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Association among Various Seed Quality Parameters in Coriander

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ABSTRACT

In the present investigation, three seed lots (L_1 - Freshly harvested seed, L_2 - One year stored seed , L_3 - Two year stored seed) of fifteen varieties/genotypes of coriander viz., DH-333-1, DH-336, DH-337, DH-338, DH-339, DH-340, DH-341, DH-343, DH- 344, DH-345, DH-352-1 and Hisar Anand, Hisar Sugandh, Hisar Bhoomit and Hisar Surbhi were subjected to study the effect of natural ageing on different seed quality parameters. Correlation coefficient analysis was employed to find out the association among various seed viability and vigour parameter viz., Test weight, Standard germination, seedling length, seedling fresh weight, seedling dry weigth, seedling vigour index-I, seedling vigour index- II, accelerated ageing test, Tetrazolium test, dehydrogenase activity test, electrical conductivity test, pH exudates test and field emergence (%). Test weight was found non significant with field emergence and standard germination. Field emergence (%) was positively and significantly correlated with seedling length (0.765), standard germination (0.853), seedling fresh weight (0.525), seedling dry weight (0.531), vigour index-I (0.826), vigour index-II (0.743), tetrazolium test (0.866), accelerated ageing test (0.693), dehydrogenase activity test (0.817), pH exudates test (0.808) while negatively and significant correlation with electrical conductivity (0.757). Among all the seed quality parameters standard germination and tetrazolium test were found highly correlated with field emergence for all the seed lots hence they can be used as reliable predictors of field emergence (%).

Key words: *Ageing, coriander, correlation, seed quality, seed lots, field emergence (%)*

INTRODUCTION

Coriander (*Coriandrum sativum* L.) is an important spice crop grown throughout the country for the leaves as well as seeds. Seeds of this crop are used as spice, while its tender green leaves are used as culinary herb. It has found to be a remunerative crop in *rabi* season. All parts of this herb are in use as flavoring agent and/or as traditional remedies for the treatment of different disorders in the folk medicine systems of different civilizations.[1] This plant is highly aromatic and has multiple uses in food and in other industries. Plants have played a critical role in maintaining human health and civilizing the quality of human life for thousands of years[2]. Coriander has been reported to posses many pharmacological activities like antioxidant[3], anti-diabetic[4], anti-mutagenic[5], antilipidemic[6].

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Quality seed is the basic unit for releasing higher yield per unit area. The quality seed not only enables the farmers to take economic decisions regarding cost of seed but also helps them to have idea about the quantity of seed to be plant, uniformity of plant stand and consequently the net returns. Therefore, the availability of genetically pure and vigorous seed at planting time is important for achieving target of agriculture production. Laboratory seed tests aim to provide accurate and reproducible guidance, rather than absolute answers or predictions. Viability, germination and vigour tests all produce results that are usually greater than, and at best equal to, how the seed will actually perform in the field. An appreciation of what viability, germination and vigour measure can help and maximize the understanding of the planting value or storage potential of seed. Therefore, the present study was aimed at to find out the best predictors of field emergence in naturally aged seed lots of coriander.

MATERIAL AND METHODS

The present investigation was carried out on coriander seeds of fifteen genotypes *viz*., DH-333-1, DH-336, DH-337, DH-338, DH-339, DH-340, DH-341, DH-343, DH-344, DH-345, DH-352-1 and Hisar Anand, Hisar Sugandh, Hisar Bhoomit and Hisar Surbhi with three lots of seed *viz*., freshly harvested seed (Lot_1), one year old seed (Lot_2) and two year old seed (Lot_3) collected from Department of Vegetable Science, CCS H.A.U, Hisar during 2014-15. All the seed lots stored under ambient condition were analysed for test weight, standard germination test (%), seedling length (cm), seedling fresh weight, seedling dry weight (mg), seedling vigour index-I, seedling vigour index-II, accelerated ageing test (%), tetrazolium test (viability %), pH exudate test (%), Dehydogenase activity test (OD g^1 ml^{-1}), electrical conductivity test ($\mu S\ cm^{-1}\ seed^{-1}$) and field emergence (%) in seed testing laboratory, Department of Seed Science and Technology, CCS Haryana Agricultural University.

The experiment was conducted in a Completely Randomized Design for laboratory parameters and, for field parameters; the same was designed in Randomized Block. The angular transformation was applied to the percent data and the transformed data were subjected to the statistical analysis on the basis of the model described by Ostle and Mensing[7]. The correlation coefficient between various seed quality parameters in laboratory and field emergence was carried out as per standard procedure given below:

$$r = \frac{\text{Cov. (XY)}}{\sqrt{\text{Variance of X x Variance of Y}}}$$

Where,

r = Correlation cofficient

Cov(x, y) = Covariance between characters x and y

RESULTS AND DISSCUSION

The correlation between field and laboratory parameters of freshly harvested seed lot is given in Table 1. It is evident that all the parameters were significantly correlated with each other except test weight. Standard germination is positively and significantly correlated with seedling length (0.820) vigour index-I (0.961), vigour index-II (803), accelerated ageing test (0.855), tetrazolium test (0.988), pH exudates test (0.922), dehydrogenase activity test (0.919) and field emergence (0.829) while negatively and significant correlation was found with electrical conductivity (0.752). Field emergence showed positive and significant correlation with vigour index-I (0.879), accelerated ageing test (0.820), tetrazolium test (0.838), pH exudates (0.889), dehydrogenase activity test (0.862) and negative and significant correlation with electrical conductivity (-0.810). Correlation studies revealed highly significant and positive correlation between standard germination, tetrazolium test and pH exudate and field

emergence, suggesting that these tests can be successfully used as predictor of field emergence of coriander seeds. Similar results were reported by Kumar[8] in coriander and by Kumari[9] in fenugreek.

The correlations between field and laboratory parameters of one year old seed lot are presented in Table 2. Field emergence showed positive and significant correlation with standard germination (0.677), seedling length (0.642) fresh weight (0.598), dry weight (0.547), vigour index- I (0.688), vigour index-II (0.681), tetrazolium test (0.753) and dehydrogenase activity test (0.710). standard germination showed positive and significant correlation with seedling length (0.778), vigour index- I (0.890), vigour index-II (0.627), tetrazolium test (0.828), pH exudates test (0.847) and dehydrogenase activity test (0.777). Similar results were also reported by Deshraj[10] in coriander and Punia *et al*.[11] in indian mustard.

The correlations between field and laboratory field and laboratory parameters of two year old seed lot are presented in Table 3. It was found that test weight was positively and significantly correlated with dehydrogenase activity test (0.527) whereas negatively and significantly correlated with electrical conductivity (0.545). Field emergence showed positive and significant correlation with standard germination (0.727), seedling length (0.506), vigour index- I (0.636), vigour index-II (0.588), accelerated ageing test (0.566), tetrazolium test (0.688) and dehydrogenase activity test (0.646). Above results are in agreement with various workers in different crops such as fennel[12], okra[13] and in coriander[8].

The correlation between field emergence and laboratory parameters of means of naturally aged seed of coriander is presented in Table 4. Test weight is positively and significantly correlated with dehydrogenase activity test (0.523) and negatively and significantly correlated with electrical conductivity test (0.676). Standard germination is positively and significantly correlated with vigour index-I (0.946), vigour index-II (0.713), accelerated ageing test (0.722), tetrazolium test (0.991), pH exudates test (0.736), dehydrogenase activity test (0.897) and field emergence (0.853) while negatively and significant correlated with electrical conductivity (0.544). Field emergence showed positive and significant correlation with standard germination (0.853), seedling length (0.765), seedling fresh weight (0.525), seedling dry weight (0.531), vigour index-I (0.826), vigour index-II (0.743), accelerated ageing test (0.693), tetrazolium test (0.866), pH exudates test (0.808) and dehydrogenase activity test (0.817) while negatively and significant correlation with electrical conductivity (0.757). The present results are also in corroborate with the findings of Kumar *et al.*[14] in coriander; Kumar [15] in onion and Sadik[16] in ajwain.

CONCLUSION

Present study revealed that different seed quality parameters were positively and significantly correlated with field emergence except test weight while electrical conductivity was negatively and significantly correlated with field emergence. As standard germination, tetrazolium test and dehydrogenase activity test were highly associated with field emergence, they can be used as reliable predictors of field emergence (%).

Table 1: Association among various laboratory parameters of seed quality and field emergence (%) of freshly harvested seed lot of coriander

Parameters	TW	SG	SL	SFW	SDW	VI-I	VI-II	AAT	TZ	pH	DHA	EC	FE(%)
TW													
SG	0.350												
SL	0.460	0.820**											
SFW	0.352	0.536*	0.719**										
SDW	0.377	0.559*	0.741**	0.997**									
VI-I	0.423	0.961**	0.945**	0.649**	0.672**								
VI-II	0.409	0.803**	0.857**	0.932**	0.942**	0.867**							
AAT	0.407	0.855**	0.907**	0.483*	0.515*	0.919**	0.706**						
TZ	0.371	0.988**	0.825**	0.507*	0.533*	0.954**	0.775**	0.863**					
pH	0.262	0.922**	0.801**	0.491*	0.504*	0.909**	0.734**	0.783**	0.909**				
DHA	0.402	0.919**	0.900**	0.628**	0.651**	0.951**	0.835**	0.905**	0.917**	0.880**			
EC	-0.196	-0.752**	-0.840**	-0.759**	-0.750**	-0.829**	-0.840**	-0.680**	-0.726**	-0.775**	-0.791**		
FE (%)	0.321	0.829**	0.856**	0.497*	0.505*	0.879**	0.690**	0.820**	0.838**	0.889**	0.862**	-0.810**	

*Significant at 5% (p = 0.05)
** Significant at 1% (p = 0.01)

TW = Test Weight, SG =standard germination, SL = Seedling length, SFW = Seedling fresh weight, SDW = Seedling dry weight,
VI-I = Vigour index-I, VI-II = Vigour index-II, AAT = Accelerated ageing test, TZ = Tetrazolium test, pH = pH exudates test,
DHA = Dehydrogenase activity test, EC = Electrical conductivity test, FE = Field emergence.

Table 2: Association among various laboratory parameters of seed quality and field emergence (%) of one year stored seed lot of coriander

Parameters	TW	SG	SL	SFW	SDW	VI-I	VI-II	AAT	TZ	pH	DHA	EC	FE (%)
TW													
SG	0.141												
SL	0.194	0.778**											
SFW	0.363	0.360	0.589*										
SDW	0.323	0.373	0.619**	0.989**									
VI-I	0.184	0.890**	0.978**	0.539*	0.565*								
VI-II	0.325	0.627**	0.767**	0.941**	0.956**	0.757**							
AAT	0.417	0.510*	0.563*	0.368	0.323	0.564*	0.424						
TZ	0.269	0.828**	0.737**	0.623**	0.631**	0.810**	0.797**	0.492*					
pH	0.306	0.847**	0.689**	0.614**	0.604*	0.777**	0.780**	0.466	0.914**				
DHA	0.362	0.777**	0.788**	0.454	0.441	0.827**	0.617**	0.651**	0.810**	0.812**			
EC	-0.380	-0.428	-0.618**	-0.269	-0.271	-0.582*	-0.357	-0.545*	-0.370	-0.392	-0.619**		
FE (%)	0.243	0.677**	0.642**	0.598*	0.547*	0.688**	0.681**	0.458	0.753**	0.860**	0.710**	-0.243	

Significant at 5% (p = 0.05)
** Significant at 1% (p = 0.01)

TW = Test Weight, SG =standard germination, SL = Seedling length, SFW = Seedling fresh weight, SDW = Seedling dry weight, VI-I = Vigour index-I, VI-II = Vigour index-II, AAT = Accelerated ageing test, TZ = Tetrazolium test, pH = pH exudates test, DHA = Dehydrogenase activity test, EC = Electrical conductivity test, FE = Field emergence.

Table 3: Association among various laboratory parameters of seed quality and field emergence (%) of two year stored seed lot of coriander

Parameters	TW	SG	SL	SFW	SDW	VI-I	VI-II	AAT	TZ	pH	DHA	EC	FE (%)
TW													
SG	0.222												
SL	0.211	0.834**											
SFW	0.232	0.257	0.342										
SDW	0.288	0.301	0.385	0.992**									
VI-I	0.212	0.960**	0.952**	0.311	0.357								
VI-II	0.332	0.755**	0.722**	0.816**	0.849**	0.774**							
AAT	0.123	0.567*	0.669**	0.324	0.344	0.626**	0.527*						
TZ	0.200	0.994**	0.838**	0.250	0.294	0.962**	0.744**	0.557*					
pH	0.005	-0.259	-0.397	0.027	-0.040	-0.359	-0.220	-0.112	-0.265				
DHA	0.527*	0.669**	0.532*	0.393	0.418	0.631**	0.671**	0.514*	0.639**	-0.204			
EC	-0.545*	-0.178	0.031	-0.024	-0.047	-0.066	-0.137	-0.174	-0.115	-0.286	-0.352		
FE (%)	0.335	0.727**	0.506*	0.280	0.291	0.636**	0.588*	0.566*	0.688**	0.241	0.646**	-0.459	

*Significant at 5% (p = 0.05)

** Significant at 1% (p = 0.01)

TW = Test Weight, SG =standard germination, SL = Seedling length, SFW = Seedling fresh weight, SDW = Seedling dry weight, VI-I = Vigour index-I, VI-II = Vigour index-II, AAT = Accelerated ageing test, TZ = Tetrazolium test, pH = pH exudates test, DHA = Dehydrogenase activity test, EC = Electrical conductivity test, FE = Field emergence.

Table 4: Association among various laboratory parameters of seed quality and field emergence (%) of means of naturally aged seed lots of coriander

Parameters	TW	SG	SL	SFW	SDW	VI-I	VI-II	AAT	TZ	pH	DHA	EC	FE (%)
TW													
SG	0.285												
SL	0.281	0.852**											
SFW	0.320	0.384	0.613**										
SDW	0.332	0.399	0.632**	0.999**									
VI-I	0.302	0.946**	0.972**	0.545*	0.564*								
VI-II	0.382	0.713**	0.825**	0.918**	0.926**	0.816**							
AAT	0.422	0.722**	0.832**	0.413	0.440	0.813**	0.629**						
TZ	0.317	0.991**	0.852**	0.444	0.458	0.942**	0.754**	0.704**					
pH	0.382	0.736**	0.723**	0.655**	0.653**	0.752**	0.783**	0.589*	0.775**				
DHA	0.523*	0.897**	0.892**	0.577*	0.596*	0.934**	0.823**	0.788**	0.918**	0.823**			
EC	-0.676**	-0.544*	-0.592*	-0.504*	-0.505*	-0.581*	-0.592*	-0.658**	-0.553*	-0.756**	-0.647**		
FE (%)	0.409	0.853**	0.765**	0.525*	0.531*	0.826**	0.743**	0.693**	0.866**	0.808**	0.817**	-0.757**	

*Significant at 5% (p = 0.05)
** Significant at 1% (p = 0.01)

TW = Test Weight, SG =standard germination, SL = Seedling length, SFW = Seedling fresh weight, SDW = Seedling dry weight, VI-I = Vigour index-I, VI-II = Vigour index-II, AAT = Accelerated ageing test, TZ = Tetrazolium test, pH = pH exudates test, DHA = Dehydrogenase activity test, EC = Electrical conductivity test, FE = Field emergence.

REFERENCES

1. Sahib NG, Anwar F, Gilani AH, Hamid AA, Saari A, Alkharfy KM. Coriander (Coriandrum sativum L.): A potential source of high-value components for functional foods and nutraceuticals- A Review. *J. Phytother. Res*. **27(9):** doi10.1002/ptr.4897. (2012).
2. Dhankar S, Kaur R, Ruhil S, Balhara M, Dhankhar S, Chhillar AK. A review on Justicia adhatoda A potential source of natural medicine. *Afr. J. Plant Sci*. **5(11):** 620-627 (2011).
3. Darughe F, Barzegar M, Sahari MA. Antioxidant and antifungal activity of Coriander (Coriandrum sativum L.) essential oil in cake. *Int. Food Res. J.* **19(3):** 1253-1260 (2012).
4. Eidi M, Eidi A, Saeidi A, Molanaei S, Sadeghipour A, Bahar M, Bahar K. Effect of coriander seed (Coriandrum sativum L) ethanol extract on insulin release from pancreatic beta cells in streptozotocininduced diabetic rats. *J. Phytother. Res*. **23(3):** 404-406 (2012).
5. Cortes-Eslava J, Gomez-Arroyo S, Villalobos-Pietrini R. Antimutagenicity of coriander (Coriandrum sativum) juice on the mutagenesis produced by plant metabolites of aromatic amines. *J. Toxicol. Lett***. 153:** 283-292 (2004).
6. Sunil C, Agastian P, Kumarappan C, Ignacimuthu S. In vitro antioxidant, antidiabetic and antilipidemic activities of Symplocos cochinchinensis (Lour.) S. Moore bark. *J. Food Chem. Toxicol.* **50(5):** 1547-1553 (2012).
7. Ostle, B. and Mensing, R.W. Status in research. In: Basic concepts and techniques for Research workers ed. (3rd). The IOWA state University Press/Ames. Oxford and IBH Pub. Co. (1975).
8. Kumar, A. Seed quality assessment in naturally aged seeds of coriander (*Coriandrum sativum* L.). M. Sc. Thesis, submitted to CCS Haryana Agricultural University, Hisar (2007).
9. Kumari, S., Kumar, A. and Tehlan, S.K. Studies on physiological parameters in fenugreek under ambient conditions. *Annals of biology*. **30(4):** 691-695 (2014)
10. Deshraj. Studies on viability and vigour in coriander (*Coriandrum sativum* L.). In: M.Sc. *Thesis*, submitted to CCS HAU, Hisar (2002).
11. Punia, R.C., Dahiya, O.S. and Kumar, A. Exudate pH test : A quick and reliable predictor of seedling establishment in India Mustard [*Brassica juncea* (L.) Czern and Coss]. Natnl. J. Pl. *Improv.* **8 (2):** 103 – 105 (2006).
12. Mor, V.S., Verma, S.S., and Verma, U. studies on seed viability and vigor in various order. *Seed Sci. & Technol.,* **37:** 747-757 (2009).
13. Yadav, S.K. and Dhankar, B.S. Correlation studies between various fields parameters and seed quality traits in okra cv. Versha uphar. *Seed Res*. **29(1):** 84-88 (2001).
14. Kumar, V., Verma S. S, Verma U. and Kumar A. Seed viability and vigour in naturally aged seeds of coriander (*Coriandrum sativum*). *Indian J. agric. Sci*. **85 (4):** 561–5 (2015).
15. Kumar, A. Seed quality assessment in naturally aged seed of onion (*Allium cepa*). **In:** M.Sc. thesis submitted to CCS Haryana Agricultural University, Hisar (2004).
16. Sadik, M. Studies on seed viability and vigour in Ajwain (*Trachyspermum copticum* L.). **In:** M. Sc. Thesis, submitted to CCS Haryana Agricultural University, Hisar (2012).