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Inter Relationship Among Seed Quality Parameters of Treated Blackgram Seed After Storge in Different Packaging Material

Blackgram (*Vigna mungo* L.) is the fourth important pulse crop in India and the second most important pulse crop in Andhra Pradesh in terms of extent of cultivation. It is consumed in the form of split pulse as well as whole pulse, which is an essential supplement of cereal based diet. Seed deterioration is one of the important factors responsible for the poor performance of blackgram. Maintenance of seed quality during storage period is important not only for successful crop production but also for maintaining the quality and integrity of the seed that are in constant threat of genetic erosion (Barua *et al.,* 2009). Seed treatment and storing the seed in assured packaging material have a major role in protecting the seed during storage and achieving uniform seedling emergence and crop establishment in the field. However limited information is available about the relationship of germination with other seed quality parameters. Hence, the present study is contemplated with the main aim of assessing the interrelationship among the seed quality parameters of the blackgram seed treated with botanicals and fungicide after storage in different packaging material.

Breeder seed of blackgram variety, LBG-752, procured from Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh with an initial germination of 98.66 % and seed moisture content of 8 % was treated with botanicals and recommended fungicide, thiram and stored in three different packaging material [jute bag (P_1), cloth bag (P_2) and HDPE bag (700 gauge) (P_3)] along with control (T_1) under ambient conditions in the Department of Seed Science and Technology, Advanced Post Graduate Centre, Lam, Guntur for 10 months from July, 2016 to May, 2017. The experiment was laid out in Factorial Completely Randomized Design with two factors *viz.,* packaging materials as one factor and seed treatment as second factor and three replications

Seed samples drawn initially one week after seed treatment but before packing and at monthly intervals during the storage period were tested for germination as per the standard procedure of ISTA (ISTA, 1985). Observations on various seed quality parameters *viz*., germination, seedling length, seedling fresh and dry weights, moisture content and electrical conductivity were recorded as per the standard procedures. Speed of germination, co-efficient of velocity of germination, mean daily germination, seedling vigour indices were computed as per the formulae suggested by Adebisi and Oyekale (2005), Maguire (1962), Scott *et al.* (1984), Abdul Baki and Anderson (1973), respectively.

Correlation co-efficient analysis was carried out to study the nature and degree of relationship between all the seed quality parameters following the method of Fisher and Yates (1967) at n-2 degrees of freedom at 5 and 1 per cent level of significance. Where, "n" denotes the number of treatments used in the calculation by using OPSTAT software.

Correlation co-efficient analysis measures the mutual relationship between various characters. Simple correlations estimated from the mean data obtained at the end of the storage period showed that germination exhibited highly significant positive association with co-efficient of velocity of germination (0.887), seedling vigour index-I (0.858), seedling vigour index-II (0.858) and dry weight of seedlings (0.809) and significant positive correlation with seedling length (0.756), while significant negative association of this trait was observed with electrical conductivity (-0.703) (tABLE.1). The association of seed germination with moisture content was found to be negative and non-significant. Agrawal (1976) and Singh (1999) observed increase in seed moisture content and its negative association with germination in rice over storage.

Speed of germination exhibited highly significant positive correlation with seedling vigour index-II (0.768) and significant positive association with dry weight of seedlings (0.680), while highly significant negative correlation of this trait was observed with electrical conductivity (-0.846).

Co-efficient of velocity of germination showed highly significant association with seedling vigour index-I (0.829) and seedling vigour index-II (0.802) and significant positive correlation with seedling length (0.756) and dry weight of seedlings (0.727), while highly significant negative association of this trait was observed with electrical conductivity (-0.771) and moisture content (-0.819).

Mean daily germination exhibited positive association with dry weight of seedlings (0.761) and seedling vigour index-II (0.722). Seedling length exhibited highly significant positive association with seedling vigour index-I (0.985) and dry weight of seedlings (0.765) and significant positive correlation with co-efficient of velocity of germination (0.756) and seedling vigour index-II (0.710).

Table 1: Simple correlation matrix of seed quality parameters in treated blackgram seed stored in different packaging material

	CVG	MDG	SL	FW	DW	SVI-I	SVI-II	MC	EC	G
SOG	0.58	0.58	0.54	0.14	0.680*	0.594	0.768**	-0.592	-0.846**	0.623
CVG		0.260	0.756*	0.274	0.727*	0.829**	0.802**	-0.819**	-0.771**	0.887**
MDG			0.336	-0.26	0.761*	0.398	0.722*	-0.314	-0.565	0.495
SL				0.396	0.765**	0.985**	0.710*	-0.542	-0.587	0.756*
FW					-0.053	0.38	0.201	0.07	0.108	0.279
DW						0.817**	0.890**	-0.639*	-0.763*	0.809**
SVI-I							0.785**	-0.577	-0.651*	0.858**
SVI-II								-0.707*	-0.819**	0.853**
MC									0.857**	-0.553
EC										-0.703*

SOG : Speed of germination;
CVG : Co-efficient of velocity of germination
MDG : Mean daily germination;
SL : Seedling length
FW : Fresh weight of seedlings;
DW : Dry weight of seedlings
SVI-I : Seedling vigour index-I;
SVI-II : Seedling vigour index-II
MC : Moisture content:
EC : Electrical conductivity
G : Germination

Fresh weight of seedlings showed non-significant association with all the seed quality parameters under study. Dry weight of seedlings exhibited highly significant positive association with seedling vigour index-II (0.890), seedling vigour index-I (0.817) and seedling length (0.765) and significant positive correlation with mean daily germination (0.761), co-efficient of velocity of germination (0.727) and speed of germination (0.680). This trait showed significant negative association with moisture content (-0.639) and electrical conductivity (-0.763). The significant positive association between dry weight and length of the seedlings may be due to the fact that the dry matter production increases with the advance of seedling growth.

Seedling vigour index-I exhibited highly significant positive association with seedling length (0.985), co-efficient of velocity of germination (0.829), dry weight of seedlings (0.817) and seedling vigour index-II (0.785). The seedling vigour index-I was actually a computed value based on germination (%) and seedling length (cm), which might be the reason for the highly significant positive correlation between these traits. The seedling vigour index-I had significant negative association with electrical conductivity(-0.651).

Seedling vigour index-II had highly significant positive correlation with dry weight of seedlings (0.890), co-efficient of velocity of germination (0.802), seedling vigour index-I (0.785) and speed of germination (0.768) and significant positive correlation with mean daily germination (0.722) and seedling length (0.710), while highly significant negative association of this trait was observed with moisture content (-0.707) and electrical conductivity (-0.819). Seedling vigour index-II was calculated by multiplying germination and seedling dry weight, which might have resulted in getting highly significant positive association among these parameters.

Moisture content showed highly significant positive correlation with electrical conductivity (0.857), while highly significant negative association of this trait was observed with co-efficient of velocity of germination (-0.819) and significant negative association with dry weight of seedlings (-0.639) and seedling vigour index-II (-0.707). A significant negative correlation between seed moisture content and viability was observed earlier in sorghum, bajra and maize (Nagarajan and Karivaratharaju, 1976).

Electrical conductivity exhibited highly significant positive association with moisture content (0.857) and negative correlation with all the remaining seed quality parameters under study. Highly significant negative association of this trait was observed with co-efficient of velocity of germination (-0.771), seedling vigour index-II (-0.819), speed of germination (-0.846) and significant negative association with seedling vigour index-I (-0.651) and dry weight of seedlings (-0.763). The leachate of seed as measured by electrical conductivity (Bradnock and Mathews, 1970 and Powell and Mathews, 1986) was shown to be associated with the loss of vigour and viability.

CONCLUSION

Highly significant positive association of seed moisture content with electrical conductivity and negative correlation of electrical conductivity with all the seed quality parameters clearly indicated that membrane deterioration under high seed moisture content was involved in the loss of vigour and viability during storage. From the negative association of electrical conductivity of seed leachates with germination parameters and seedling traits it can be inferred that healthy and sound seed which have retained superior seed quality by undergoing relatively lower ageing during storage would be able to complete the process of germination in considerably lesser time than those which showed the signs of deterioration due to natural ageing.

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