

INFLUENCE OF STORAGE CONTAINERS ON SEED LONGEVITY OF CUMIN (*Cuminum cyminum* L.) SEED

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ABSTRACT

A laboratory experiment was conducted using completely randomized design with three repetitions in the Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University, Junagadh from 20th May 2016 to 20th January 2017. The seeds of cumin cv. GC 4 was stored in six types of containers viz., moisture vapour proof high density laminated polyvinyl bags, polyvinyl bags 700 gauge, aluminium foil laminated bag, plastic lined jute bag, polyvinyl bag packing with vacuum and cloth bag (Control) in laboratory under ambient condition. The results revealed that polyvinyl bag packing with vacuum and aluminium foil laminated bag seed container was found superior than rest of other containers for maintaining seed quality.

KEY WORDS: Germination, Cumin, Containers, Vigour

INTRODUCTION

Cumin (*Cuminum cyminum* L.) seed is commonly known as “Jeera” in India. Cumin is considered as one of the important seed spices of an annual herb and is grown throughout the world. In the Middle East, it is a familiar spice as flavour over meat and vegetables in Europe. Cumin is grown as a *rabi* crop in India and it is also grown well in sub-tropical climate, suited for sandy soil.

Seed moisture and storage temperature are two most important factors affecting seed longevity during storage. Harrington (1960) formulated a general rule for seed storage involving temperature and seed moisture content. Cumin seed has unfortunately not adequate quality seed available in market due to poor storability. Types of container also regulate

temperature, relative humidity and seed moisture contents. High temperature, relative humidity and moisture in the storage environment appeared to be principle factor involved in deterioration of seed quality. Loss of germination capacity is the final manifestation of seed deterioration. Maintenance of seed quality during storage period is important not only for crop production in the following year but also for the maintenance integrity of the seeds because of their constant threat and of genetic erosion (Monira *et al.*, 2012). However, Using different kinds of packaging materials were another way to enhance storage life in cumin seed without chemical using and could be prevent the main cause seed deterioration such as moisture content and O₂ concentration.

Cumin being hygroscopic in nature, viability and vigour of seeds are known to be regulated by variations in seed containers, storage period, initial seed quality, packaging conditions and physiochemical factors etc. Seed containers or packaging materials are considered as one of the most important factors influencing longevity of seeds in storage in many field crops. To maintain the quality of seeds during storage the standardization of suitable seed packaging material is most important because seed packaging material is the basic measure to assure adequately healthy crops at emergence and during further growth of plants (Wani *et al.*, 2014). Therefore, the purpose of this study was to determine the influence of containers on seed longevity of cumin under natural ageing conditions.

MATERIALS AND METHODS

The seed of cumin variety viz., Gujarat Cumin 4 (GC 4) was obtained from Agricultural Research Station, Junagadh Agricultural University, Halvad. The production year of Gujarat Cumin- 4 seeds was Rabi 2016 and moisture content was 6 to 8 per cent. Firstly, seven hundred fifty gram seeds were taken from ninety kilogram seed lot of variety by using electronic balance. Then these seeds were kept in bowl, this material was mixed well with seeds by spoon in bowl. Thereafter, the seeds weighted in electronic balance to make two hundred fifty grams of seed and packed in seed containers viz., moisture vapour proof high density laminated polyvinyl bags (C₁), polyvinyl bags 700 gauge (C₂), aluminium foil laminated bag (C₃), plastic lined jute bag (C₄), polyvinyl bag packing with vacuum (C₅) and cloth bag (Control) (C₆). The seed materials were mixed uniformly and then packed in the above seed container and stored for the period from 20th May 2016 to 20th January 2017. The observations viz., seed moisture content (%) (Agrawal, 1980), germination

(%) (Anonymous, 1993), speed of germination (Maguire, 1962), seedling length (cm), seedling dry weight (g), strong and weak seedlings (Anonymous, 1983), seedling vigour index (length and mass) (Abdul Baki and Anderson, 1973), test weight (g), and incidence of drugstore beetles and cigarette beetles were measured after 150 and 250 days after storage period in each container. The data were analyzed as per the methods suggested by Cochran and Cox (1957).

RESULTS AND DISCUSSION

Cumin is poor storage crop which losses viability very rapidly under warm and humid condition of storage. Loss in viability and seedling vigour with prolonged storage has been found to decrease slowly and differs between species and within species. Cumin has hygroscopic nature, it absorbs moisture through environment. Moisture content of seed during storage was no doubt most influential factor affecting the longevity. Seed moisture content is the utmost cause for seed deterioration. Higher germination was associated with low moisture content in seed (Arulnandhy and Senanayake, 1988).

Seed stored in polyvinyl bag packing with vacuum (C₅) maintained the highest germination percentage (69.53% and 70.13%), lower seed moisture (6.76 % and 6.80 %), highest seedling length (10.76 cm and 10.69 cm), seed vigour index length (748.58 and 749.84), seed vigour index mass (19.71 and 18.87), highest seedling dry weight (0.28 and 0.27 g), highest strong seedlings (62.30 and 61.07), lowest weak seedlings (7.83 and 8.47) and lowest drugstore beetles and cigarette beetle infestation (4.45 % and 5.63 %), while aluminum foil laminated bag (C₃) recorded the highest speed of germination (41.37 and 41.74) and higher test weight (3.07 g and 3.01g) after 150 and 250 days of

storage periods, respectively (Table 1, 2 and 3).

Rahman and Rahman (1997) recorded the highest germination in polythene bag as compared to gunny bag. Maximum moisture content was observed in cloth bag as compare to polyvinyl bag packing with vacuum and aluminum foil laminated bag throughout the storage periods. Because rate of absorption was higher in cloth bag, it was not air tight container as compare to polyvinyl bag and aluminum bag. The best containers are those that maintain low moisture content of seed in storage and minimize moisture fluctuation in seed like polyvinyl bag packing with vacuum and aluminum foil laminated bag. Similar results were observed by Kurdikeri (1991), Kundu and Kachari (2000), Barua *et al.* (2009) and Monira *et al.* (2012).

CONCLUSION

Cumin seed germination and vigour is high at physiological maturity. High seed moisture level plays an important role in deterioration of cumin seed quality during storage. Seed stored in aluminum foil laminated bag and polyvinyl bag packing with vacuum gave best result as compare to the other seed containers. Aluminum foil laminated bag and polyvinyl bag packing with vacuum was resistance to moisture absorption from air. The suitability of polyvinyl bag container and aluminum foil laminated bag for lowest seed moisture per cent might be due to moisture impervious property, while cloth bag and jute bag having porous nature and reacts with change in atmospheric conditions.

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Table 1: Effect of seed containers on germination (%), moisture (%), test weight (g) and speed of germination during storage periods in cumin

Storage Containers	Germinatio (%)		Moisture (%)		Test Weight (g)		Speed of Germination	
	150	250	150	250	150	250	150	250
Moisture vapour proof high density laminated polyvinyl bags (C ₁)	65.40	65.53	6.79	6.80	3.02	2.96	39.22	39.05
Polyvinyl bags 700 gauge (C ₂)	66.27	65.57	6.83	6.88	3.05	2.99	39.66	39.18
Aluminium foil laminated bag (C ₃)	68.90	68.33	6.84	6.87	3.07	3.01	41.37	41.74
Plastic linted jute bag (C ₄)	66.97	67.53	6.82	6.98	2.86	2.98	39.85	39.35
Polyvinyl bag packing with vacuum (C ₅)	69.53	70.13	6.76	6.81	2.83	2.94	40.10	40.86
Cloth bag (Control) (C ₆)	66.53	65.97	6.86	7.01	3.00	2.95	38.86	38.93
S.Em ±	0.43	0.36	0.03	0.03	0.01	0.02	0.18	0.19
CD (P=0.05)	1.20	1.01	0.07	0.08	0.02	0.04	0.51	0.53

Table 2: Effect of seed containers on seedling length (cm), seedling vigour index (length and mass) and incidence of beetle during storage periods in cumin

Storage Containers	Seedling Length (cm)		Seedling Vigour Index (length)		Seedling Vigour Index (mass)		Incidence of Beetle	
	150	250	150	250	150	250	150	250
Moisture vapour proof high density laminated polyvinyl bags (C ₁)	10.64	10.17	695.38	667.38	15.92	15.93	4.78	6.32
Polyvinyl bags 700 gauge (C ₂)	10.20	10.48	676.76	687.59	15.69	16.05	4.88	5.95
Aluminium foil laminated bag (C ₃)	10.49	10.48	723.05	716.23	16.89	15.97	5.10	6.31
Plastic linted jute bag (C ₄)	10.31	10.63	690.12	717.99	17.03	16.49	5.09	6.76
Polyvinyl bag packing with vacuum (C ₅)	10.76	10.69	748.58	749.84	19.71	18.87	4.45	5.63
Cloth bag (Control) (C ₆)	10.29	10.25	684.54	676.28	15.21	14.53	5.31	6.85
S.Em ±	0.06	0.06	5.45	4.99	0.21	0.22	0.07	0.09
CD (P=0.05)	0.17	0.16	15.26	13.98	0.60	0.61	0.19	0.25

Table 3: Effect of seed containers on seedling dry weight (g) and Strong & weak seedlings during storage periods in cumin

Storage Containers	Seedling Dry Weight (g)		Strong Seedlings		Weak Seedlings	
	150	250	150	250	150	250
Moisture vapour proof high density laminated polyvinyl bags (C ₁)	0.24	0.24	57.43	56.20	8.10	9.20
Polyvinyl bags 700 gauge (C ₂)	0.24	0.24	57.07	57.47	8.50	8.80
Aluminium foil laminated bag (C ₃)	0.25	0.23	60.30	60.10	8.03	8.80
Plastic lined jute bag (C ₄)	0.25	0.25	59.27	58.20	8.27	8.77
Polyvinyl bag packing with vacuum (C ₅)	0.28	0.27	62.30	61.07	7.83	8.47
Cloth bag (Control) (C ₆)	0.23	0.22	56.07	55.53	9.90	11.00
S.Em ±	0.003	0.003	0.37	0.43	0.10	0.12
CD (P=0.05)	0.01	0.01	1.04	1.21	0.29	0.32

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