



Research Article

SEED QUALITY EVALUATION OF SOME RICE GENOTYPES

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Abstract: Rice is the staple food of more than half the world's population, and is being cultivated in Asia since ancient time generation after generation. Good quality seeds are the seeds of green revolution, it has been assertively and emphatically shown that 15-20% increased yield could be achieved by the use of good quality seeds alone. The production and supply of good quality seed is one of the most important requirements to achieve higher production and productivity in any crop. The seed quality is governed by various factors viz. genetic, edaphic, environmental, biotic, etc. The production of good quality seed depends on complex condition evoking the most favorable interactions between the genetic makeup of the seed and the environment, under which it is produced, harvested, processed and stored. Seeds undergo deterioration at various levels during storage resulting in decline in vigour and viability. With the above considerations, the present investigation has been undertaken to observe the potentials of ten rice genotypes and observed its seed quality after harvesting in 2015-2016 at Seed Testing Laboratory, Department of Seed Science and Technology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India. Just after harvesting V2 (Gobindabhog) & V9 (IR-36) showed highest germination percentage (97.66) and V9 (IR-36) showed highest vigour index (3204.13). But most of the varieties germination and vigour was nearer to V2 & V9.

Keywords: Rice, Morphology, Germination and Vigour

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Introduction

Rice (*Oryza sativa* L.) is the major staple food and is being cultivated in Asia since ancient time's generation after generation. The farmers are maintaining thousands of different types and these landraces, together with the 22 pan tropical, wild species of *Oryza zizania*, are the genetic foundation for the breeding efforts to increase the productivity of rice, it. Besides, the landraces and wild species, the genetic resources of rice also include the natural hybrids and a range of different genetic stocks comprising commercial and absolute varieties. Seeds undergo deterioration at various levels during storage resulting in decline in vigour and viability [1]. The loss of viability during storage due to atmospheric factors from the time of maturity is a common phenomenon in all crop seeds until next planting season [2,3]. The deterioration leading to loss in viability of seed may affect the yield of crop in two ways: firstly, decrease in germination may lead to a sub-optimal population of plants per unit area, secondly poor performance by the surviving plants [4]. Maintenance of viability, vigour and storability of seeds is a problem in tropical regions where high temperature and high relative humidity accelerate seed deterioration which ultimately results in non-viability [5]. Over the years, researchers have, involved themselves to develop more suitable techniques to keep the seed healthy, viable and vigorous during storage. With this available background information, the present investigation is proposed to evaluate the morphology and quality of produced seeds.

Materials and Methods

The panicle of ten rice genotypes viz, Koilash (V1), Gobindabhog (V2), Kalma (V3), Dudheswar(V4), Malabati (V5), Kanakchur (V6), Kalojira (V7), Radhatilak (V8), IR-36 (V9) and Pusa-1509 (V10) were collected from the trial plot of Gontra village, Nadia, West Bengal. Different seed morphological and seed vigour evaluated in the Seed Testing Laboratory, Department of Seed Science and Technology, F/Ag., BCKV, Mohanpur, Nadia.

The different morphological characteristics like Seed colour, Seed length, Seed breadth, Seed thickness, Kernel length, Kernel breadth, Kernel thickness, presence or absence of awn and kernel colour studied by following the nomenclatures of Ramaiah and Rao (1953) [6]. Seed quality parameters were number of seeds panicle-1, test weight, root length, shoot length, fresh weight, dry weight, germination percentage and vigour index. The seedling vigour index was computed using the formula suggested by Abdul Baki and Anderson (1973) [7] and data were analyzed by employing CRD through SASSA, DMRT.

Results and Discussion

Among the rice genotypes, the seed colour of V7 was black and that of remaining genotypes was straw colour. With respect to length seeds of, V1, V4, V7 and V8 are long; that of V2, V5 and V6 were medium; and of V3, V9 and V10 were extra-long. The seed breadth was found as narrow for V1. V5, V9 and V10, very narrow for V2 and V7 only then of and remaining genotypes were medium. In case of seed thickness, all the genotypes are medium except V1, V2, & V7 of which V1 is high and V2, & V7 are very thin. V3, V9 and V10 were long with regarding to its kernel length and remaining all the genotypes was medium in nature. Kernel breadth was medium for V2, V4, V7 and V9, which that of remaining genotypes was bold in nature. Whereas, all genotypes were of medium, type with regarded to thickness. And while type with regard to kernel colour. Awn found to be present seeds of V1, V2, V6 and V10 and the remaining genotypes were absent of awnless type. Performances of ten rice genotypes for various characters are presented in Table-2. Significant variation in all the characters studied was noticed among the genotypes except for decorticated. Mean value of seeds per panicle among the genotypes ranged between 139 to 260. The deviation from mean also varied within the range between 5.77 to 15.27. Maximum number of seeds per panicle was recorded as 260.00 for V2, which it was as minimum as 139.00 for V10.

Seed Quality Evaluation of Some Rice Genotypes

Table-1 Diagnostic characters of ten genotypes seeds colour, length, breadth, thickness, kernel length, kernel breadth, kernel thickness, awn, kernel colour

Genotypes	Seed colour	Seed length	Seed breadth	Seed thickness	Kernel length	Kernel breadth	Kernel thickness	Awn	Kernel colour
V1	Straw	Long	Narrow	High	Medium	Bold	Medium	Awne	White
V2	Straw	Medium	Very narrow	Very thin	Medium	Medium	Medium	Awne	White
V3	Straw	Extra long	Medium	Medium	Long	Bold	Medium	Awn less	White
V4	Straw	Long	Medium	Medium	Medium	Medium	Medium	Awn less	White
V5	Straw	Medium	Narrow	Medium	Medium	Bold	Medium	Awn less	White
V6	Straw	Medium	Medium	Medium	Medium	Bold	Medium	Awne	White
V7	Black	Long	Very narrow	Very thin	Medium	Medium	Medium	Awn less	White
V8	Straw	Long	Medium	Medium	Medium	Bold	Medium	Awn less	White
V9	Straw	Extra long	Narrow	Medium	Long	Medium	Medium	Awn less	White
V10	Straw	Extra long	Narrow	Medium	Long	Bold	Medium	Awne	White

Koilash- V1, Gobindabhog- V2, Kalma- V3, Dudheswar-V4, Malabati- V5, Kanakchur- V6, Kalojira- V7, Radhatilak- V8, IR-36- V9 and Pusa-1509- V10

Table-2 Mean values with standard deviation for number of seeds per panicle, seed length, seed breadth, seed thickness, decorticated seed length, decorticated seed breadth and decorticated seed thickness at harvest fresh condition

Genotypes	Number of seeds/panicle Mean±SD	Seed length (mm) Mean±SD	Seed breadth (mm) Mean±SD	Seed thickness (mm) Mean±SD	Decorticated seed length (mm) Mean±SD	Decorticated seed breadth (mm) Mean±SD	Decorticated seed thickness (mm) Mean±SD
V1	161.66 ^G ±5.77	6.88 ^{CD} ±0.20	2.15 ^{AB} ±0.36	2.30 ^A ±0.46	4.46 ^D ±0.45	2.53 ^A ±0.45	1.63 ^A ±0.54
V2	260.0 ^A ±10.00	6.19 ^D ±0.32	1.82 ^C ±0.23	1.38 ^B ±0.28	4.67 ^D ±0.11	1.51 ^C ±0.41	1.50 ^A ±0.10
V3	173.0 ^C ±10.00	8.35 ^B ±0.68	2.59 ^{AB} ±0.25	1.68 ^B ±0.00	6.45 ^B ±0.46	2.59 ^A ±0.35	1.62 ^A ±0.24
V4	189.0 ^{DE} ±10.00	7.47 ^{CB} ±0.51	2.62 ^{AB} ±0.40	1.84 ^{AB} ±0.11	5.59 ^C ±0.44	1.60 ^C ±0.25	1.58 ^A ±0.10
V5	168.0 ^C ±10.00	6.25 ^D ±0.35	2.41 ^{AB} ±0.30	1.80 ^B ±0.00	4.58 ^D ±0.07	2.37 ^{AB} ±0.11	1.54 ^A ±0.05
V6	196.3 ^C ±15.27	6.21 ^D ±0.50	2.76 ^A ±0.26	1.75 ^B ±0.11	4.56 ^D ±0.00	2.50 ^A ±0.05	1.62 ^A ±0.05
V7	196.3 ^{CD} ±15.27	7.19 ^C ±0.76	1.78 ^C ±0.23	1.50 ^B ±0.25	5.52 ^C ±0.00	1.67 ^C ±0.51	1.51 ^A ±0.01
V8	183.0 ^{DEF} ±10.00	6.86 ^{CD} ±0.50	2.52 ^{AB} ±0.40	1.69 ^B ±0.17	4.43 ^D ±0.00	2.05 ^{ABC} ±0.00	1.46 ^A ±0.34
V9	238.0 ^B ±10.00	8.36 ^B ±0.72	2.26 ^{CB} ±0.23	1.70 ^B ±0.23	6.37 ^B ±0.00	1.82 ^{BC} ±0.41	1.51 ^A ±0.25
V10	139.0 ^H ±10.00	12.52 ^A ±0.40	2.24 ^{BC} ±0.05	1.66 ^B ±0.51	9.35 ^A ±0.00	2.28 ^{AB} ±0.32	1.63 ^A ±0.05
SEm(±)	2.449	0.117	0.064	0.060	0.056	0.074	0.053
LSD (0.05)	18.657*	0.8593*	0.4946*	0.4646*	0.4307*	0.5717*	NS

Koilash- V1, Gobindabhog- V2, Kalma- V3, Dudheswar-V4, Malabati- V5, Kanakchur- V6, Kalojira- V7, Radhatilak- V8, IR-36- V9 and Pusa-1509- V10

Table-3 Mean value with standard deviation for test weight, seedling root-shoot length and fresh & dry weight, germination (%) and vigour index of the genotypes at harvest fresh condition

Genotypes	Test weight (g) Mean±SD	Shoot length (cm) Mean±SD	Root length (cm) Mean±SD	Fresh weight (g) Mean±SD	Dry Weight (g) Mean±SD	Germination% Mean±SD	V.I. Mean±SD
V1	22.27 ^B ±1.53	10.81 ^A ±3.05	13.0 ^D ±0.57	1.29 ^F ±0.00	0.63 ^F ±0.00	97.00 ^A ±1.00	2312.86 ^B ±335.36
V2	11.84 ^D ±1.53	11.44 ^A ±1.52	11.24 ^D ±0.57	1.25 ^F ±0.00	0.63 ^F ±0.00	97.66 ^A ±0.57	2216.49 ^C ±152.66
V3	21.38 ^B ±1.53	13.57 ^A ±2.51	18.82 ^{AB} ±0.57	1.45 ^A ±0.00	0.91 ^C ±0.00	96.66 ^A ±0.57	3137.92 ^A ±259.12
V4	18.05 ^C ±1.53	13.78 ^A ±2.51	16.98 ^{BAC} ±1.52	1.30 ^F ±0.00	0.95 ^A ±0.00	97.00 ^A ±1.00	2986.70 ^{BA} ±397.35
V5	13.89 ^D ±1.53	13.85 ^A ±2.51	17.18 ^{BAC} ±2.30	1.52 ^B ±0.00	0.92 ^B ±0.00	96.66 ^A ±0.57	3001.82 ^{BA} ±463.24
V6	13.51 ^D ±1.53	12.86 ^A ±2.51	15.29 ^{BCD} ±4.10	1.38 ^F ±0.00	0.85 ^F ±0.00	97.00 ^A ±1.00	2981.82 ^{BA} ±575.41
V7	13.47 ^D ±1.53	14.76 ^A ±2.51	16.81 ^{ABC} ±3.21	1.31 ^F ±0.00	0.72 ^F ±0.00	96.66 ^A ±0.57	3053.30 ^{BA} ±541.44
V8	12.74 ^D ±1.53	12.60 ^A ±2.51	15.32 ^{BCD} ±4.58	1.26 ^F ±0.00	0.52 ^F ±0.00	97.33 ^A ±1.15	2721.45 ^{BAC} ±618.78
V9	18.44 ^C ±1.00	12.85 ^A ±2.51	19.94 ^A ±0.57	1.60 ^A ±0.00	0.91 ^C ±0.00	97.66 ^A ±0.57	3204.13 ^A ±271.25
V10	13.49 ^A ±1.53	13.24 ^A ±2	17.65 ^{AB} ±3.21	1.50 ^C ±0.00	0.62 ^H ±0.00	97.33 ^A ±1.15	2009.17 ^{BA} ±502.70
SEm (±)	0.331	0.547	0.583	0.00	0.00	0.191	97.694
LSD (0.05)	2.5262*	NS	4.4414*	22E-17 *	34E-17 *	NS	NS

Koilash- V1, Gobindabhog- V2, Kalma- V3, Dudheswar-V4, Malabati- V5, Kanakchur- V6, Kalojira- V7, Radhatilak- V8, IR-36- V9 and Pusa-1509- V10

The genotypes were laid in different groups on the basis of this character, as: V2 was under A group, V9 was under B group, V6 was under C group, V7 was under both D and C group, V8 was the combined group D E, and F, V3 and V5 were grouped under G, and V10 was under H group. Seed length of the genotypes ranged from 6.19mm to 12.52mm, V10 (12.52mm) was identified as longest type and the shortest genotype was V2 (6.19mm). The deviation from mean value varied from 0.20 to 0.76. Genotypes were classed into different groups: V10 was under the A group, V3 and V9 was under the B group, V7 was under C group, V1 & V8 under combination of C & D group similarly, V4 was under both CB group, and V2, V5, & V6 were grouped under D. Among the rice genotypes the mean value of seed breadth ranged from 1.78 mm to 2.76 mm. The highest breadth was found for seed of V6 (2.76mm) and lowest for that of V7 (1.78mm). However, all the genotypes displayed significant variation in performance. The five genotypes V1, V3, V4, V5, V8 constituted the combined AB group, V2 was under C group, V6 under A group, V9 under CB group and V10 is under BC group. The deviation from the mean value was 0.05 to 0.40 and V4 & V8 recorded as highest. With regard to mean value of seed thickness, V1 ranked the highest position (2.30mm) and V2 was in lowest (1.38mm), while the deviation from the mean value ranged from 0.00 to 0.51. A group was constituted with only V1, V4 constituted AB group, and remaining genotypes grouped under B. Highest decorticated seed length was

recorded for V10 (9.35mm) and it was lowest (4.43mm) for V8. The genotypes formed different groups as: V10 under A group. V3 and V9 under B group, V4 and V7 were grouped under C, the remaining five V1, V2, V5, V6, V8 were grouped under D. Mean value for decorticated seed breadth varied from 1.51mm to 2.59mm and the deviation from the mean value varied from 0.00 to 0.51. V3 showed the highest (2.59mm) decorticated seed breadth it was lowest (1.50mm) for V2. For this character, group A was constituted with V1, V3 and V6, V9 constituted BC group, ABC group with V8, group C with V2, V4, V7 and AB group with only V5. With regard to mean value of decorticated seed thickness, highest value was recorded for both the genotypes V1 and V10 (1.63mm) and lowest value (1.50mm) for V2. As the genotypes showed the non-significant variation among themselves for this trait, they constituted only a single group. Significant variation among the genotypes was recorded for test weight, seedling root length, fresh weight and dry weight only. Among the genotypes mean value of test weight varied from 11.84g for V2 to 22.27g for V1, and the deviation from mean value was recorded from 1.00 to 1.53. Constitution of different groups was: group A was constituted with single genotypes V10, B with two constituents V1 & V3, group C with V4 & V9 and remaining genotypes constituted group D. Average seedling shoot length varied from 10.81cm V1 to 14.76 cm V7. As the genotypes displayed non-significant variation in performance for this character, they formed a single



group A. For V2, while V9 exhibited highest root length (19.94cm) and it was lowest (11.24cm) for V2, while the deviation from the mean value varied from 0.57 to 4.10. The genotypes formed different groups as: V1 was grouped under DC, V2 was under D, V3 under AB group, BAC was formed with V4, V5 was grouped under BAC and V7, while V6 and V8 were grouped under BCD, and V10 & V9 were grouped under AB and A respectively. Seedling fresh weigh highest (1.60g) for V9 and it was lowest (1.25g) for V2. As the genotypes displayed significant variation in performance for this character, they formed different groups: V1 was grouped under H group, V2 was grouped under J, both V3 and V9 were grouped under A, V4 was grouped under G, V5 was grouped under B, V6 was grouped under E, V7 was grouped under F, V8 was grouped under I, and V10 was grouped under C. While considering seedling dry weight the mean value was highest (0.95g) for V4 and lowest (0.52g) for V8. The genotypes constituted different groups with varying constituents: the genotype V1 was grouped under F, V2 was under G, V5 was under B, V4 was under A, V3 and V9 were under C, V7 was under E, V6 was under D, V8 was under I group, and V10 was grouped under H group. Maximum germination (97.66%) was recorded for both V2 and V9 though non-significant and it was minimum (96.66%) for V5, V7 and V3, while the deviation from the mean value varied from 0.52 to 1.15. The genotypes failed to constitute different group due to its highest magnitude for vigour index (3204.13) was recorded for V9 and it was lowest for V10 (2009.17). Though non-significant variation among genotypes was noted for this character, genotype V1 was grouped under B, V2 was grouped under C, V3 and V9 were under A group, and V10 was grouped under BA, V8 was grouped under BAC. So, harvested fresh seeds of V2 (Gobindabhog) & V9 (IR-36) showed highest germination percentage and that of V9 (IR-36) showed highest vigour index.

Conclusion: It can be concluded that V2 (Gobindabhog) & V9 (IR-36) had the high germination percentage (97.66) and V9 (IR-36) (3204.13) was high vigour than other genotypes.

Application of research: Study of identification and diagnostic characters and seed quality parameters of these local genotypes and high yielding variety.

Research Category: Seed Science and Technology

Abbreviations: VI= vigour index

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Study area / Sample Collection: rice seed

Cultivar / Variety / Breed name: Koilash- V1, Gobindabhog- V2, Kalma- V3, Dudheswar-V4, Malabati- V5, Kanakchur- V6, Kalojira- V7, Radhatilak- V8, IR-36- V9 and Pusa-1509- V10

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