Research | Egyptian Journal of Agricultural Research | Field Crops

The relationship between seed vigor tests and field emergence of wheat lots

*Abdelmageed M.S. Kishk** and *Walaa S. Elbatrawy*

Address:

Seed Technology Research Department, Field Crops Research Institute, Agricultural Research Centre, Giza, Egypt

*Corresponding author: ***Abdelmageed Kishk***, e-mail: abdelmageedk@yahoo.com

Received: 03-08-2023 **; Accepted:** 28-10-2023 **; Published:** 29-10-2023 **DOI**: 10.21608/ejar.2023.227019.1424

ABSTRACT

The study aimed to predict the correlation between field emergence of fresh and old wheat seed lots for three wheat varieties: Sakha 95, Sakha 94, and Misr 3. To assess the physiological quality of seeds, various vigor tests were utilized. Laboratory and field experiments were conducted at the Seed Technology Research Department (STRD), Agricultural Research Station in Tag El-Ezz, Dakahlia Governorate during the winter seasons of 2019/2020 and 2020/2021. Using less robust seeds can result in a yield reduction of up to 27%. Laboratory tests, such as standard germination (SG), seedling length (SL), seedling dry weight (SDW), seedling vigour index (SVI), accelerated aging test (41°C for 48 h), and electrical conductivity test (EC), were conducted to assess the vigour of wheat seed lots. These tests successfully detected variations in vigour among the different seed lots. Also, a field study was conducted to estimate field emergence. The appropriate test for estimating field emergence was determined using correlation coefficients. The findings showed that most vigor tests were helpful in classifying seed lots based on the physiological stage of deterioration. Standard germination (SG), Electrical conductivity test (EC), and Accelerated aging provided the best estimate for the viability of seed lots and prediction of wheat variety emergence in the field. The electrical conductivity test and aging test were found to be the most effective in assessing the quality of wheat seeds and predicting their field emergence as seedlings. There was a strong correlation between these vigor tests and field emergence. Therefore, it is recommended to use the electrical conductivity test and accelerated aging test to rank seed lots and predict their field emergence, seedling establishment, and overall performance. These tests have proven to be reliable indicators of wheat seed emergence potential.

Key words: Wheat, seed lots, prediction, vigour tests, field emergence.

INTRODUCTION

Scientists are interested in measuring seed vigour when assessing seed quality. A strong, high-quality seed makes use of its surroundings and develops into a strong seedling. To assess seed vigour in the future, seed scientists must gain a deeper understanding of the factors that contribute to seed deterioration (McDonald, 1998). High vigour seeds that ensure uniform crop establishment in fields produce healthy, strong plants. A seed's inability to germinate is known as seed ageing, and it results in variations in seed vigour (Ebrahim & Mokhtari, 2023). In Egypt, wheat (*Triticum aestivum* L.) is the main crop and is considered one of the most crucial food crops with a strategic dimension on the national and food security of all the world. It has long been recognized that wheat productivity considerably varies due to vigour, genotype, environment, and interaction. Seed is a basic agricultural input that is important in increasing production, productivity, and the country's economy. Without the use of high-quality seed, investments in irrigation, pesticides, and fertilizer will not yield the expected returns. Seed viability and growth potentials of many crops severely decrease and biochemical changes could occur through the storage duration of aged seeds (Sveinsdóttir *et al.,* 2009; Mersal, 2011; Luo *et al.,* 2017; Demir *et al.,* 2020).

Strong seed vigour, uniform germination, and seedling establishment under different field environmental conditions are the main aspects of an ideal seed. So, control field stand, establishment, and performance are aspects of seed quality. The maximum number of seeds that will germinate into healthy seedlings is predicted by standard germination testing, which also yields trustworthy results (ISTA, 1999). When field conditions are ideal, standard germination tests may accurately predict seedling emergence. Accelerated aged, electrical conductivity and seedlings vigour test techniques are also beneficial in a variety of other ways. Accelerated ageing (AA) is a stress test used in practical seed handling to determine the vigour of a seed lot and predict the potential storage life of a seed. Accelerated aging (AA) assumes that if seeds deteriorate at a certain predictable rate under a given set of storage conditions, then deterioration will occur much faster under sub-optimal conditions of increased temperature and humidity. Accelerated aged can promise indicators that can be used to predict the emergence of different varieties. They are useful for assessing seed vigour and crop performance, as well as an experimental technique in the deterioration of seed studies. (Khan *et al.,* 2010; Mersal, 2011; Sharma *et al.,* 2017; Biradarpatil *et al.,* 2021) evaluating the seed vigour factors' capacity to forecast field emergence is critical in providing better results for ranking seed lots quality and indicating planting value than germination test. It is necessary to standardise a seed lot's responsive vigour so that it can be linked to wheat seed performance in the field. Seed vigour declines with age, resulting in low seedling emergence in the field and a decrease in seed germination percentage (Luo *et al.,* 2017; Demir *et al.,* 2020). These findings can be used to compare the quality of various seed lots and calculate the field emergence value (El-Abady *et al.,* 2014; Sharma *et al.,* 2017; Kaya *et al.,* 2019; Cheyed, 2020; Biradarpatil *et al.,* 2021). Several researchers have found significant correlations between field emergence and standard germination test. However, they discovered variations and difficulties in predicting field emergence. Seed lots that do not differ in germination may differ in deterioration level and field performance significantly (Kolasinska *et al.,* 2000; Khan *et al.,* 2010). Consequently, viability tests of seed have been suggested as a means of detecting differences in potential seeds lot performance. (Khan *et al.,* 2010) revealed that the vigour test must be more sensitive to seed quality than the germination test and must predict the value of high germinating lots more accurately than a test of germination. Aliloo & Shokati, (2011) and Ghaderi-far, (2011) mention that the growth of seedlings, electrical conductivity (EC), and the accelerated test could distinguish commercially acceptable seed lots. The current study utilized correlation coefficients, multiple laboratory seed germination and seed vigor tests, and various laboratory seed germination and vigor tests to predict the field emergence of wheat seed lots.

MATERIALS AND METHODS

Experiment site: was conducted in the laboratory of Seed Technology Research Department (STRD), the Field Crops Research Institute (FCRI), Agricultural Research Center (ARC). Field emergence was conducted at Tag El-Ezz Agricultural Research Station, Agriculture Research Center, Dakahlia governorate, Egypt during (2019/20 and 2020/21).

Wheat seeds source and storage conditions: Seed of wheat varieties (Sakha 95, Sakha 94, and Misr 3) were obtained after harvest from the Central Administration for Seed Production (CASP), Agricultural Research Center in June (2019/20 and 2020/21). From both seed samples, abnormal and damaged seeds were first dismissed. The initial seed germination was determined to know high and low-vigour seeds. After that, they were kept in their tightly sealed containers for an entire night so that they could fully acclimatize to the lab's temperatures before being used in the subsequent experiments. Standard germination percentage (SG): at 20°C, between paper method was used.

Seedling length (SL): was calculated on ten normal seedlings that were chosen at random and dried for 24 hours in a hot air oven at 80 degrees Celsius.

Seedling dry weight (SDW): was calculated and presented in grams.

Seedling vigour index (SVI): was determined using the equation provided by (Abdul-Baki *et al.,* 1973)

SVI 1 = Seedling length × Standard germination%

SVI 2 = Seedling dry weight (gm) × Standard germination%

Accelerated aging (AA): using the methodology outlined by (Marcos Filho, 2006) on wire mesh trays that were inserted into plastic boxes with 40 ml of distilled water, each variety's seeds were arranged in a single layer. for 48 hours. The germination percentage of the seeds was assessed after the boxes were placed in an ageing chamber set at 40 °C and 100% relative humidity.

Electrical conductivity (µ S cm-1 g^{-1}): Five grammes of seeds were weighed in four replications and surface sterilized with 0.5% HgCl2 for 30 seconds. The seeds were sterilized, rinsed twice in distilled water, and then soaked in 25 ml of distilled water for 24 hours at 25 °C. according (ISTA, 1999). The lower the value of EC greater is the seed vigour.

Field emergence (FE): the experimental field at Tag El-Ezz Agricultural Research Station in Dakahlia governorate, one hundred seeds of each variety were sown in three replications in a Randomized Complete Block Design (RCBD). The total number of seedlings in the field was counted when the emergence was complete or when there was no further addition in total emergence.

Data obtained of parameters were exposed to the statistical analysis using the technique of analysis of variance of Completely Randomized Design (CRD) and Randomized Complete Block Design (RCBD) for laboratory and field study, respectively as described by (Gomez and Gomez 1984). Correlation Coeffients calculated for new and old wheat seed was conducted.

RESULTS

Table 1. Standard germination, seedling length, seedling dry weight, and seedling vigour index 1 as affected by wheat varieties and seed lots during 2019/2020 and 2020/2021

A. Varieties	Standard germination (%)		Seedling length (cm)		Seedling dry weight (gm)		Seedling vigour index 1	
	2019/2020	2020/2021	2019/2020	2020/2021	2019/2020	2020/2021	2019/2020	2020/2021
Sakha 95	89.8	90.6	22.8	23.5	0.025	0.026	2054	2129
Sakha 94	89.2	89.6	23.3	23.8	0.0213	0.024	2086	2138
Misr 3	87.6	88.2	26.2	25.3	0.0268	0.028	2301	2239
F. test	NS	NS	**	**	**	*	**	*
LSD $_{0.05}$	-	-	0.52	0.842	0.0013	0.003	97.9	83.2
B. Seed lots								
New lot	93.4	93.6	25.4	25.6	0.027	0.029	2376	2399
Old lot	84.3	85.4	22.8	22.7	0.0216	0.024	1917	1938
F. test	**	**	**	**	**	**	**	**
LSD $_{0.05}$	2.3	2.02	0.41	0.68	0.0011	0.002	79.9	67.9
A x B	NS	NS	*	**	*	*	NS	**

Table (1) exhibits the impact of different varieties and seed lots on standard germination, seedling length, seedling dry weight, and seedling vigour index 1. Highly significant differences among wheat varieties were observed except for standard germination. Sakha 94 recorded the highest seedling length and Misr 3 recorded the highest value of the seedling dry weight and seedling vigour index 1 comparing other varieties. On the other hand, the variation between the two lots was highly significant. Fresh seeds gave the highest standard germination percentage and seedling parameters while old seeds gave the lowest one. Like this, a new lot's seedling vigour was also noticeably higher (2376 and 2399, whereas the least was recorded in an old lot (1917 and 1938) in both seasons respectively. This study came as a direct response to improving the quality of the wheat crop and improving germination levels, especially considering the climate change crisis, which has become a major threat to the Egyptian agricultural production process. Also, this study focused on measuring and estimating a set of tests, physiological parameters and measurements of growth strength, quality degree besides, seed vitality for three selected varieties of wheat crop using both old and fresh lots.

Table 2. Seedling vigour index 2, germination after accelerated aging, electrical conductivity test, and field emergence as affected by wheat varieties and seed lots during 2019/2020 and 2020/2021

A.Varieties	Seedling vigour index 2		Germination after AA		Electrical Conductivity		Field emergence	
	2019/2020	2020/2021	2019/2020	2020/2021	2019/2020	2020/2021	2019/2020	2020/2021
Sakha 95	2.257	2.36	78.8	79.2	9.2	8.01	72.5	71.6
Sakha 94	1.9	2.19	79.3	80.0	8.4	9.61	69.6	71.8
Misr 3	2.36	2.49	78.3	79.5	10.5	9.9	69.2	70.5
F. test	**	*	NS	NS	**	**	**	NS
LSD $_{0.05}$	0.099	0.205	-	-	0.644	0.441	2.21	-
B.Seed lots								
New lot	2.53	2.66	83.1	83.5	6.68	7.03	73.8	75.3
Old lot	1.816	2.03	74.5	75.5	12.04	11.4	67.0	67.3
F. test	**	**	**	**	**	**	**	*
LSD $_{0.05}$	0.0815	1.68	2.48	1.67	0.525	0.359	1.81	2.3
A x B	**	*	*	*	**	**	**	NS

Highly positive significance on the studied traits i.e.; seedling vigour index 2, germination after accelerated test, and electrical conductivity except for field emergence in the second season (Table 2). Sakha 95 recorded the highest seedling vigour index 2 (2.257 and 2.36), and lowest electrical conductivity (9.2 and 8.01) in both seasons respectively. Also, Sakha 95 recorded the highest field emergence in the first season (72.5) and no significance in the second season. In the present experiment, two seed lots are checked for seedling vigour index 2, germination after accelerated test, electrical conductivity, and field emergence. Fresh lots recorded positive significance for all parameters followed by old lots. In both seasons respectively.

Table 3: Interaction between wheat varieties and seed lots on seedling length, seedling dry weight, seedling vigour index 2 as well as electrical conductivity during 2019/2020 and 2020/2021

Varieties	Seed lots	Seedling length (cm)		Seedling dry weight (gm)		Seedling vigor index 2		Electrical conductivity (EC)	
		2019/2020	2020/2021	2019/2020	2020/2021	2019/2020	2020/2021	2019/2020	2020/2021
Sakha 95	New	24.16	24.4	0.028	0.026	2.64	2.55	6.5	6.5
	Old	21.43	22.5	0.022	0.025	1.86	2.16	10.2	9.4
Sakha 94	New	24.96	24.93	0.023	0.028	2.13	2.67	6.1	6.9
	Old	21.66	22.66	0.019	0.019	1.66	1.71	12.2	12.4
Misr 3	New	27.16	27.56	0.030	0.029	2.815	2.77	7.3	7.6
	Old	25.2	23	0.023	0.026	1.916	2.22	13.7	12.4
F. test		**	**	**	**	**	**	**	**
LSD $_{0.05}$		1.28	2.06	2.353	6.754	0.24	0.504	1.6	0.5

Table (3) presents the interaction impact of wheat varieties and seed lots on the following parameters i.e. seedling lengths, seedling dry weights, seedlings vigour index 2, and electrical conductivity. Misr 3 recorded the highest seedling length, and seedling dry weight, SVI 2 with fresh lots on the other hand Sakha 95 recorded the lowest electrical conductivity. Fresh lots recorded the highest values in seedling parameters comparing old lots.

Table 4: Interaction between wheat varieties and seed lots on field emergence

Varieties	Seed lots	Field emergence %
		2019/2020
Sakha 95	New lot	75
	Old lot	69
Sakha 94	New lot	77
	Old lot	67
Misr 3	New lot	75
	Old lot	66
F. test		**
LSD 0.05		5.4

Table (4) presents the interaction impact of wheat varieties and seed lots on the field emergence. Sakha 94 recorded the highest field emergence with fresh lots on the other hand Misr 3 recorded the lowest values with old lots. Fresh lots recorded the highest values in field emergence comparing old lots.

Table 5. A correlation coefficient of different measures of three wheat varieties and two lots

	Standard G	Seedling L	1SDW	SVI 1	SVI2	G AA	FE	EC
Standard G	1							
Seedling L	0.614271	1						
1SDW	0.585713	0.777153	1					
SVI 1	0.847905	0.938971	0.777459	1				
SVI2	0.746982	0.796163	0.976076	0.860367	1			
G AA	0.861822	0.813898	0.665963	0.921497	0.771069	1		
FE	0.874382	0.711813	0.538552	0.857208	0.669615	0.823278	1	
EC	-0.88877	-0.61333	-0.61697	-0.79871	-0.73694	-0.84569	-0.87063	1

Standard germination, seedling length, seedling dry weight, seedling vigour index 1, seedling vigour index 2, electrical conductivity, and field emergence were highly significant positively correlated with the studied parameters, according to Table (5), which showed the correlation coefficient of the various measures of the three wheat varieties and two lots. Along the same lines, seedling vigours 1, 2, and other traits showed significant and highly significant positive correlations with standards of germination, seedling lengths, seedling dry weights, electrical conductivity, and field emergence. Significant and highly significant negative correlations were found with EC and studied traits, respectively. Regarding standard germination, seedling length, seedling dry weight, seedling vigour index 1, seedling vigour index 2, electrical conductivity, and field emergence, fresh lots of wheat varieties have made progress in genetic improvement.

DISCUSSION

Fresh and old seed lots can occasionally have similar germination potential, but eventually they differ in their levels of vigour in the lab and during field emergence, for which the germination test is unable to distinguish them. (Adebisi *et al.,* 2003; Ghaderi-far, 2011; Jeong *et al.,* 2014; Patil *et al.,* 2019; Biradarpatil *et al.,* 2021) showed that there are close relationships between seed testing results and emergence in the field under ideal environmental conditions. The necessary vigor tests are required to reveal this relatively small variation in the seed vigor level of seed lots to understand this hidden yield-influencing quality of wheat seeds (Baalbaki *et al.,* 2009). Because of age-induced deterioration of the seed, which results in a decline in vigour followed by viability, there is a difference in the pattern of variation in the germination test and vigours. The components of the seedling vigour test, which includes the contribution of germination values with seedling length measured at final count, are responsible for a similar trend of response with respect to seedling vigour as that of germination potential of the tested seed lots. The study's findings are consistent with those of (Patil *et al.,* 2019; Kumari *et al.,* 2021) who noted that high-vigor seeds had a higher vigour index and a higher standard germination rate. Also, there has been a significant increase in the quality attributes, which has the greatest impact on creating useful and constructive proteins in (DNA), and this is due to a significant role in bringing the development and modification of the genetic reaction associated with enhancing previously studied parameters accordance to (Khan *et al.,* 2010; El-Abady *et al.,* 2014; Baldini *et al.,* 2017; Hassan and Hassan 2018; Patil *et al.,* 2019). Also, results showed the extent to which new seeds are superior to their old counterparts in terms of growth rate, germination, and degree of vitality, which may be due to the large and unusual activity of a series of physiological and biochemical reactions that stimulate growth and activity enzymes to give the highest indicator of seedling strength in new seeds, while these are less. The ability and efficiency in the old seeds, and this is the most prominent result of this study and represents an important reflection in this regard. Moreover, fresh seeds of the three wheat varieties, especially Sakha 95 were superior to the old seed in the germination in conjunction with the aging test of 85%. This fact confirms beyond any doubt that the rate of physiological and biochemical changes in the new lot was much higher than in the old lot. Besides, this led to giving a distinctive of field emergence rate in the first lot type. Along the same, there was an inverse relationship between the percentage of germination and electrical conductivity in fresh and old lots. These results were consistent with the results obtained by Also, these results showed the extent to which modern seeds are superior to their old counterparts in terms of growth rate, germination, and the degree of vitality, which may be due to the large and unusual activity of a series of physiological and biochemical reactions that stimulate growth and activity enzymes to give the highest indicator of seedling strength in new seeds, while these are less. The ability and efficiency in the old seeds, and this is the most prominent result of this study and represents an important reflection in this regard. Moreover, results in table (2) show that the fresh seeds of the three wheat varieties, especially Sakha 95 were superior to the old seeds in the rate of germination rate in conjunction with the aging rate of 85%. This fact confirms beyond any doubt that the rate of physiological and biochemical changes in the new lot was much higher than the old lot. Besides, this led to giving a distinctive of field emergence rate in the first lot type. In the same context, there was an inverse relationship between the percentage of germination and the rate of electrical conductivity in fresh and old wheat lots. These results are consistent with the results obtained by (Kishk *et al.,* 2017).

The interaction between wheat varieties like fresh and old lots had the greatest impact in giving significant and fruitful results in this regard as a standard indicator for all the traits studied in table (3). However, on the contrary, the ancient wheat cultivars outperformed the new seeds in the percentage of germination. This came as a direct reflection of the efficiency of the storage process, which locked and prevented the migration of foodstuffs from the inside to the outside. This is considered an important measure and a scientific leap in this investigation, which will be used to know cases of commercial fraud and prevent confusion between old and fresh lots (Kishk *et al.,* 2017; Patil *et al.,* 2019). The interaction between wheat varieties like fresh and old lots had the greatest impact in giving significant and fruitful results in this regard as a standard indicator for all the traits studied. However, on the contrary, the old lot outperformed the new lot in the percentage of germination. This came as a direct reflection of the efficiency of the storage process, which locked and prevented the migration of foodstuffs from the inside to the outside. This is considered an important measure and a scientific leap in this investigation. The fresh seeds likely prevent the transmission of food ingredients from the inside to the outer shell of the grain and reduce the migration of proteins, carbohydrates, and transition to the outside of cover as well as preventing decomposition and maintaining freshness. The values of the EC were low in fresh lots to all varieties, and this was clearly visible in fresh lots more clearly than in old lots, indicating a high storage efficiency in fresh lots. Fresh lots of wheat varieties that have made notable strides in genetic improvement in relation to traits like standard germination, seedling length, seedling dry weight, seedling vigour indexes 1 and 2, electrical conductivity, and field emergence. Due to a significant role in bringing the development and modification of the genetic reaction linked with enhancing the prior traits, the process also extinguishes a noticeable increase in the quality attributes, which has the greatest impact on producing useful and constructive proteins in (DNA). Further, the process of genetic improvement in quality traits was very clear in the new wheat lots of the three wheat varieties under study. Building protein chains that are useful in the processes of building and growing nutrients for new seeds compared to old seeds, and in crystallizing the process of understanding plant physiology and its effective role in improving the quality, vitality, and viability of modern varieties not only of wheat but of quite a few field crops. These outcomes complemented those gained by (Tekrony, 2003; Khan *et al.,* 2010; El-Abady *et al.,* 2014; Baldini *et al.,* 2017; Hassan & Hassan 2018;Patil *et al.,* 2019; Correia *et al.,* 2020) pointed to examining the utility of tests for predicting the physiological quality of wheat grains. The process of genetic improvement in quality traits was evident in the modern wheat lots of the three varieties studied. These improvements involve building protein chains that contribute to the growth and development of nutrients in modern seeds. Additionally, understanding plant physiology plays a crucial role in enhancing the quality, vitality, and viability of not only wheat but also other field crops.

CONCLUSION

The germination percentage test proved to be a dependable method for predicting the emergence of various wheat seed lots when sown in ideal conditions. This study revealed that seed viability significantly influenced seed performance, both in the laboratory and in the field. High viability seeds and seedlings exhibited superior vigour traits compared to other viability categories. Furthermore, their standard germination and field emergence surpassed the acceptance level set by wheat seed certification, unlike medium and low viability levels. In conclusion, the germination test is a reliable indicator of potential seed performance. However, it is important to consider the seed's vigour when assessing its field performance. Additional remarks can be made regarding testing in different laboratories, field conditions, and locations. Tests such as electrical conductivity, accelerated aging, and radicle emergence can yield valuable insights into the relationship between these factors and field performance. However, further research is needed to validate these findings by conducting experiments with various seed lots and sowing conditions.

REFERENCES

Abdul-Baki, A. N. J; A. Prentice Hall & J. D. Anderson (1973). Vigour determination in soybean seed by multiple criteria. *Crop Science*, 13,630-633.

Adebisi, M.A., Ajala, M. O. & Rasaki, N.O (2003). Comparison of seed vigour of sesame in laboratory & field tests. *Journal of Tropical Forest Resource*. 19 (3), 21-23.

Aliloo, A. A., & Shokati, B. (2011). Correlation Between Seed Tests & Field Emergence of Two Maize Hybrids (Sc704 and Sc500). Online J . Anim . Feed Res . *Journal Online Journal of Animal and Feed Research*, 1(6), 249-254.

Baldini, M., Ferfuia, C., & Pasquini, S (2017). Effects of some chemical treatments on standard germination, field emergence & vigour in hybrid maize seeds. *Seed Science and Technology,* 46(1), 41–51. https://doi.org/10.15258/sst.2018.46.1.04

Baalbaki, R., Elias, S., Marcos-Filho, J Mcdonald, M.B (2009). Seed vigour testing handbook. Ithaca: Assoczation of Official Seed Analysts (AOSA), 341.

Biradarpatil, N. K., Rana, S., & Patil, S. S. (2021). Prediction of Field Performance of Seed Lots of Groundnut (Arachis hypogaea L.) through Vigour Tests. *Legume Research - an International Journal*, I(of), 1-8. https://doi.org/10.18805/lr-4458.

Cheyed, S. H. (2020). Field emergence & seedling vigour of bread wheat as influenced by method & longevity of storage. *Iraqi Journal of Agricultural Sciences*, 50(6), 1495-1500. https://doi.org/10.36103/IJAS.V50I6.837.

Correia, L., Pereira, L., Matera, T., Pereira, R., Suzukawa, A., Santos, R., & Braccini, A. (2020). Accessing the relevance of tests for estimating the physiological quality of wheat grains. *Plant, Soil and Environment,* 66 (9), 477-482.

Demir, I., Erturk, N., & Gokdas, Z. (2020). Seed vigour evaluation in petunia seed lots to predict seedling emergence and longevity. *Seed Science and Technology,* 48 (3), 391-400. https://doi.org/10.15258/sst.2020.48.3.07.

Ebrahim, N., & Mokhtari, P. (2023). Standardization of vigour test to predict field emergence and difference of seed vigour among lentils (*Lens culinaris* L.) *Seed Lots,* 47(2). https://doi.org/10.55730/1300-011X.3079.

El-Abady, M. I., Seadh, S. E., & El-Emam, A. A. M (2014). Use of some seed laboratory tests during storage to predict field emergence of maize. *In Research Journal of Seed Science* (Vol. 7, Issue 2, pp. 39–51). https://doi.org/10.3923/rjss.2014.39.51.

Ghaderi-far, M. E. M. E. F. (2011). The Appropriate Laboratory Tests for Predicting Field Emergence & Performance of Chickpea. *Seed Science and Biotechnology,* 5 (1), 21-24.

Gomez, K. A. and A. A. Gomez (1984). Statistical procedures for Agricultural Research, (2nd ed.), pp.20-29&359-387. *John Wiley and Sons, Incorporated,* New York 10158, USA.

Hassan, F. A., & Hassan, M. M. A (2018). The Use of Seed Vigour Tests for Predicting Field Emergence. *International Journal of Applied Science*, 1 (2), p 93.

ISTA (1999). International Seed Testing Association (ISTA). International rules for seed testing. *Seed Science Technology,* 27(Suppl.), 27-32.

Jeong, G.-S., Na, Y.-W., Shim, S.-I., & Kim, S.-H. (2014). Application of Seed Vigour Test for Predicting Field Emergence in Azuki Bean (Vigna angularis Wight). *Korean Journal of Crop Science*, 59(3), 341–349. https://doi.org/10.7740/kjcs.2014.59.3.341.

Kaya, M. D., Kulan, E. G., Ileri, O., & Avci, S. (2019). Prediction of viability & emergence capacity of safflower seed lots. *Journal of Animal and Plant Sciences*, 29(3), 714–720.

Khan, A. Z., Shah, P., Mohd, F., Khan, H., Amanullah, Perveen, S., Nigar, S., Khalil, S. K., & Zubair, M (2010). Vigour tests used to rank seed lot quality and predict field emergence in wheat. *Pakistan Journal of Botany,* 42 (5), 3147-3155.

Kolasinska, K., J. Szyrmer and S. Dul (2000). Relationship between laboratory seed quality tests & field emergence of common bean seed. *Crop Sciences*, 40, 470-475.

Kishk, A. M. S., Abdel-Rahman, H. M., El-Mouhamady, A. A., & Aboud, K. A. (2017). Sophisticated genetic studies on onion through using gamma rays. *Research Journal of Pharmaceutical Biological and Chemical Sciences*, 8 (4), 202-220.

Kumari, N., Chaurasia, A. K., & Mishra, S. N. (2021). Effect of accelerated ageing on quality, growth and yield in seeds (Artificial ageing techniques): Review. *The Pharma Innovation Journal*, 10(7), 1750–1752. http://www.thepharmajournal.com.

Luo, Y., Lin, C., Fu, Y. Y., Huang, Y. T., He, F., Guan, Y. J., & Hu, J. (2017). Single counts of radicle emergence can be used as a fast method to test seed vigour of indica rice. *Seed Science and Technology,* 45(1), 222–229. https://doi.org/10.15258/sst.2017.45.1.19.

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(2), 485-497.

McDonald, M. B. (1998). Seed quality assessment. *Seed Science Research,* 8(2), 265–275. https://doi.org/10.1017/s0960258500004165.

Mersal, I. (2011). the Accuracy of Accelerated Aging Test for Evaluating the Phsiological Quality of Seeds. *Journal of Plant Production*, 2 (9), 1249-1258. https://doi.org/10.21608/jpp.2011.85655

Patil, K. G., Karjule, A., Patel, D. A., & Sasidharan, N. (2019). Effect of accelerated ageing on viability and longevity of wheat (*Triticum aestivum*) seed. *Indian Journal of Agricultural Sciences, 89 (6), 920-928. https://doi.org/10.56093/ijas.v89i6.90760.*

Sharma, S., Punia, R. C., Singh, V., Mor, V. S., & der, H (2017). Prediction of Seedling Establishment in Field by Using Various Seed Vigour Parameters in Wheat (Triticum spp.). International Journal of Current Microbiology and Applied Sciences, 6 (11), 410-414.

Sveinsdóttir, H., Yan, F., Zhu, Y., Peiter-Volk, T., & Schubert, S. (2009). Seed ageing-induced inhibition of germination and post-germination root growth is related to lower activity of plasma membrane H+-ATPase in maize roots. *Journal of Plant Physiology*, 166 (2), 128-135.

Tekrony, D. M. (2003). Precision is an essential component in seed vigour testing. *Seed Science and Technology,* 31(2), 435–447. https://doi.org/10.15258/sst.2003.31.2.20.

العلاقة بين اختبارات حيوية البذور والتكشف الحقلي للوطات القمح

عبدالمجيد محمد سعد كشك* , ولاء سامي البطراوي

قسم بحوث تكنولوجيا البذور، معهد بحوث المحاصيل الحقلية ، مركز البحوث الزراعية ، الجيزة ، مصر

* بريد المؤلف المراسل abdelmageedk@yahoo.com

يعد انخفاض نسبة الإنبات وتأخير النمو بعد الإنبات من السمات الرئيسية لتدهور حيوية التقاوي حيث يسبب نقص حوالي 27% للمحصول. لذلك تهدف هذه الدراسة إلي التنبؤ بالعلاقة بين اختبارات جودة التقاوي والتكشف الحقلي للوطات تقاوي القمح حديثة الحصاد (عالية الحيوية) ولوط قديم (منخفض الحيوية) وذلك لثلاثة أصناف من القمح صنف سخا 95 وصنف سخا 94 وصنف مصر 3 لذلك أقيمت تجارب معملية بوحدة بحوث تكنولوجيا البذور بالمنصورة وحقلية بمحطة البحوث الزراعية بتاج العز بمحافظة الدقهلية خلال الموسمين الشتويين 2019/2020 و 2021/2020. أشارت النتائج أن معظم اختبارات حيوية التقاوي كانت مفيدة في ترتيب لوطات التقاوي بناءً على مرحلة تدهورها الفسيولوجية. أوضحت النتائج أن اختبار نسبة الانبات القياسي والتوصيل الكهربي واختبار الشيخوخة أعطت أفضل تقدير لحيوية لوطات التقاوي والتنبؤ بالتكشف الحقلي لأصناف القمح المستخدمة في التجربة. كان اختبار التوصيل الكهربي من أفضل الاختبارات لجودة تقاوي لوطات القمح والتنبؤ بالتكشف الحقلي. وجد ارتباط قوي بين اختبارات حيوية التقاوي في المعمل والانبثاق في الحقل. (لذلك توصي الدراسة بإستخدام إختبار الإنبات القياسي و إختبار التوصيل الكهربي وإختبار الشيخوخة لترتيب جودة لوطات تقاوي القمح الحديثة والقديمة والتنبؤ بالتكشف الحقلي).

الكلمات الدالة: القمح ، لوطات التقاوي ، التكشف الحقلي ، التنبؤ ، قياسات حيوية البذور.