Effect of some thermal and moisture stresses on some physiological traits of wheat grains *Triticum aestivum* Ḷ.

[1] Muhammad Alwan Hashem, [2]Mohammed Radwan Mahmoud

Agriculture College, Al-Muthanna University, Iraq.

Abstract:

A laboratory experiment was conducted in one of the laboratories of Silo General Company for Grain Trading the variety Eba 99 during the 2019 season in order to study the response of the seeds to treatments of Moisture and heat. -7, 20 and 32), and the second factor was three Moisture treatments (10%, 14% and 16%), temp 32 was significantly superior, were highest value of germin perc. and reached 94.33 %, while temp. 7 was lowest value and reached 89%.Moisture level treatment exceeded 14% and washighest germin perc., which reached 92%, and 16% gave the lowest percentage of germ. that reached 90%.The interaction between temperature and Moisture levels showed significant superiority, and the interaction treatment 10x32 gave the highest value of 97%., The treatment of the heat level 32 was significantly superior to the rest of the treatments and gave the highest value of specific weight 77.03 kg while the treatment of the heat level - 7 gave 75.47 kg with an insignificant difference from the heat level 20, which amounted to 75.20 kg, The treatment of the level of moisture in the specific weight was significantly superior, and the treatment of 16% gave the highest value, and it reached 75,9 kg, the treatment of heat 32 was superior to the speed of germin. and gave the lowest value of 3.44 days, while treatment 37 gave the highest value of 4.22 days The humidity level of 10% gave the lowest number of days for germin., while the level of ride of 16% gave the highest value of the number of days to reach germin. 4.22days, that temperature degree treatment of 32 °C gave the highest in weight of 1000 grains 35.50 g.

Keywords: thermal stress, moisture stress, physiological traits, environment.

Introduction:

Wheat *Triticum aestivum* L. is a nutritionally important crop and ranks first among cereal crops in Iraq and the world(Shafak and Al-Dababi 2008,Shewry, 2009). in terms of importance and cultivated area. Stress is caused by the influence of so-called specific environmental factors Militants Ecologies which are each of the elements of the medium or An environment that has the abiḷity to directḷy or indirectly influence even once during a cycle The life of the plant, whether the effect is negative or positive, even if this effect is for a short period. Soil temperature degree is an essential issue in applied climatic studies, and it has a great importance on the overall plant activity in terms of seed germination speed, and the process of root absorption of water. Conditions suitable for seed germination and seedling growth in the early

stages of plant life .The process of seed germination depends mainly on the temperature degree of the soil, as it makes the germination process fast, and reduces the volume of waste from the planted seeds, and the opposite happens in the lowering of the soil temperature degree (Aḷ-Rawi, 1990), as the effect of soil temperature degree is not limited to seed germination, but affects the other phases of plant growth, as when it is lower than the minimum it leads to freezing of water inside the plant roots and in the spaces between them, which leads to the wilt of the plant, because it is unable to it obtains the water it needs to complete the vital processes, which ḷeads to the disruption of the activity of the roots and their death (Saḷah *et aḷḷ*,1989). During the absorption process, the so-called impregnation pressure is formed as a result of the swelling of the pot. The impregnation pressure is of great importance and is evidence of the strength of the seeds to preserve water, and the water impregnation of the seeds is attributed to the water-loving colloids in the semi-permeable pot. The most imbibed area is the hilum because it is less thick, and the protein is considered from The most important components in seeds that absorb moisture (whether liquid or gas) and absorb water by 187% of their weight, meaning that the swelling of the seeds depends on temperature degree and moisture Also, the seeds do not begin to germinate before the seed moisture reaches 37% or more, and water stress (lack of water) leads to an increase in the hardness of the protoplasm of the seed. and specific weight is the weight of a unit volume of grain without any interstitial spaces The specific weight of wheat ranges from 1.33-1.48 g/cm3, endosperm ranges from 1.38-1.47 g/cm3, protein is 1.32-1.34 g/cm3, and the shell is 1.06-1.15 g/cm3 Because the starch-containing endosperm is characterized by its high specific weight, the small and atrophic grains have a low specific weight because they contain a shell and embryo in a greater proportion than large or healthy grains. Rectangular grains and your son increases the volumetric weight of the first over the second. As for increasing or decreasing moisture, both of them lead to a decrease in the specific weight. Insect infestation with the grains or being affected by frost leads to a decrease in the specific weight and therefore the volumetric weight. Whenever the volumetric weight of the infected grains decreases, this means the height of the infected grains. and specific weight It is the weight of a unit volume of grain without any interstitial spaces, The specific weight of wheat ranges from 1.33-1.48 g/cm3, endosperm ranges from 1.38-1.47 g/cm3, protein is 1.32-1.34 g/cm3, and the shell is 1.06-1.15 g/cm3 Because the starch-containing endosperm is characterized by its high specific weight, the small and atrophic grains have a low specific weight because they contain a shell and embryo in a greater proportion than large or healthy grains. Rectangular grains and your son increases the volumetric weight of the first over the second. As for increasing or decreasing moisture, both of them lead to a decrease in the specific weight. Insect infestation with the grains or being affected by frost leads to a decrease in the specific weight and therefore the volumetric weight. Whenever the volumetric weight of the infected grains decreases, this means the height of the infected grains Aakre et aḷ. (2005). The importance was that it could affect both the percentage and germination rate of the seeds.

Materiaḷs and methods

A laboratory exp. was conducted at one lab. of Silo Gen. Company Trading the variety Eba 99 during the 2019 season in order to study the response of the seeds to treatments of Moisture and heat. -7, 20 and 32), and the second factor was three Moisture treatments (10%, 14% and 16%) ,The cold modification way was used to reach to moisture contents of 12, 14 and 16% **(Muhsin *et al***. 2012).

Studied traits

Percentage OF Germination,1000 grains weight, speed of Germination and spec. wt.

Results and discussion

Germination percentage

Increased Moisture inhibits germination because the anaerobic conditions formed hinder the germination process and the seeds suffocate to deprive them of free oxygen.Seeds need oxygen for their germination, as the respiration of the seeds increases during germination and thus an oxidation and demolition inhibitor is present in the seed and thus allows germination. Thus, the ability of the seed to resist stress can be measured by calculating the seed germination rate. The ratio The germination may remain stable for a specific period of time by increasing the temperature until this temperature reaches the optimum level Until there is time to allow germination to occurand this was reached by Rodriguez̤ et al . (2004).

Table .1 Eff. of temp. degrees & Moisture levels on the on the percentage germin. (%)

Moisture levels%	Temperature degree treatments			Average
	-7	20	32	
10	88.00	90.00	97.00	91.67b
14	91.00	92.00	93.00	92.00 b
16	88.00	89.00	93.00	90.00a
Average	89.00b	90.33b	94.33a	
Ḷ.S.D0.05	h	m	h * m	
	1.4	1.4	1.9	

Spec. wt (kg / hectoliter)

A significantly superior to the rest of the treatments and gave the highest value of specific weight 77.03 kg while the treatment of the heat level - 7 gave 75.47 kg with an insignificant difference from the heat level 20, which amounted to 75.20 kg, The treatment of the level of moisture in the specific weight was significantly superior, and the treatment of 16% gave the highest value, and it reached 75,9 kg.

Table .2 Eff. of temp. degree and Moisture levels on the spec. wt (kg / hectoliter)

Moisture levels%	Temperature degree treatments			Average
	-7	20	32	
10	75.00	75.67	75.76	75.15b
14	77.14	75.43	75.60	75.72ab
16	75.47	75.59	77.73	75.90a
Average	75.53b	75.20b	77.03a	
Ļ.S.D0.05	h	m	h * m	
	0.61	0.61	ns	

speed of germination (days)

Table 3, temp. and hum. levels affected the speed of germin., where the treatment of heat 32 to the speed of germ. and was lowest value of 3.44 days, while treatment 37 gave the highest value of 4.22 days The humidity level of 10%.

Table .3 the effect of temp. degree & Moisture levels on the speed of germin.

Moisture levels%	Temperature degree treatments			Average
	-7	20	32	
10	4.000	3.000	3.000	3.333
14	4.000	3.000	3.000	3.333
16	4.667	3.667	4.333	4.222
Average	4.222	3.222	3.444	
Ļ.S.D0.05	h	m	h * m	
	0.3301	0.3301	ns	

1000 Wt grians

The humidity treatment of 10% reached 32.70 g The reason for this is that the high Moisture has increased respiration , fungal activity, and consequently, the food stock of the grain is low compared to the Moisture level (10%),(Aļ-Ẓubaidi, 1997).

Table. (4) Eff.of temp. degree and Moisture on the 1000 grains weight (g)

Moisture levels%	**Temperature degree treatments**			**Average**
	-7	**20**	**32**	

12	**33.17**	**29.57**	**32.30**	32.70b
14	**34.50**	**33.57**	**33.50**	33.86ab
16	**34.20**	**34.57**	**37.67**	35.48a
Average	33.96ab	32.57b	35.50a	
L.S.D 0.05	**h**	**m**	**h*m**	
	0.90	**0.90**	**ns**	

Reference

Al-Zubaidi, iman Khalil Abdul Karim. 1997. Changes in rice (Oryza sativa L.) seeds during storage. Master's Thesis, Faculty of Agriculture. Baghdad University.

Al-Rawi, Ahmed Rajab Muhammad.2002. Effect of storage temperature degree, seed moisture and storage period on the vitality of Pistachio, Colza and Sunflower seeds. Master Thesis. faculty of Agriculture. Anbar University.

Rodriguez, J. C., R. E. Bartosik, H. D. Malinarc, J. P. Exilart, M. Nolasco.2004 iP Short Term Storage of Argentine Cereals in Silobags to. Prevent Spoilage and insects. http://cobweb.ecn.purdue.edu/~grainlab/iQGC1/proc/powerpoint/prodriguez.pdf

Sabah Mahmoud Al-Rawi, 1990, Soil Temperature degree in Determining the ideal Period for Germination of Wheat Seeds in iraq, iraqi Geographical Journal, issue Twenty-four and Twenty-Five, April 1990, p. 221.

Salah El-Din Baha El-Din Wali, Ahmed Abdel-Hussein, Ahmed Hama Amin Hama Rashid,1989, the effect of varying temperature degrees on the germination of some characteristics of seedlings of wheat and barley, Zanko Salah El-Din Magazine, Volume Two, Number One, Higher Education Press, Erbil, 1989, p. 6.

Harner, J. P., Herrman, T. J., and Reed, C. 1998. Temporary Grain Storage Considerations.http://www.uwex.edu/ces/ag/issues/hurricanekatrina/documents/. Kansas.pdf.

Al-Yahya, S. A. 2001. Effect of Storage Conditions on Germination in Wheat. http://www.ingentaconnect.com/content/bsc/jac/2001/00000186/00000004/art00402

Muir, W. E., and White, N. D., (1992).Mcroorganisms in Stored Grain.http://sci.agr.ca/winnipeg/storage/pubs/presbios/chap04rf.pdf

Muhsin A.A. Aḷ Janabi & Niama H.D. Aḷ joboori .(2012).The Effect of Storage Conditions in Number And Kinds of Fungi Acompiend With Bread Wheat *Triticum aestivum* Ḷ. **2nd Scientific Conference - Coḷḷege of Science - Tikrit University 2**

Sachs, M., D,J. Cantiḷffe, and J.T. Watkins.1990. Germination of pepper seed at ḷow temperature degree after various pretreatments. Proc. Fḷa. Hort. Soc.260-93:208.

Shafshak, Salah El-Din Abdel-Razzaq and Abdel-Hamid El-Sayed El-Dababy. 2008. Field Crops Production. first edition. Arab Thought House. pg. 594.

Shewry ,P.R.2009.Wheat .J.Expe.Bot.,60(6):1637-1653.