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Influence of resultant seeds from drip irrigation and fertigation on storage potential in Bhendi cv. Arka Anamika

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Abstract

A storage study was conducted to predict the storability of resultant seeds of bhendi. The resultant bhendi seeds along with control were treated with Bavistin (2g / kg) and Imidachloprid (1 ml / kg) and stored in cloth bag and aluminium foil pouches under ambient conditions. Resultant seeds of drip fertigation with 100% RDF and treated with imidachloprid stored in aluminium foil pouches recorded early germination and maintained higher germination percentage, root and shoot length and vigour index throughout the storage period.

Keywords: Storage, resultant seeds, bhendi, aluminium foil pouch

Introduction

On account of the diverse biological activities taking place in seed during storage, the seed deteriorates progressively in quality attributes resulting in impairment of germination and vigour. The factors responsible for deterioration are multifold. Viability of seed in storage is determined not only by the period of storage, the type of container used, seed treatment, and storage environment but also by the environment including package of practices under which the seed is produced.

Seed quality is a multiple and complex factor comprising of physical, chemical and biological components. Seed being a biological or living entity, deterioration is inevitable, irreversible and inexorable. Loss of vigour and viability is hereditary in nature and senescence is common for the entire living organism. Seed deterioration is a phenomenon, which begins immediately after attaining physiological maturity even on the mother plant itself (Helmer *et al.*, 1962) [8]. Though quality of the seed is decided by the genetic makeup, seed vigour is decided by viability and seed storage conditions (Deepa *et al.* 2013) [5].

Materials and methods

The storage studies were carried out at Department of Seed Science and Technology, TNAU, Coimbatore with the resultant seeds after imposing pre storage treatment with Bavistin (2g / kg) and Imidachloprid (1 ml / kg) using different storage containers like cloth bag and aluminium foil pouches and evaluated for the seed quality characters at bi monthly intervals. The treatments imposed are T1 – Furrow irrigation + 125% RDF as soil application (control), T2 - Furrow irrigation + 125% RDF as soil application + Bavistin (2g / kg), T3 - Furrow irrigation + 125% RDF as soil application + Imidachloprid (1 ml / kg), T4 – Drip irrigation + 125% RDF as soil application (control), T5 – Drip irrigation + 125% RDF as soil application + Bavistin (2g / kg), T6 – Drip irrigation + 125% RDF as soil application + Imidachloprid (1 ml / kg), T7 – Drip fertigation with 100% RDF (control), T8 – Drip fertigation with 100% RDF + Bavistin (2g / kg) and T9 – Drip fertigation with 100% RDF + Imidachloprid (1 ml / kg).

The experiment was carried out in Factorial Completely Randomized Design with three replications. The observations recorded on seed quality parameters such as speed of germination, germination (%), seedling length (cm), seedling dry weight (g seedlings⁻¹⁰) and seedling vigour index. Seed quality parameters were tested as per ISTA rules, speed of germination was calculated as suggested by Maguire (1962) [14] and vigour index was determined according to Abdul-Baki and Anderson (1973) [2]. The results were analyzed statistically by Panse and Sukhatme (1985) [18].

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Results and discussion

Germination is the visible indicator of seed quality. Abdalla and Roberts (1969) ^[1] reported that its percentage is an excellent indicator of growth potential of the surviving seeds, irrespective of the factors responsible for the viability of the seed. In the present investigation, seeds from drip fertigation with 100% RDF and treated with imidachloprid stored in aluminium foil pouches recorded early germination and maintained higher germination throughout the storage period

(Fig 1). Similar results were observed by Saisanthosh and Patil (2018) ^[22] in onion. The decline in germinability with time of storage could be due to the phenomenon of ageing associated with irreversible physical, physiological and biochemical changes occurring in them, accelerated by the fluctuation in the relative humidity and temperature of the storage environment (Barton, 1953; Vadivelu and Ramaswamy, 1983; Hong and Kim, 2004; Netra *et al.*, 2015) ^[3, 24, 10, 17].

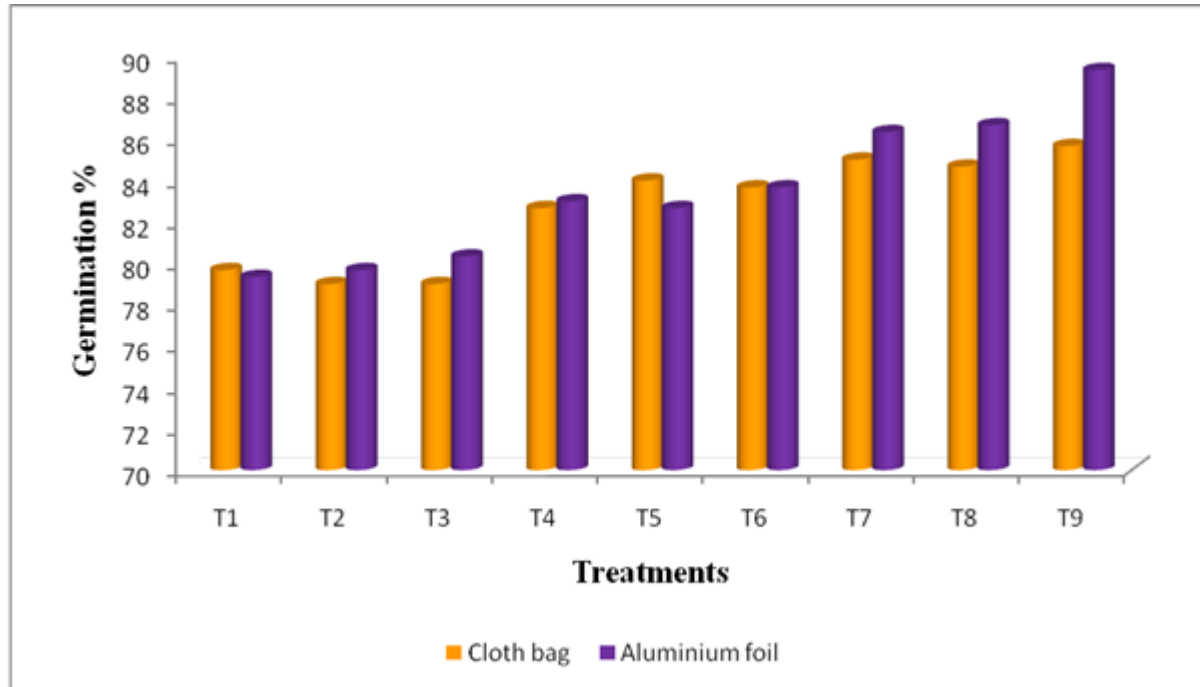


Fig 1: Effect of drip irrigation and drip fertigation treatments on germination (%) in different storage container in six months after storage in Bhendi cv. Arka anamika

The root and shoot length could be considered as a criterion for assessing seed vigour (Woodstock, 1969) ^[25]. In the present study, seeds from drip fertigation with 100% RDF and treated with imidachloprid stored in aluminium foil pouches maintained higher root and shoot length throughout the storage period (Table 1 and 2). The root and shoot length reduced with increase in the period of storage irrespective of treatments and containers. Seed deterioration associated with

loss of viability during storage resulted in decreased growth of root and shoot (Abdalla and Roberts, 1969) ^[1]. The reduction in seedling length was comparatively less in the treated seeds than untreated ones and similarly aluminium foil pouches proved to be superior to cloth bag for the maintenance of seed vigour under storage. The results are in conformity with the findings of Doijode (1986) ^[6] in cluster bean and Rani (1988) ^[20] in tomato.

Table 1: Effect of drip irrigation and drip fertigation treatments, storage container and period of storage on root length (cm) in Bhendi cv. Arka anamika

Storage periods Containers	P0		P1		P2		P3		Mean	
	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
T1	14.47	14.77	14.25	14.41	14.06	13.36	13.85	13.38	14.15	13.98
T2	14.58	15.02	14.85	15.84	14.89	15.91	13.89	13.25	14.55	14.99
T3	15.02	14.59	15.32	15.31	14.52	15.42	14.25	14.22	14.77	14.88
T4	14.91	14.96	16.04	14.36	14.71	13.83	14.03	14.99	14.92	14.53
T5	14.99	15.13	15.75	15.76	14.95	15.73	14.26	14.91	14.98	15.38
T6	15.09	14.96	15.78	16.10	14.09	15.82	14.04	14.81	14.75	15.42
T7	15.35	15.61	16.45	14.14	13.84	14.18	14.12	16.25	14.94	15.04
T8	15.96	14.99	14.90	16.27	14.57	16.17	14.18	16.69	14.90	16.02
T9	16.18	16.14	15.90	17.42	14.72	17.49	14.21	16.68	15.25	16.93
Mean	15.17	15.13	15.47	15.50	14.48	15.32	14.09	15.01	14.80	15.24
	P	C	T	P x C	C x T	P x T	P x C x T			
SEd	0.095	0.067	0.142	0.134	0.201	0.285	0.403			
CD (P=0.05)	0.188	0.133	0.282	0.266	0.400	0.565	0.800			

Seedling dry matter production was another manifestation of the physiological efficiency of the germinating seeds which

depend on seed vigour (Heydecker, 1973) ^[9]. In this study, the seeds from drip fertigation with 100% RDF

and treated with bavistin maintained higher dry matter production throughout the storage period. The seedling dry matter decreased with increase in storage period irrespective of containers and treatment. The rate of reduction of seedling dry matter in the treated seeds was less. Between the

containers, the seeds stored in aluminium foil pouches maintained higher dry matter than that of seeds stored in cloth bag. Such results are reported by Doijode (1986)^[6] in cluster bean, Rani (1988)^[20] in tomato and Monira *et al.* (2012)^[16] in soybean.

Table 2: Effect of drip irrigation and drip fertigation treatments, storage container and period of storage on shoot length (cm) in Bhendi cv. Arka anamika

Storage periods	P0		P1		P2		P3		Mean	
Containers	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
Treatments	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
T1	14.02	13.66	13.47	13.88	12.28	13.18	11.76	13.54	12.88	13.56
T2	13.44	12.72	13.72	15.29	12.07	13.52	11.83	14.29	12.76	13.95
T3	14.33	13.58	13.50	15.02	11.96	14.72	11.80	13.87	12.89	14.29
T4	14.07	14.60	13.89	15.39	13.36	12.80	12.90	14.20	13.55	14.24
T5	13.91	14.65	13.62	14.91	12.99	14.36	12.62	14.27	13.28	14.54
T6	14.11	13.51	14.33	14.91	13.57	14.64	12.92	14.04	13.73	14.27
T7	14.09	14.91	15.39	14.77	14.16	13.13	13.59	14.08	14.30	14.22
T8	13.88	14.73	14.96	14.99	13.62	14.60	14.07	14.24	14.13	14.64
T9	14.87	15.54	15.91	14.77	14.10	14.87	14.29	14.18	14.79	14.84
Mean	14.08	14.21	14.31	14.88	13.12	13.98	12.86	14.07	13.59	14.28
	P	C	T	P x C	C x T	P x T	P x C x T			
SEd	0.088	0.062	0.132	0.124	0.187	0.265	0.374			
CD (P=0.05)	0.175	0.123	0.262	0.247	0.371	0.525	0.743			

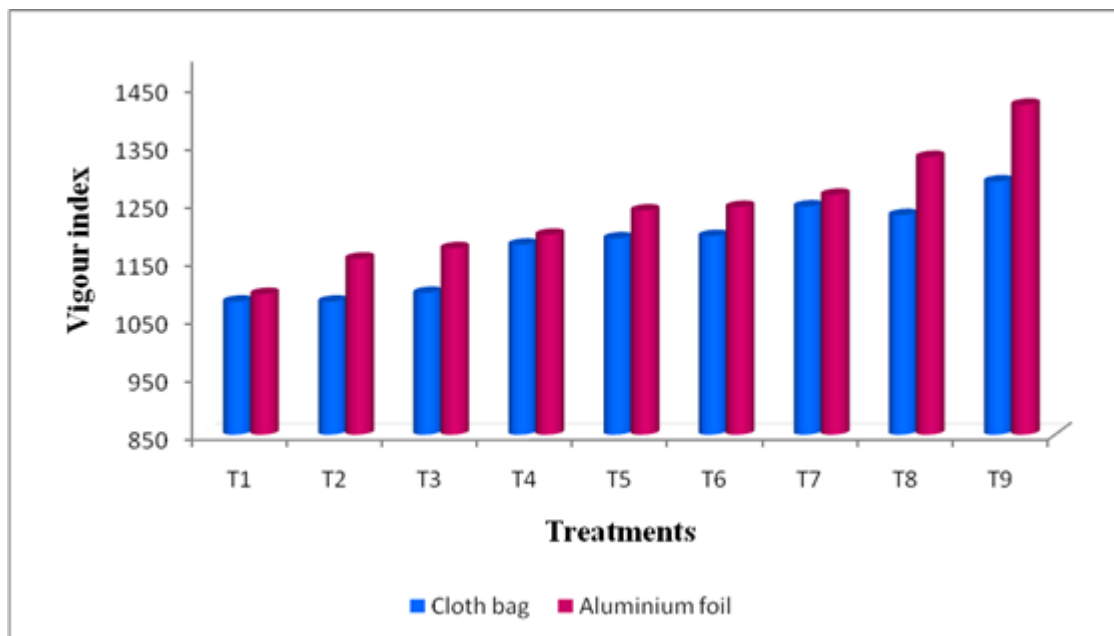


Fig 2: Effect of drip irrigation and drip fertigation treatments on vigour index in different storage container in six months after storage in Bhendi cv. Arka anamika

Seeds with better viability and vigour give satisfactorily emergence and establishment. Loss of vigour precedes loss of viability (Harrington, 1972)^[7] and hence the vigour potential of the seed in storage has to be maintained with great care. In this study, drip fertigation with 100% RDF and treated with imidachloprid maintained higher vigour index throughout the storage period (Fig 2). The vigour index decreased with increase in storage period irrespective of containers and treatment. The rate of reduction of vigour in the treated seeds was less. Between the containers, the seeds stored in aluminium foil pouches maintained higher vigour than that of seeds stored in cloth bag. Such results reinforcing the superiority of aluminium foil pouches were reported by Chuasin *et al.* (2006)^[4] in soybean and Khadtar *et al.* (2018)^[11] in cowpea.

The type of container exercised a profound influence on seed and seedling quality attributes. Seeds stored in aluminium foil

pouch registered an increased germination percentage, root length, shoot length, dry matter production and vigour. Similar results were reported in different crop seeds by (Rahman and Rahman 1997; Roknuzzaman *et al.*, 2008; Khalequzzaman *et al.*, 2012; Lambat *et al.*, 2015; Mollah *et al.*, 2016; Sultana *et al.*, 2016)^[19, 21, 12, 13, 15, 23]

Conclusion

In this study it can be concluded that the resultant seeds from drip fertigation with 100% RDF and treated with imidachloprid stored in aluminium foil pouches maintained the seed quality parameters at higher level throughout the period of storage.

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