QUALITATIVE AND QUANTITATIVE EVALUATION OF SEED VIGOUR AND VIABILITY BY TETRAZOLIUM TEST IN PEARL MILLET [*Pennisetum glaucum* (L.) R. Br.]

***PATEL, J. B.; RIBADIYA, K. H.; SONDARVA JYOTI; BABARIYA, C. A. AND BHATIYA, V. J.**

DEPARTMENT OF SEED SCIENCE AND TECHNOLOGY
JUNAGADH AGRICULTURAL UNIVERSITY
JUNAGADH – 362 001, GUJARAT, INDIA

****EMAIL: jbpatelvasai38@gmail.com***

ABSTRACT

The present investigation was carried out in the laboratory of the Department of Seed Science and Technology, Junagadh Agricultural University, Junagadh from December 2012 to February 2015, wherein one (1) kg seed of each of five genotypes consisting two hybrids (GHB 744 and GHB 538) and their respective parents (ICMA 98444, J 2340 and ICMA 95444) were stored in air tight plastic container and were kept in ambient conditions under insect free environment. The experiment was carried out using Completely Randomized Design (CRD) repeated six times. Observations were recorded at bimonthly interval on qualitative tetrazolium test for vigour and viability, quantitative tetrazolium test for vigour and viability, germination at first count (%), germination at final count (%), seedling length (cm), seedling dry weight (g), seed vigour index I, seed vigour index II, field emergence (%) and seed moisture content (%). The results presented revealed that genotypes exhibited significant difference for all the characters measured in laboratory as well as in field emergence. Among the different genotypes evaluated, parent ICMA 98444 and J 2340 were the best genotypes, as it recorded high values for germination percentage and other quality parameters over and after the period of two year of storage of bajra seeds in air tight plastic containers kept in ambient conditions under insect free environment. The drastic reduction in germination and other quality parameters was observed in both the hybrids, GHB 744 and GHB 538 indicated that it cannot be stored more than 10-12 months in air tight plastic containers under ambient conditions. However, out of 5 genotypes tested, 4 genotypes (ICMA 98444, J 2340 and ICMA 95444) showed its superiority for qualitative and quantitative tetrazolium test of viability, germination at first and final count, seedling length and dry weight, and seed vigour index I and II up to 16-18 months of storage, indicated that the seeds of these genotypes can be stored in air tight plastic containers for 16 mouths kept in ambient conditions under insect free environment without deterioration in germination and seedling vigour.

KEY WORDS: Pearl millet, storage, tetrazolium test

INTRODUCTION

Pearl millet (*Pennisetum glaucum*) is the most widely grown type of millet. Because of its tolerance to difficult growing conditions such as drought, low soil fertility and high temperature, it can be grown in areas where other cereal crops, such as

maize (*Zea mays*) or wheat (*Triticum aestivum*), would not survive.

Seed quality is very important for optimum growth and yield production in farm which influenced by many factors such as genetic characteristics, viability, germination per cent, vigor, moisture content, storage conditions, survival ability and seed health, but their most important is germination per cent and vigor (Akbari *et al.*, 2004). According to Sastry *et al.* (2008), even seeds stored under conditions optimal for long-term storage may decrease in viability as a result of deterioration processes.

Seed germination and vigour are the main physiological quality attributes. Since the standard germination test has proved to be an imperfect tool for measuring seed lot performance under adverse field conditions, much effort has been given to develop a test or group of tests that can determine seed vigour accurately. Vigour testing is important because it often gives a better prediction of field performance and is a more sensitive indicator of seed quality than the standard germination test (Younis *et al.,* 1990). The tetrazolium test was developed in Germany by Lakon in the 1940 to furnish a quick estimate of seed viability. It is useful when growers need to make a fast decision about the planting value of their seeds within a very short time, 24-48 hours, rather than waiting several weeks for standard germination test and/or other vigor test results.

Keeping all this in view, the experiment was conducted with an objectives to rapidly assess the vigour and viability of pearl millet seed by tetrazolium test, to relate qualitative and quantitative evaluation of seed by tetrazolium with standard germination test (SGT) and field emergence (FE), and to compare vigour and viability of seeds of hybrids and parents of pearl millet.

MATERIALS AND METHODS

The present investigation was carried out in the laboratory of the Department of Seed Science and Technology, Junagadh Agricultural University, Junagadh from December 2012 to February 2015, wherein one (1) kg seed of each of five genotypes consisting two hybrids (GHB 744 and GHB 538) and their respective parents (ICMA 98444, J 2340 and ICMA 95444) were stored in air tight plastic container and were kept in ambient conditions under insect free environment. The experiment was carried out using Completely Randomized Design (CRD) repeated six times. Observations were recorded at bimonthly interval on qualitative tetrazolium test for vigour and viability, quantitative tetrazolium test for vigour and viability, germination at first count (%), germination at final count (%), seedling length (cm), seedling dry weight (g), seed vigour index I, seed vigour index II, field emergence (%) and seed moisture content (%). The data were analyzed as per the method suggested by Cochran and Cox (1957) for Completely Randomized Design (CRD).

RESULTS AND DISCUSSION

The results presented in Table 1 revealed that genotypes exhibited significant differences to qualitative as well as quantitative *tetrazolium* test for vigour and viability for all the dates. Among the different genotypes evaluated to *tetrazolium* test, significantly highest viability (56.33 %) was recorded by parent ICMA 98444 and lowest (34.83 %) by hybrid GHB 744 after the period of two year of storage of bajra seeds in air tight plastic containers kept in ambient conditions under insect free environment. However, out of 5

genotypes tested, 4 genotypes (GHB 744, GHB 538, ICMA 98444 and J 2340) exhibited more than 75 per cent germination as per qualitative *tetrazolium* test (as per ISTA standards) after 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment (Table 1). It was also observed that there is no much variation was observed up to 14 months of storage in the values of absorbance of colour solution (quantitative *tetrazolium* test) (Table 2). This may support the findings of qualitative *tetrazolium* test.

The results presented in Table 3 revealed that genotypes exhibited significant differences to germination percentage at first count. Among the different genotypes evaluated, significantly highest germination percentage at first count (45.00 %) was recorded by parent ICMA 98444 and lowest 0.00 by both the hybrids, GHB 744 and GHB 538 after the period of two year of storage of bajra seeds in air tight plastic containers kept in ambient conditions under insect free environment. Similarly, significantly highest germination percentage at final count (46.67%) was recorded by parent ICMA 98444 and lowest 0.00 by the hybrid, GHB 744 after the period of two year of storage of bajra seeds in air tight plastic containers kept in ambient conditions under insect free environment (Table 4)., Out of 5 genotypes tested, 3 genotypes (GHB 538, ICMA 98444 and J 2340) exhibited more than 75 per cent germination at first count as well as final count (as per ISTA standards) after 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment.

Among the different genotypes evaluated, significantly highest seedling length (11.54 cm) (Table 5) and seedling dry weight (0.47 g) (Table 6) was recorded in parent ICMA 98444 after the period of two year of storage of bajara seeds in air tight plastic containers kept in ambient conditions under insect free environment. However, all the genotypes noted seedling length of more than 17 cm was recorded up to 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment (Table 5). Out of 5 genotypes, 4 (GHB 538, ICMA 98444, J 2340 and ICMA 95444) genotypes had seedling dry weight of more than 0.34 g up to 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment (Table 6).

Among the different genotypes evaluated, significantly highest seed vigour index - I (519.7) (Table 7) and seed vigour index – II (22.19) (Table 8) was recorded by parent ICMA 98444 and lowest (0.00) by hybrid GHB 744 after the period of two year of storage of bajara seeds in air tight plastic containers kept in ambient conditions under insect free environment. However, out of 5 genotypes, 3 genotypes (GHB 538, ICMA 98444 and J 2340) possessed seed vigour index I of more than 1600 and seed vigour index II of more than 40 up to 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment (Table 7 and 8).

The results presented in Table 9 revealed that genotypes exhibited significant differences for field emergence. Among the different genotypes evaluated, significantly the highest field emergence (32.67 %) was recorded by parent ICMA 98444 and lowest (0.00 %) by hybrid GHB 744 after the period of two year of storage

of bajra seeds in air tight plastic containers kept in ambient conditions under insect free environment. Out of 5 genotypes tested, 2 genotypes exhibited (ICMA 98444 and J 2340) more than 70 per cent of field emergence and one had almost 64 per cent field emergence after 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment. The field emergence depends on the texture of soil and the depth of sowing. Therefore, it can be concluded that bajara seed can be stored in ambient conditions under insect free environment for 16 months without deteriorating seed vigour and viability.

Genotypes exhibited significant differences for seed moisture content. All the genotypes tested had more than 9 per cent moisture content after the period of two year of storage of bajra seeds in air tight plastic containers kept in ambient conditions under insect free environment. Moisture content was gradually increased with increasing the storage duration (Table 10).

Viability and vigour of the seed varied from source to source as the locality factors influenced the storability of seed. The seeds of different varieties possess different quality values, physical structures and chemical composition. These factors determine the longevity of seed in the storage. In the present investigation, Out of 5 genotypes tested, 4 genotypes exhibited more than 75 per cent germination as per qualitative tetrazolium test (as per ISTA standards) and 3 genotypes exhibited more than 75 per cent germination at first as well as final count (as per ISTA standards) after 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment. Similarly, out of 5 genotypes, 3 genotypes possessed seed vigour index I of more than 1600 and seed vigour index II of more than 40 up to 16 months of storage in air tight plastic containers kept in ambient conditions under insect free environment. This is because with the advance in the storage period, irrespective of seed source all the seed quality parameters were gradually decreased. It is generally seen that reduction in germinability depends on duration of aging. Germination decreases with increase in ageing period, as seen by Mandal and Basu (1986) in cereals. Such difference in storage potential between varieties may be attributed mainly to difference in their genetic make up and environmental influence (Thiagarajan and Ramaswamy, 1984). The difference in seeds of two pearl millet hybrids and their parents under controlled conditions were observed by Yadav *et al.,* 1987.

The results obtained under the present study are in accordance with the findings of Nagarajan and Karivaratharaju (1976) stored the seed of sorghum, pearl millet and maize at ambient conditions in Coimbatore, in moisture-previous and moisture proof container with or without seed treatments and concluded that with increasing length of storage, the seed moisture content increased and viability decreased. The seeds of onion stored in airtight jars under ambient condition retained higher vigour as compared to the seeds in paper packet (Currah and Msika, 1994). Fischer (1994) reported that seeds of Capsicum annum stored in sealed plastic flask and glass jars have maintained higher germination even after 20-22 years.

CONCUSION

From the results and discussion, it can be concluded and recommended that pearl millet seed may be stored in air tight plastic

containers under insect free ambient storage condition for a period of 16 months without deterioration in germination seedling vigour.

REFERENCES

Akbari, Gh A., Ghasemi Pirbalouti, M., Najaf-Abadi Farahani, M. and Shahverdi, M. (2004). Effect of harvesting time on soybean seed germination and vigor. *J of Agr*., **6**:9-18.

Cochran, V. G. and Cox, G. M. (1957). Experimental Designs. New York, John Wiley and Hall Ltd., London, pp. 293· 296.

Currah, L. and Msika, L. (1994). Cheap methods of storing small quantities of onion seeds without refrigeration. *Onion Newsletter for the Tropics*, **6**: 61-62.

Fischer, I. (1994). Sweet pepper gene conservation in long term storage. *Zoldesegtermesztesi Kutato Intezet Bulletinje*, **26**: 47-54.

Mandal, A. K. and Basu, R. N. (1986). Vigour and viability of wheat seed treatment with bleaching power, *Seeds and Farms*, **21**: 46-48.

Nagarajan, K. and Karivaratharaju, T. (1976). Storage studies in sorghum,bajra and maize seed viability in realtion to moisture content. *Seed Res*., **4**(2): 161-166.

Sastry, D. V. S. S. R., Upadhyaya, H. D. and Gowda, C. L. L. (2008). Seed viability of active collections in ex-situ genebanks: An analysis of sorghum germplasm conserved at ICRISAT genebank. *J. SAT Agric. Res*., **6**: 1-8.

Thiagarajan, C. P. and Ramaswamy, K. R. (1984). Seed quality studies in cotton. *Madras Agril. J.*, **71**: 805-811.

Yadav, R. S.; Dadlani, M. and Agarwal, P. K.(1987). Storability of seeds of two pearlmillet hybrids and their parents under controlled conditions. *Indian J. Agril. Sci.*, **57**(11): 821-824.

Younis, S. A., Al-Rawi, F. I. and Hagop, E. G. (1990). Physiological and biochemical parameters of seed quality in some rice varieties (*Oryza sativa* L.). *Seed Res.,* **18**:148-153.

Table 1: Performance of different genotypes to *tetrazolium* test (qualitative) for vigour and viability

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	87.17	91.33	91.17	85.67	74.17	79.33	77.33	77.00	42.17	35.67	35.00	38.67	34.83
T_2	92.00	89.17	89.17	86.00	82.83	66.67	84.00	84.17	63.67	55.83	40.33	43.00	38.00
T_3	88.17	91.33	91.67	88.00	86.00	87.83	88.50	94.33	79.17	80.50	79.83	73.67	56.33
T_4	88.50	95.33	95.33	84.83	85.00	84.00	81.33	91.33	82.00	82.83	59.83	65.00	52.66
T_5	70.50	81.67	81.33	70.67	64.00	48.83	63.00	65.33	51.00	50.50	47.33	49.17	46.50
Mean	85.27	89.77	89.73	83.03	78.40	73.33	78.83	82.43	63.60	61.07	52.47	53.90	45.66
S.Em. +	1.24	1.16	0.92	1.64	0.94	1.20	1.44	1.06	1.76	1.40	1.49	2.50	0.59
C.D. at 5%	3.62	3.38	2.68	4.79	2.77	3.50	4.23	3.11	5.17	4.09	4.37	0.85	1.74
CV%	3.55	3.15	2.50	4.83	2.95	3.99	4.48	3.15	6.80	5.60	6.97	3.88	3.18

Table 2: Performance of different genotypes to *tetrazolium* test (quantitative) for absorbance of colour solution

Parents /Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	0.69	1.65	1.66	0.83	0.40	0.24	0.43	0.60	0.63	0.56	0.59	0.48	0.08
T_2	0.83	1.83	1.80	0.60	0.38	0.17	0.34	0.67	0.75	0.75	0.65	0.73	0.08
T_3	1.50	1.99	1.92	0.65	0.56	0.35	0.54	1.03	1.09	1.05	0.89	1.35	0.12
T_4	0.94	1.51	1.43	0.60	0.36	0.17	0.31	0.83	0.49	0.52	0.53	0.51	0.06
T_5	1.18	2.21	2.24	0.59	0.62	0.41	0.56	1.40	1.34	1.31	0.97	1.05	0.15
Mean	1.03	1.84	1.81	0.65	0.46	0.27	0.44	0.90	0.86	0.84	0.72	0.82	0.10
S.Em. +	0.04	0.08	0.08	0.05	0.02	0.02	0.04	0.08	0.11	0.13	0.14	0.11	0.01
C.D. at 5%	0.12	0.23	0.24	0.14	0.07	0.04	0.11	0.24	0.33	0.37	NS	0.32	0.03
CV%	9.91	10.20	11.23	18.30	11.71	13.49	20.07	22.06	31.70	37.18	46.07	32.29	25.44

Table 3: Germination (%) recorded at first count in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	81.83	70.67	71.50	58.67	66.17	26.50	24.67	21.50	15.00	10.67	2.67	0.00	0.00
T_2	79.67	83.17	69.33	89.67	84.50	85.50	63.33	81.33	72.67	60.00	27.83	7.67	0.00
T_3	84.83	88.00	89.67	90.17	85.17	81.83	84.67	85.33	83.17	71.67	68.83	51.67	45.00
T_4	90.83	92.17	87.67	94.50	92.50	83.33	79.33	94.17	91.33	83.17	70.83	56.83	37.83
T_5	45.83	56.67	48.00	57.00	59.17	40.00	41.00	41.83	34.67	28.33	15.33	7.67	6.00
Mean	76.60	78.13	73.23	78.00	77.50	63.43	58.60	64.83	59.37	50.77	37.10	24.77	17.77
S.Em. +	1.33	1.27	2.61	2.07	1.46	1.34	2.87	1.11	1.06	1.46	2.06	0.99	0.80
C.D. at 5%	3.89	3.71	7.63	6.07	4.28	3.93	8.41	3.26	3.11	4.28	6.05	2.90	2.35
CV%	4.25	3.97	8.77	6.47	4.62	5.17	12.01	4.21	4.38	7.06	13.63	9.79	11.07

Table 4: Germination (%) recorded at final count in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	85.17	76.50	78.00	90.33	67.00	29.33	28.50	24.00	16.83	12.50	2.67	0.00	0.00
T_2	83.17	88.00	80.17	65.00	86.33	86.50	64.83	81.50	73.00	64.83	30.83	8.17	3.50
T_3	91.00	91.33	91.50	90.17	87.17	85.50	84.33	86.67	83.17	74.67	69.83	52.00	46.67
T_4	94.83	93.83	91.00	94.50	93.00	84.67	82.67	94.17	91.83	84.67	72.50	57.00	38.83
T_5	51.50	62.33	56.17	57.00	60.83	44.17	44.00	43.83	35.67	34.00	19.33	8.00	6.00
Mean	81.13	82.40	79.37	79.40	78.87	66.03	60.87	66.03	60.10	54.13	39.03	25.03	19.00
S.Em. +	1.05	1.50	1.72	1.30	1.58	1.32	2.66	1.11	1.28	1.50	2.09	1.01	0.81
C.D. at 5%	3.08	4.41	5.03	3.81	4.62	3.86	7.78	3.25	3.75	4.39	6.11	2.96	2.36
CV%	3.18	4.50	5.30	3.99	4.90	4.89	10.69	4.11	5.22	6.78	13.08	9.88	10.40

Table 5: Seedling length (cm) recorded in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	16.95	18.04	15.85	15.88	17.92	10.63	20.16	17.96	13.69	11.25	8.38	0.00	0.00
T_2	16.65	17.41	14.50	14.40	16.67	14.23	20.12	19.87	15.22	11.94	12.64	9.31	2.42
T_3	16.46	17.65	16.14	15.86	17.74	14.31	20.39	19.85	17.42	12.97	13.39	12.25	11.54
T_4	15.98	17.36	15.95	16.72	17.30	15.51	21.52	20.78	17.29	14.85	15.06	11.46	6.58
T_5	16.77	17.90	14.87	16.75	17.92	16.06	21.96	20.71	15.91	13.70	12.70	10.64	7.24
Mean	16.56	17.67	15.46	15.92	17.51	14.15	20.83	19.84	15.91	12.94	12.43	8.73	5.56
S.Em. +	0.50	0.28	0.32	0.53	0.24	0.37	0.72	0.72	0.65	0.50	0.51	0.39	0.43
C.D. at 5%	NS	NS	0.94	1.56	0.69	1.10	NS	NS	1.90	1.47	1.48	1.13	1.27
CV%	7.30	3.90	5.09	8.09	3.36	6.48	8.51	8.87	10.01	9.52	9.96	10.86	19.05

Table 6: Seedling dry weight (g) recorded in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	0.62	0.61	0.61	0.38	0.47	0.26	0.21	0.18	0.10	0.10	0.01	0.00	0.00
T_2	0.52	0.67	0.57	0.44	0.46	0.58	0.40	0.53	0.39	0.38	0.28	0.38	0.007
T_3	0.64	0.72	0.72	0.53	0.68	0.61	0.50	0.57	0.47	0.56	0.48	0.48	0.47
T_4	0.45	0.47	0.51	0.40	0.47	0.42	0.34	0.46	0.38	0.40	0.35	0.34	0.20
T_5	0.41	0.58	0.35	0.39	0.51	0.40	0.33	0.34	0.30	0.33	0.16	0.47	0.04
Mean	0.53	0.61	0.55	0.43	0.52	0.45	0.36	0.41	0.33	0.36	0.25	0.35	0.14
S.Em. +	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.01
C.D. at 5%	0.08	0.04	0.06	0.02	0.06	0.06	0.06	0.04	0.04	0.04	0.10	0.04	0.04
CV%	11.99	5.66	9.60	4.56	8.86	10.14	13.58	8.35	8.79	9.20	31.55	9.57	20.64

Table 7: Seed vigour index - I recorded in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	1437.88	1379.95	1236.98	1434.14	1121.09	314.64	573.40	429.63	209.85	140.56	21.56	0.00	0.00
T_2	1383.90	1531.57	1161.88	936.25	1441.04	1230.61	1306.50	1620.82	1111.78	769.00	401.81	78.19	8.50
T_3	1497.86	1611.84	1477.11	1429.93	1546.10	1224.51	1719.31	1720.63	1450.25	968.15	935.69	618.87	519.78
T_4	1515.35	1628.54	1452.78	1581.35	1608.38	1312.65	1752.65	1956.51	1355.14	1256.26	1092.30	657.49	251.61
T_5	864.74	1118.00	834.52	1012.13	1090.08	710.07	977.82	896.80	576.21	468.87	244.38	84.81	43.10
Mean	1339.95	1453.98	1232.65	1278.76	1361.34	958.50	1265.94	1324.88	940.64	720.57	539.15	287.87	164.60
S.Em. +	46.41	33.42	52.32	31.66	36.14	31.96	72.57	39.13	113.80	31.33	39.10	11.62	10.17
C.D. at 5%	135.96	97.89	153.27	92.75	105.86	93.63	212.58	114.63	333.36	91.76	114.52	34.03	29.79
CV%	8.49	5.63	10.26	6.07	6.50	8.18	14.04	7.24	29.63	10.65	17.76	9.88	15.13

Table 8: Seed vigour index - II recorded in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	52.57	46.63	47.70	39.68	31.55	7.61	5.93	4.41	1.58	1.37	0.04	0.00	0.00
T_2	43.03	58.75	45.60	24.65	39.77	50.25	26.52	43.10	28.71	25.57	6.67	0.40	0.02
T_3	58.48	66.02	66.43	47.90	59.15	52.27	42.98	48.97	39.22	42.34	33.63	20.76	22.19
T_4	42.33	43.78	46.22	37.47	43.23	35.43	27.72	43.53	35.21	33.88	25.17	18.57	7.74
T_5	21.15	36.32	19.78	22.32	30.48	17.82	14.85	14.67	10.56	11.27	3.23	0.41	0.28
Mean	43.51	50.30	45.15	34.40	40.84	32.68	23.60	30.93	23.05	22.89	13.75	8.03	6.05
S.Em. +	2.38	1.50	2.28	0.98	2.16	2.14	1.95	1.46	0.74	0.98	1.23	0.41	0.61
C.D. at 5%	6.96	4.40	6.67	2.86	6.32	6.27	5.71	4.26	2.16	2.86	3.61	1.20	1.78
CV%	13.44	7.35	12.34	6.93	13.03	16.16	20.24	11.52	7.83	10.45	21.95	12.52	24.61

Table 9: Field emergence in percentage recorded in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	85.83	67.67	76.00	70.83	69.50	67.00	6.17	18.83	11.67	7.67	0.67	0.33	0.00
T_2	90.50	76.33	75.50	71.67	69.17	68.50	40.17	64.83	50.33	50.00	9.83	2.67	0.67
T_3	87.00	76.17	83.33	66.83	65.00	63.17	40.50	74.17	62.83	62.33	42.83	38.67	32.67
T_4	84.50	85.00	85.33	81.00	81.17	80.33	83.83	85.33	80.17	78.00	47.00	32.17	27.17
T_5	62.00	60.67	50.33	44.33	39.17	35.83	24.83	38.17	22.17	21.83	10.33	4.83	2.33
Mean	81.97	73.17	74.10	66.93	64.80	62.97	39.10	56.27	45.43	43.97	22.13	15.73	12.57
S.Em. +	1.12	1.79	2.88	1.24	0.95	1.10	0.91	2.04	1.31	1.23	1.30	1.02	0.82
C.D. at 5%	3.28	5.26	8.42	3.62	2.78	3.23	2.65	5.98	3.85	3.61	3.80	2.98	2.40
CV%	3.34	6.00	9.38	4.52	3.60	4.28	5.67	8.88	7.09	6.86	14.35	15.86	15.98

Table 10: Seed moisture content (%) recorded in various genotypes of bajra over storage period.

Parents/ Periods	2 Month	4 Month	6 Month	8 Month	10 Month	12 Month	14 Month	16 Month	18 Month	20 Month	22 Month	24 Month	26 Month
T_1	7.63	6.97	7.88	5.83	9.54	10.57	6.87	8.05	8.54	9.05	10.15	8.53	9.69
T_2	7.84	7.53	8.41	5.30	9.15	10.41	7.31	8.88	8.93	9.49	10.74	8.36	9.93
T_3	4.35	5.57	6.76	4.51	8.83	9.90	6.30	8.79	8.43	9.38	10.75	8.32	8.79
T_4	5.72	6.34	7.43	4.17	8.70	9.99	6.38	8.31	8.43	8.66	10.07	8.19	10.75
T_5	4.29	4.58	5.79	3.86	7.64	8.94	6.29	7.42	7.83	9.54	10.98	7.83	10.13
Mean	5.97	6.20	7.25	4.73	8.77	9.96	6.63	8.29	8.43	9.22	10.54	8.24	9.86
S.Em. +	0.15	0.08	0.08	0.05	0.04	0.09	0.23	0.03	0.08	0.06	0.04	0.10	0.79
C.D. at 5%	0.44	0.23	0.22	0.15	0.13	0.25	0.67	0.08	0.22	0.17	0.11	0.30	NS
CV%	6.20	3.14	2.54	2.48	1.19	2.14	8.47	0.81	2.20	1.56	0.84	3.02	9.61

[MS received: May 24, 2016] *[MS accepted: June 21, 2016]*