



RESEARCH PAPER

Studies on the physiological quality of stored sorghum seed concerning germinative parameters

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Abstract : Seed germination and the field crop stand that is necessary for the higher yield area affected by the physiological quality of the seed *i.e.* the seed viability and vigor. The *Rabi* sorghum seed is considered a "moderate storer" as its viability fluctuates drastically under warm and humid storage conditions. In the present research, we evaluated the stored *Rabi* sorghum seed material for its physiological quality particularly vigor and viability as germinative evaluation criteria. The seeds of *Rabi* sorghum variety, SPV-1411, SPV-1595, CSV-22R, CSV-29R and SPV2407 were stored in air-tight plastic containers and kept under ambient laboratory conditions were evaluated for germinative criteria. The storage of seeds resulted in the deterioration of seed vigor as evidenced by the decline in the various parameters investigated.

Key Words : Sorghum, Germination, Physiological quality, Vigour

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INTRODUCTION

Sorghum [*Sorghum bicolor* (L.) Moench] is one of the most important millet cereal grain crops, originating from West Africa about 5000- 8000 years ago (De Candolle, 1884). It is the fifth most important cereal crop in the world and is the dietary staple of more than 500 million people in more than 30 countries (ICRISAT, 2010). It is a water-efficient crop for semiarid and arid environments where water is the main limiting factor. The yield of the sorghum crop is dependent on various factors including the quality of seed used for sowing. The environment before harvest, at the time of harvest, and after harvest influences the physiological quality of the

seed. Hence, it is essential to know the physiological quality of the seeds before sowing these in the field and that requires rapid, precise and convenient evaluation criteria. Therefore, the present study was conducted to evaluate the physiological quality of *Rabi* sorghum seed using germinative parameters.

MATERIAL AND METHODS

The seeds of the *Rabi* sorghum genotype were produced in Sorghum Research Station V.N.M.K.V, Parbhani in 2018 and were stored for further germinative studies. Germinative evaluation criteria for seeds of 5 sorghum genotypes were studied in the seed stored under

ambient storage conditions employing CRD design with four replications. The seed of each entry was stored from May 2018 onward in an airtight plastic container kept in the laboratory under ambient conditions. The sample was drawn for various observations at monthly intervals till the seed germination declined considerably below the Indian minimum seed certification standard

A hundred seeds of each entry were weighed and kept in a wet paper towel. The seeds were weighed after 4, 10, and 16 hours of imbibitions. The rate was calculated by subtracting the initial value from the subsequent ones and presented of water imbibed during different periods of imbibitions. The germination test was conducted in four replications of 100 seeds each by adopting between paper methods as described by ISTA rules (1996). The temperature of $25 \pm 1^\circ\text{C}$ and RH of 95 percent was maintained during the germination test. Germination percentage was observed after 24, 36, 48, 72, hours, and 7 days period. The counts taken on the 3rd and 7th day were considered as first and final counts respectively. The germination index was calculated as per the formula given by Maguire. (1962), using average values derived from germination trials. The root length of ten randomly selected normal seedlings after 7th day of the germination trial was measured in four replications and mean values were calculated. The root length of ten randomly selected normal seedlings after 7th day of the germination trial was measured in four replications and mean values were calculated. The seed weight differences in the stored seeds were also tabulated (Table 1).

RESULTS AND DISCUSSION

The experimental findings obtained from the present

study have been discussed in following heads :

Imbibition :

The imbibition rates of 0-4 hours, 4-10 hours and 10-16 hours were studied. The imbibition rate of 0-4 hours differed significantly among the entries and over the storage period. The entries and storage period were also significant. The highest imbibition rate was recorded for SPV2407 followed by CSV29R.

Germination percentage :

The entries and the storage period differed significantly concerning germination percentage after 24, 36, 48, and 72 hours and 7 days. The entry SPV2407 recorded the highest germination percentage followed by CSV29R, SPV1411, and CSV22R respectively.

Germination index :

The entries and storage period differences were significant. The entries recorded a higher value as was the case in germination percentage. The entry CSV29R recorded the highest value followed by SPV2407, CSV22R, and SPV1411 respectively.

Root length :

The entries and storage periods were significant and the highest root length was recorded in the entry SPV2407 at the initiation of storage (Jul 2018) while the lowest root length was recorded in CSV29R at the end of the storage period.

Shoot length :

There was a decline in shoot length with the increase in the storage period. The entries SPV2407 and CSV22R recorded higher shoot lengths.

Table 1 : Seed weight difference variation in various months during storage

Treatment	Seed weight (of 100 seeds in g) difference of stored seeds during the sampling period of the month			
	July	August	September	October
SPV1411	4.17	4.05	3.97	3.87
SPV1595	4.89	3.84	3.77	3.45
CSV22R	4.88	3.39	3.23	3.31
CSV29R	3.81	2.74	2.84	2.67
SPV2407	5.13	4.03	3.94	4.15
Mean	4.53	3.61	3.56	3.49
S.E.±	0.12	0.06	0.08	0.08
C.Dat5%	0.37	0.22	0.25	0.24
C.V. (P=0.05)	5.43	3.83	4.72	4.64

Root / Shoot length ratio :

The highest root shoot length ratio was recorded in SPV411. The minimum ratio was recorded for entry CSV29R.

Shoot fresh weight :

Shoot fresh weight also showed a declining trend over the storage period and it differed significantly among the entries. In general, the entry SPV2407 reported the highest value followed by SPV1595.

Seedling fresh weight :

The seedling fresh weight showed a decreasing trend with the advancement of storage periods. The entries differed significantly and the highest value was recorded by SPV207 followed by CSV29R, respectively.

Conclusion :

Rabi sorghum variety SPV2407 and CSV29R were superior and recorded better germinative evaluation on the physiological quality of the *Rabi* sorghum genotype. The germinative parameters except seedling moisture exhibited a significant decline with the deterioration in seed vigour due to storage.

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