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EFFECT OF STORAGE CONDITIONS AND CONTAINERS ON SEED QUALITY OF GREEN GRAM [*VIGNA RADIATA* (L.) WILCZEK] cv. SHINYMOONG

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Abstract

An experiment was conducted to know the effect of storage conditions and containers on seed quality of greengram [*Vigna radiata* (L.) Wilczek] cv. Shinymoong. The well dried green gram seeds packed in cloth bag, Poly Lined Gunny Bag (PLGB) and High Density Polythene Bag (HDPE) and stored under two different storage conditions *viz.,* ambient and commercial cold storage condition with initial of 7.4% moisture content. The result revealed that the seeds stored in commercial cold storage and packed in polylined gunny bag recorded higher seed germination (91.25%), seedling length (24.33 cm) and seedling vigour index-II (2219) after ten months of storage.

Key words : Green gram, storage conditions, containers.

Introduction

Green gram [*Vigna radiata* (L.) Wilczek] is one of the most extensively grown pulse crop in India. The dietary protein content of pulses varies from 20 to 30 per cent. It is grown as pre and late monsoon crop. In India, it is grown under an area of 30.80 lakh ha with the production of 0.69 m tones and Karnataka occupy an area of 5.80 lakh ha with production of 9.2 thousand tonnes (Anonymous, 2009). In recent days, several private organizations established the commercial cold storage with temperature of 5-7^{0}C and 65-70 per cent relative humidity for storage of dry chilli, bengalgram, paddy grains to preserve marketable colour of dry chilli and bengalgram grains. Therefore, there is need of exploiting the possibility of storing different crop seeds under commercial cold storage structures hence the present study was undertaken.

Materials and Methods

The present study was carried out to know the effect of storage conditions and containers on seeds quality of green gram [*Vigna radiata* (L.) Wilczek] cv. Shinymoong at Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Raichur (Karnataka), India during year 2010-2011. The seeds were procured from Seed Unit, U.A.S. Raichur and used for storage studies. The treatment details, storage conditions S_1- Ambient storage, S_2- Commercial cold storage (5-7^0 C, 65-70% RH), storage containers C_1- Cloth bag, C_2- PLGB, 700 gauge, C_3- HDPE. The bulk green gram seeds treated with thiram 1 gKg^{-1} before storage. The observation *viz*., germination test was conducted in laboratory using between paper method as per (ISTA, 1999), one hundred seeds of four replicates were placed equidistantly between moist *kraft* paper towels. The seedlings were evaluated on seventh day of incubation and the cumulative percentage of germination was expressed based on normal seedlings. Five normal seedlings were selected at random in each replication on seventh day. The mean seedling length was computed by adding both shoot and root lengths and expressed in centimetres. The seedling vigour index-II was expressed in whole number. Seedling vigour index-II = Germination (%) x Mean seedling length (cm). The data obtained from the experiment was statistically analyzed by using factorial CRD, the Critical Differences between the treatments

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Table 1 : Effect of storage conditions and containers on seed germination (%), seedling length (cm) and seedling vigour index-II in green gram cv. Shinymoong.

Storage conditions	Months after storage								
	Germination %			Seedling length (cm)			Seedling vigour index		
	2	6	10	2	6	10	2	6	10
S_1	94.25(76.15)	89.42(71.05)	83.58(66.17)	28.10	26.72	22.02	2594	2390	1841
S_2	95.25(77.55)	92.83(74.49)	89.67(71.30)	28.17	26.90	24.23	2638	2497	2173
Mean	94.75	91.13	86.63	28.13	26.81	23.13	2616	2443	2007
S. Em±	0.34	0.15	0.36	0.34	0.005	0.004	16.50	4.18	7.03
CD @ 5%	NS	0.46	1.08	NS	0.014	0.013	NS	12.42	20.90
Storage conditions	Months after storage								
	Germination %			Seedling length (cm)			Seedling vigour index-II		
	2	6	10	2	6	10	2	6	10
C_1	94.38(76.39)	89.88(71.54)	84.25(66.80)	28.11	26.74	23.04	2603	2403	1946
C_2	95.13(77.36)	92.38(74.03)	89.00(70.73)	28.16	26.89	23.21	2635	2483	2068
C_3	94.75(76.79)	91.13(72.74)	86.64(68.68)	28.14	26.80	23.12	2609	2442	2006
Mean	94.75	91.13	86.63	0.43	26.81	23.13	2616	2443	2007
S. Em±	0.42	0.19	0.44	0.32	0.006	0.005	20.20	5.12	8.61
CD @ 5%	NS	0.56	1.32	NS	0.017	0.016	NS	15.2	25.59

NS-Non significant, *Figures in parentheses are arc sine transformed values.

were worked out at five per cent significance (Snedecor and Corchran, 1967).

Results and Discussion

The results on the effect of storage condition and container and their interaction effect at different months of storage are presented in the (Table 1-2). The seed germination %, seedling length (cm), seedling vigour index-II differed significantly between the storage conditions during storage except second and fourth month of storage irrespective of storage condition and storage container. The maximum germination (89.67%), seedling length (24.23 cm) and seedling vigour index-II (2173) were recorded in commercial cold storage as compared to ambient storage condition (83.58%, 22.02 cm, 1841) after ten months of storage.

There was gradual reduction in the germination percentage from one to ten months of storage in both condition, but reduction in germination process was relatively slower in cold storage condition compared to ambient storage condition. This might be due to storage environmental conditions. The effect storage longevity is negative on level of seed vigour varied between storage conditions. It could be correlated with difference amongst crops in expression of protective system of enzymatic processes which influence on intensity of seed deterioration. Longevity of stored seeds of any crops considerably depends upon the storage condition, primarily in terms of air temperature and relative humidity in storage. The results of this investigation regarding the use of different storage conditions were in conformity to those of Arulnandy and Senanayake (1991), Gupta and Shakya (1976) in soybean seeds. The probable reason for slow rate of reduction in germination process in cold storage condition is due reduced rate of respiration and metabolic changes occurring seeds as reported by Das *et al*. (1998) in rajmah seeds and Mc. Neal (1966) in soybean seeds. Under ambient storage condition excessive leaching of electrolytes, soluble sugars and free amino acids occur as revealed by Doijode (1990) in onion seeds. With passing of storage period, vigour of seeds decline due to catabolic activity in seed and thus seed though viable, reduction in length of shoot and root were observed, similar observation was made by Arunandly and Senanayake (1991) in soybean.

Similarly significant differences are noticed for different storage containers after four months of storage. Irrespective of storage conditions the seed stored in PLGB (C_2) recorded maximum germination (89.0 %), seedling length (23.21 cm) and seedling vigour index-II (2068)

Table 2 : Interaction effect of storage conditions and containers on seed germination (%), seedling length (cm) and seedling vigour index-II in green gram cv. Shinymoong.

Storage conditions × storage containers	Months after storage								
	Germination %			Seedling length (cm)			Seedling vigour index-II		
	2	6	10	2	6	10	2	6	10
S_1C_1	93.75(75.55)	87.85(69.51)	80.25(63.61)	28.08	26.65	21.93	2583	2338	1759
S_1C_2	94.75(76.76)	91.00(72.54)	86.75(68.65)	28.12	26.79	22.11	2614	2437	1917
S_1C_3	94.25(76.13)	89.50(71.10)	83.75(66.25)	28.10	26.73	22.03	2585	2392	1845
S_2C_1	95.00(77.24)	92.00(73.57)	88.25(69.98)	28.14	26.83	24.16	2624	2468	2132
S_2C_2	95.50(77.96)	93.75(75.53)	91.25(72.81)	28.20	26.99	24.33	2657	2530	2219
S_2C_3	95.25(77.45)	92.75(74.38)	89.50(71.11)	28.17	26.87	24.20	2633	2492	2167
Mean	94.75	91.13	86.63	28.13	26.81	23.13	2616	2443	2007
S. Em±	0.60	0.27	0.63	0.60	0.008	0.008	28.57	4.18	12.18
CD @ 5%	NS	0.80	1.87	NS	0.024	0.023	NS	12.42	36.20

NS-Non significant, *Figures in parentheses are arc sine transformed values.

followed by C_3 (86.64%), (23.12 cm) and minimum in C_1 (84.25%), (23.04 cm) and (1946) after ten months of storage.

The present study revealed that germination percentage decreased in all the three containers with the advancement of storage period. However, significantly higher germination (89.0%) was recorded in PLGB compared to HDPE (86.64%) and clothbag (84.25%) at the end of ten months of storage. The seeds stored in PLGB and HDPE also exhibited deterioration in seed quality but, at slower rate. The PLGB has maintained highest germination per cent because of less fluctuation in moisture due its moisture proofing nature, comparatively less insect damage and seed infection per cent compared to seed stored in cloth bag.

The superiority of PLGB over cloth bag in prolonging the storage life was reported by Dwivedi and Shukla (1990) in chickpea seeds. The reason for reduced seed quality parameters in cloth bag was due to high rate of seed quality deterioration by biotic and abiotic factors, the cloth bags were proven more susceptible to the changes occurring in biotic and abiotic factors. The loss in viability and vigour of seeds stored in cloth bag was comparatively more. These findings are in conformity with Singh *et al.* (2007) in lentil seeds, Paul *et al.* (1996) in mungbean seeds. The decrease in germination of seeds stored in cloth bag is mainly due to age induced phenomenon which is inevitable and irreversible. The decline germination percentage may be attributed to ageing effect leading to depletion of food reserve and decline in synthetic activity of embryo.

Interaction between storage conditions and containers differed significantly on germination percentage, seedling length and seedling vigour index-II after four months of storage (table 2). The seeds stored in commercial cold storage in PLGB (S_2C_2) recorded maximum germination (91.25%) which on par and followed by S_2C_3 (89.0%). Significantly lowest germination (80.25%) was recorded in S_1C_1. The PLGB (S_2C_2) recorded highest seedling length (24.33 cm) followed by S_2C_3 (24.20 cm) and S_2C_1 (24.16) and lowest seedling length noticed in S_1C_1 (21.93 cm). Significantly higher seedling vigour index-II recorded in S_2C_2 (2219) followed by S_2C_3 (2167) which is on par with S_2C_1 (2132) and lowest seedling vigour index-II recorded in S_1C_1 (1759).

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