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Balappa Sattigeri
Department of Seed Science and Technology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Parashivamurthy
Department of Seed Science and Technology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Siddaraju R
Department of Seed Science and Technology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Harish MS
Department of Seed Science and Technology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Corresponding Author:
Balappa Sattigeri
Department of Seed Science and Technology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Effect of seed production locations on seed quality and storabillty in rice (*Oryza sativa* L.) hybrid KRH-4

Balappa Sattigeri, Parashivamurthy, Siddaraju R and Harish MS

Abstract
The experiment was conducted at Department of Seed Science and Technology G.K.V.K, U.A.S, Bengaluru. To investigate the "Effect of seed production locations on seed quality and storabillty in rice (*Oryza sativa* L.) hybrid KRH-4". Freshly harvested seeds were collected from three different locations *viz*,.L_1-Mandya, L_2-Tumkur, L_3-Kollegala and used for investigation. The seeds were stored for twelve months under ambient condition and observation were recorded on seed quality parameters bimonthly up to ten months and their after observation were recorded monthly interval. Among different locations, seeds produced at Mandya had better seed storability and seed quality parameters such as moisture content (10.18%), test weight (18.97 g), germination (80.08%), seedling vigour index-II (846), electrical conductivity of see leachates (3.79 dSm^{-1}), pH of seed lechates (7.33). alpha amylase activity (0.27 cm), total dehydrogenase activity (0.36 A_{480nm}), seed infection (15.37%), seed infestation (22.17%) and field emergence (76.29%). This study could be concluded, that the rice hybrid KRH-4 produced at Mandya location can be stored for longer period. However, seed produced at Kollegala location recorded lower seed quality parameters.

Keywords: Seed production locations, seed quality, storabillty, rice, *Oryza sativa* L., hybrid KRH-4

Introduction
Rice (*Oryza sativa* L.) is one of the world's most favored staple food crops and more than 90 per cent of rice is produced and consumed in Asia. Rice occupies a pride place among food crops cultivated in world. Globally rice is cultivated in 160 million tones with an average productivity of 4.18 tonnes ha^{-1}. In India rice was cultivated in an area of 42 million hectares with production of 104.32 million tones with an average productivity of 2 tonnes ha^{-1}. In Karnataka rice is being grown over 2.72 million ha with production and productivity of 3.64 million tones and 2.51tonnes $ha^{-1,}$ respectively. In India the area under rice hybrid seed production is 2000 hectares with production of 3000tonnes with an average productivity of 1.5–2.5 tonnes ha^{-1} (Rice Knowledge Management Portal-2010, DRR).
The task of increasing rice supply to meet the anticipated demand will be difficult without further technological innovation to shift the yield ceilings and their large scale adoption. Hybrid technology in many crops has clearly shown that it can contribute significantly (20-30%) towards increased production, almost at the same level of input use except for the cost of seed. Even though per cent increase in yield of rice has shown an upward trend in the last few years it is still lower than many other countries.
The production and supply of quality seed is one of the important factors responsible for the increased productivity and production of any crop. The highest quality of the seed is attained under that complex of conditions evoking the most favourable interactions between genetic makeup of a seed and the environment under which it is produced, harvested, processed and stored.
Storage of seeds till the next sowing is an essential segment of the seed industry. It is essential to make available better quality seed for sowing. Seeds tend to deteriorate even under controlled conditions but at a very slower pace compared to ambient conditions.

Material and Methods
To study the effect of seed production locations on seed quality during storage
Freshly harvested rice hybrid KRH-4 F_1 seeds were collected from three different locations mainly from V.C. Farm, Mandya, Tumkur and Kollegala. Seeds were cleaned, graded, dried to safe level of moisture and used for the storage study. The initial moisture content of the seeds was in the range of 9 to 10 per cent.

Seed production locations
L_1: Mandya
L_2: Tumkur
L_3: Kollegala

The experiment was initiated on 14th May 2014 to 21st May 2015 with seven treatments by adopting factorial completely randomized design with three replications.

Table 1: Influence of locations, containers and seed treatments on germination (%) andseedling vigour index-Iduring storage in rice hybrid KRH-4

Treatments	Months of storage from May 2014 to May 2015											
	2	4	6	8	10	12	2	4	6	8	10	12
	Germination (%)						Seedling vigour index-I					
a. Locations												
L_1: Mandya	93.33	92.85	86.95	82.37	82.00	80.08	2829	2535	2390	2020	1877	1766
L_2:Tumkur	91.98	91.37	85.50	80.33	79.06	77.09	2741	2447	2327	1946	1712	1715
L_3:Kollegala	92.32	91.45	83.30	76.17	77.86	75.36	2743	2442	2236	1731	1533	1671
SEM±	0.25	0.16	0.24	0.28	0.31	0.26	12.15	10.39	10.99	14.63	17.52	7.9
CD (P=0.05)	0.69	0.45	0.68	0.79	0.86	0.73	33.90	29.00	30.66	40.81	48.88	21.9

Table 2: Influence of locations, containers and seed treatments on alpha amylase activity (cm) and seed infection (%) during storage in rice hybrid KRH-4

Treatments	Months of storage from May 2014 to May 2015											
	2	4	6	8	10	12	2	4	6	8	10	12
	Alpha amylase (cm)						Seed infection (%)					
a. Locations												
L_1: Mandya	0.44	0.39	0.35	0.29	0.30	0.27	0.29	2.17	4.32	11.05	12.01	15.37
L_2:Tumkur	0.43	0.39	0.36	0.29	0.30	0.27	0.42	2.42	4.83	11.49	13.82	17.04
L_3:Kollegala	0.40	0.37	0.34	0.28	0.28	0.25	0.40	2.65	5.29	13.20	15.82	18.42
SEM±	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.15	0.59	0.59	0.59
CD (P=0.05)	0.01	0.01	0.01	0.00	0.01	0.01	0.20	0.22	0.42	1.65	1.64	1.63

Result and Discussion

Germination

The seed production locations differed significantly for germination percentage throughout the storage periods. The Mandya location (L_1) recorded highest (93.33%) germination which differed significantly with all other locations after two months of storage. Whereas, the lowest germination (91.98%) was recorded in seeds produced at Kollegala location (L_3). The germination goes on decreasing periodically as the storage period progressed and at twelve months of storage the highest (80.08%) germination was observed in Mandya location which differed significantly with other locations and the least (75.36%) was in Kollegala which was significantly inferior to all other locations. This is in agreement with Deshpande (1993) [2], Kumar and Dev (1990) [4] opined that rice hybrids seeds differed in their longevity as an impact of their production locations.

Seedling Vigour Index-I

Among seed production locations, the seeds produced at Mandya recorded highest SVI-I (2829) compared to Tumkur (2741) and Kollegala (2743) at second month of storage and thereafter the SVI-I gradually declined and reached 2390, 2327 and 2236 at the end of six months of storage and 1766, 1715 and 1671 at the end of twelve months of storage in Mandya, Tumkur and Kollegala, respectively The decrease in the seedling vigour index was related to the decreased seed germination and mean seedling length over a storage period. Similar results were also reported by Rame Gowda (1992) [5]; Deshpande and Mahadevappa (1994) [3]; Swaranna (2001) [6] observed better relationship between the seedling vigour index and seed quality in rice.

Alpha Amylase Activity

Among seed production locations, the seeds produced at Mandya recorded highest alpha amylase activity (0.44 cm) compared to Tumkur (0.43 cm) and Kollegala (0.40 cm) in second month of storage and thereafter the alpha amylase activity declined and reached 0.35, 0.36 and 0.34 cm at the end of six months of storage and 0.26, 0.25 and 0.25 cm at the end of twelve months of storage in Mandya, Tumkur and Kollegala respectively. The seed production locations mainly affect the α-amylase activity mainly due to climatic conditions and ageing factors. Similar findings were reported by Bhojaraj (2005) [1].

Seed Infection

Among seed production locations, the seeds produced at Mandya was recorded lowest seed infection (0.29%) compared to Kollegala (0.40%) and Tumkur (0.42%) in second month of storage and thereafter the seed infection increased and reached 4.32, 4.83, and 5.28 per cent and 11.05, 11.49, 13.20 per cent at the end of six and twelve months of storage in Mandya, Tumkur and Kollegala respectively. The seed production location mainly affects the seed infection mainly due to climatic condition and ageing factors. Similar findings were obtained by Bhojaraj (2005) [1].

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