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Influence of storage containers and seed pelleting on seed quality in brinjal (*Solanum melongena* L.) during storage

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ABSTRACT

The experiment was conducted using brinjal hybrid seeds cv. Arka Navneet. Seeds were pelleted with Bavistin, $ZnSO_4$, $MnSO_4$, DAP and Arappu leaf powder and stored in paper and polyethylene bags under ambient conditions for 12 months. Among the seed pelleting treatments, seeds pelleted with Bavistin (0.1%) followed by *Albezia amara* leaf powder (250 g/kg) resulted in minimum quantitative losses with better seed quality parameters. The seeds stored in polyethylene (700 gauges) bags maintained better seed quality parameters with less quantitative losses in comparison with seeds stored in paper bags throughout the storage period. In the interaction, effect of seeds pelleted with Bavistin and stored in polyethylene bag followed by *Albezia amara* leaf powder and stored in polyethylene bag revealed higher values for all the positive quality parameters when compared to other interaction effects throughout the storage period.

Key words: Brinjal, seed pelleting, seed quality, seed storage.

INTRODUCTION

The productivity of brinjal could be improved by the use of high quality seed, which is affected during storage leading to loss of vigour and viability. Several factors viz., inherent genetic potential, initial seed quality, environment during seed production, seed moisture content, mechanical damage, seed borne pathogens, storage insects, seed dressing chemicals and seed treatments influence the seed longevity and affect subsequent field emergence. Hence, storage of seeds after harvest until sowing assumes great importance for a successful crop production programme. During storage, viability and vigour are lost due to many biotic factors like storage pests and other micro flora. The insect pest and fungi cause considerable damage and are responsible for deterioration and reduction in storage potential of seed. Therefore, seed treatment with suitable chemicals and botanicals will reduce the quantitative and qualitative losses besides maintaining quality of seed for a longer period.

Seed pelleting is the process of enclosing small and irregular seeds with a small quantity of inert material to produce a globular unit of standard size needed to facilitate precision planting. It is also a mechanism of applying needed materials in such a way that they affect the seed or soil at the seed soil interface. Thus seed pelleting provides an opportunity to package, effective quantities of materials such that they can influence the micro environment of each seed (Krishnasamy, 2003). Hence, the present investigation was carried out to study the influence of seed pelleting and storage containers on seed quality of brinjal during storage.

MATERIAL AND METHODS

Four months old hybrid seeds of brinjal cv. Arka navneet, were obtained from Agricultural Research Station, UAS, Dharwad. The seeds were pelleted with Bavistin (0.1%), $ZnS0_4$ (0.03%), $MnS0_4$ (2%), DAP (6%). *Albezia amara* leaf powder (2.5%) and stored in paper bags and polyethylene bags of 700 gauge with four replications laid out in CRD with two factorial concepts along with control. The seeds were initially coated with adhesive and pelleting material followed by sprinkling and was rolling on the filler material (ash) for effective and uniform coating. The seeds were then dried back to their original moisture content and stored in paper and polyethylene bags under ambient conditions for 12 months.

Seeds were drawn at random from the bags at bi-monthly intervals for sowing in the field above observations. Observations on germination percentage, speed of germination, seedling length (cm), seedling vigour index

(SVI), seedling dry weight (mg) and field emergence (%) were collected following procedure prescribed by ISTA (Anon.,1999). The field emergence was studied by using one hundred seeds selected at random from each treatment in four replications, sown in well prepared black soil. Field emergence count was taken on the 15th day after sowing and emergence percentage was calculated taking into account the number of seedlings measuring cm above the soil surface.

RESULTS AND DISCUSSION

Seed pelleting with fungicides and botanicals had a significant effect on germination. Seeds treated with Bavistin resulted in significantly higher germination throughout the storage period followed by seeds treated with *Albezia amara* leaf powder, $MnSO_4$, $ZnSO_4$, DAP and control (Table 1). Seed pelleting with Bavistin was found to preserve the quality by its protecting the seeds from fungal and insect attack thus contributing to seed quality parameters (Taylor and Eckenrode, 1993). Beneficial effects of *Albezia amara* leaf powder could be attributed to bio-active materials present in them which might synergistically interact with amino acids especially tryptophan to form IAA in germinating seeds resulting in enhancement in seedling growth (Krishnasamy and Basaria Begam, 2003). Increased seed quality parameters might be due to the physiologically active substances present on the *Albezia amara* leaf powder which might have activated the embryo and other associated structure leading to development of stronger and efficient root system and higher vigour index (Ahmedraza, 1997).

However, the decline in per cent germination observed in all the treatments with increasing storage period might be due to the phenomenon of ageing, depletion of seed reserves and degradation of seed coat resulting in leaching of its constituents as reported by Chandra senan (1996) in Chilli and Joeraj (2000) in sunflower and Basavegowda and Nanjareddy (2008) in groundnut.

Seed pelleting with Bavistin followed by *Albezia amara* leaf powder recorded significantly higher seedling length, vigour index and seedling dry weight during storage (Table 1). This might be due to the control of physiological deterioration of seeds by their anti fungal and antioxidant effects, increased enzymatic activity, efficient translocation of nutrients from the seed into the initially heterotrophic seedling (Ref). The decrease in germination, seedling length, seedling vigour index and seedling dry weight with increasing storage period increased (Tables 1 and 2) could be attributed to the damage to membranal enzyme, proteins and nucleic acids resulting in the complete disorganization of membranes and cell organelles (Roberts, 1972).

Table 1. Effect of seed pelleting and containers on seed quality parameters during storage of brinjal hybrid cv. Arka Navneet

Treatment	2 MAS				4 MAS				6 MAS			
	G (%)	SG	VI	SW (mg)	G (%)	SG	VI	SW (mg)	G (%)	SG	VI	SW (mg)
P0	87.50 (69.30)	12.58	913	438	85.10 (67.24)	12.13	839	415	82.60 (65.31)	11.78	768	393
P1	96.70 (79.56	13.78	1293	477	95.20 (77.32)	13.57	1224	460	93.70 (75.45)	13.35	1160	444
P2	93.20 (74.80)	13.28	1139	470	91.60 (73.13)	12.07	1082	453	90.20 (71.69)	12.85	1026	436
P3	92.60 (74.20)	13.21	1115	463	89.50 (71.60)	12.85	1050	446	87.60 (69.37)	12.50	973	428
P4	91.60 (73.10)	13.06	1054	454	88.60 (70.21	12.64	961	433	85.90 (67.96)	12.26	886	412
P5	95.70 (76.68)	13.49	1267	473	94.20 (76.06)	13.28	1198	459	92.60 (74.21)	13.07	1140	442
SEM±	0.73	0.09	11.11	0.84	0.25	0.08	10.5	0.61	0.80	0.08	7.81	0.71
CD *(P=0.05)*	2.08	0.24	31.76	2.41	1.73	0.24	29.9	1.74	1.84	0.24	22.30	2.03
C1	92.30 (73.98)	13.14	1106	461	89.70 (71.27)	12.76	1023	441	87.10 (68.94)	12.49	945	422
C2	93.60 (75.38)	13.31	1133	464	92.00 (73.58)	13.09	1072	446	90.50 (73.04)	12.87	1019	430
SEM±	0.30	0.03	4.53	0.34	0.61	0.03	4.30	0.25	0.23	0.03	3.20	0.30
CD *(P=0.05)*	0.85	0.09	12.90	0.98	0.70	0.09	12.22	0.71	0.67	0.09	9.09	0.83

G-germination (%), SG-speed of germination, VI-vigour index, SW-seedling dry weight

Table 1. Effect of seed pelleting and containers on seed quality parameters during storage of brinjal hybrid cv.Arka Navneet (contd.)

Treatment	8 MAS				10 MAS				12 MAS			
	G%	SG	VI	SW	G%	SG	VI	SW	G%	SG	VI	SW
P0	80.10 (63.52)	11.42	699	370	76.60 (61.08)	10.92	626	348	72.00 (58.40)	10.35	552	325
P1	92.20 (73.36)	13.14	1092	428	89.70 (71.25)	12.78	1021	412	85.70 (65.74)	12.21	887	395
P2	88.70 (70.31)	12.64	971	419	86.30 (68.21)	12.28	903	402	82.20 (65.03)	11.71	798	380
P3	85.20 (67.38)	12.14	906	411	81.90 (64.88)	11.73	832	393	77.70 (61.77)	11.07	739	375
P4	83.60 (67.12)	11.92	817	392	80.10 (63.46)	11..36	735	371	75.70 (60.44)	10.78	640	350
P5	91.10 (73.64)	12.85	1070	427	88.10 (69.42)	12..58	996	411	84.70 (66.97)	11.97	835	392
SEM±	0.54	0.09	9.16	0.70	0.50	0.09	9.80	0.61	0.50	0.09	9.60	1.11
CD *(P=0.05)*	1.64	0.25	26.24	1.95	1.38	0.25	27.90	1.75	1.38	0.25	27.30	3.25
C1	84.60 (66.89)	12.04	869	402	80.90 (64.11)	11.52	694	383	76.70 (61.27)	10.95	694	362
C2	89.10 (70.68)	12.66	965	430	86.89 (68.65)	12.33	790	395	82.50 (65.23)	11.73	790	377
SEM±	0.22	0.04	3.74	0.30	0.20	0.04	5.52	0.30	0.20	0.04	5.52	0.50
CD *(P=0.05)*	0.63	0.10	10.70	0.83	0.56	0.10	15.80	0.81	0.56	0.10	15.80	1.38

P_0 – Control; P_3 – $MnSO_4$ (2%); C_1 – Paper bag

P_1 – Bavistin (0.1%); P_4 – DAP (60 g/ka); C_2 – Polythene bag 700 gauge

P2 – Zinc sulphate (300 mg/kg) P_5 – Arappu leaf powder (*Albizia amara)(250g/kg)*

• Figures in the parentheses indicate arc sine transformed values

Seed pelleting with $ZnSO_4$, $MnSO_4$ and DAP was not found to be effective in maintaining seed quality during storage. Although micronutrients are not helpful in enhancing storage life of the seed, they are helpful in plant establishment in the field (Krishna Samy and Basaria Begam, 2003).

Effect of containers on storability

Moisture content, temperature and RH during storage are the most important factors in determining seed storability. The hygroscopic nature of seeds results in fluctuation of seed moisture content due to changes in atmospheric temperature and RH. So, storage of seeds in moisture proof containers during storage will eliminate the dampness, deterioration, microbes, and enhance the seed longevity. It was observed that a decrease in germination percentage, root length, shoot length, vigour index, seedling dry weight, field emergence and speed of germination occurred with increase in storage period of seeds in both paper and polyethylene bags. Significantly higher root length, germination, shoot length, SVI, and seedling dry weight were noticed in the seeds stored in polyethylene bag while the seeds stored in paper bag recorded lower values which might be due to a larger fluctuation in moisture content leading to a faster rate of deterioration in the seeds stored in paper bags. Similar results were also obtained by Karivaratharaju *et al* (1987) in brinjal.

The seeds treated with Bavistin, zinc sulphate, manganese sulphate, DAP, Arappu leaf powder and stored in polyethylene bag recorded better seed quality parameters. Seed pelleting with Bavistin accompanied by and storage in polyethylene bag recorded significantly higher germination percentage, speed of germination, root length, shoot length, vigour index, seedling dry weight and field emergence (Table 2) than those seeds stored in paper bag. Results obtained in seeds pelleted with Bavistin and stored in polyethylene bag might be due to anti fungal effect of Bavistin and impervious nature of polyethylene bag which caused less interference of outside atmosphere. Similar observations were made by Jacqueline and Selvaraj (1988) in brinjal.

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Table 2. Interaction effect of seed pelleting and containers on field emergence (%) during storage of brinjal hybrid Cv. Arka Navneet

Treatments Interaction effect (P x C)	Storage period (months) 2	4	6	8	10	12
$P_1 C_1$	88.00	87.00	86.10	85.10	82.50	75.10
	(66.73)*	(68.85)	(68.06)	(67.24)	(65.24)	(60.04)
$P_2 C_1$	86.10	85.10	84.10	83.20	79.20	70.10
	(68.06)	(67.24)	(66.45)	(65.75)	(62.82)	(56.79)
$P_3 C_1$	86.10	84.10	82.10	80.20	74.10	69.10
	(68.06)	(66.45)	(64.99)	(63.53)	(59.35)	(56.18)
$P_4 C_1$	83.10	80.20	77.10	74.40	72.10	65.10
	(66.67)	(63.53)	(61.36)	(59.60)	(58.06)	(53.74)
$P_5 C_1$	87.00	86.10	85.10	84.10	80.90	74.10
	(68.85)	(68.06)	(67.24)	(66.45)	(64.03)	(59.41)
$P_0 C_1$	82.10	79.20	75.10	72.10	70.80	60.00
	(64.92)	(62.82)	(60.01)	(58.06)	(56.88)	(50.77)
$P_1 C_2$	89.10	88.00	87.00	86.00	84.10	78.00
	(70.65)	(69.73)	(68.85)	(68.06)	(66.45)	(62.03)
$P_2 C_2$	87.00	86.10	85.10	84.10	82.10	74.10
	(68.85)	(68.06)	(67.24)	(66.45)	(64.99)	(59.35)
$P_3 C_2$	87.00	85.10	83.20	80.90	78.10	70.00
	(68.85)	(67.24)	(65.75)	(64.18)	(62.04)	(56.79)
$P_4 C_2$	84.10	82.10	80.20	78.10	75.10	68.10
	(66.44)	(64.99)	(63.53)	(62.04)	(60.01)	(55.56)
$P_5 C_2$	88.00	87.00	86.00	85.10	83.80	77.10
	(69.69)	(68.85)	(68.06)	(67.24)	(66.25)	(61.41)
$P_0 C_2$	84.70	80.96	79.20	77.10	72.40	65.10
	(66.99)	(64.18)	(62.82)	(61.36)	(58.55)	(53.74)
Mean	86.03	84.24	82.53	81.10	78.00	70.50
S. Em±	0.70	0.69	0.66	0.64	0.64	0.53
CD at 5%	2.00	1.96	1.97	1.82	183	1.50

P0 – Control; P3 – $MnSO_4$ (2%), C_1 – Paper bag
P1 – Bavistin (0.1%), P4 – DAP (60 g/ka) C2 – Polythene bag (700 gauge)
P2 – Zinc sulphate (300 mg/kg), P5 – Arappu leaf powder (*Albizia amara*)*(250g/kg)*

- Figures in the parentheses indicate arc sine transformed values

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