

# Studies on Seed Vigour and Their Relationship With Field Emergence in Brinjal (*Solanum melongena* L.) and Chilli (*Capsicum frutescens* L.)

Seed vigour is an inherent character and an important attribute of seed quality indicating the degree of aliveness. Seed vigour tests indicate relative superiority of seed lots for better establishment even under adverse field conditions. Although an absolute prediction of field emergence can not be achieved through vigour tests, yet a more useful ranking of the test in relation to field emergence can be obtained. Unlike germination test there is no specific method for testing seed vigour that can be recommended for particular crop. With a view to find out suitable method for vigour assessment of brinjal and chilli seeds, this experiment was conducted.

The experimental material comprised of three cultivars of brinjal viz., Arka nidhi (obtained from IIHR, Bangalore), Malapur local (local variety) and Kudachi (popular variety) with two varieties of chilli viz., Byadagi kaddi and Dyavanur local (both locally popular varieties) with three lots of each variety differing in storage conditions. Nine vigour tests were conducted on each lot. All seed lots were subjected to field emergence test for comparison of vigour test and the correlation coefficient values of field emergence with nine vigour tests were

worked out. Seed vigour tests like electrical conductivity test of seed leachate (Bedford, 1974), brick-gravel test (Fritz, 1965), accelerated ageing test for 48 and 96 hrs. (Baskin, 1981), methanol stress test (Mugnisjab and Nakamura, 1986), germination index (Maguire, 1962) and length (cm) and dry weight (g) of seedlings (Edje and Burris, 1970) were subjected with three replications of each seed lot.

The first count test was conducted in four replications each with 100 seeds on T.P. media and kept at 20-30 °C temperature. The normal seedlings were counted at 7<sup>th</sup> day in brinjal and 5<sup>th</sup> day in chilli. A field emergence test was conducted in randomised block design with four replications in the experimental plots. Hundred seeds were sown and seedling emergence was recorded. Mean sum of squares showed highly significant differences among different lots of varieties indicating the sufficient variability in the material (Table 1). Mean values of different vigour tests ranged from 0.493 to 0.613 for seed leachate test, 50.70 to 65.00% for first count test, 13.43 to 16.63 % for germination index, 7.54 to 9.04 cm for seedling length, 0.16 to 0.21 g for seedling dry weight, 62.70 to 77.30% for brick-

Table 1. Performance of different lots of Brinjal and Chilli with respect to different vigour tests

Crop/ Variety	Lots	Biochemical test	Vigour Tests								Test for comparison	
			Performance Tests				Stress Tests					
			Seed leachate test [EC (dsm <sup>-1</sup> )]	First count test (%)	Germination index (%)	Seedling length (cm)	Seedling dry weight (g)	Brick- gravel test (%)	Accelerated ageing test (%) (48 hrs)	Accelerated ageing test (%) (96 hrs.)		Methanol stress test (%)
Brinjal												
Arka Nidhi (V <sub>1</sub> )	V <sub>1</sub> L <sub>1</sub>	0.493	65.0	16.63	9.04	0.210	77.3 (61.55)	77.3 (61.55)	65.3	76.0 (60.65)	82.7 (65.40)	
	V <sub>1</sub> L <sub>2</sub>	0.560	55.3	15.87	8.51	0.197	68.0 (55.89)	73.3 (56.17)	59.7	72.3 (58.27)	79.3 (62.97)	
Malapur local (V <sub>2</sub> )	V <sub>2</sub> L <sub>1</sub>	0.510	62.3	15.94	8.70	0.190	73.7 (59.13)	75.0 (59.97)	62.7	72.0 (58.06)	78.3 (62.27)	
	V <sub>2</sub> L <sub>2</sub>	0.560	53.7	14.17	8.14	0.180	66.3 (54.97)	69.3 (56.30)	55.0	67.0 (55.18)	72.0 (58.05)	
Kudachi (V <sub>3</sub> )	V <sub>3</sub> L <sub>1</sub>	0.553	59.3	15.07	8.00	0.170 (57.42)	71.0 (58.91)	69.0	55.0 (55.76)	68.3 (61.31)	77.0	
	V <sub>3</sub> L <sub>2</sub>	0.613	50.7	13.43	7.54	0.160 (52.34)	62.7 (54.47)	65.3	51.7	64.0 (53.33)	71.3 (57.63)	
(SE) diff.+		0.0067	0.981	0.494	0.258	0.0077	0.594	0.694	0.903	0.832	0.749	
C.D. at 5% level		0.015	2.138	1.077	0.562	0.0168	1.295	1.512	1.967	1.813	1.669	
“r” values with field emergence			-0.862*	0.854*	0.969**	0.879*	0.883*	0.878*	0.903*	0.899*	0.961**	
Chilli												
Byadagi kaddi (V <sub>1</sub> )	V <sub>1</sub> L <sub>1</sub>	0.676	50.7	13.20	6.84	0.150	60.3	65.7	51.3	64.0	66.0	
	V <sub>1</sub> L <sub>2</sub>	0.753	47.7	9.93	6.06	0.130	56.3	61.0	43.3	60.3	62.3	
	V <sub>1</sub> L <sub>3</sub>	0.820	43.7	9.34	5.71	0.110	51.0	55.3	41.7	55.3	59.3	
Dyavanur local (V <sub>2</sub> )	V <sub>2</sub> L <sub>1</sub>	0.644	54.3	13.30	7.32	0.167	63.7	68.0	55.0	68.0	68.3	
	V <sub>2</sub> L <sub>2</sub>	0.713	50.0	12.48	6.36	0.140	60.0	64.7	51.0	63.7	62.3	
	V <sub>2</sub> L <sub>3</sub>	0.730	45.3	10.41	5.24	0.133	55.0	60.7	41.3	57.3	58.7	
(SE) diff.+		0.0120	0.9810	0.3150	0.2910	0.0092	0.9430	1.0190	1.2910	1.4270	1.1250	
C.D. at 5% level		0.026	2.138	0.688	0.634	0.020	2.054	2.219	2.813	3.110	2.507	
“r” values with field emergence			-0.837*	0.928**	0.843*	0.824*	0.907*	0.866*	0.858*	0.906*	0.933**	

L<sub>1</sub> - Lot 1, L<sub>2</sub> - Lot 2, L<sub>3</sub> - Lot 3

Mean angular values given in brackets.

\* Significant at 5% level

\*\* Significant at 1% level

gravel test, 65.30 to 77.30% for accelerated ageing test (48 hrs.), 51.70 to 65.30% accelerated ageing test (96 hrs.) and 64.00 to 76.00% for methanol stress test. All the tests showed significant correlation with field emergence (Table 1) viz., seed leachate test (-0.862\*), first count test (0.854\*), germination index (0.969\*\*), seedling length (0.879\*), seedling dry weight (0.883\*), brick-gravel test (0.878\*) accelerated ageing test for 48 hrs. (0.903\*) and for 96 hrs. (0.899\*) and methanol stress test (0.961\*\*) that can be used to predict the vigour status. These results were in conformity with the reports of Krishnaswamy and Palniappam (1988) in brinjal. Taking into consideration the performance of diverse material in different vigour tests and field emergence test it appears that methanol stress test ( $r=0.961^{**}$ ) and germination index tests (0.969\*\*) are suitable to know the vigour of brinjal seeds. Analysis of the experimental results revealed highly significant differences among different lots of varieties with respect to all vigour tests, indicating that sufficient variability existed in chilli material as far as different vigour tests are concerned (Table 1). Mean values of different vigour tests ranged from 0.820 to 0.644 for seed leachate test, 54.30 to 43.70% for first count test, 13.30 to 9.34 for germination index, 7.32 to 5.24 cm for seedling length, 0.16 to 0.11 g for seedling dry weight, 63.70 to 51.00% for brick-gravel test, 68.00

to 55.30% for accelerated ageing (48 hrs.), 55.00 to 41.30% for accelerated ageing (96 hrs.) and 68.00 to 55.30% for methanol stress test. Among different lots, *Dyavanur* local showed best performance followed by lot<sub>2</sub> of *Byadagi* kaddi in all vigour tests. Least vigour was found in lot<sub>3</sub> of *Byadagi* kaddi in all tests except seedling length and accelerated ageing (96 hrs.) where lot<sub>3</sub> of *Dyavanur* local showed poor performance. Seed leachate test was negatively correlated with field emergence, while other vigour tests were positively and significantly correlated (Table 1). Seed leachate test (-0.837\*), first count test (0.928\*\*), germination index (0.843\*), seedling length (0.824\*), seedling dry weight (0.907\*), brick-gravel test (0.866\*), accelerated ageing test (48 hrs.) (0.858\*) and for 96 hrs. (0.906\*) and methanol stress test (0.933\*\*). These vigour tests can be used to predict the potential for better plant stand of the lots under field conditions. Similar findings have been reported by Osman and George (1988) in chilli and Pandey *et al.*, (1990) in cucurbits. Thus, the study indicated that methanol stress test ( $r=0.933^{**}$ ) and first count test ( $r=0.928^{**}$ ) were found to be more suitable to work out the vigour of chilli seeds while methanol stress test ( $r=0.961^{**}$ ) and germination index test (0.969\*\*) are suitable to know the vigour of brinjal seeds.

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## References

- BASKIN, C. C. 1981, Accelerated ageing test. In *Hand Book of Vigour Test Methods* by Perry, D.A. (ed.) 43-48. ISTA Switzerland.
- BEDFORD, L. V. 1974, Conductivity test in commercial and harvested seed of pea cultivars and their relation to field establishment. *Seed Science & Technology*. **2** : 323-326.
- EDJE, C. T. AND BURRIS, J. S. 1970, Seedling vigour in soybean. *Proceedings of Association of Official Seed Analysts*, **60** : 149-157.
- FRITZ, T (1965), Germination and vigour tests of cereal seeds. *Proceedings of the International Seed Testing Association* **30** : 923-927.
- KRISHNASWAMY, V AND PALNIAPPAM, G. R., 1989, Seed vigour as influenced by the delayed seed extraction after fruit harvest and the intensity of fruit borer incidence in Brinjal var. EP-65. Paper presented at *National Seminar on Seed vigour in Relation to Eco-agriculture*, held at Coimbatore from Feb. 24-25, 1989.
- MAGUIRE, J. D. 1962, Speed of germination-aid in selection and evaluation for seedling emergence and vigour. *Crop Science*. **2** :176-177.
- MUGNISJAB, W. Q. AND S. NAKAMURA 1986. Methanol and Ethanol stress for seed vigour evaluation in soybean. *Seed Science & Technology*. **14** :95-103.
- OSMAN, D. A. AND GEORGE, R. A. T. 1988 Controlled deterioration as vigour test for sweet-pepper seed. *Acta Horticulture*. **218** :109-114.
- PANDEY, P. K., GOAL, R. D.; PRAKASH, V., KATIYAR, R. P. AND SINGH, C. B., 1990, Association between laboratory vigour tests and field emergence in cucurbits. *Seed Research*. **18** : 21-24.