IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, July 2022
Impact Factor 6.252

Seed Vigour Test: An Overview

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Abstract: *Seed vigour is "the sum total of those properties of the seed which determine the level of activity and performance of the seed or seed lot during germination and seedling emergence". Seed vigour is an important quality parameter which needs to be assessed to supplement germination and viability tests to gain insight into the performance of a seed lot in the field or in storage. Seed vigor can be measured by a variety of methods including accelerated aging (AA), electrical conductivity (EC), seed vigour imaging system (SVIS), cold test, speed of germination (SG) count. Seed vigour is an important component of seed quality and satisfactory levels are necessary in addition to traditional quality criteria of moisture, purity, germination and seed health to obtain optimum plant stand and high production of crops.*

Keywords: Seed vigour, Germination, Accelerated Ageing (AA), Electrical Conductivity (EC), Seed Vigour Imaging System (SVIS), Cold Test

REFERENCES

[1]. Aiazzi MT, Aregullo JA, Perez J, Rienzo, Guzman CA (1996). Deterioration in Atriplex cordobensis (Gandogeret sucker) seed: Natural & accelerated ageing. Seed Sci. Technol. 25:147-155.
[2]. Alberts, H.W. 1927. Effects of pericarp injury on moisture absorption, fungus attack, and viability of corn. Journal of the American Society of Agronomy 19: 1021-1030.
[3]. Al-Yahya SA (1995). Losses of corn in the storage. Arab Gulf J. Sci. Res. 13:199-212.
[4]. Association of Official Seed Analysts [AOSA]. 1983. Seed Vigor Testing Handbook. AOSA, Ithaca, NY, USA. (Contribution to the Handbook on Seed Testing, 32).
[5]. Balesevic-Tubic, S, M.Tatic, J. Miladinovic, M. Pucarevic (2007): Changes of fatty acid content and vigour of sunflower seed during natural aging *30*, (47) 61- 68.
[6]. Beratlief C, Iliescu H (2005). Highlights of proper sunflower seed storage. Helia 20:121-137.
[7]. Burris JS (1980). Maintenance of soybean seed quality in storage as influenced by moisture temperature and genotype. Iowa State J. Res. 54:337-389.
[8]. Chiquito, A.A.; Gomes Júnior, F.G.; Marcos Filho, J. 2012. Assessment of physiological potential of cucumber seeds using the software seedling vigor imaging system (SVIS). Revista Brasileira de Sementes 34: 255-263.
[9]. Cho, Y., and Scott, R.A. 2000. Combining ability of seed vigor and seed yield in soybean. Euphytica. 112:145-150.
[10]. Delouche JC, Baskin CC. Accelerated aging techniques for predicting the relative storability of seed lots. Seed Sci Technol. 1973;1:427–52.
[11]. Depaula M, Perezotaola M, Darder M, Torres M, Frutos G, Martinezhonduvilla CJ (1996). Function of the ascorbate glutathione cycle in aged sunflower seeds. Stored Grain Losses Physiologia Plantarum 96:543-550.
[12]. Egli, D.B., and TeKrony, D.M. 1996. Seedbed conditions and prediction of field emergence of soybean seed. J. of Prod. Agric. 9:365-370.
[13]. Egli, D.B., White, G.M., and TeKrony, D.M. 1978. Relationship between seed vigor and the storability of soybean seed. J. Seed Technol. 3:1-11.
[14]. Ferguson, J. (1990): Report of seed vigour subcommittee. J. of Seed Technology, *14*, 182-184.
[15]. Ferguson, J.M. Metabolic and biochemical changes during the early stages of soybean seed deterioration. Lexington: University of Kentucky, 1988. 138p. (Ph.D. - Thesis).
[16]. Fick, G.L.; Hibbard, R.P. 1925. A method for determining seed viability by electrical conductivity measurements. Michigan Academy of Sciences, Arts and Letters 5: 95-103.
[17]. Finch-Savage, W. E., Clay, H. A., Lynn, J. R. & Morris, K. Towards a genetic understanding of seed vigour in

small-seeded crops using natural variation in Brassica oleracea. Plant Sci. 179, 582–589 (2010).
[18]. França-Neto, J.B.; Krzyzanowski, F.C.; Costa, N.P. 1998. The tetrazolium test for soybean seeds. Embrapa Soja, Londrina, PR, Brazil. (Documents, 115).
[19]. Geneve R.L., Kester S.T. Evaluation of seedling size following germination using computer-aided analysis of digital images from a flat-bed scanner. HortScience, 36 (2001), pp. 1117-1120
[20]. Hamman, B., Egli, D.B., Koning, G. 2002. Seed vigor, soilborne pathogens, preemergent growth, and soybean seedling emergence. Crop Sci. 42:451-457.
[21]. Hampton, J. G. (1992): Vigour testing within laboratories of the Internacional Seed Testing Association: A survey. Seed Sci. and Tehnology, *20*, 199-203.
[22]. Han, Z. et al. QTLs for Seed Vigor-Related Traits Identifed in Maize Seeds Germinated under Artifcial Aging Conditions. PLoS One 9, e92535 (2014).
[23]. Hempton, J.G., D.M. Tekrony (1995): Handbook of Vigour Test Methods, 3rd Edition, International Seed Testing Association.
[24]. Hoffmaster, A.L., Fujimura, K., McDonald, M.B. and Bennett, M.A. 2003. An automated system for vigor testing three-day-old soybean seedlings. Seed Sci. & Technol. 31:701-713.
[25]. Hoffmaster, A.L., Xu, L., Fujimura, K., McDonald, M.B., Bennett, M.A., and Evans, A.F. 2005. The Ohio State University Seed Vigor Imaging System (SVIS) for soybean and corn seedlings. Seed Technol. 27:7-24.
[26]. Isely, D. 1957. Vigor tests. Proc. Assoc. Off. Seed Analysts. 47:176-182.
[27]. José Luís de Marchi .; Silvio Moure Cicero 2017. Use of the software Seed Vigor Imaging System (SVIS®) for assessing vigor of carrot seeds. Scientia Agricola v.74, n.6, p.469-473.
[28]. Kikuti, A.L.P.; Marcos Filho, J. 2013. Seedling imaging analysis and traditional tests to assess okra seed vigor. Journal of Seed Science 35: 443-448.
[29]. Kolasinska, K., Szyrmer, J., and Dul, S. 2000. Relationship between laboratory seed quality tests and field emergence of common bean seed. Crop Sci. 40:470-475.
[30]. Kulik, M.M., and Yaklich, 1982. Evaluation of vigor tests in soybean seeds: Relationship of accelerated aging, cold, sand bench, and speed of germination tests to field performance. Crop Sci. 22:766-770.
[31]. Lal M, Singh D, Dass S. Heterosis studies for yield and quality traits in rabi quality protein maize. Agricultural Science Digest. 2011; 31(3).
[32]. Lovato, A., E.Noli, A. F. S. Lovato (2005): The relationship between three cold test temperatures, accelerated ageing test and field emergence of maize seed. Seed Sci. and Tehnology, *33*, 249- 253.
[33]. Lowe, L. B. & Ries, S. K. Efects of environment on the relation between seed protein and seedling vigor in wheat. Can. J. Plant Sci. 52, 157–164 (1972).
[34]. Lu, X. et al. Genetic dissection of seedling and early vigor in a recombinant inbred line population of rice. Plant Sci. 172, 212–220 (2007).
[35]. Marchi, J.L.; Cicero, S.M.; Gomes Junior, F.G. 2011. Using computerized analysis of seedlings to evaluate the physiological potential of peanut seeds treated with fungicide and insecticide. Revista Brasileira de Sementes 33: 652-662 (in Portuguese, with abstract in English).
[36]. Marcos Filho, J.; Bennett, M.A.; McDonald, M.B.; Evans, A.F.; Grassbaugh, E.M. 2006. Assessment of melon seed vigour by an automated computer imaging system compared to traditional procedures. Seed Science and Technology 34: 485-497.
[37]. Matthews, S., A. A. Powell (1981): Electrical conductivity test. In: Perry, D.A. (Ed.) Handbook of vigour test methods. Zurich: International Seed Testing Association 37-41.
[38]. Matthews, S., Noli, E., Demir, I., Khajeh-Hosseini, M. and Wagner, M.H. (2012). Evaluation of seed quality: from physiology to international standardization. Seed Science Research, 22, 69-73.
[39]. McCormac, A.C.; Keefe, P.D.; Draper, S.R. 1990. Automated vigor testing of field vegetables using image analysis. Seed Science and Technology 18: 103-112.
[40]. McDonald MB (1999). Seed deterioration: Physiology, Repair and Assessment. Seed Sci. Technol. (27):177-237.
[41]. McDonald, M.B. 1998. Seed quality assessment. Seed Sci. 8:265-275.

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Impact Factor 6.252

[42]. McDonald, M.B., and Phaneendranath, B.R. 1978. A modified accelerated aging seed vigor test for soybean. J. Seed Technol. 3:27-37.
[43]. Milosevic, M., J. Rnpreht, M. Cirovic, M.Zlokolica (1994): Methods for testing corn seed viability. Plant breeding and seed production, (1) 179-182.
[44]. Noli, E., Casarini, G., Urso, G.and Conti, S. (2008). Suitability of three vigour test procedures to predict field performance of early sown maize seed. Seed Sci. and Technol., 36: 168-176.
[45]. Pandey PK, Goyal RD, Parakash V, Katiyar RP, Singh CB (1999). Association between laboratory vigor tests and field emergence in cucurbits. Seed Res. 18:40-43.
[46]. Popinigis, F. Fisiologia da semente. Brasília: AGIPLAN, 1985. 289p.
[47]. Powell AA, Don R, Haigh P, Phillips G, Tonkin JHB, Wheaton OE. Assessment of the repeatability of the controlled deterioration test both within and between laboratories. Seed Sci Technol. 1984;12:421–7.
[48]. Powell AA, Matthews S. Towards the validation of the controlled deterioration vigour test for small-seeded vegetables. Seed Test Int. 2005;129:21–4.
[49]. Rajjou, L. et al. Seed Germination and Vigor. Annu. Rev. Plant Biol. 63, 507–533 (2012).
[50]. Roy, K.W., and Ratnayake, S. 1997. Frequency of occurrence of Fusarium pallidoroseum, effects on seeds and seedlings, and associations with other fungi in soybean seeds and pods. Can. J. Plant Pathol. 19:188-192.
[51]. Sako, Y.; McDonald, M.B.; Fujimura, K.; Evans, A.F.; Bennett, M.A. 2001. A system for automated seed vigour assessment. Seed Science and Technology 29: 625-636.
[52]. Stahl, C. 1931. Comparative experiments between the laboratory and the field germination of seed. Proceedings of the International Seed Testing Association 15-17: 75-143.
[53]. Tabaković, M., Sabovljević, R., Crevar, M., Mišović, M., Jovanović, S., Ćurčić, N., Pavlov, M. (2013). Influence of grain moisture content during harvest on the maize seed germination. Journal on Processing and Energy in Agriculture, 17(2), 73-75.
[54]. Tatum, L.A.; Zuber, M.S. 1943. Germination of maize under adverse conditions. Journal of the American Society of Agronomy 35: 48-59.
[55]. Tekrony, D.M. Accelerated ageing test. In: VAN DE VENTER, H.A (ed.). Seed Vigour Testing Seminar. Copenhagen: ISTA, 1995. p.53-72.
[56]. TeKrony, D.M., and Egli, D.B. 1977. Relationship between laboratory indices of soybean seed vigor and field emergence. Crop Sci. 17:573-577.
[57]. Tewari MN, Gupta PC (1981). Effect of genotype, seed grade and environment on viability and vigor of sunflower seed in storage. Seed Res. 9:126-131.
[58]. Tohidloo, G.; Kruse, M. 2009. Development of an image analysis aided seedling growth test for winter oilseed rape and verification as a vigour test. Seed Science and Technology 37: 98-109.
[59]. Torres, R.M., Vieira, R.D., and Panobianco, M. 2004. Accelerated aging and seedling field emergence in soybean. Sci. Agric. 61:476-480.
[60]. Vieira, R.D., TeKrony, D.M., Egli, D.B., and Rucker, M. 2001. Electrical conductivity of soybean seeds after storage in several environments. Seed Sci. Technol. 29:599-608.
[61]. Vieira, R.D.; Krzyzanowski, F.C. Teste de condutividade elétrica. In: Krzyzanowski, F.C.; Vieira, R.D.; Franca-Neto, J.B. (Ed.). Vigor de sementes: conceitos e testes. Londrina: Abrates, 1999. cap.4, p.1-26
[62]. Vieira, R.D.; Tekrony, D.M.; Egli, D.B.; Rucker, M. Electrical conductivity of soybean seeds after storage in several environments. Seed Science and Technology, v.29, p.599-608, 2001.
[63]. Vujaković, M., Marjanović-Jeromela A., Jovičić, D. (2015). Viability of oil rape seed (Brassica napus L.). Journal on Processing and Energy in Agriculture, 19 (4), 171-174.
[64]. Woltz, J., D. M. Tekrony, D. B. Egli (2006): Corn seed germination and vigour following freezing during seed development. Crop Sci., *46*, 1526-1535.
[65]. Woltz, J.M. and TeKrony, D.M. (2001). Accelerated ageing test for corn seed. Seed Technology, 23: 21-34.
[66]. Zorrilla, G., Knapp, A.D., and McGee, D.C. 1994. Severity of Phomopsis seed decay, seed quality evaluation, and field performance of soybean. Crop Sci. 43:172-177.