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# Seed Multiplication of Traditional Varieties of Paddy (*Oryza sativa* L) for their Protection in Sustainable Agriculture

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**ABSTRACT: Generally, seed multiplication procedure is followed only for the certification of high yielding, hybrid varieties etc. which are notified under Seed Act 1966. In this regard, we have challenge to protect our traditional varieties of paddy for the development of sustainable agriculture. These varieties' values are very significant because it's containing significant genes. Traditional rice varieties can be multiplied as seed in order to acquire high-quality seeds while maintaining the quality of their existing features. Therefore, sixty-two (62) traditional rice varieties of West Bengali were collected and stored at a low temperature in a deep freezer at -10 degrees centigrade at the Crop Research and Seed Multiplication Farm, The University of Burdwan. Seeds were multiplied after six months of storage in order to study yield and other important agronomic traits among the varieties. A wide variation of yield and other valuable agronomic traits like plant height (cm), total number of tillers per hill, number of panicles per hill, number of seeds per panicle, number of chaffy seeds per panicle, duration of 50% flowering (days), 100 seed weight (gram), maturity duration (days), length of panicle (cm), length of flag leaf (cm), grain characters like presence or absence of awning were found among the varieties during Kharif season of 2020 and 2021. These traits may be used in future to choose the parents in a breeding programme to develop high yielding, hybrid varieties.**

**Keywords:** Paddy, Varieties, Yield & others traits, Seed multiplication, Preservation.

## INTRODUCTION

Over half of the world's population consumes rice as a major food crop, making it one of the most important cereal food crops (Mahender *et al*., 2016; Li *et al*., 2017). West Bengal is the state that produces the most paddy out of all the states in India, making it the country's "food home" (Prahalad, 2010). One of the most vital factors in the seed production of improved rice varieties for sustainable agriculture is the utilizantion and adaptability of traditional rice varieties (Atlin *et al*., 2006; Anandan *et al*., 2011). Traditional varieties serve as the gene pool for a number of important traits that must be collected and conserved order to produce future high yielding, hybrid cultivars of pest resistant, salt resistant, draught resistant, etc., and eco-friendly varieties of rice. According to some researchers, traditional paddy varieties are very important in terms of flavour, nutrition, colour, aroma, pest-resistance, medicinal characteristics, etc. (Banerjee and Godda 2021). Due to the overuse of high yielding paddy varieties, traditional rice cultivation in West Bengal has been continuously reduced (Chatterjee *et al*., 2008; Chakravorty and Ghosh 2012). The study has been done for conservation and identification of various traits of traditional rice varieties of Bankura district of West Bengal (Sinha and Mishra 2012; 2015). Farmers in southern West Bengal are gradually cultivating numerous traditional rice varieties since high yielding improved varieties couldn't survive the severe growing conditions (Deb, 1995). As per the section of 5 to the seeds Act. 1966, "Notified kind or variety", in relation to any seed, means any kind or variety thereof notified under section 5. To ensure genetic purity of high quality seeds of notified varieties, seed certification system is to maintain and make available to the farmers (Seed Act, 1966). Therefore, we have challenge to protect our traditional varieties of paddy for the development of sustainable agriculture because these varieties are not under section 5 to the seeds Act 1966. Present study was aim to assess the yield and other agronomic characters of different traditional rice varieties with try to follow of some cultivation practices as per seeds Act, 1966 to protect and obtain high quality traditional varieties of paddy seed at Crop Research and Seed Multiplication Farm, Tarabag, The University of Burdwan. The preservation and seed multiplication both are the major aspect for the protection of these traditional varieties from extinction and valuable

characters which may be utilized for the production of new high yielding varieties.

## MATERIALS AND METHODS

Seeds of traditional paddy varieties (Table 1) were collected from progressive farmer namely Rafikul Alam Sahana of the village Arjun Pukur, P.O.- Nadan Ghat, Dist.- Purba Bardhaman, Pin-713615; Central Rice Research Station, Chinsurah (Govt. of W.B.); Indian Institute of Technology, Kharagpur, West Bengal; Amarkanan Rural Socio-environmental Welfare Society (ARSW Society) etc. to study about yield and others valuable agronomic characters of these traditional varieties those characters will help for researchers, students and also farmers for sustainable agriculture. After collection, seeds were properly dried in the sun to safe moisture content and kept in plastic container and then stored in a deep freezer at -10 degree centigrade. After six month of storage seeds were properly treated with mancozeb 64% WP @ 2 gm per kg of seed and directly sown on field (plot size 3 feet × 3 feet) with spacing of 20 × 20 cm between rows and plants in the month of July of two consecutive *Kharif* season in the year of 2020 and 2021 under old alluvial soil in the Crop Research and Seed Multiplication farm (CRSMF) of Burdwan University, Tarabag, Burdwan, West Bengal. The average soil pH of the study area was 6.6. Seed multiplication practices *viz*., proper isolation distance of 3 meter from one each variety, free from volunteer plants in selected plot and well pulverized soil, kept the plots wet with water and drain off excess water, kept the plots free of weeds, minimum doses of fertilizer (10:26:26) @ 100 gm during basal application per plot, rouging of off-type plants were done once prior to flowering and then at flowering and maturity, disease and insect infected plants were rouged off from time to time, seeds were threshed by hand and winnowed to remove chaff, light grains etc. These seed multiplication practices were followed for maintaining the seed quality of these traditional varieties and observations were recorded on three randomly chosen plants of each plot on various agronomical traits *i.e*., plant height (cm), Number of panicles per hill, panicle length (cm), no of seeds per panicle, no of chaffy seeds per panicle, 100-grains weight (g), seed yield per plot (g) were recorded after harvesting and also recorded time to 50% flowering (days), maturity duration (days) of traditional paddy varieties individually.

**Table 1: List of collected traditional varieties of paddy of West Bengal which were used as given code in figure (1-10) for the study at CRSMF, The University of Burdwan.**

| Sr. No. | Name of Variety | Code | Sr. No. | Name of Variety | V31 |
|---|---|---|---|---|---|
| 1. | ADAN SILPA | V1 | 32. | LALTIPPA | V32 |
| 2. | AGRIBAN | V2 | 33. | LANGAL MUTHI | V33 |
| 3. | ANJALI | V3 | 34. | LIKE KAKUA | V34 |
| 4. | AUS KHAR | V4 | 35. | MANDIRA | V35 |
| 5. | BADSHA | V5 | 36. | MEDHI | V36 |
| 6. | BAHURUPI | V6 | 37. | MORAGI HATU | V37 |
| 7. | BAKRI SAL | V7 | 38.. | MUGI SAL | V38 |
| 8. | BANSKATA | V8 | 39.. | NABANNA | V39 |
| 9. | BANSHFUL | V9 | 40. | NASKELYHOP | V40 |
| 10. | BHART SAL | V10 | 41. | NC- KALMA | V41 |
| 11. | BHARATI | V11 | 42. | NIKUNJA | V42 |
| 12. | BHIM SAL | V12 | 43. | NUGABARO | V43 |
| 13. | CHAMPA KHUSI | V13 | 44. | PANKHI RAJ | V44 |
| 14. | CHANDARAKANTA | V14 | 45. | PURNENDU | V45 |
| 15. | CHANDARA KANTI | V15 | 46. | SABITRI-2 | V46 |
| 16. | CHATUI MUKHI | V16 | 47. | SABITRI | V47 |
| 17. | DADKHANI | V17 | 48. | SANKAR SAL | V48 |
| 18. | DANARGURI | V18 | 49. | SATIA | V49 |
| 19. | GANDHESWARI | V19 | 50. | SINDUR MUKHI | V50 |
| 20. | GOKULSAL | V20 | 51. | SITA BHOG | V51 |
| 21. | JAMAI NADU | V21 | 52. | SUKHASAL | V52 |
| 22. | JHULUR--2 | V22 | 53. | SUYARTHA | V53 |
| 23. | KAL GANDHESWARI | V23 | 54. | BHASA MANIK | V54 |
| 24. | KALAM KATI | V24 | 55. | VALKI | V55 |
| 25. | KALAMA | V25 | 56. | VADOI SAL | V56 |
| 26. | KALBORA | V26 | 57. | TULSI BHOG | V57 |
| 27. | KANAK CHUR | V27 | 58. | TALMUGUR | V58 |
| 28. | KARTIK SAL | V28 | 59. | DANGAPATANI | V59 |
| 29. | KLESH | V29 | 60. | FULPAGRI | V60 |
| 30. | KOMAL KARI | V30 | 61. | PATNAI | V61 |
| 31. | LAL DUDHESWAR | V31 | 62. | NARAYN KAMANI | V62 |

## RESULT AND DISCUSSION

Quality seed of high yielding, hybrid, etc. varieties can be used to boost rice production, and these varieties can be developed with the help of traditional rice varieties because they have a high level of genetic variation (Cleveland and Soleri 2007). Development of new varieties of high yielded, improved and hybrids depends upon desirable genes those are existed in traditional paddy varieties only (Shiva, 1991; Holden *et al.*, 1993**).** In this connection the following parameters of yield and others agronomic characters of 62 important traditional paddy varieties of West Bengal (Table 2) were recorded individually at Crop Research and Seed Multiplication Farm, The University of Burdwan.

**Plant height (cm).** Gokulsal and Purnendu had the tallest plants (182.9 cm), whereas Sabitri 2 had the shortest plants (64 cm) than all other varieties (Table 2 & Fig. 1). The genetic diversity among the varieties are mostly to responsible for these differences of plant height. These findings are in accordance with those of Naha (2007); Banumathy *et al.* (2010), who observed variations in plant height between varieties as a result of genotype genetic makeup.

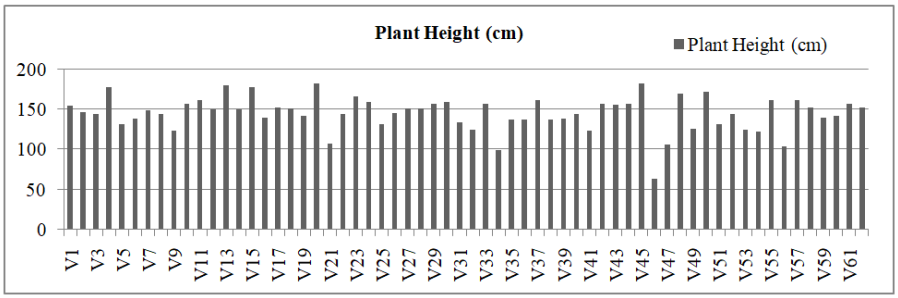


**Fig. 1.** Plant height of different traditional rice varieties.

**Number of tiller/ hill.** In order to produce rice, tilling is a key agronomic characteristic (Badshah *et al.*, 2014). In the current field study, Komalkari recorded the fewest tillar (10 nos.) compared to all other varieties, while Auskhar recorded the largest number of tiller per hill (31 nos.), followed by Fulpagri and Purnendu (Table 2 and Fig. 2). Varietal characteristics may be responsible for the variation in the obtained results showed of tillers per hill. Nuruzzaman *et al.* (2000) noted that the variety affected the overall number of tillers/hill.

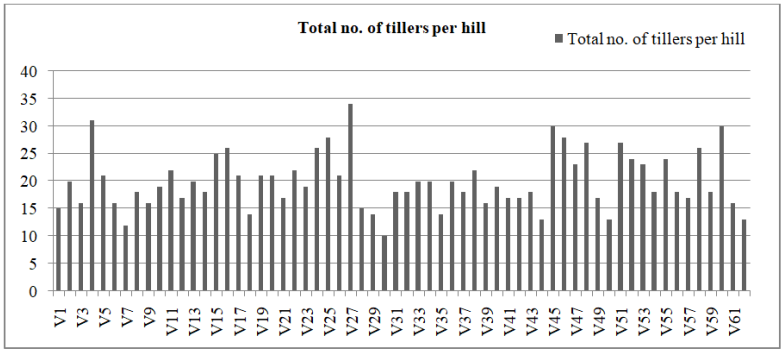


**Fig. 2.** Total tillers of different traditional rice varieties.

**Number of panicles/hill.** The number of reproductive tillers, also known as ear bearing tillers, is an important information for rice breeders because it directly affects yield per plant (Sadeghi, 2011). In this field study, Kanakchur has the highest number of panicles per hill (34nos.). It was found that Fulpagri had the second-fewest number of tillers (28 nos.), followed by Purnendu and Auskhar (28 nos.). Komarkari has the fewest panicles (10), followed by Sindurmukhi (12), and Kartiksal (13), when compared to the other varieties (Table 2 & Fig. 3).

**Number of seeds/ panicle.** The number of spikelets per panicle is useful data to rice breeders and directly affects production per plant (Sadeghi, 2011). According to Banumathy *et al.* (2010), overall variance was influenced by total grains per panicle. Here, the variety with the highest seeds per panicle was Bansphool (280 nos.), followed by Mugisal (274 nos.), and Komalkari (250 nos.), while the variety with the fewest seeds per panicle was Kanakchur (68 nos.), which was the lowest of all the varieties (Table 2 & Fig. 4). Additionally, Singh and Gangwar (1989) noted that different rice genotypes varied in the number of grains per panicle.

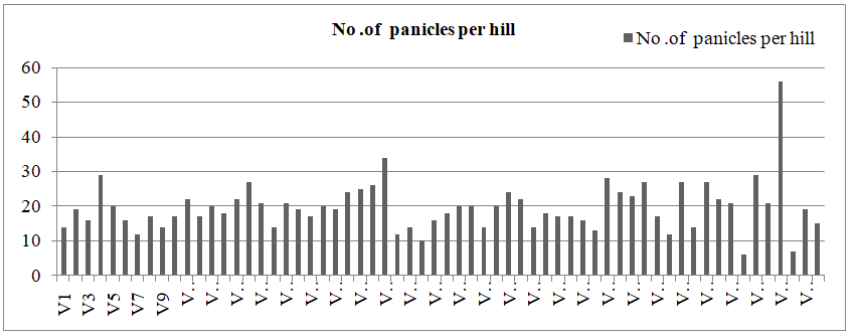


**Fig. 3.** Number of panicles of different traditional rice varieties.

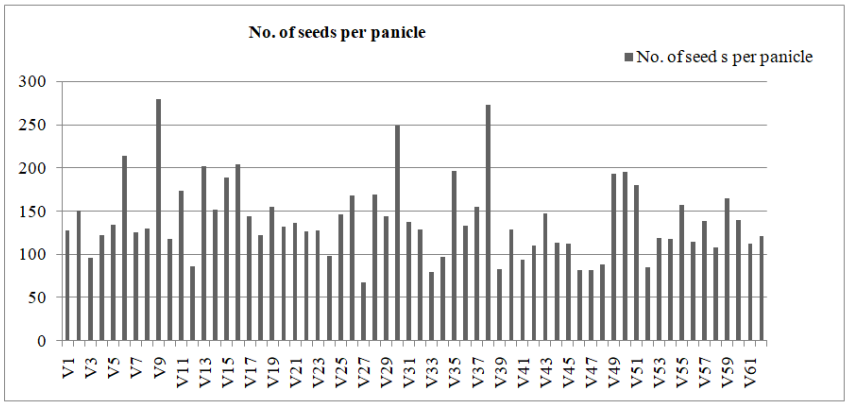


**Fig. 4.** Number of seeds of different traditional rice varieties.

**No. of chaffy seeds/panicle.** A negative character in a variety is chaffy seed. It seriously lowers yield and degrades a variety's popularity. In the current experiment, Klesh (57 nos.), Dangapatnai (56 nos.), and Gandheswari (57 nos.) displayed the maximum number of chaffy seeds (56 nos.). In terms of chaffy seed, Bakrisal and Banskanta performed very less number among all the varieties (Table 2 & Fig. 5).

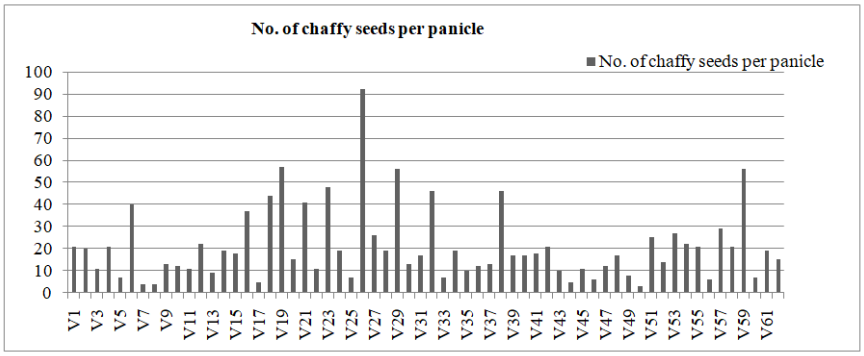


**Fig. 5.** No. of chaffy seeds of different traditional rice varieties.

**Length of Panicle (cm).** Long panicles of a variety may boost the crop yield. In Sankarsal, the maximum panicle length was recorded (35 cm). It was unique from all other varieties (Table 2 & Fig. 6). In terms of panicle length, Nugebaro produced the lowest panicle (19 cm), followed by NC Kalma, Jhulau 2, and Suyartha (Fig. 6). This diversity may be the result of heredity, which was directly connected to the genetic traits of variations. Idris and Motin (1990) reported similar findings.

**Length of Flag leaf (cm).** Among the traditional rice varieties, the highest length of flag leaf was recorded by Kartiksal (50.8 cm), while lowest length of flag leaf was recorded by Suyartha (25.4 cm) (Table 2 and Fig. 7).

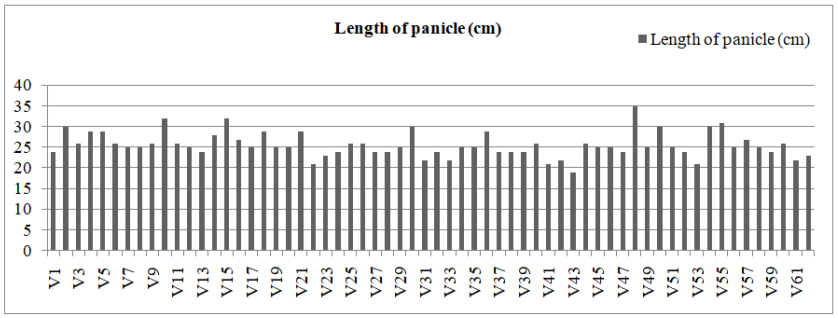


**Fig. 6.** Panicle length of different traditional rice varieties.

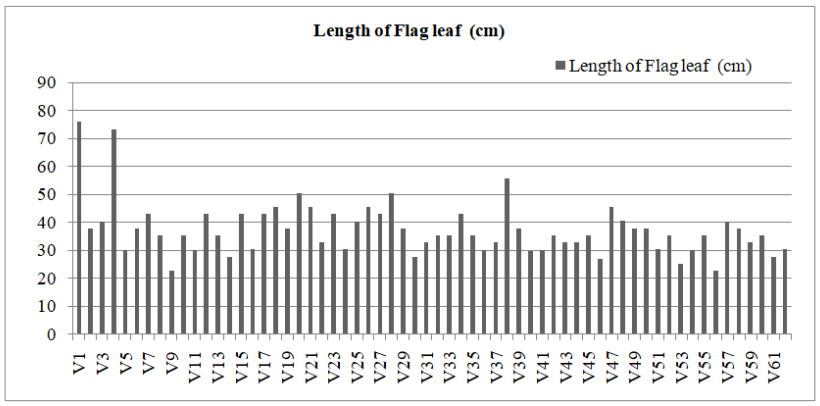


**Fig. 7.** Length of Flag leaf of different traditional rice varieties.

**Duration of 50% flower (days).** Vadoisal was an early 50% flowering (85 fays) and maturing (128 days) variety, while Champakhusi was the long duration of 50 % flowering (106 days) and maturity (137 fays) (Table 2 & Fig. 8). According to Banumathy *et al.* (2010), overall variance was influenced by days to fifty percent flowering. The most relevant traits that could be employed to increase rice yield, based to Augustina *et al*. (2013), are the number of grains per plant and days to 50% heading.

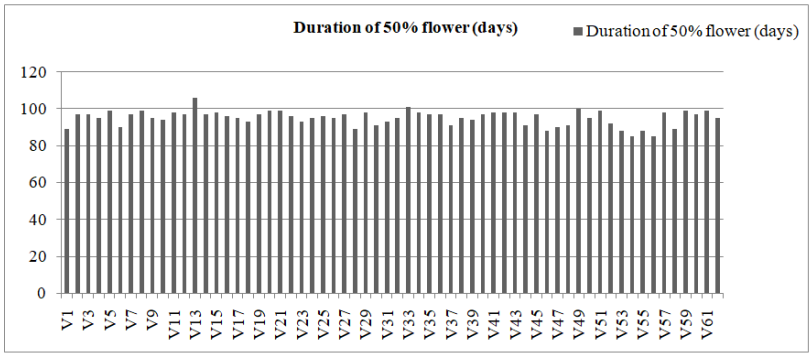


**Fig. 8.** Days of 50% flower of different traditional rice varieties.

**Maturity Duration.** In present experiment Kanakchur took long duration (164 days), while Kalama took short duration (101 days) and it was lowest maturity duration of variety than all other varieties (Table 2 & Fig. 9).

**Test weight (g).** The highest test weight (100 seed) was recorded by Naskelyhop (3.46g), while lowest was recorded by Laltippa (1.10 g). Sreedhar and Reddy (2019), using correlation studies, came to the conclusion that yield showed a substantial positive association at both the genotypic and phenotypic levels with the number of productive tillers and 100-grain weight.

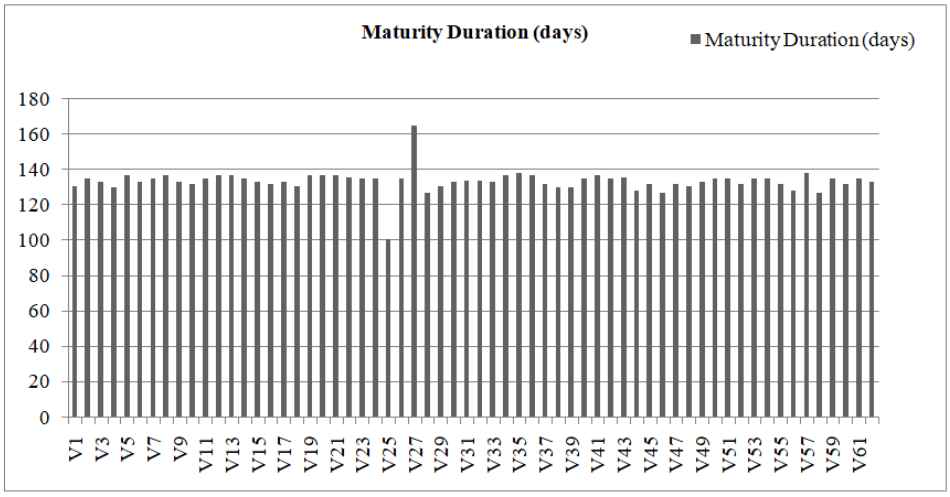


**Fig. 9.** Maturity days of different traditional rice varieties.

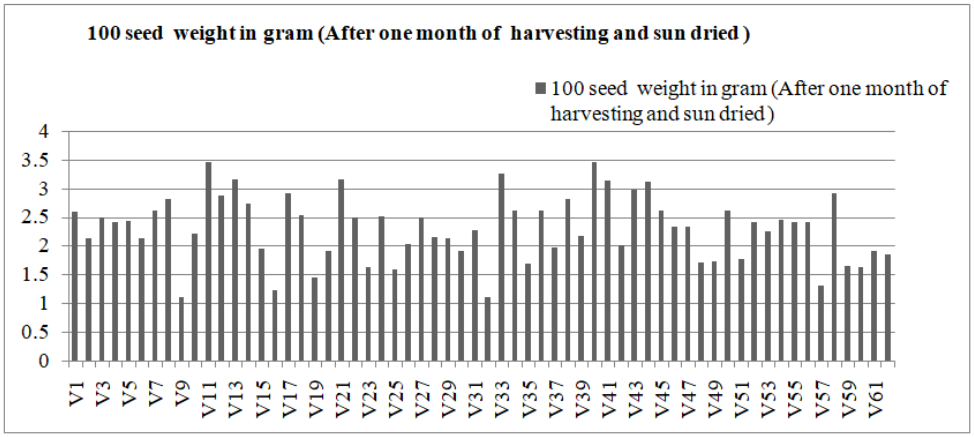


**Fig. 10.** Test weight of different traditional rice varieties.

**Seed yield (g).** The majority of breeding programmes remain to focus the highest priority on increasing grain yield (Yan *et al.*, 2002). In this experiment, Bahurupi had the maximum seed yield (640g) in the areas of 3 feet × 3 feet, whereas Nabanna and Vadoisal had the lowest seed yields (each 180 grammes) (Table 2 & Fig. 11). There have been reports of variety variances in grain yield (Tyeb *et al.*, 2013; Islam *et al.,* 2014).

**Awan of seed grain.** Awaning of seed grain was present only in Sindurmukhi, Bharatsal, Jhulur 2 and Kalamkati. Due to the protection provided by the awns in wild rice cultivars against pest attack and their crucial role in seed dissemination, they are classified as beneficial character (Takahashi *et al.*, 1986).

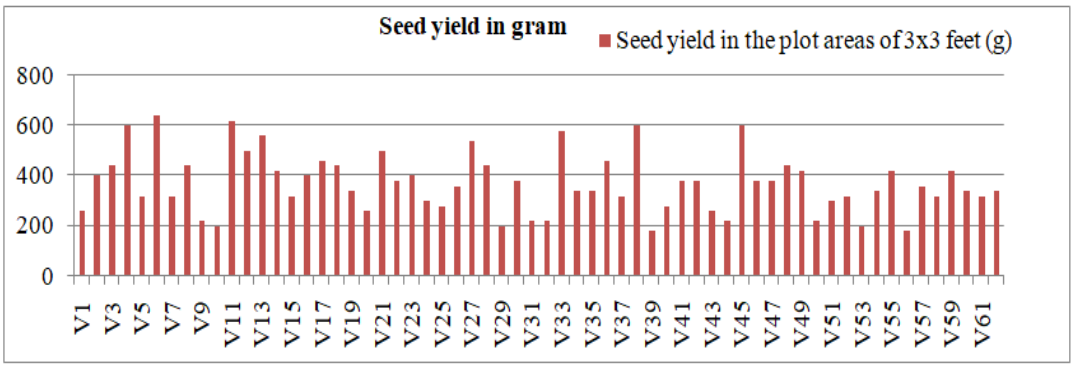


**Fig. 11.** Seed yield of different traditional rice varieties.

**Table 2 : Growth, yield and yield attributes of 62 nos. traditional varieties of Paddy (*Oryza sativa*).**

| Sr. No. | Name of traditional variety of *Oryza sativa* (Poaceae) | Plant Height (cm) | Total no. of tillers per hill | Length of panicle (cm) | Length of Flag leaf (cm) | No. of seed s per panicle | No. of chaffy seeds per panicle | No .of panicles per hill | Duration of 50% flower (days) | 100 seed weight in gram (After one month of harvesting and sun dried ) | Seed yield in the plot areas of 3 ×3 feet (gram) | Maturity Duration (days) | Awning of seed grain (Absent /present) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Adansilpa | 155 | 15 | 24 | 76.2 | 128 | 21 | 14 | 89 | 2.60 | 260 | 131 | Absent |
| 2. | Agriban | 147 | 20 | 30 | 38.1 | 151 | 20 | 19 | 97 | 2.13 | 400 | 135 | Absent |
| 3. | Anjali | 144.7 | 16 | 26 | 40.6 | 96 | 11 | 16 | 97 | 2.50 | 440 | 133 | Absent |
| 4. | Auskhar | 177.8 | 31 | 29 | 73.6 | 123 | 21 | 29 | 95 | 2.42 | 600 | 130 | Absent |
| 5. | Badsha | 132 | 21 | 29 | 30.4 | 135 | 7 | 20 | 99 | 2.43 | 320 | 137 | Absent |
| 6. | Bahurupi | 139 | 16 | 26 | 38.1 | 215 | 40 | 16 | 90 | 2.13 | 640 | 133 | Absent |
| 7. | Bakrisal | 149 | 12 | 25 | 43.2 | 126 | 4 | 12 | 97 | 2.61 | 320 | 135 | Absent |
| 8. | Banskanta | 145 | 18 | 25 | 35.6 | 130 | 04 | 17 | 99 | 2.81 | 440 | 137 | Absent |
| 9. | Banshphool | 124 | 16 | 26 | 22.8 | 280 | 13 | 14 | 95 | 1.10 | 220 | 133 | Absent |
| 10. | Bharatsal | 157 | 19 | 32 | 35.5 | 118 | 12 | 17 | 94 | 2.21 | 200 | 132 | Present |
| 11. | Bharati | 162.2 | 22 | 26 | 30.4 | 174 | 11 | 22 | 98 | 3.45 | 620 | 135 | Absent |
| 12. | Bhimsal | 150 | 17 | 25 | 43.18 | 86 | 22 | 17 | 97 | 2.88 | 500 | 137 | Absent |
| 13. | Champa Khusi | 180 | 20 | 24 | 35.56 | 203 | 9 | 20 | 106 | 3.16 | 560 | 137 | Absent |
| 14. | Chandarakanta | 149.8 | 18 | 28 | 27.9 | 152 | 19 | 18 | 97 | 2.74 | 420 | 135 | Absent |
| 15. | Chandrakanti | 177.8 | 25 | 32 | 43.1 | 189 | 18 | 22 | 98 | 1.94 | 320 | 133 | Absent |
| 16. | Chatuimukhi | 139.7 | 26 | 27 | 30.5 | 205 | 37 | 27 | 96 | 1.22 | 400 | 132 | Absent |
| 17. | Dadkhani | 152.4 | 21 | 25 | 43.2 | 144 | 05 | 21 | 95 | 2.92 | 460 | 133 | Absent |
| 18. | Danarguri | 152 | 14 | 29 | 45.7 | 123 | 44 | 14 | 93 | 2.54 | 440 | 131 | Absent |
| 19. | Gandheswari | 142 | 21 | 25 | 38.1 | 156 | 57 | 21 | 97 | 1.45 | 340 | 137 | Absent |
| 20. | Gokulsal | 182.9 | 21 | 25 | 50.8 | 132 | 15 | 19 | 99 | 1.91 | 260 | 137 | Absent |
| 21. | Jamainadu | 108 | 17 | 29 | 45.7 | 137 | 41 | 17 | 99 | 3.16 | 500 | 137 | Absent |
| 22. | Jhulur 2 | 145 | 22 | 21 | 33 | 127 | 11 | 20 | 96 | 2.50 | 380 | 136 | Present |
| 23. | Kal and heswari | 167 | 19 | 23 | 43.1 | 128 | 48 | 19 | 93 | 1.62 | 400 | 135 | Absent |
| 24. | Kalamkati | 160 | 26 | 24 | 30.48 | 98 | 19 | 24 | 95 | 2.52 | 300 | 135 | Present |
| 25. | Kalama | 132 | 28 | 26 | 40.6 | 146.3 | 07 | 25 | 96 | 1.58 | 280 | 101 | Absent |
| 26. | Kalbora | 146 | 21 | 26 | 45.7 | 169 | 92 | 26 | 95 | 2.03 | 360 | 135 | Absent |
| 27. | Kanakchur | 152 | 34 | 24 | 43.1 | 68 | 26 | 34 | 97 | 2.50 | 540 | 165 | Absent |
| 28. | Kartiksal | 152 | 15 | 24 | 50.8 | 170 | 19 | 12 | 89 | 2.16 | 440 | 127 | Absent |
| 29. | Klesh | 157 | 14 | 25 | 38.1 | 145 | 56 | 14 | 98 | 2.13 | 200 | 131 | Absent |
| 30. | Komalkari | 159 | 10 | 30 | 27.9 | 250 | 13 | 10 | 91 | 1.90 | 380 | 133 | Absent |
| 31. | Laldudheswar | 134.6 | 18 | 22 | 33 | 138 | 17 | 16 | 93 | 2.28 | 220 | 134 | Absent |
| 32. | Laltippa | 124.5 | 18 | 24 | 35.5 | 129 | 46 | 18 | 95 | 1.10 | 220 | 134 | Absent |
| 33. | Langalmuthi | 157 | 20 | 22 | 35.5 | 80 | 7 | 20 | 101 | 3.25 | 580 | 133 | Absent |
| 34. | Likekakua | 99 | 20 | 25 | 43.2 | 97 | 19 | 20 | 98 | 2.62 | 340 | 137 | Absent |
| 35. | Mandira | 137 | 14 | 25 | 35.5 | 197 | 10 | 14 | 97 | 1.68 | 340 | 138 | Absent |
| 36. | Medhi | 138 | 20 | 29 | 30.4 | 134 | 12 | 20 | 97 | 2.62 | 460 | 137 | Absent |
| 37. | Moragihatu | 162 | 18 | 24 | 33 | 155 | 13 | 24 | 91 | 1.97 | 320 | 132 | Absent |
| 38. | Mugisal | 138 | 22 | 24 | 55.8 | 274 | 46 | 22 | 95 | 2.81 | 600 | 130 | Absent |
| 39. | Nabanna | 139 | 16 | 24 | 38.1 | 83 | 17 | 14 | 94 | 2.17 | 180 | 130 | Absent |
| 40. | Naskelyhop | 144 | 19 | 26 | 30 | 129 | 17 | 18 | 97 | 3.46 | 280 | 135 | Absent |
| 41. | NC- Kalma | 124 | 17 | 21 | 30.1 | 94 | 18 | 17 | 98 | 3.13 | 380 | 137 | Absent |
| 42. | Nikunja | 157 | 17 | 22 | 35.5 | 111 | 21 | 17 | 98 | 2.00 | 380 | 135 | Absent |
| 43. | Nugebaro | 156.4 | 18 | 19 | 33 | 148 | 10 | 16 | 98 | 2.97 | 260 | 136 | Absent |
| 44. | Pankhiraj | 157 | 13 | 26 | 33 | 114 | 5 | 13 | 91 | 3.11 | 220 | 128 | Absent |
| 45. | Purnendu | 182.9 | 30 | 25 | 35.6 | 113 | 11 | 28 | 97 | 2.62 | 600 | 132 | Absent |
| 46. | Sabitri 2 | 64 | 28 | 25 | 27 | 82 | 6 | 24 | 88 | 2.34 | 380 | 127 | Absent |
| 47. | Sabitri | 106 | 23 | 24 | 45.72 | 82 | 12 | 23 | 90 | 2.34 | 380 | 132 | Absent |
| 48. | Sankarsal | 170 | 27 | 35 | 40.64 | 89 | 17 | 27 | 91 | 1.71 | 440 | 131 | Absent |
| 49. | Satia | 126 | 17 | 25 | 38 | 194 | 8 | 17 | 100 | 1.73 | 420 | 133 | Absent |
| 50. | Sindurmukhi | 172.7 | 13 | 30 | 38.1 | 196 | 3 | 12 | 95 | 2.61 | 220 | 135 | Ptrsent |
| 51. | Sitabhog | 132 | 27 | 25 | 30.5 | 181 | 25 | 27 | 99 | 1.76 | 300 | 135 | Absent |
| 52. | Sukhsal | 144.7 | 24 | 24 | 35.5 | 85 | 14 | 24 | 92 | 2.41 | 320 | 132 | Absent |
| 53. | Suyartha | 124.4 | 23 | 21 | 25.4 | 119 | 27 | 23 | 88 | 2.25 | 200 | 135 | Absent |
| 54. | Bhasamanik | 123 | 18 | 30 | 30.4 | 118 | 22 | 18 | 85 | 2.46 | 340 | 135 | Absent |
| 55. | Valki | 162 | 24 | 31 | 35.5 | 157.3 | 21 | 22 | 88 | 2.41 | 420 | 132 | Absent |
| 56. | Vadoisal | 104 | 18 | 25 | 22.9 | 115 | 6 | 17 | 85 | 2.42 | 180 | 128 | Absent |
| 57. | Tulshibhog | 162.2 | 17 | 27 | 40.6 | 139 | 29 | 17 | 98 | 1.31 | 360 | 138 | Absent |
| 58. | Talmugur | 152.4 | 26 | 25 | 38.1 | 108 | 21 | 23 | 89 | 2.92 | 320 | 127 | Absent |
| 59. | Dangapatnai | 140 | 18 | 24 | 33 | 165 | 56 | 18 | 99 | 1.65 | 420 | 135 | Absent |
| 60. | Fulpagri | 142 | 30 | 26 | 35.5 | 140 | 7 | 28 | 97 | 1.63 | 340 | 132 | Absent |
| 61. | Patnai | 157 | 16 | 22 | 27.9 | 113 | 19 | 16 | 99 | 1.91 | 320 | 135 | Absent |
| 62. | Narayan Kamini | 152.4 | 13 | 23 | 30.5 | 122 | 15 | 13 | 95 | 1.84 | 340 | 133 | Absent |

## CONCLUSION

The future food supply depends critically on maintaining traditional paddy varieties. It can be possible when researchers, seed growers and farmers will try to apply the seed multiplication procedures for protecting these traditional varieties. With accordance to the yield and other agronomic characters examined, the current study showed great variance among the traditional varieties of paddy. These variance are helpful for evaluating genetic diversity among the varieties.

## FUTURE SCOPE

This presumption is founded on the idea that continued genetic resource input into rice breeding efforts will lead to yield stability and growth. Therefore, Breeders, researchers, and farmers can use this work to find, replace, and conserve valuable genes for crop improvement programme.

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## REFERENCES

Anandan, A., G. Rajiv, R. Eswaran, and Prakash, M. (2011). Genotypic variation and relationships between quality traits and trace elements in traditional and improved rice (*Oryza sativa* L.) genotypes. *Journal of Food Science*, *76*(4), H122–H130.

Atlin, G. N., Lafitte, H. R., Tao, D., Laza, M., Amante, M. and Courtois, B. (2006). Developing rice cultivars for high-fertility upland systems in the Asian tropics. *Field crops research*, *97*(1), 43-52.

Augustina, U. A., Iwunor, O. P. and Ijeoma, O. R. (2013). Heritability and character correlation among some rice genotypes for yield and yield components. *Journal of plant breeding and Genetics*, *1*(2), 73-84.

Badshah, M. A., Naimei, T., Zou, Y., Ibrahim, M. and Wang, K. (2014) Yield and Tillering Response of Super Hybrid Rice Liangyoupeijiu to Tillage and Establish-ment Methods. *The Crop Journal, 2,* 79-86.

Banerjee, S. and Godda, S. (2021). Study of Performance of Indigenous Paddy Varieties under SRI and Conventional Practices, National Consortium of SRI, New Delhi. Available online: https://www.indiawaterportal.org/sites/default/files/iwp/ncs_ipv_sri_report_rev.pdf (accessed on 6 October 2021).

Banumathy, S., Manimaran, R., Sheeba, A., Manivannan, N., Ramya, B., Kumar, D. and Ramasubramanian, G. V. (2010). Genetic diversity analysis of rice germplasm lines for yield attributing traits. *Electronic Journal of Plant Breeding*, *1*(4), 500-504.

Chakravorty, A. and Ghosh, P. D. (2012). Genetic divergence in landraces of rice (O. sativa L.) of West Bengal, India. *Journal of Crop and Weed*, *8*(2), 23-28.

Chatterjee, S. D., Adhikari, B., Ghosh, A., Ahmed, J., Neogi, S.B. and Pandeym, N. (2008). The rice bio-diversity in West Bengal. Department of Agriculture, Govt. of West Bengal, pp. 50.

Cleveland, D. A. and Soleri, D. (2007). Extending Darwin's analogy: bridging differences in concepts of selection between farmers, biologists, and plant breeders. *Economic botany*, *61*(2), 121-136.

Deb, D. (1995). Sustainable agriculture and folk rice varieties: ecological, economic and cultural aspects. Mimeo. WWF India Eastern Region, Calcutta.

Holden, J., Peacock, J., Peacock, W. J. and Williams, T. (1993). *Genes, crops and the environment*. Cambridge University Press.

Idris, M and Matin, M. (1990). Response of four exotic strains of aman rice to Urea. *Bangladesh J. Agril. Sci., 17*(2), 271-275.

Islam, M. S., Paul, S. K. and Sarkar, M. A. R. (2014). Varietal performance of modern transplant *Aman* rice subjected to level of nitrogen application. *J.Bangladesh Agril. Univ., 12*(1), 55-60.

Li, J., Li, H. Y., Zhi, J. K., Shen, C. Z., Yang, X. S. and Xu, J. C. (2017). Codon usage of expansin genes in *Populus trichocarpa. Curr. Bioinform., 12*, 452–461.

Mahender, A., Anandan, A., Pradhan, S. K., and Pandit, E. (2016). Rice grain nutritional traits and their enhancement using relevant genes and QTLs through advanced approaches. *Springerplus, 5*, 2086.

Naha, R. N. (2007). Effect of variety and seedling age on the performance of Aman rice. Thesis, M.S. in Agron., Bangladesh Agril. Univ., Mymemsingh, pp. 34-54.

Nuruzzaman, M., Yamamoto, Y., Nitta, Y., Yoshida, Y., and Miyazaki. A. (2000). Varietal differences in tillering ability of fourteen Japonica and Indica rice varieties. *Soil Sci. Plant Nutri., 46*(2), 381-391.

Prahalad, P. C. K. (2010). West Bengal Vision @2022. Rajarhat Prasari, Kolkata, (India). In consultation with Food and Agriculture Organization of the United Nation, Rome (Italy), pp 1-31.

Prakriti, M., Bhandarkar, S., Shrivas, Y., Nair, S. K., Ojha, G. C., and Pachauri, A. K. (2017). Assessment of genetic variability for quantitative and qualitative traits in Rice Germplasm Accessions (*Oryza sativa* L.). Bull. Env. Pharmacol. *Life Sci. Special issue* [1], 76-83.

Sreedhar, S. and Uma Reddy, R. (2019). Association Studies for Yield and Its Traits in Rice (*Oryza sativa* L.) Genotypes, [online journal] available on https://www.ijcmas.com/8-1-2019.

Sadeghi, S. M. (2011). Heretability, Phenotypic correlation and path coefficient studies for some agronomic characters in Landrace rice varieties. *World Applied Sciences Journal, 13*(5), 1229- 1233.

Shiva, V. (1991). The Violence of the Green Revolution. Third World Network, Penang.

Singh, S. and Gangwar, B. (1989). Comparative studies on production potentials in traditional tall and improved rice cultivars. *J. Andaman Sci. Assoc., 5*, 81-82.

Sinha, A. K. and Mishra, P. K. (2012). Agronomic Evaluation of landraces of Rice (*Oryza sativa* L.) of Bankura District of West Bengal. *Columban Journal of Life Science, 13*(1&2), 35-38.

Sinha, A. K. and Mishra, P. K. (2015). Identification of genetically distant rice genotypes for selection based crop improvement from rice landraces of red and lateritic region of West Bengal through cluster analysis. *American-Eurasian J. Agric. & Environ. Sci., 15*(3), 411-414.

Takahashi, N., Alter fa, H. A. H. and Sato, T. (1986). Significant role of awn in rice plants. A survey for

agricultural value of rice awn. Rep. Institute of Agricultural Resource Tohoku University, 35: 21-31.
The Seeds Act (1966). Deptt. of Agri., Ministry of Agri. & Coop, Govt. of India, New Delhi.
Tyeb, A., Paul, S. K. and Samad, M. A. (2013). Performance of variety and spacing on the yield and yield contributing characters of transplant *Aman* rice. *J. Agrof. Environ., 7*(1), 57-60.
Yan, W., Hunt, L. A., Johnson, P., Stewart, G. and Lu, X. (2002). On-Farm Strip Trials vs Replicated Performance Trials for Cultivar Evaluation. *Crop Science*, *42*, 385-392.

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