International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 8, Issue 51, 2016, pp.-2329-2331.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

Research Article

EFFECT OF ORGANIC AND INORGANIC PELLETING MATERIALS AND STORAGE ENVIRONMENT ON VIABILITY AND VIGOUR OF CHILLI SEEDS DURING STORAGES

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Received: June 19, 2016; Revised: August 03, 2016; Accepted: August 04, 2016; Published: October 27, 2016

Abstract- A laboratory experiment was conducted in factorial completely randomized design with four repetition in the laboratory of Seed Science and Technology, Junagadh Agricultural University, Junagadh from 8th June to 21st February, 2015-16 to study the effect of different, seed pelleting on seed quality in chilli [*Capsicum annum* L.] during four storage periods (2, 4, 6, 8 month of storage). With regards to different seed pelleting treatments, (Thiram (3 g/kg) + Imidacloprid (600 g/lit) helped to maintain higher germination, speed of germination, seedling length, seedling dry weight, strong, seed vigour index (length) and seed vigour index (mass) at the end of eight month of storage period.

Keywords- Chilli, Pelleting, Quality, Storability.

Citation: Zala I. M., et al., (2016) Effect of Organic and Inorganic Pelleting Materials and Storage Environment on Viability and Vigour of Chilli Seeds during Storages. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 8, Issue 51, pp.-2329-2331.

Academic Editor / Reviewer: Dr K. C. Shivabalan

Introduction

Chilli (*Capsicum annum* L.) is one of the important spice crops of the world and is widely cultivated through warm temperate, tropical and sub-tropical countries. Chilli is famous for its pleasant aromatic flavour, pungency and high colouring substance. Chilli is extremely used as a spice in India, the popularity of chilli is associated with its pungency. This is due to the capsacinoids that are unique to the genus capsicum [11].

Chilli has very high nutritional value according to Joshi and Singh (1975), 100 g edible part of chilli contains water 92.4 percent, protein 1.2 g, fat 0.8 g, carbohydrate 10 g, fiber 2.6 g, calcium 11 mg, phosphorous 61 mg, energy 2 Cal and rich source of vitamins like carotene 870 I.U., ascorbic acid 175 mg, riboflavin 0.03 mg, and niacin 0.58 mg.

Seed deterioration is irreversible, inevitable, irreparable, but the rate of deterioration can be reduced by certain seed enhancement techniques like seed treatment, coating, or pelleting with suitable chemicals, botanicals, micronutrients and biocontrol agents, which reduce the quantitative and qualitative loss besides maintaining quality of the seed for longer storage [16]. Seed pelleting is the process of enclosing a seed with small quantity of inert material just large enough to produce globular unit of standard size to provide small amount of nutrients to young seedlings [13, 14, 8). This technique is acclaimed to play a vital role in modern agriculture for precision planting and also for supplementary nutrition through which uniform and vigorous field stand is possible.It reduce the problem of thinning, gap filling and chemicals required in low quantity [10].

Materials and Methods

The fresh seeds of three chilli varieties, of which GVC-101 and GVC-111 were obtained from Main Vegetable Research Station, Anand Agricultural University, Anand, and one local variety Reshmpatta were used in the study. The storage experiment was conducted for a period of eight months (8th June to 21st February, 2015-16 under ambient storage condition) in the Department of Seed Science and Technology, Junagadh Agricultural University, Junagadh. Seeds were pelleted with T_1: Control, T_2: Arappu leaf powder 100g/kg seeds T_3: Neem leaf powder 100g/kg seeds T_4: KH_2PO_4 (2.0%) T_5: KNO_3 (1.0%) T_6: K_2SO_4 (1.0%) T_7: Thiram (3 g/kg) + Imidacloprid (600 g/lit)the required quantity of neem leaf powder 100 g/kg, Arappu leaf powder 100 g/kg KH_2PO_4 2%, KNO_3 1%, K_2SO_4 1% and Thiram (3 g/kg) + Imidacloprid (600 g/lit) were treated and pelleting was done by using gum arabica as adhesive material. Moisture content of seeds was brought 10 to 12 per cent after pelleting before storing. The observation on germination percentage [4], speed of germination, seedling length, seedling dry weight (g) [17], seed vigour index (length and mass) [1], and strong seedlings[2] were recorded after two, four, six and eight month of storage of treated seeds. Statistical analysis of the data was worked out using Factorial Completely Randomized Block Design [15] for each character and treatments were compared by critical difference at five per cent and one per cent levels of significance.

Results

Germination percentage:

A significant effect on germination percentage was observed by using different seed treatment throughout the storage periods [Table-1]. The results revealed that seed treatment with Thiram (3g/kg) + Imidacloprid (600g/lit) (T_7) was recorded significantly the highest germination percentage (85.67, 77.25, 71.25 and 68.08%) while, significantly the lowest germination percentage (74.08, 62.58, 56.58 and 53.42%) was recorded by untreated seeds after two, four, six and eight month of storage periods, respectively. These results are in accordance with the findings of [3, 12, 5] and [7] in chilli.

Speed of germination:

The significant effect on speed of germination was observed by using different seed treatment throughout the storage periods [Table-2]. The results revealed that seed treatment with Thiram (3g/kg) + Imidacloprid (600g/lit) (T_7) was recorded

significantly the highest speed of germination (37.39, 36.48, 34.72 and 30.88), while, untreated seeds (control) recorded significantly the lowest speed of germination (32.90, 33.11, 31.03 and 27.17) after two, four, six and eight months of storage periods, respectively. These results are in accordance with the results of [3, 12, 5] and [7] in chilli.

Table-1 *Effect of seed treatments on germination percentage during storage periods in chilli.*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	74.08	62.58	56.58	53.42
Arappu leaf powder 100g/kg seed	76.92	69.00	63.25	59.00
Neem leaf powder 100g/kg seed	80.83	74.08	63.50	62.42
KH_2PO_4 (2%)	76.00	65.83	57.00	54.58
KNO_3 (1%)	76.83	72.33	62.92	58.58
K_2SO_4 (1%)	76.58	66.42	60.00	56.33
Thiram (3g/kg)+ Imidacloprid (600g/lit)	85.67	77.25	71.25	68.08
S. Em±	0.38	0.39	0.57	0.29
C.D. at 5%	1.08	1.11	1.61	0.81

Table-2 *Effect of seed treatments on speed of germination during storage periods in chilli*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	32.92	33.11	31.03	27.17
Arappu leaf powder 100g/kg seed	34.87	34.33	33.16	29.21
Neem leaf powder 100g/kg seed	36.13	34.83	33.30	30.68
KH_2PO_4 (2%)	34.92	33.76	32.17	27.31
KNO_3 (1%)	35.37	34.48	32.73	28.35
K_2SO_4 (1%)	34.51	33.93	31.83	27.53
Thiram (3g/kg)+ Imidacloprid (600g/lit)	37.39	36.48	34.72	30.88
S. Em±	0.10	0.07	0.05	0.04
C.D. at 5%	0.27	0.20	0.14	0.11

Seedling length:

The effect of seed treatments on seedlings length was significant throughout the storage periods [Table-3]. The results revealed that seed treatment with Thiram (3g/kg) + Imidacloprid (600g/lit) (T_7) was recorded significantly the highest seedling length (9.18, 7.75, 6.37 and 6.04 cm), while, significantly the minimum seedling length (7.17, 5.31, 4.85 and 4.48 cm) was recorded by untreated (control) seeds after two, four, six and eight month of storage periods respectively. These results are in accordance with the findings of [10] in chilli.

Table-3 *Effect of seed treatments on seedling length during storage periods in chilli*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	7.17	5.31	4.85	4.48
Arappu leaf powder 100g/kg seed	7.53	6.15	5.44	4.98
Neem leaf powder 100g/kg seed	8.12	6.42	5.55	5.20
KH_2PO_4 (2%)	7.44	6.20	4.94	4.77
KNO_3 (1%)	7.63	6.14	5.12	4.87
K_2SO_4 (1%)	7.52	6.39	5.38	4.98
Thiram (3g/kg)+ Imidacloprid (600g/lit)	9.18	7.75	6.37	6.04
S. Em±	0.06	0.05	0.05	0.04
C.D. at 5%	0.18	0.14	0.15	0.10

Seedlings dry weight

The effect of seed treatments on seedlings dry weight was significant throughout the storage periods [Table-4]. Seeds treated with Thiram (3g/kg) + Imidacloprid (600g/lit) (T_7) recorded significantly the highest seedlings dry weight (0.0428, 0.0394, 0.0334 and 0.0264 g), while significantly lowest seedling dry weight was recorded by untreated seeds (control) (0.0320, 0.0293, 0.0235 and 0.0208 g) after two, four, six and eight month of storage periods, respectively. These results are in accordance with the results reported by [7, 10] in chilli and [9] in brinjal.

Strong seedlings

The effect of seed treatments on strong seedlings was significant throughout the storage periods [Table-5]. Among all the seed treatments, Thiram (3g/kg) + Imidacloprid (600g/lit) (T_7) recorded significantly the highest (83.67, 75.25, 69.92 and 66.00) strong seedlings, while significantly the lower strong seedling (71.42, 60.42, 53.75 and 50.17) were recorded by untreated seeds (control) (T_1) after two, four, six and eight month of storage periods, respectively.

Table-4 *Effect of seed treatments on seedling dry weight (g) during storage periods in chilli*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	0.0320	0.0293	0.0235	0.0208
Arappu leaf powder 100g/kg seed	0.0357	0.0293	0.0272	0.0223
Neem leaf powder 100g/kg seed	0.0370	0.0297	0.0273	0.0228
KH_2PO_4 (2%)	0.0338	0.0279	0.0242	0.0215
KNO_3 (1%)	0.0321	0.0294	0.0267	0.0228
K_2SO_4 (1%)	0.0327	0.0287	0.0250	0.0211
Thiram (3g/kg)+ Imidacloprid (600g/lit)	0.0428	0.0394	0.0334	0.0264
S. Em±	0.0005	0.0003	0.0003	0.0003
C.D. at 5%	0.0013	0.0009	0.0008	0.0009

Table-5 *Effect of seed treatments on strong seedlings during storage periods in chilli*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	71.42	60.42	53.75	50.17
Arappu leaf powder 100g/kg seed	74.83	67.00	60.58	56.17
Neem leaf powder 100g/kg seed	78.83	72.00	61.33	59.75
KH_2PO_4 (2%)	74.00	63.50	54.58	51.58
KNO_3 (1%)	74.75	69.67	60.17	55.67
K_2SO_4 (1%)	75.08	64.33	57.33	53.33
Thiram (3g/kg)+ Imidacloprid (600g/lit)	83.67	75.25	69.92	66.00
S. Em±	0.38	0.39	0.58	0.29
C.D. at 5%	1.08	1.10	3.35	1.80

Seed vigour index (length)

The effect of seed treatments on seed vigour index (length) was significant throughout the storage periods [Table-6]. Seed treated with Thiram (3g/kg) + Imidacloprid (600 g/lit) recorded significantly the highest seed vigour index (length) (793.44, 601.91, 455.87 and 412.54), while seeds as untreated (control) recorded significantly the lowest seed vigour index (length) (535.57, 332.57, 275.92 and 239.74) after two, four, six and eight month of storage periods, respectively. These results are in accordance with the findings of [7, 10] in chilli and [9] in brinjal.

Table-6 *Effect of seed treatments on seed vigour index (length) during storage periods in chilli*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	535.57	332.57	275.92	239.74
Arappu leaf powder 100g/kg seed	584.57	427.48	347.26	296.35
Neem leaf powder 100g/kg seed	665.68	476.16	352.20	325.11
KH_2PO_4 (2%)	571.86	410.92	282.80	261.40
KNO_3 (1%)	595.38	445.13	326.07	289.73
K_2SO_4 (1%)	582.53	425.70	323.83	282.17
Thiram (3g/kg)+ Imidacloprid (600g/lit)	793.44	601.91	455.87	412.54
S. Em±	5.67	4.54	4.79	2.31
C.D. at 5%	16.02	12.82	13.53	6.52

Seed vigour index (mass)

The effect of seed treatments on seed vigour index (mass) was significant throughout the storage periods [Table-7]. Seeds treated with Thiram (3g/kg) + Imidacloprid (600g/lit) (T_7) recorded significantly the highest seed vigour index (mass) (3.6813, 3.0526, 2.3953 and 1.8098), while significantly the lowest seed vigour index (mass) (2.3767, 1.8311, 1.3365 and 1.1123) was recorded by seeds remain as untreated (control) after two, four, six and eight month of storage

periods, respectively.

Table-7 *Effect of seed treatments on seed vigour index (mass) during storage periods in chilli*

Seed Treatments (T)	Storage period (Month)			
	2 month	4 month	6 month	8 month
Control	2.3767	1.8311	1.3365	1.1123
Arappu leaf powder 100g/kg seed	2.7568	2.0257	1.7275	1.3197
Neem leaf powder 100g/kg seed	3.0575	2.1993	1.7340	1.4248
KH_2PO_4 (2%)	2.5968	1.8423	1.3842	1.1743
KNO_3 (1%)	2.4664	2.1298	1.6970	1.3307
K_2SO_4 (1%)	2.5087	1.9058	1.5025	1.1872
Thiram (3g/kg)+ Imidacloprid (600g/lit)	3.6813	3.0526	2.3953	1.8098
S. Em±	0.0395	0.0266	0.0242	0.0190
C.D. at 5%	0.1115	0.0750	0.0684	0.0536

Conclusions

Based on the results of the present study, it may be concluded that chilli seeds pelleted with Thiram (3g/kg) + Imidacloprid (600g/lit) under ambient storage condition maintain higher viability and vigour up to eight months of storage.

Conflict of Interest: None declared

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