelets, grain yield and harvest index.

## Introduction

The slogan "Rice is life" is the most appropriate for India as this crop play a vital role in our national food security and means of livelihood for millions of rural households. In India export rice around 10.3 million metric tonnes. Total global consumption of milled rice amounted to approximately 477.77 million metric tonnes in 2016-17. China consumed around 146 million metric tonnes of milled rice per year, and was by far the world leading rice consumer in the year. In comparison U. S. consumed some 3.85 million metric tonnes (Anonymous, 2017). The Indian aromatic rice, often called Basmati is nature's gift to the sub-continent and human kind at large (Ahuja *et al.*, 1995). With growing demand for aromatic rice in international market high emphasis was placed till now on improvement of basmati types.

The improvement of indigenous small and medium grained aromatic rice, which possess outstanding quality like aroma, kernel elongation after cooking and taste were somewhat neglected as they lacked export value. Almost every state of the country has its own set of aromatic rice that performs well in native areas. Aroma and taste of short grained aromatic rice specially Badshahbhog

and Dubraj is known to be superior to Basmati types (Hossain *et al.*, 2009)

Information on physiological characters plays a vital role in rice breeding. It is essential to know the physiological behaviour and genetic expression of the selective aromatic and modern rice genotypes for definite breeding objectives to improve those genotypes. Identifying promising physiological traits associated with quality and yield plays an important role in varietal development programmes. Development of rice varieties with high yielding ability is one of the most fundamental approaches for dealing with the expected increase in the world demand.

Little information is available on the morphological characters of aromatic and non-aromatic rice varieties and hence the present work would give an account of growth and yield performance of some aromatic and non-aromatic rice genotypes and better orientation towards grain yield.

## Materials and Methods

The experiment was carried out at Regional Agricultural Research Station, Karjat, Dist. Raigad (MS) during *Kharif*2017 and 2018. Karjat is situated at 18°91'67" North latitude and 73°33' East longitude with an altitude of 194 meters (636 ft) above the mean sea level with warm and humid conditions throughout the year. The mean annual precipitation is 3500 mm, which is generally received during the month from June to November at the location. The present experiment was conducted during the *kharif*2017 & 2018. Fifty eight aromatic and non-aromatic rice genotypes were used and cultivated in a Randomized Block Design (RBD) with two replications.

The observations on physiological attributes viz. days to 50% flowering and days to physiological maturity were recorded in all the genotypes. The observations on morphological characters viz. plant height, number of tillers, leaves/plan and yield characters viz. panicle length, total spikelets/panicle, filled spikelets/panicle, 1000 seed weight, grain yield, straw yield and harvest index were recorded and subjected to statistical analysis as per Panse and Sukhatme (1985).

## Results and Discussion

### Phenological observations

In the present study, significantly lower days for 50 % flowering were recorded in Parag (81.25 days) which was at par with Lala (84.25 days) over other rice genotypes. Significantly maximum days for 50 % flowering were recorded in Ambemohar (112.00 days) which was at par with Karjat-8 (111.00 days) and Karjat-2 (110.00 days) over other rice genotypes. Similar results were also reported by Ashrafuzzaman *et al.*, (2009) and Shahidullah *et al.*, (2009).

Amongst 58 aromatic and non-aromatic rice genotypes, significantly minimum numbers of days to physiological maturity were recorded in Terana (113.25 days) which was at par with Parag (114.25 days), Ambika (116.50 days) and Velchi (117.00 days) over other rice genotypes. Significantly maximum numbers of days to physiological maturity were recorded in Ambemohar (144.00 days) which was at par with Karjat-8 (144.00 days) and Karjat-2 (141.00 days) over other rice genotypes.

Days to physiological maturity have shown significant association with productive tillers and grain yield per plant. A highly significant difference among the genotypes for number of days from sowing to maturity was observed. Similar results also reported by

Zia-Ul *et al.,* (2005), Ashrafuzzaman *et al.,* (2009) and Shahidullah *et al.,* (2009) (Table 1–5).

## Morphological observations

### Plant height

Plant height increased up to harvest in all the 58 aromatic and non-aromatic rice genotypes. The rapid increase in height was observed during the period of 20 to 80 DAS and thereafter rate of increase was slow up to harvest. Such trend in plant height was also reported by Yadava *et al.*, (1988), Singh and Jain (2000), Golam (2001), Chandrasekhar *et al.,* (2001), Poonam *et al.*, (2009), Hussain *et al.*, (2014) and Kardile *et al.*, (2018). Amongst 58 aromatic and non-aromatic rice genotypes plant height at harvest was recorded significantly higher in aromatic rice genotype Girga (155.99 cm) which was at par with Bela blue (154.70 cm) and Basmati-107 (142.35 cm) over other rice genotype and significantly lower plant height at harvesting was recorded in genotype Belgaum Basmati (89.85 cm) over other rice genotypes. The presents results for the plant height was in agreement with EnamulKabir *et al.,* (2004) who have reported significant variations in plant height at harvest among the aromatic fine rice genotypes tested. Similarly Sinha *et al.,* (2009), Abdul Baset Mia *et al.,* (2012) and Mohammad Shamim *et al.,* (2018) also found that plant height varied significantly among the aromatic rice genotypes up to 60 DAT which increased up to maturity.

### Number of tillers

The number of tillers per plant was significantly differed among the aromatic and non-aromatic rice genotypes at 80 DAT stage and rest of all stages showed no significant variation for number of tillers. Progressive increase was found for number of tillers per plant up to 80 DAT after that declined up to the maturity because of drying of unproductive tillers. Data showed significantly higher number of tillers (10.36 plant$^{-1}$) was produced by the genotype Karjat-9 which was at par with Karjat-8 (10.02 plant$^{-1}$), Karjat-7 (9.89 plant$^{-1}$), Karjat-2 (9.79 plant$^{-1}$), Karjat-3 (9.73 plant$^{-1}$) and Belgaum Basmati (9.69 plant$^{-1}$) over other rice genotypes. The minimum number of tillers was recorded in Girga (8.06 plant$^{-1}$). The difference in the tiller production among genotypes may be attributed to varietal character (Chandrashekhar *et al.,* 2001 and Abdul Baset Mia *et al.,* 2012). Similar results were also reported by Enamul *et al.,* (2004).

Gallagher and Biscoe (1978) and Shahidullah *et al.,* (2009) reported that tiller number directly affect the number of panicles and thereby affects the total yield. Positive and highly significant association was observed between number of fertile tillers and grain yield. Similar results were reported by Zahid *et al.,* (2005), Hossain *et al.,* (2008), Jamal *et al.,* (2009), Arooj *et al.,* (2015) and Lavanya *et al.,* (2018).

### Number of leaves

In the present investigation, it was observed that in all aromatic and non-aromatic rice genotypes, the number of leaves increased from 20 DAT to 80 DAT thereafter declined till maturity. The size of photosynthetic surface in terms of number of leaves per plant was found significantly different in all the genotypes. It was found that the number of leaves increased progressively with the advancing age of crop. Initially the number was rather small but it increased very rapidly during grand growth period of the crop and then towards the maturity, there was little change in the leaf number. Yadava *et al.,* (1988), Gautam and sharma (1983) and Golam (2001) also reported similar results in

rice. As regards to number of leaves per plant was significantly higher recorded in Karjat-9 (35.05 plant$^{-1}$) which was at par with Karjat-8 (31.68 plant$^{-1}$), Karjat-7 (30.74 plant$^{-1}$), Karjat-2 (30.38 plant$^{-1}$), Karjat-3 (29.74 plant$^{-1}$) and Belgaum Basmati (28.90 plant$^{-1}$) over other rice genotypes and minimum number of leaves was found in Girga (20.39 plant$^{-1}$). The decrease in leaf number towards maturity can be attributed to senescence of older leaves (Streck *et al.,* 2008 and Sie *et al.,* 1998). Numbers of leaves were observed positively associated and highly significant with grain yield. Aye and Oscar (2009) found that the higher numbers of leaves, with consequently higher photosynthetic productivity, are responsible for high yields in rice genotypes. Similar results were also obtained by Yin and Kropff *et al.,* (1998) and Mehta *et al.,* (2013).

## Yield and yield attributing characters

Data on total number of spikelets per panicle, total number of filled spikelets per panicle, panicle length, 1000 grain weight, grain yield per plant, straw yield per plant and harvest index for aromatic and non-aromatic rice genotypes are presented in table 5.

## Total number of spikelets and filled spikelets per panicle

The significant differences were observed within the aromatic and non-aromatic rice genotypes under study. In the present investigation, the significantly maximum number of spikelets per panicle was recorded in Karjat-9 (190.46) which was at par with Karjat-7 (182.85), Karjat-8 (182.75) and Karjat-2 (182.44) over other rice genotypes. In aromatic rice genotypes significantly maximum number of spikelets per panicle was recorded in Belgaum Basmati (176.69) which was at par with Paras Sona (176.60), Pule Maval (176.04) and Durgabhog (173.65) over other rice genotypes. The minimum number of spikelets per panicle was recorded in Girga (90.67). Spikelets per panicle contributed more to the yield and this study confirms the sink size is the most important factor responsible for yield. Total number of spikelets and filled spikelets per panicle was observed positively associated with grain yield. Similar results were reported by Fageria and Baligar (2001) and Patel *et al.,* (2010). The varietal difference for total number of spikelets was also reported by Chandrika *et al.,* (2015) and Kardile *et al.,* (2018)

## Panicle length

The data on the panicle length revealed that it varied significantly among the aromatic and non-aromatic rice genotypes.

In the present study, significantly maximum panicle length was recorded in aromatic rice genotypes, Basmati-386 (28.81 cm) which was at par with Pusasugandha-5 (28.75 cm), Basmati-63 (28.26 cm), Tulsi-75-14 (27.85 cm) and Pusasugandha (27.77 cm) over other rice genotypes. The minimum panicle length was recorded in Karjat-8 (19.84 cm). Panicle length was observed highly significant and negative association with grain yield. Similar results were reported by Fageria and Baligar (2001). The varietal difference for panicle length was also reported by Singh and Jain (2000), Sharma (2002) and Mohammad Shamim *et al.,* (2018).

## 1000 grain weight

Significantly maximum 1000 grain weight was recorded in Karjat-9 (21.59 g) which was at par with Karjat-2 (21.38 g), Karjat-8 (20.41 g), Karjat-7 (19.89 g), Belgaum Basmati (19.50 g), Karjat-3 (19.48 g) and Pusasugandha-5 (19.23 g) over other rice genotypes. The minimum 1000 grain weight was recorded in Durgabhog (9.19 g).

**Table.1** Evaluation of aromatic and non-aromatic rice genotypes for phenological observations of rice

| Sr. No. | Genotypes | Days to 50 % Flowering | Days to Physiological Maturity |
|---|---|---|---|
| **1** | PhuleMaval ($G_1$) | 96.50 | 128.50 |
| **2** | Phuleradha ($G_2$) | 86.25 | 117.50 |
| **3** | SKL-7($G_3$) | 106.50 | 139.25 |
| **4** | Terana ($G_4$) | 87.00 | 113.25 |
| **5** | Parag ($G_5$) | 81.25 | 114.25 |
| **6** | ACK-5 ($G_6$) | 96.75 | 126.50 |
| **7** | HMT Sona ($G_7$) | 88.50 | 118.00 |
| **8** | Kasturi ($G_8$) | 95.00 | 128.00 |
| **9** | Paras Sona ($G_9$) | 86.25 | 117.75 |
| **10** | Lolak ($G_{10}$) | 87.25 | 118.50 |
| **11** | Tulsi-75-14 ($G_{11}$) | 85.25 | 118.00 |
| **12** | Basmati-63 ($G_{12}$) | 94.50 | 126.50 |
| **13** | Pusa Sugandha-5 ($G_{13}$) | 97.50 | 129.00 |
| **14** | Basmati-107 ($G_{14}$) | 96.25 | 128.50 |
| **15** | Basmati-386 ($G_{15}$) | 94.75 | 126.75 |
| **16** | Super Basmati ($G_{16}$) | 98.75 | 129.75 |
| **17** | Antarvel ($G_{17}$) | 92.00 | 124.75 |
| **18** | Kala Jeera ($G_{18}$) | 105.50 | 136.25 |
| **19** | Dhanaprasad ($G_{19}$) | 96.25 | 129.00 |
| **20** | Bishnubhog ($G_{20}$) | 96.25 | 128.50 |
| **21** | Shrabanmasi ($G_{21}$) | 93.25 | 125.50 |
| **22** | Pusasugandha ($G_{22}$) | 86.75 | 119.00 |
| **23** | Kala Krishna ($G_{23}$) | 102.75 | 136.00 |
| **24** | Belgaum Basmati ($G_{24}$) | 93.00 | 126.00 |
| **25** | RDN-Scented ($G_{25}$) | 96.50 | 129.00 |
| **26** | Mamla ($G_{26}$) | 93.25 | 125.50 |
| **27** | Ghansal regional ($G_{27}$) | 106.25 | 138.00 |
| **28** | Pakistan basmati ($G_{28}$) | 102.00 | 134.00 |
| **29** | Pusa basmati ($G_{29}$) | 104.75 | 136.00 |
| **30** | Kate chinoor($G_{30}$) | 97.25 | 129.00 |
| **31** | RDN-local ($G_{31}$) | 96.25 | 128.00 |
| **32** | Lala ($G_{32}$) | 84.25 | 117.50 |
| **33** | Durgabhog ($G_{33}$) | 92.75 | 125.00 |
| **34** | Velchi ($G_{34}$) | 85.00 | 117.00 |
| **35** | PKV-khamang ($G_{35}$) | 99.25 | 134.00 |
| **36** | PKV-HMT ($G_{36}$) | 106.25 | 139.50 |
| **37** | PKV-ganesh ($G_{37}$) | 94.75 | 128.00 |
| **38** | PKV-Makrand ($G_{38}$) | 106.50 | 139.00 |
| **39** | Ambika ($G_{39}$) | 86.75 | 116.50 |
| **40** | Avishkar ($G_{40}$) | 96.00 | 128.00 |
| **41** | Bhogawati ($G_{41}$) | 103.00 | 135.00 |
| **42** | Kundalika ($G_{42}$) | 94.75 | 126.00 |
| **43** | Pawana ($G_{43}$) | 94.50 | 125.50 |
| **44** | Basmati-370 ($G_{44}$) | 103.75 | 135.50 |
| **45** | Basmati-388 ($G_{45}$) | 97.00 | 129.50 |
| **46** | Pusa sugandha-2 ($G_{46}$) | 96.00 | 128.00 |
| **47** | Sugandha ($G_{47}$) | 96.50 | 128.50 |
| **48** | Patnijira ($G_{48}$) | 95.75 | 128.00 |
| **49** | Bela blue ($G_{49}$) | 96.25 | 128.50 |
| **50** | Girga ($G_{50}$) | 94.75 | 127.00 |
| **51** | Ambemohar ($G_{51}$) | 112.00 | 144.00 |
| **52** | Elaichi ($G_{52}$) | 87.00 | 118.50 |
| **53** | Badshahabhog ($G_{53}$) | 94.75 | 127.00 |
| **54** | Karjat-3 ($G_{54}$) | 87.25 | 119.00 |
| **55** | Karjat-2 ($G_{55}$) | 110.00 | 141.00 |
| **56** | Karjat-7 ($G_{56}$) | 86.75 | 118.00 |
| **57** | Karjat-8 ($G_{57}$) | 111.00 | 144.00 |
| **58** | Karjat-9 ($G_{58}$) | 93.50 | 126.00 |
| **S.E±** | | **1.23** | **1.50** |
| **C.D at 5%** | | **3.47** | **4.24** |

**Table.2** Plant height (cm) and number of tillers per plant at 20 DAT to at harvest in aromatic and non-aromatic rice genotypes

| Sr. No | Genotypes | Plant height | | | | | Number of tillers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 DAT | 40 DAT | 60 DAT | 80 DAT | At Harvest | 20 DAT | 40 DAT | 60 DAT | 80 DAT | At Harvest |
| **1** | PhuleMaval ($G_1$) | 57.45 | 74.30 | 89.95 | 92.25 | 93.55 | 4.61 | 6.33 | 9.02 | 9.78 | 9.57 |
| **2** | Phuleradha ($G_2$) | 58.75 | 72.15 | 96.10 | 98.88 | 101.45 | 3.41 | 5.59 | 8.20 | 9.06 | 9.04 |
| **3** | SKL-7($G_3$) | 55.83 | 60.45 | 89.50 | 91.38 | 93.60 | 4.63 | 5.67 | 8.64 | 8.73 | 9.11 |
| **4** | Terana ($G_4$) | 66.40 | 86.25 | 115.60 | 117.25 | 120.35 | 4.25 | 5.68 | 8.87 | 9.20 | 9.16 |
| **5** | Parag ($G_5$) | 66.70 | 61.20 | 90.30 | 93.30 | 94.10 | 5.36 | 5.62 | 8.39 | 8.68 | 8.94 |
| **6** | ACK-5 ($G_6$) | 59.50 | 65.90 | 106.10 | 108.63 | 109.33 | 4.64 | 6.23 | 8.19 | 9.28 | 9.45 |
| **7** | HMT Sona ($G_7$) | 52.90 | 64.25 | 93.85 | 94.25 | 98.95 | 4.62 | 6.01 | 8.72 | 9.72 | 8.87 |
| **8** | Kasturi ($G_8$) | 61.55 | 64.45 | 92.15 | 94.10 | 97.35 | 4.62 | 6.05 | 8.72 | 9.61 | 8.78 |
| **9** | Paras Sona ($G_9$) | 52.95 | 56.40 | 86.65 | 88.55 | 91.15 | 4.64 | 6.33 | 9.05 | 9.80 | 9.64 |
| **10** | Lolak ($G_{10}$) | 60.25 | 71.95 | 97.55 | 99.68 | 101.70 | 4.83 | 5.44 | 8.68 | 8.67 | 8.89 |
| **11** | Tulsi-75-14 ($G_{11}$) | 63.25 | 71.75 | 107.80 | 111.08 | 111.00 | 4.38 | 5.96 | 8.27 | 9.23 | 9.11 |
| **12** | Basmati-63 ($G_{12}$) | 69.65 | 89.20 | 121.15 | 124.73 | 125.23 | 3.48 | 5.14 | 7.81 | 8.28 | 8.11 |
| **13** | Pusa Sugandha-5 ($G_{13}$) | 62.00 | 79.65 | 135.10 | 137.38 | 140.15 | 3.56 | 5.23 | 7.84 | 8.48 | 8.33 |
| **14** | Basmati-107 ($G_{14}$) | 63.75 | 72.55 | 137.05 | 139.93 | 142.35 | 3.95 | 5.65 | 8.02 | 8.86 | 8.95 |
| **15** | Basmati-386 ($G_{15}$) | 66.58 | 76.65 | 114.65 | 117.93 | 121.25 | 4.79 | 5.91 | 8.68 | 9.65 | 8.90 |
| **16** | Super Basmati ($G_{16}$) | 62.15 | 73.10 | 109.10 | 110.20 | 113.45 | 4.10 | 5.44 | 8.31 | 8.93 | 8.71 |
| **17** | Antarvel ($G_{17}$) | 61.80 | 74.55 | 124.10 | 127.48 | 127.55 | 4.61 | 5.80 | 8.37 | 9.19 | 8.89 |
| **18** | Kala Jeera ($G_{18}$) | 67.10 | 85.43 | 109.80 | 112.83 | 113.85 | 4.41 | 6.20 | 8.42 | 9.53 | 9.34 |
| **19** | Dhanaprasad ($G_{19}$) | 66.73 | 83.05 | 124.10 | 127.48 | 129.75 | 4.37 | 6.17 | 8.84 | 9.45 | 9.39 |
| **20** | Bishnubhog ($G_{20}$) | 61.45 | 89.20 | 119.55 | 123.08 | 124.93 | 4.42 | 6.11 | 8.90 | 9.70 | 9.46 |
| **21** | Shrabanmasi ($G_{21}$) | 57.75 | 74.45 | 116.50 | 120.15 | 121.65 | 4.05 | 5.94 | 8.65 | 9.37 | 9.34 |
| **22** | Pusasugandha ($G_{22}$) | 54.30 | 65.80 | 106.10 | 109.25 | 111.05 | 3.94 | 5.98 | 8.45 | 9.11 | 8.91 |
| **23** | Kala Krishna ($G_{23}$) | 62.75 | 72.93 | 119.55 | 122.08 | 126.45 | 4.25 | 5.69 | 8.47 | 9.18 | 9.09 |
| **24** | Belgaum Basmati ($G_{24}$) | 46.45 | 53.55 | 83.25 | 86.05 | 89.85 | 4.39 | 6.34 | 9.08 | 9.85 | 9.69 |
| **25** | RDN-Scented ($G_{25}$) | 60.85 | 73.40 | 110.35 | 112.45 | 115.63 | 3.70 | 5.45 | 8.15 | 8.74 | 8.60 |
| **26** | Mamla ($G_{26}$) | 58.05 | 62.45 | 113.60 | 113.50 | 115.78 | 4.22 | 6.02 | 8.73 | 9.35 | 8.88 |
| **27** | Ghansal regional ($G_{27}$) | 59.65 | 77.95 | 129.10 | 132.45 | 135.70 | 4.58 | 5.86 | 8.56 | 9.26 | 8.92 |
| **28** | Pakistan basmati ($G_{28}$) | 65.10 | 81.20 | 129.75 | 132.78 | 135.85 | 3.55 | 5.48 | 8.13 | 8.68 | 8.53 |
| **29** | Pusa basmati ($G_{29}$) | 66.13 | 77.35 | 99.00 | 101.65 | 103.78 | 3.94 | 5.75 | 8.22 | 9.44 | 9.26 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **30** | Kate chinoor($G_{30}$) | 57.60 | 63.65 | 114.15 | 115.63 | 118.05 | 4.63 | 6.00 | 8.39 | 9.48 | 9.47 |
| **31** | RDN-local ($G_{31}$) | 59.10 | 64.95 | 103.75 | 105.65 | 108.73 | 4.63 | 6.13 | 8.74 | 9.22 | 9.54 |
| **32** | Lala ($G_{32}$) | 65.40 | 80.45 | 106.25 | 108.15 | 112.05 | 4.38 | 5.99 | 8.72 | 9.28 | 8.88 |
| **33** | Durgabhog ($G_{33}$) | 53.35 | 67.15 | 100.75 | 102.48 | 104.25 | 4.43 | 6.04 | 8.17 | 9.11 | 8.88 |
| **34** | Velchi ($G_{34}$) | 56.85 | 67.80 | 101.30 | 109.63 | 112.78 | 4.21 | 6.31 | 8.69 | 9.13 | 8.81 |
| **35** | PKV-khamang ($G_{35}$) | 54.65 | 67.10 | 96.95 | 99.25 | 102.15 | 3.90 | 5.60 | 8.06 | 8.86 | 8.79 |
| **36** | PKV-HMT ($G_{36}$) | 64.95 | 87.35 | 112.30 | 114.55 | 117.25 | 4.30 | 6.07 | 8.85 | 9.45 | 9.35 |
| **37** | PKV-ganesh ($G_{37}$) | 53.58 | 68.95 | 98.35 | 100.28 | 102.95 | 3.98 | 5.81 | 8.60 | 9.30 | 9.08 |
| **38** | PKV-Makrand ($G_{38}$) | 54.08 | 72.55 | 95.50 | 97.67 | 102.63 | 4.14 | 6.24 | 8.45 | 9.50 | 9.37 |
| **39** | Ambika ($G_{39}$) | 61.15 | 72.20 | 103.05 | 105.85 | 108.33 | 4.36 | 5.96 | 8.28 | 9.30 | 9.07 |
| **40** | Avishkar ($G_{40}$) | 61.75 | 74.50 | 107.05 | 109.93 | 112.85 | 4.22 | 6.12 | 8.96 | 9.38 | 9.50 |
| **41** | Bhogawati ($G_{41}$) | 57.95 | 74.05 | 107.15 | 109.85 | 114.45 | 4.40 | 5.84 | 8.63 | 9.46 | 9.43 |
| **42** | Kundalika ($G_{42}$) | 51.23 | 69.45 | 104.10 | 106.78 | 110.18 | 4.59 | 5.78 | 8.86 | 9.25 | 8.99 |
| **43** | Pawana ($G_{43}$) | 54.55 | 67.43 | 105.15 | 108.35 | 113.40 | 3.94 | 5.44 | 8.30 | 8.83 | 8.68 |
| **44** | Basmati-370 ($G_{44}$) | 53.90 | 75.90 | 130.95 | 133.48 | 138.25 | 3.96 | 6.21 | 8.30 | 9.35 | 9.20 |
| **45** | Basmati-388 ($G_{45}$) | 63.25 | 83.75 | 132.95 | 135.25 | 137.15 | 3.55 | 5.39 | 8.14 | 8.68 | 8.46 |
| **46** | Pusa sugandha-2 ($G_{46}$) | 58.75 | 68.50 | 103.65 | 106.93 | 109.78 | 4.53 | 6.10 | 8.89 | 9.47 | 9.46 |
| **47** | Sugandha ($G_{47}$) | 55.35 | 89.60 | 127.55 | 129.85 | 133.95 | 4.13 | 5.88 | 8.62 | 9.16 | 8.99 |
| **48** | Patnijira ($G_{48}$) | 64.15 | 77.20 | 134.25 | 137.28 | 139.40 | 4.44 | 6.17 | 8.87 | 9.72 | 9.42 |
| **49** | Bela blue ($G_{49}$) | 46.40 | 88.90 | 148.35 | 151.63 | 154.70 | 4.48 | 6.01 | 8.86 | 9.45 | 9.08 |
| **50** | Girga ($G_{50}$) | 74.60 | 103.10 | 149.85 | 152.28 | 155.99 | 3.90 | 5.13 | 7.77 | 8.08 | 8.06 |
| **51** | Ambemohar ($G_{51}$) | 62.95 | 63.60 | 129.35 | 130.95 | 132.40 | 4.22 | 6.13 | 8.67 | 9.52 | 9.44 |
| **52** | Elaichi ($G_{52}$) | 59.55 | 82.60 | 107.85 | 109.95 | 113.33 | 4.47 | 6.13 | 8.34 | 9.54 | 9.54 |
| **53** | Badshahabhog ($G_{53}$) | 67.25 | 89.35 | 109.10 | 111.25 | 115.40 | 4.50 | 6.12 | 8.42 | 9.31 | 8.80 |
| **54** | Karjat-3 ($G_{54}$) | 51.55 | 63.10 | 95.95 | 98.75 | 101.40 | 4.49 | 6.42 | 9.14 | 9.88 | 9.73 |
| **55** | Karjat-2 ($G_{55}$) | 70.95 | 72.25 | 126.90 | 129.93 | 131.23 | 4.34 | 6.51 | 9.19 | 9.91 | 9.79 |
| **56** | Karjat-7 ($G_{56}$) | 55.78 | 72.60 | 96.35 | 98.63 | 101.15 | 4.48 | 6.54 | 9.24 | 10.00 | 9.89 |
| **57** | Karjat-8 ($G_{57}$) | 54.95 | 79.40 | 102.25 | 104.28 | 104.83 | 3.99 | 6.95 | 9.29 | 10.22 | 10.02 |
| **58** | Karjat-9 ($G_{58}$) | 63.85 | 78.75 | 118.25 | 121.05 | 122.63 | 3.23 | 7.24 | 9.94 | 10.79 | 10.36 |
| | **S.E±** | **2.71** | **4.09** | **4.23** | **5.87** | **5.12** | **0.12** | **0.16** | **0.20** | **0.34** | **0.24** |
| | **C.D at 5%** | **7.81** | **11.57** | **11.98** | **16.62** | **14.50** | **0.33** | **0.46** | **0.57** | **0.97** | **0.67** |

**Table.3** Number of leaves per plant at 20 DAT to at harvest in aromatic and non-aromatic rice genotypes

| Sr. No | Genotypes | Number of leaves | | | | |
|---|---|---|---|---|---|---|
| | | 20 DAT | 40 DAT | 60 DAT | 80 DAT | At Harvest |
| **1** | PhuleMaval ($G_1$) | 9.99 | 25.28 | 31.03 | 33.06 | 28.49 |
| **2** | Phuleradha ($G_2$) | 9.08 | 21.12 | 24.29 | 28.38 | 23.97 |
| **3** | SKL-7($G_3$) | 9.91 | 24.17 | 27.85 | 31.73 | 27.58 |
| **4** | Terana ($G_4$) | 9.28 | 20.13 | 24.94 | 27.48 | 22.68 |
| **5** | Parag ($G_5$) | 9.94 | 23.66 | 30.14 | 31.88 | 27.49 |
| **6** | ACK-5 ($G_6$) | 9.70 | 22.67 | 27.39 | 30.33 | 25.80 |
| **7** | HMT Sona ($G_7$) | 9.61 | 23.16 | 26.63 | 30.01 | 25.33 |
| **8** | Kasturi ($G_8$) | 9.46 | 23.73 | 28.92 | 31.41 | 27.29 |
| **9** | Paras Sona ($G_9$) | 10.15 | 25.44 | 31.19 | 33.69 | 28.53 |
| **10** | Lolak ($G_{10}$) | 9.86 | 24.32 | 29.94 | 31.27 | 27.44 |
| **11** | Tulsi-75-14 ($G_{11}$) | 9.54 | 19.02 | 23.88 | 24.99 | 22.81 |
| **12** | Basmati-63 ($G_{12}$) | 8.45 | 15.11 | 20.98 | 23.34 | 20.54 |
| **13** | Pusa Sugandha-5 ($G_{13}$) | 8.54 | 15.64 | 21.35 | 23.78 | 20.65 |
| **14** | Basmati-107 ($G_{14}$) | 8.87 | 16.76 | 22.76 | 24.83 | 22.21 |
| **15** | Basmati-386 ($G_{15}$) | 9.80 | 19.61 | 24.93 | 26.47 | 21.78 |
| **16** | Super Basmati ($G_{16}$) | 9.03 | 24.39 | 29.74 | 32.40 | 26.91 |
| **17** | Antarvel ($G_{17}$) | 9.23 | 21.40 | 27.10 | 27.73 | 22.88 |
| **18** | Kala Jeera ($G_{18}$) | 9.46 | 23.27 | 29.63 | 31.44 | 27.19 |
| **19** | Dhanaprasad ($G_{19}$) | 9.40 | 16.97 | 23.32 | 25.51 | 21.39 |
| **20** | Bishnubhog ($G_{20}$) | 9.15 | 23.95 | 29.44 | 29.08 | 24.90 |
| **21** | Shrabanmasi ($G_{21}$) | 9.35 | 21.18 | 27.01 | 29.29 | 24.53 |
| **22** | Pusasugandha ($G_{22}$) | 9.04 | 18.43 | 23.68 | 24.80 | 22.14 |
| **23** | Kala Krishna ($G_{23}$) | 9.20 | 22.52 | 28.07 | 30.01 | 25.98 |
| **24** | Belgaum Basmati ($G_{24}$) | 10.47 | 25.56 | 31.22 | 34.02 | 28.90 |
| **25** | RDN-Scented ($G_{25}$) | 8.72 | 20.51 | 25.91 | 28.59 | 22.61 |
| **26** | Mamla ($G_{26}$) | 9.59 | 21.73 | 27.78 | 29.94 | 25.30 |
| **27** | Ghansal regional ($G_{27}$) | 9.47 | 18.53 | 24.60 | 26.65 | 22.00 |
| **28** | Pakistan basmati ($G_{28}$) | 8.70 | 16.08 | 22.50 | 24.42 | 20.94 |
| **29** | Pusa basmati ($G_{29}$) | 9.32 | 19.85 | 25.66 | 29.95 | 24.99 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **30** | Kate chinoor($G_{30}$) | 9.99 | 18.06 | 24.33 | 26.13 | 21.80 |
| **31** | RDN-local ($G_{31}$) | 9.71 | 23.31 | 29.97 | 31.75 | 27.08 |
| **32** | Lala ($G_{32}$) | 9.48 | 21.93 | 27.37 | 28.41 | 23.56 |
| **33** | Durgabhog ($G_{33}$) | 9.24 | 24.23 | 28.07 | 32.65 | 26.54 |
| **34** | Velchi ($G_{34}$) | 9.44 | 21.69 | 29.30 | 30.08 | 26.54 |
| **35** | PKV-khamang ($G_{35}$) | 9.14 | 17.42 | 24.21 | 24.96 | 22.09 |
| **36** | PKV-HMT ($G_{36}$) | 9.37 | 19.69 | 25.54 | 28.53 | 21.94 |
| **37** | PKV-ganesh ($G_{37}$) | 9.23 | 19.89 | 25.23 | 27.28 | 21.90 |
| **38** | PKV-Makrand ($G_{38}$) | 9.91 | 21.22 | 29.40 | 29.06 | 25.25 |
| **39** | Ambika ($G_{39}$) | 9.26 | 20.41 | 26.97 | 28.74 | 23.80 |
| **40** | Avishkar ($G_{40}$) | 9.62 | 17.65 | 23.52 | 27.48 | 22.54 |
| **41** | Bhogawati ($G_{41}$) | 9.37 | 20.63 | 25.88 | 27.98 | 22.99 |
| **42** | Kundalika ($G_{42}$) | 9.56 | 24.44 | 29.83 | 31.32 | 26.58 |
| **43** | Pawana ($G_{43}$) | 9.19 | 19.13 | 23.69 | 27.70 | 22.21 |
| **44** | Basmati-370 ($G_{44}$) | 9.31 | 18.83 | 25.95 | 28.17 | 23.76 |
| **45** | Basmati-388 ($G_{45}$) | 8.88 | 16.85 | 23.04 | 24.21 | 21.62 |
| **46** | Pusa sugandha-2 ($G_{46}$) | 9.03 | 19.77 | 26.30 | 29.13 | 24.00 |
| **47** | Sugandha ($G_{47}$) | 8.98 | 16.58 | 24.17 | 24.60 | 22.31 |
| **48** | Patnijira ($G_{48}$) | 9.80 | 19.26 | 25.92 | 26.20 | 23.63 |
| **49** | Bela blue ($G_{49}$) | 9.56 | 23.59 | 30.06 | 31.97 | 27.51 |
| **50** | Girga ($G_{50}$) | 8.38 | 15.13 | 20.69 | 22.62 | 20.39 |
| **51** | Ambemohar ($G_{51}$) | 9.53 | 20.41 | 27.60 | 26.98 | 23.54 |
| **52** | Elaichi ($G_{52}$) | 9.43 | 20.38 | 28.97 | 30.88 | 24.14 |
| **53** | Badshahabhog ($G_{53}$) | 9.51 | 24.62 | 30.34 | 30.86 | 28.05 |
| **54** | Karjat-3 ($G_{54}$) | 9.46 | 25.70 | 31.76 | 34.49 | 29.74 |
| **55** | Karjat-2 ($G_{55}$) | 9.45 | 25.83 | 32.51 | 35.26 | 30.38 |
| **56** | Karjat-7 ($G_{56}$) | 9.49 | 27.79 | 34.14 | 35.69 | 30.74 |
| **57** | Karjat-8 ($G_{57}$) | 9.09 | 28.27 | 34.34 | 37.45 | 31.68 |
| **58** | Karjat-9 ($G_{58}$) | 8.82 | 32.03 | 38.58 | 39.71 | 35.05 |
| | **S.E±** | **0.14** | **0.40** | **1.62** | **1.91** | **2.30** |
| | **C.D at 5%** | **0.40** | **1.12** | **4.58** | **5.41** | **6.51** |

**Table.4** Evaluation of aromatic and non-aromatic rice genotypes for yield and yield attributes of rice

| Sr. No | Genotypes | Panicle length (cm) | Total number spikelets/ panicle | Number filled spikelets/ panicle | 1000 grain wt. (g) | Grain yield/plant (g) | Straw wt./plant (g) | Harvest Index (%) |
|---|---|---|---|---|---|---|---|---|
| **1** | PhuleMaval ($G_1$) | 25.65 | 176.04 | 146.58 | 18.46 | 16.67 | 25.16 | 39.90 |
| **2** | Phuleradha ($G_2$) | 24.49 | 120.73 | 91.02 | 16.42 | 13.43 | 24.48 | 35.40 |
| **3** | SKL-7($G_3$) | 25.51 | 157.17 | 128.92 | 18.24 | 15.14 | 24.61 | 38.37 |
| **4** | Terana ($G_4$) | 24.43 | 120.23 | 103.15 | 11.38 | 14.62 | 27.09 | 34.79 |
| **5** | Parag ($G_5$) | 20.39 | 118.98 | 94.56 | 18.66 | 15.53 | 28.71 | 34.77 |
| **6** | ACK-5 ($G_6$) | 19.99 | 106.38 | 101.50 | 12.64 | 14.85 | 24.28 | 37.95 |
| **7** | HMT Sona ($G_7$) | 23.30 | 144.04 | 119.29 | 17.20 | 10.42 | 19.41 | 34.97 |
| **8** | Kasturi ($G_8$) | 25.25 | 163.58 | 148.04 | 15.80 | 13.46 | 25.92 | 34.03 |
| **9** | Paras Sona ($G_9$) | 21.12 | 176.60 | 151.10 | 18.91 | 16.83 | 23.87 | 41.30 |
| **10** | Lolak ($G_{10}$) | 25.13 | 125.38 | 85.75 | 16.45 | 16.36 | 28.27 | 36.54 |
| **11** | Tulsi-75-14 ($G_{11}$) | 27.85 | 132.98 | 108.69 | 13.28 | 14.47 | 25.35 | 36.06 |
| **12** | Basmati-63 ($G_{12}$) | 28.26 | 97.91 | 78.62 | 16.78 | 8.91 | 16.43 | 34.86 |
| **13** | Pusa Sugandha-5 ($G_{13}$) | 28.75 | 128.48 | 114.31 | 19.23 | 10.81 | 19.53 | 35.44 |
| **14** | Basmati-107 ($G_{14}$) | 25.58 | 98.71 | 82.83 | 16.83 | 15.33 | 29.53 | 34.05 |
| **15** | Basmati-386 ($G_{15}$) | 28.81 | 165.71 | 121.92 | 16.89 | 15.76 | 26.20 | 37.33 |
| **16** | Super Basmati ($G_{16}$) | 27.16 | 149.81 | 124.10 | 16.33 | 15.63 | 27.98 | 35.80 |
| **17** | Antarvel ($G_{17}$) | 25.23 | 167.92 | 139.83 | 14.20 | 15.45 | 26.99 | 36.26 |
| **18** | Kala Jeera ($G_{18}$) | 24.59 | 119.08 | 94.21 | 13.36 | 15.39 | 28.73 | 34.79 |
| **19** | Dhanaprasad ($G_{19}$) | 25.05 | 164.46 | 136.96 | 14.89 | 15.33 | 25.84 | 37.37 |
| **20** | Bishnubhog ($G_{20}$) | 25.53 | 136.90 | 113.35 | 14.15 | 15.26 | 28.56 | 34.77 |
| **21** | Shrabanmasi ($G_{21}$) | 26.12 | 126.83 | 103.79 | 14.35 | 15.81 | 28.72 | 35.39 |
| **22** | Pusasugandha ($G_{22}$) | 27.77 | 100.25 | 81.92 | 17.75 | 15.78 | 29.79 | 34.56 |
| **23** | Kala Krishna ($G_{23}$) | 27.38 | 152.00 | 128.33 | 14.95 | 15.66 | 29.92 | 34.36 |
| **24** | Belgaum Basmati ($G_{24}$) | 24.60 | 176.69 | 149.60 | 19.50 | 17.51 | 24.28 | 42.13 |
| **25** | RDN-Scented ($G_{25}$) | 25.10 | 160.02 | 130.27 | 13.27 | 15.95 | 26.72 | 37.35 |
| **26** | Mamla ($G_{26}$) | 23.95 | 158.00 | 130.54 | 12.75 | 15.47 | 25.80 | 37.29 |
| **27** | Ghansal regional ($G_{27}$) | 26.69 | 104.73 | 82.31 | 14.46 | 15.74 | 29.65 | 34.60 |
| **28** | Pakistan basmati ($G_{28}$) | 25.35 | 121.85 | 105.52 | 13.98 | 10.02 | 16.89 | 36.98 |
| **29** | Pusa basmati ($G_{29}$) | 25.55 | 165.58 | 142.25 | 13.45 | 15.61 | 28.49 | 35.23 |
| **30** | Kate chinoor($G_{30}$) | 25.12 | 136.69 | 108.06 | 17.22 | 13.24 | 24.48 | 34.87 |
| **31** | RDN-local ($G_{31}$) | 25.79 | 108.19 | 89.27 | 14.28 | 15.45 | 26.75 | 36.37 |
| **32** | Lala ($G_{32}$) | 25.42 | 148.40 | 122.52 | 9.98 | 12.53 | 20.87 | 37.30 |

**Continued……**

| Sr. No | Genotypes | Panicle length (cm) | Total number spikelets/ Panicle | Number filled spikelets/ panicle | 1000 grain wt. (g) | Grain yield/plant (g) | Straw wt./plant (g) | Harvest Index (%) |
|---|---|---|---|---|---|---|---|---|
| **33** | Durgabhog ($G_{33}$) | 22.95 | 173.65 | 141.73 | 9.19 | 13.56 | 22.63 | 37.22 |
| **34** | Velchi ($G_{34}$) | 25.79 | 116.00 | 110.25 | 13.60 | 12.31 | 21.56 | 36.14 |
| **35** | PKV-khamang ($G_{35}$) | 24.26 | 150.65 | 137.31 | 13.98 | 11.48 | 20.53 | 35.77 |
| **36** | PKV-HMT ($G_{36}$) | 25.65 | 131.08 | 124.17 | 11.81 | 12.20 | 22.95 | 34.50 |
| **37** | PKV-ganesh ($G_{37}$) | 24.99 | 107.10 | 84.27 | 11.79 | 13.42 | 24.55 | 35.10 |
| **38** | PKV-Makrand ($G_{38}$) | 26.52 | 137.81 | 101.90 | 17.34 | 14.63 | 26.89 | 35.21 |
| **39** | Ambika ($G_{39}$) | 25.02 | 141.31 | 116.85 | 14.81 | 12.36 | 23.22 | 34.70 |
| **40** | Avishkar ($G_{40}$) | 25.19 | 142.75 | 117.08 | 18.27 | 13.36 | 25.03 | 34.80 |
| **41** | Bhogawati ($G_{41}$) | 24.43 | 146.21 | 120.46 | 13.34 | 14.15 | 25.83 | 35.39 |
| **42** | Kundalika ($G_{42}$) | 24.61 | 138.35 | 112.56 | 16.96 | 14.27 | 26.68 | 34.83 |
| **43** | Pawana ($G_{43}$) | 24.84 | 166.02 | 140.23 | 14.93 | 13.56 | 25.06 | 35.11 |
| **44** | Basmati-370 ($G_{44}$) | 24.95 | 123.15 | 96.35 | 16.83 | 14.56 | 26.64 | 35.33 |
| **45** | Basmati-388 ($G_{45}$) | 25.27 | 154.98 | 128.44 | 16.12 | 9.56 | 17.08 | 35.86 |
| **46** | Pusa sugandha-2 ($G_{46}$) | 27.16 | 155.21 | 127.67 | 15.25 | 15.28 | 24.91 | 38.00 |
| **47** | Sugandha ($G_{47}$) | 25.21 | 105.35 | 85.44 | 15.99 | 13.14 | 23.31 | 36.03 |
| **48** | Patnijira ($G_{48}$) | 24.57 | 167.90 | 139.19 | 13.83 | 13.25 | 21.35 | 38.28 |
| **49** | Bela blue ($G_{49}$) | 25.22 | 134.71 | 111.96 | 14.73 | 12.61 | 22.34 | 36.03 |
| **50** | Girga ($G_{50}$) | 25.16 | 90.67 | 59.04 | 9.23 | 7.03 | 14.21 | 33.08 |
| **51** | Ambemohar ($G_{51}$) | 24.52 | 166.96 | 139.71 | 13.20 | 13.74 | 23.39 | 36.75 |
| **52** | Elaichi ($G_{52}$) | 26.06 | 103.15 | 86.06 | 16.56 | 14.51 | 24.71 | 36.97 |
| **53** | Badshahabhog ($G_{53}$) | 24.57 | 132.02 | 111.02 | 10.94 | 15.41 | 25.14 | 38.00 |
| **54** | Karjat-3 ($G_{54}$) | 20.25 | 179.46 | 152.46 | 19.48 | 20.66 | 28.23 | 42.25 |
| **55** | Karjat-2 ($G_{55}$) | 20.57 | 182.44 | 156.69 | 21.38 | 18.01 | 24.39 | 42.54 |
| **56** | Karjat-7 ($G_{56}$) | 20.50 | 182.85 | 148.52 | 19.89 | 18.79 | 23.78 | 44.32 |
| **57** | Karjat-8 ($G_{57}$) | 19.84 | 182.75 | 149.83 | 20.41 | 18.20 | 22.41 | 44.81 |
| **58** | Karjat-9 ($G_{58}$) | 20.73 | 190.46 | 163.21 | 21.59 | 18.49 | 21.77 | 45.93 |
| | **Range** | 19.84-28.81 | 90.67-190.46 | 59.04-163.21 | 9.19-21.59 | 7.03-20.66 | 14.21-29.92 | 33.08-45.93 |
| | **S.E±** | **1.12** | **3.50** | **2.31** | **0.89** | **1.37** | **1.34** | **2.03** |
| | **C.D at 5%** | **3.17** | **9.91** | **6.54** | **2.52** | **4.10** | **3.81** | **6.10** |

**Table.5** Correlation co-efficient of morphological, physiological, growth parameters and yield attributing parameters in aromatic and non-aromatic rice genotypes

| Traits | DFPF | DM | PH | NTPP | LPP | TDM | LA | CC | CSI | Pn | Tr | Sc | WUE | AGR | RGR | TSPP | TFSPP | PL | 1000 GW | GY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DFPF** | 1.00 | | | | | | | | | | | | | | | | | | | |
| **DM** | 0.947** | 1.00 | | | | | | | | | | | | | | | | | | |
| **PH** | 0.259* | 0.278* | 1.00 | | | | | | | | | | | | | | | | | |
| **NTPP** | 0.128 | 0.156 | -0.219 | 1.00 | | | | | | | | | | | | | | | | |
| **LPP** | 0.010 | 0.038 | -0.274* | 0.681** | 1.00 | | | | | | | | | | | | | | | |
| **TDM** | -0.030 | 0.031 | -0.324* | 0.703** | 0.634** | 1.00 | | | | | | | | | | | | | | |
| **LA** | -0.084 | -0.051 | -0.467** | 0.603** | 0.734** | 0.708** | 1.00 | | | | | | | | | | | | | |
| **CC** | 0.013 | 0.061 | -0.277 | 0.721** | 0.693** | 0.763** | 0.731** | 1.00 | | | | | | | | | | | | |
| **CSI** | 0.040 | 0.049 | -0.309* | 0.674** | 0.571** | 0.672** | 0.630** | 0.913** | 1.00 | | | | | | | | | | | |
| **Pn** | -0.014 | 0.017 | -0.313* | 0.555** | 0.496** | 0.640** | 0.613** | 0.615** | 0.573** | 1.00 | | | | | | | | | | |
| **Tr** | -0.044 | -0.016 | 0.271* | -0.505** | -0.479** | -0.570** | -0.525** | -0.588** | -0.567** | -0.668** | 1.00 | | | | | | | | | |
| **Sc** | 0.018 | 0.031 | -0.289* | 0.567** | 0.514** | 0.656** | 0.518** | 0.589** | 0.556** | 0.685** | -0.679** | 1.00 | | | | | | | | |
| **WUE** | 0.034 | 0.038 | -0.281* | 0.511** | 0.490** | 0.610** | 0.526** | 0.607** | 0.572** | 0.714** | -0.815** | 0.648** | 1.00 | | | | | | | |
| **AGR** | -0.048 | -0.065 | -0.410** | 0.601** | 0.500** | 0.745** | 0.590** | 0.621** | 0.626** | 0.541** | -0.468** | 0.551** | 0.502** | 1.00 | | | | | | |
| **RGR** | -0.038 | -0.086 | 0.070 | -0.191 | -0.238 | -0.187 | -0.243* | -0.217 | -0.118 | -0.271* | 0.276* | -0.220 | -0.286* | 0.314* | 1.00 | | | | | |
| **TSPP** | 0.134 | 0.167 | -0.271* | 0.427** | 0.441** | 0.519** | 0.454** | 0.536** | 0.512** | 0.548** | -0.559** | 0.528** | 0.537** | 0.431** | -0.225* | 1.00 | | | | |
| **TFSPP** | 0.148 | 0.174 | -0.266* | 0.433** | 0.447** | 0.500** | 0.468** | 0.504** | 0.473** | 0.545** | -0.580** | 0.563** | 0.544** | 0.391** | -0.257* | 0.959** | 1.00 | | | |
| **PL** | 0.051 | 0.118 | 0.314* | -0.265 | -0.224 | -0.332* | -0.400** | -0.334** | -0.386** | -0.462** | 0.389** | -0.391** | -0.455** | -0.347** | 0.292* | -0.321* | -0.331* | 1.00 | | |
| **1000 GW** | 0.013 | 0.056 | -0.179 | 0.386** | 0.397** | 0.512** | 0.428** | 0.542** | 0.506** | 0.460** | -0.520** | 0.475** | 0.518** | 0.375** | -0.185 | 0.336** | 0.298* | -0.187 | 1.00 | |
| **GY** | -0.006 | 0.030 | -0.257* | 0.616** | 0.551** | 0.844** | 0.611** | 0.703** | 0.641** | 0.507** | -0.543** | 0.594** | 0.491** | 0.729** | -0.007 | 0.439** | 0.402** | -0.248* | 0.418** | 1.00 |

(*indicates significance at 5 per cent levels; **indicates significance at 1 per cent levels)

Similar significant variation among the rice genotypes were recorded significant association between 1000 grain weight and yield. Similar findings supported by Sidhu *et al*., (1992), Cheema *et al.*, (1998), Mondal *et al.,* (2005) and Ashrafuzzaman *et al.,* (2009).

## Grain yield per plant

The significantly higher grain yield was recorded in Karjat-3 (20.66 g plant$^{-1}$) which was at par with Karjat-7 (18.79 g plant$^{-1}$), Karjat-9 (18.49 g plant$^{-1}$), Karjat-8 (18.20 g plant$^{-1}$), Karjat-2 (18.01 g plant$^{-1}$), Belgaum Basmati (17.51 g), Paras sona (16.83 g) and PhuleMaval (16.67 g) over other rice genotypes. The lowest grain yield was recorded in Girga (7.03 g plant$^{-1}$). Grain yield was observed highly significant and positively correlated with number of tillers, number of leaves, total dry matter, leaf area, AGR, LAI, LAD, LAR, total and filled spikelets per panicle and 1000 grain weight while plant height and panicle length was observed highly significant and negatively associated with grain yield. Similar results were reported by Sidhu *et al*., (1992), Fageria and Baligar (2001), Patel *et al.,* (2010), Islam *et al.,* (2016) and MohhamdShmim *et al.,* (2018). Variation in grain yield in rice has been also reported by Hari *et al.,* (1997), Golam *et al.,* (2001), Ramrao (2004), Chandrika *et al.,* (2015), Kardile *et al.,* (2018) and Mohammad Shamim *et al.,* (2018).

## Straw yield per plant

Significantly maximum straw yield was recorded in Kala Krishna (29.92 g plant$^{-1}$) which was at par with Pusasugandha (29.79 g plant$^{-1}$), Ghansal Regional (29.65 g plant$^{-1}$), Basmati-107 (29.53 g plant$^{-1}$), Kala Jeera (28.73 g plant$^{-1}$), Shrabanmasi (28.72 g plant$^{-1}$) and Parag (28.71 g plant$^{-1}$) over other rice genotypes. The minimum straw yield was recorded in Girga (14.21 g plant$^{-1}$). Variation in straw yield in rice genotypes has been also reported by Hari *et al.,* (1997), Singh and Jain (2000) and Golam (2001).

## Harvest index

The data on harvest index revealed that there was significant difference among the aromatic and non-aromatic rice genotypes. The harvest index reflects the physiological ability of the crop genotype to mobilize photosynthates to the economic portion of the plant. In the present investigation, significantly higher harvest index of 45.93% was recorded in genotype Karjat-9 which was at par with Karjat-8 (44.81%), Karjat-7 (44.32%), Karjat-2 (42.54%), Karjat-3 (42.25%), Belgaum Basmati (42.13%), Paras Sona (41.30%) and PhuleMaval (39.90%) over other rice genotypes and the lowest harvest index of 33.08% was recorded in Girga. Highest harvest index in Karjat-8 can be attributed to more grain filling percentage and more grain weight per plant as compared to other rice genotypes. High harvest index is associated with high yields. There is a positive relationship between the harvest index and dry matter mobilization efficiency during grain filling resulted in higher grain yield. Similar results reported by Lavanya *et al.,* (2018). The varietal difference for harvest index was also reported by Kusutani *et al.,* (2000) and Chandrasekhar *et al.,* (2001).

Based on above results, it is concluded that, Among aromatic rice genotypes viz., Belgaum Basmati, PhuleMaval and Paras Sona and all non-aromatic rice genotypes, i.e., Karjat-2, Karjat-3, Karjat-7, Karjat-8 and Karjat-9 found to be physiologically most efficient in respect of source translocation and sink capacity development, compared to other rice genotypes. Among aromatic rice genotypes Belgaum Basmati, Paras Sona and PhuleMaval and non-aromatic rice genotypes

Karjat-9, Karjat-8, Karjat-7, Karjat-2 and Karjat-3 showed higher value of number of tillers, number of leaves, total number of filled spikelets, grain yield and harvest index.

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