

## Influence of Seed Hardening and Pelleting on Storability of Fingermillet (*Eleusine coracana*) Seeds

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Dry farming relies mainly on soil moisture and seasonal rains. Often seed encounters deficits in soil moisture and struggles for survival and germination. Seed hardening and pelleting has been recommended long back to withstand drought at early phase of germination. Several scientists in different crops reported the importance of seed hardening and pelleting on drought resistance and yield. But the studies on storability of hardened and pelleted seeds are very meagre. Selvaraju [1] stated that the pelleted seeds of sorghum could be stored for four months under ambient condition, while Jegathambal [2] reported that the hardened and pelleted seeds of sorghum can be stored up to 2 weeks with higher germination and seedling vigour and beyond that it declined. Though, this treatment is done as a pre-sowing treatment, the need for storability of hardened and pelleted seeds arises in case of failure of expected monsoon. In such cases, the germinability of the seeds has to be maintained until next showers. This encouraged the study on storage potential of hardened and pelleted seeds.

The processed (BSS 12 x 12 sieve) seeds of finger millet cv. CO 13 were hardened using different chemicals and botanicals in a seed to solution ratio of 1:0.6 for 6 hours. Then the seeds were pelleted using DAP and ZnSO<sub>4</sub> @ 100 g and 100 mg respectively for 1 kg of seed after drying to the original moisture content. The hardening and pelleting consists of 9 treatment combinations viz. T<sub>1</sub>- control (unsoaked seeds) ; T<sub>2</sub>-Seeds hardened with calcium chloride (0.5 %); T<sub>3</sub>-Seeds hardened with brassinolide (0.1 ppm); T<sub>4</sub>- Seeds hardened with Salicylic acid (200 ppm); T<sub>5</sub>- Seeds hardened with

KH<sub>2</sub>PO<sub>4</sub> (2 %)+DAP (100 g) powder pelleting; T<sub>6</sub>- Seeds hardened with prosopis leaf extract (1%)+ DAP (100 g) and ZnSO<sub>4</sub> (100 mg) pelleting; T<sub>7</sub>- Seeds hardened with brassinolide (0.1 ppm) and KH<sub>2</sub>PO<sub>4</sub> (2 %)+DAP (100 g) and ZnSO<sub>4</sub> (100 mg) pelleting; T<sub>8</sub>- Seeds hardened with brassinolide (0.1 ppm) and prosopis leaf extract (1%) +DAP (100 g) and ZnSO<sub>4</sub> (100 mg) pelleting; and T<sub>9</sub>- Seeds hardened with brassinolide (0.1 ppm), KH<sub>2</sub>PO<sub>4</sub> (2 %) and prosopis leaf extract (1%)+DAP (100 g) and ZnSO<sub>4</sub> (100 mg) pelleting.

The hardened and pelleted seeds were packed in gada cloth bag and 700-gauge polythene bag and stored in ambient condition (33° ± 2°C and 57% RH) for 6 months. The seeds were evaluated at monthly intervals for germination [3]. The data were analyzed statistically by the method of Panse and Sukhatme [4].

The performance of hardened and pelleted seeds under storage revealed that the reduction in germination was considerably higher in hardened and pelleted seeds when compared to control. Similar results were reported by Nagaraj [5] in paddy. Among the hardened seeds, calcium chloride (62%) and brassinolide (60%) exhibited higher germination after 6 months of storage (Table 1). The decline in germination might be due to depletion of food reserves and decline in synthetic activity [6] or due to the phenomenon of ageing associated with irreversible physical, physiological and biochemical changes occurring in them [7]. The imbibition process that occurred during hardening might have lead to faster biochemical degradation of hardened seed [1]. The reduction was profound in hardened

Table 1. Influence of hardening and pelleting and containers on germination (per cent) of seeds during storage in finger millet cv. CO 13

Treatments	Cloth Bag (C <sub>1</sub> )							Polythene bag (C <sub>2</sub> )							T Mean	
	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>		P <sub>6</sub>
T <sub>1</sub>	84 (66.45)	84 (66.45)	83 (65.68)	83 (64.90)	82 (63.45)	79 (62.74)	77 (62.03)	82 (64.53)	84 (66.45)	83 (65.68)	83 (65.66)	82 (64.92)	82 (64.92)	81 (64.16)	80 (63.44)	82 (65.03)
T <sub>2</sub>	93 (74.76)	85 (67.25)	80 (63.45)	76 (60.68)	71 (57.43)	67 (54.95)	62 (51.95)	76 (61.50)	93 (74.76)	88 (69.78)	84 (66.45)	80 (63.45)	75 (60.01)	71 (57.43)	67 (54.95)	80 (63.83)
T <sub>3</sub>	95 (77.12)	86 (68.06)	79 (62.74)	74 (59.35)	68 (55.55)	64 (53.13)	60 (50.77)	75 (51.95)	95 (38.09)	89 (70.64)	84 (66.43)	77 (61.35)	72 (58.06)	68 (55.55)	63 (52.55)	78 (57.52)
T <sub>4</sub>	86 (68.04)	77 (61.35)	73 (58.70)	68 (55.55)	65 (53.73)	59 (50.19)	52 (46.15)	69 (56.24)	86 (68.04)	81 (64.16)	77 (61.35)	72 (58.06)	68 (55.55)	62 (51.95)	56 (48.45)	72 (58.22)
T <sub>5</sub>	92 (73.59)	83 (65.66)	70 (56.79)	56 (48.45)	48 (43.85)	38 (38.06)	33 (33.21)	60 (51.37)	92 (73.59)	85 (67.22)	73 (58.70)	61 (51.36)	53 (46.72)	44 (41.55)	39 (38.64)	63 (53.97)
T <sub>6</sub>	91 (72.56)	79 (62.73)	64 (53.13)	56 (48.45)	47 (43.28)	36 (36.87)	28 (31.94)	57 (49.85)	91 (72.56)	82 (64.90)	70 (56.79)	59 (50.19)	52 (46.15)	45 (42.13)	40 (39.23)	63 (53.97)
T <sub>7</sub>	92 (73.59)	78 (62.03)	67 (54.94)	60 (50.77)	48 (43.85)	37 (37.47)	30 (33.21)	59 (50.84)	92 (73.59)	81 (64.16)	72 (58.06)	64 (53.13)	55 (47.87)	46 (42.71)	41 (39.81)	62 (52.67)
T <sub>8</sub>	94 (75.86)	81 (64.16)	72 (58.06)	60 (50.77)	49 (44.43)	36 (36.87)	29 (32.58)	60 (51.82)	94 (75.86)	85 (67.22)	75 (60.01)	66 (54.34)	57 (49.03)	48 (43.85)	42 (40.40)	57 (55.82)
T <sub>9</sub>	94 (75.86)	80 (63.45)	71 (57.42)	59 (50.19)	46 (42.71)	35 (36.27)	28 (31.94)	59 (51.13)	94 (75.86)	84 (66.43)	76 (60.67)	65 (53.73)	54 (47.30)	46 (42.71)	40 (39.23)	66 (55.15)
Mean	91 (73.10)	81 (64.57)	73 (58.99)	66 (54.35)	58 (49.81)	50 (45.17)	44 (41.55)	66 (54.34)	91 (72.56)	84 (66.43)	77 (61.57)	70 (56.72)	63 (52.85)	57 (49.12)	52 (46.30)	71 (57.43)
	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>		P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>	
P	91	83	83	75	68	61	54	48								
Mean	(73.10)	(65.68)	(51.95)	(55.55)	(51.36)	(51.36)	(47.30)	(43.85)								
T	C	P	TC	CP	TP	TCP										
SED	0.718	0.339	0.633	1.016	0.896	1.900	2.687									
CD (P=0.05)	1.415	0.667	1.248	2.000	1.764	3.743	5.293									

and pelleted seeds. This is in accordance with the results of Jegathambal [2] in sorghum. This might be due to faster deterioration of stored seeds. Seed deterioration alters the semipermeability properties of the membrane integrity [8].

The results revealed that the hardened and pelleted finger millet seeds could be stored safely up to 2 months in polythene bag and 1 month in cloth bag with minimum seed certification standard of 75 per cent germination. In the case of hardened seeds, the brassinolide (0.1 ppm) hardened and calcium chloride (0.5%) hardened seeds exhibited higher germination of 75 per cent up to 4 months in polythene bag and 3 months in cloth bag.

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