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Effect of Different Packaging Materials and Storage Periods on the Yield and Quality of Bread Wheat Grains

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Abstract

This investigation was carried out at laboratories of examination and certification of seeds, at the Agronomy Department, Faculty of Agriculture, Assiut University, Egypt during 2019 season to study the impact of storage period, grains treatment and storage methods on quality and yield traits of Gemaza11 cultivar using completely randomized design. The studied traits, were significantly decreased with increasing storage periods till nine months. The lowest mean value test weight (60), seed index (50.33 g), gluten content (10.33%), fermentation time test (30.67 minutes), fine flour percentage (72%), coarse flour percentage (3.333%), coarse bran percentage (20.33%), and fine bran percentage (4.00%). The highest mean values of grain yield feddan^{-1}. Moreover the lowest mean values of grain yield feddan^{-1}.

Keywords: *grain and quality, fermentation time test, seed index, coarse bran percantage, storage methods*

Introduction

Wheat (*Triticum aestivum* L.) is one of the leading cereal crops and the ranks first in cultivated area and production in the world (Ali *et al* 2016). In Egypt, the cultivated area of wheat during 2020 was about 3.4 Million Fadan with the total yield production of 8.9 MMT (USDA, 2020). (Abdelaal and Thilmany 2019). While the total consumption reached about 20.6 MMT. It accounts for more than one – third of the daily calorie intake of Egyptian consumers and 45 percent of the overall dietary protein intake of Egyptian (Ali and Adams, 1996 and Baka 2014). Wheat, is subject to both biological and physical factors that deteriorate its quality during farm storage (Dessalegn T, Solomon T, Kristos TG, *et al*. 2017). Wheat is the principle factor that greatly affects the production and productivity of crop (Shrestha and Shrestha 2017). Quality seed is consider as the basic, critical, and cheapest input for enhancing productivity and increasing higher net monetary returns per until area (Hemming *et al*., 2018). Stored wheat is vulnerable towards attack of insects and a possible infestation can deteriorate the quality as well as the quantity resulting in significant decrease in volume, substantial weight loss and reasonable germination damage (Phillips and Throne, 2010). Seed storage method occupies a vital place in the economies of developing countries. Where, improper traditional and recent method of seed storage have caused lots of losses in terms of physical and chemical quality (Nany El-moursy 2016 and Ellis *et al*., 1992). In order to prevent the quantitative and qualitative losses due to several biotic and abiotic factors during storage, several methods are being adopted such as seed treatment with suitable chemicals or plant

products and storing in safe containers, besides Sanitation of the storage place (Nany El- Moursy, 2016 and Medhat, 2019).

The objective of this research was to study the effect of storage period, storage methods, and seed treatment on quality and yield traits of Gemaza11 wheat cultivar.

Materials and Methods

This study was carried out at laboratories of examination and certification of seeds, at the Agronomy Department Experimental farm, faculty of Agriculture, Assiut University during 2019 season. The objective of this investigation was to evaluate the effect of storage methods (types of packages) and seed treatments (fumigation with PH_3, malathion, neem oil, citronella oil) and their interaction on storage efficacy, on the quality and yield grain of bread wheat grains during different storage periods (0 (immediately after fumigation), 6 and 9 months after harvesting).

Collection of wheat grain samples and storage condition

Wheat grains (*Triticum aestivum)* samples (Gameza11) were collected from Department of Agronomy, Faculty of Agriculture, Assiut University, Egypt. The collected samples were kept in sterile plastic bags during transport to the laboratory and on the same day sieved and cleaned from dust, husk or any inert materials.

Studied traits

Flour percentage (%): 100 g of clean wheat grains were milled using a Micro Brabender Mill and percent extraction of flour was estimated according to American Association of Cereal Chemists (A. A. C. C, 2000.).

Coarse bran percentage (%): 100 g of clean wheat grains were milled using a Micro Brabender Mill and percent extraction of coarse bran was estimated according to American Association of Cereal Chemists (A. A. C. C, 2000.).

Fine bran percentage (%): 100 g of clean wheat grains were milled using a Micro Brabender Mill and percent extraction of fine bran was estimated according to American Association of Cereal Chemists (A. A.C.C, 2000.).

Dry gluten percentage (%): Wet gluten was dried for 48 hours at 70 ^{0}C to determined dry gluten.

Fermentation time (minutes): Ten grams of each sample from flour were putted in container, then 5.5 cm^3 ferment (ferment was prepared by solving 100 grams' yeast in 1000 ml water) was added and mixed, then the dough pieces were rolled into balls by hand then it was putted in glass contained 80 ml water at 32^{0}C until the dough pieces were exploded.

Test weight: One- quarter liter apparatus was used to determine the test weight of grains.

Seed index: Seed index (weight of 1000-kernels in gm) was recorded on three replicates of samples of 500 grain.

Grain yield (Ardab/fed.): All harvested plants for each experimental until were threshed then grain weighted and transferred into ardab/fed. (ardab =150 kg, fed. =4200 m^2).

Statistical analysis

Data were subjected to the statistical analysis to the technique of analysis of variance (ANOVA) for the factorial experiment in com-

pletely randomized design (CRD) by using "MSTAT-C" computer software package. Means were compared by Revised Least Significant Difference (R LSD) at 5% level of significant

Results and Discussion

Test weight (kg/hl)

Statistical analysis, revealed that test weight of Gameza11 cultivar wasaffectd significantly by storage periods, types of packages, and grains treatment (fumigation with phosohine, neem oil, citronella oil, and malathion) are shown in Table 1. The interaction between storage periods and types of packages was significant, the heaviest test weight (66.67 kg/hl) produced from stored wheat seeds without storage (control). However, the highest mean values of test weight was obtained from samples of wheat grains stored in glass jars for 6 month. The second best, interaction treatment stored in gunny bags for 6 months. The third best interaction treatment stored in twisting plastic for 6 months. Whereas, the lowest mean value of test weight was produced from samples stored in polyethylene packages for 6 months from beginning storage. It could be stated that test weight kg/hl was significantly decreased by increasing storage periods of wheat seeds from 0, 6, to 9 months from beginning storage. In agree with our results Mersal *et al.,* (2006), and Moharram (2021) who studied the effevt of storage periods, types of packages, and insecticides treatments on wheat (*Triticum aestivum* L.) seed quality. They stated that prolonged storage period with high seed moisture percentage caused loss in seed weight. Raza *et al.,*(2010) revealed that storage duration of months generally increased moisture and fat acidity, while decreased test weight and flour yield. The interaction between types of packages and grains treatment was significantly affected wheat test weight. The highest values of test weight was obtained from samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 6 month. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 6 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 6 months. Whereas, the lowest mean value of test weight was produced from samples treated with malathion and stored in polyethylene packages for 6 months from beginning storage. The interaction among storage periods, types of packages and grain treatments (phosphine, neem oil, citronella oil, and malathion) had a significant effect on test weight kg/hl(Table 1).

Seed index (g.)

Statistical analysis, showed that of Gameza11 was significantly affectd by storage periods, types of packages, and grains treatment (fumigation with phosohine, neem oil, citronella oil, and malathion) are shown in Table 2. The interaction between storage periods and types of packages was significant, the heaviest seed index (57.67) produced from stored wheat seeds without storage (control). However, The highest values of seed index was obtained from samples of wheat grains stored in glass jars for 6 month(compared with

9months) Table 2. The second best interaction treatment stored in gunny bags for 6 months. The third best interaction treatment stored in twisting plastic for 6 months. Whereas, the lowest value seed index of wheat was produced from samples stored in polyethylene packages for 6 months from beginning storage. It could be stated that seed index was significantly decreased by increasing storage periods of wheat seeds from 0, 6, and 9 months from beginning storage. In agree with our results Moharram. (2021). Storage periods, types of packages, and insecticides treatments on wheat (*Triticum aestivum* L.) seed quality. Stated that prolonged storage period seed moisture percentage caused loss in seed index. The interaction between types of packages and grains treatment was significantly affected wheat seed index. The highest values of seed index was obtained from samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 6 month(compared with 9 months) Table 2. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 6 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 6 months. Whereas, the lowest value seed index of wheat was produced from samples treated witmalathion and stored in polyethylene packages for months from beginning storage. The interaction among storage periods, types of packages and grain treatments (phosphine, neem oil, citronella oil, and malathion) had a significant effect on seed index. Table2.

Gluten content

Statistical analysis, stated that all the main factors, the first and four order interactions not significantly affected gluten content of Gameza11 wheat Table 3. On the other hand, storage significantly affected gluten content of Gameza11 while the of storage periods and storage methods were insignificant Table 3. The interactions between fumigation and types of packages were significantly The highest values of gluten content was obtained from samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 6 month (compared with 9 months) Table3. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 6 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 6 months. Whereas, the lowest value gluten content of wheat was produced from samples treated with malathion and stored in polyethylene packages for 6 months from beginning storage. The results indicated, in general, that increasing storage period, and fumigation dose; particularly at higher moisture tended to decrease gluten content. The interaction among storage periods, types of packages and gratreatments (phosphine, neem oil, citronella oil, and malathion) had insignificant effect on gluten effect Table 3.

2-4. Fermentation time test

It is revealed from the statistical analysis, (Table 41) that fermentation time test of wheat was significantly affected by factors, while the interactions between fumigation, storage pe-

riods, and types of packages were insignificant (Table 4). The interaction between storage periods and types of packages (Table 4) showed that fermentation time test was significantly affected by storage periods (0, 6, and 9 months after harvesting) of wheat seeds. The longest fermentation time test (40.47 minute) produced from stored wheat seeds for 0 months. However, the shortest fermentation time test (30.67 minute) resulted from stored wheat seeds for 9 months from beginning of storage. It could be stated that fermentation time test was significantly decreased by increasing storage periods of wheat seeds from 0, 6, and 9 months from beginning of storage. Moharram (2021) found that increasing storage periods decreased fermentation time test. and Hakansson *et al*. (2006) found that the storage affected significantly in milling characters with fermentation time test. the interactions between fumigation and types of packages were significantly The highest values of fermentation time test was obtained from samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 6 month(compared with 9 months) Table 4. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 6 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 6 months. Whereas, the lowest value fermentation time test. of wheat was produced from samples treated with malathion and stored in polyethylene packages for 6 months from beginning storage. The results indicated, in general, that increasing storage period, and fumigation dose; particularly at higher moisture tended to decrease fermentation time test The interaction among storage periods, types of packages and grain treatments (phosphine, neem oil, citronella oil, and malathion) had insignificant effect on fermentation time test (Table 4).

Fine flour percentage

Statistical analysis, showed that fine flour percentage of Gameza11 was significantly affectd by storage periods, types of packages, and grains treatment (fumigation with phosohine, neem oil, citronella oil, and malathion) are shown in Table 5. The interaction between storage periods and types of packages was significant, the heaviest fine flour percentage (78.67%) produced from stored wheat seeds without storage (control). However, the highest values of fine flour percentage was obtained from samples of wheat grains stored in glass jars for 6 month (compared with 9months) Table 5. The second best interaction treatment stored in gunny bags for 6 months. The third best interaction treatment stored in twisting plastic for 6 months. Whereas, the lowest value fine flour percentage of wheat was produced from samples stored in polyethylene packages for 6 months from beginning storage. It could be stated that fine flour percentage was significantly decreased by increasing storage periods of wheat seeds from 0, 6, and 9 months from beginning storage. In agree with our results Zainab A.M. Moharram.(2021). Storage periods, types of packages, and insecticides treatments on wheat (*Triticum aestivum L.*) seed

quality. stated that prolonged storage period seed moisture percentage caused loss in flour percentage. Raza *et al.* (2010) revealed that storage duration of 12 months generally increased moisture and fat acidity, while decreased test weight and flour yield. The interaction between types of packages and grains treatment was significantly affected wheat fine flour percentage. The highest values of fine flour percentage was obtained from samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 6 month (compared with 9 months) Table 5. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 6 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 6 months. Whereas, the lowest value fine flour percentage of wheat was produced from samples treated with malathion and stored in polyethylene packages for 6 months from beginning storage. The interaction among storage periods, types of packages and grain treatments (phosphine, neem oil, citronella oil, and malathion) had a significant effect on fine flour percentage. Table 5.

Coarse bran percentage

Data exhibited in Table 6focus that coarse bran percentage of wheat was significantly affected by factors, while the interactions between storage periods, and types of packages were insignificant (Table 6). The interaction between storage periods and types of packages (Table 6) showed that coarse bran percentage was not significantly affected by storage periods (0, 6, and 9 months after harvesting) of wheat seeds. The heaviest coarse bran percentage (19.67) produced from stored wheat seeds without storage. However, the lightest coarse bran percentage (15.33) resulted from stored wheat seeds for 6 months from beginning of storage. It could be stated that coarse bran percentage was not significantly increased by increasing storage periods of wheat seeds from 0, 6, and 9 months from beginning of storage. Moharram (2021) found that increasing storage periods decreased coarse bran percentage. The interactions between fumigation and types of packages were significantly. The highest values of coarse bran percentage (16.78%) recorded from without fumigation, whereas, the lowest value of coarse bran percentage (16.33%) samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 9 month Table 6. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 9 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 9 months. Then samples treated with malathion and stored in polyethylene packages for 9months from beginning storage. The results indicated, in general, that increasing storage period, and particularly at higher moisture tended to increase coarse bran percentage. The interaction among storage periods, types of packages and grain treatments (Phosphine, neem oil, citronella oil, and malathion) had insignificant effect on coarse bran percentage (Table 6).

Fine bran percentage.

The illustrated data in Table 7show that fine bran percentage of wheat was significantly affected by factors, while the interactions between fumigation, and types of packages were insignificant (Table 7). The interaction between storage periods and types of packages (Table 7) showed that fine bran percentage was significantly affected by storage periods (0, 6, and 9 months after harvesting) of wheat seeds. The heaviest fine bran percentage (5) produced from stored wheat seeds without storage. However, the lightest fine bran percentage (4) resulted from stored wheat seeds in glass jars for 9 months from beginning of storage. It could be stated that fine bran percentage was significantly increased by increasing storage periods of wheat seeds from 0, 6, and 9 months from beginning of storage. Moharram (2021) found that increasing storage periods decreased fine bran percentage. The interactions between fumigation and types of packages were not significantly, the highest values of fine bran percentage (5) recorded from without fumigation, whereas, the lowest value of fine bran percentage (3.667%) samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 9 month (Table7). The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 9 months. The third best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 9 months. Then samples treated with malathion and stored in polyethylene packages for 9 months from beginning storage Table 7. The results indicated, in general, that increasing storage period, and particularly at higher moisture tended to increase fine bran percentage. The interaction among storage periods, types of packages and grain treatment (phosphine, neem oil, citronella oil, and malathion) had insignificant effect on coarse bran percentage (Table7).

Grain yield (Ardab/fed.).

It is revealed from the statistical analysis, (Table 8) that grain yield of wheat was significantly affected by studied factors, while the interactions between fumigation, and types of packages were significant (Table 8). The interaction between storage periods and types of packages (Table 8) showed that grain yield was significantly affected by storage periods (0, 6, and 9 months after harvesting) of wheat seeds. The heaviest grain yield (24.00) produced from stored wheat seeds without storage. However, the lightest grain yield (25.30) resulted from stored wheat seeds in glass jars for 9 months from beginning of storage. It could be stated that grain yield was significantly decreased by increasing storage periods of wheat seeds from 0, 6, and 9 months from beginning g of storage. Moharram (2021) found that increasing storage periods decreased grain yield. The interactions between fumigation and types of packages were significantly, the highest values of grain yield (25.30) samples of wheat grains treated with phosphine at the rate of ,018 g/2kg and stored in glass jars for 9 month Table7. The second best interaction treatment treated with neem oil at the rate of 10 ml/2kg and stored in gunny bags for 9 months. The third

best interaction treatment treated with citronella oil at the rate of 4.5 ml/cm^3 and stored in twisting plastic for 9 months. Then samples treated with malathion and stored in polyethylene packages for 9 months from beginning storage Table 8. The results indicated, in general, that increasing storage period, and particularly at higher moisture tended to decrease grain yield. The interaction among storage periods, types of packages and grain treatment (phosphine, neem oil, citronella oil, and malathion) had significant effect on grain yield percentage effect Table 8.

Table 1. Test weight of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	66.67	66.33	64.00	63.33	62.67
	2		68.00	63.67	63.67	63.33
	3		66.33	64.67	62.67	62.33
	4		67.33	63.67	62.33	63.67
6 months	1	64.00	65.00	63.00	62.67	61.67
	2		64.33	62.33	61.67	62.33
	3		64.00	62.33	62.00	62.33
	4		65.33	63.00	61.67	61.00
9 months	1	60.00	63.33	61.00	60.00	60.00
	2		62.33	60.33	60.00	60.33
	3		60.67	60.00	61.33	60.67
	4		61.33	61.33	60.33	61.67
F-test= **						
L.S.d at 5 %= 0.91						

Table 2. Seed index of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	57.67	57.33	54.67	54.67	56.67
	2		56.00	57.33	54.00	57.33
	3		55.00	56.67	54.00	53.00
	4		56.00	58.00	56.00	54.00
6 months	1	57.00	57.33	52.00	53.00	53.00
	2		56.33	51.00	51.00	50.33
	3		57.00	51.67	53.00	51.33
	4		56.33	52.00	51.67	51.67
9 months	1	50.33	53.00	50.33	50.33	50.00
	2		51.00	50.33	48.33	49.00
	3		53.00	50.00	47.67	49.67
	4		52.00	51.67	50.00	48.67
F-test= **						
L.S.d at 5 %= 1.22						

Table 3. Gluten content of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	10.67	11.00	10.00	10.67	10.67
	2		10.33	10.67	10.67	10.33
	3		10.00	11.00	10.67	10.33
	4		10.00	10.67	11.00	10.00
6 months	1	10.67	10.33	10.33	10.00	11.00
	2		10.00	10.67	10.00	11.00
	3		10.67	11.00	10.67	10.33
	4		10.33	10.67	10.33	10.33
9 months	1	11.00	11.00	11.00	11.00	11.00
	2		11.00	10.33	10.00	10.33
	3		11.00	11.00	10.33	10.67
	4		10.33	10.00	11.00	10.33
F-test= n.s						
L.S.d at 5 %= --						

Table 4. Fermentation time test of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	38.33	41.67	40.00	37.00	38.33
	2		40.00	40.67	38.33	40.00
	3		45.00	42.67	39.67	36.67
	4		42.33	40.00	40.33	40.00
6 months	1	34.33	37.33	32.67	33.33	32.67
	2		37.33	30.67	31.33	32.00
	3		36.33	31.00	31.00	31.00
	4		38.33	32.67	32.67	30.00
9 months	1	31.00	34.67	31.67	30.67	30.67
	2		36.00	31.00	30.33	31.00
	3		34.33	33.00	31.00	31.33
	4		36.00	32.00	30.00	32.00
F-test= n.s						
L.S.d at 5 %= --						

Table 5. Fine flour percentage of wheat grains as affected by storage periods, types of packages and grains treatments.

Storagepe-riods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	78.67	80.33	79.33	79.67	79.67
	2		81.00	79.00	78.67	80.00
	3		79.33	79.00	79.00	79.67
	4		80.33	79.00	79.67	79.67
6 months	1	78.33	79.00	77.67	77.33	76.33
	2		79.00	78.00	78.00	76.33
	3		78.33	77.00	77.00	75.33
	4		79.00	77.67	77.00	76.33
9 months	1	72.67	75.33	74.67	72.67	73.67
	2		76.33	75.00	73.33	72.33
	3		78.67	74.00	74.00	72.00
	4		78.33	73.33	72.00	74.33
F-test= **						
L.S.d at 5 %= 1.02						

Table 6. Coarse bran percentage of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	15.33	14.67	14.67	15.00	15.00
	2		14.67	15.33	15.33	15.00
	3		14.67	15.00	15.00	15.00
	4		14.67	15.00	15.00	15.00
6 months	1	19.67	15.00	15.00	15.33	15.00
	2		15.00	15.33	15.67	16.00
	3		15.00	15.67	15.67	15.33
	4		15.00	15.00	16.00	15.67
9 months	1	14.67	18.67	18.33	19.33	19.33
	2		17.67	18.67	19.67	20.33
	3		16.33	19.33	19.00	20.67
	4		16.33	19.33	21.00	19.00
F-test= **						
L.S.d at 5 %= 0.84						

Table 7. Fine bran percentage of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	3.333	3.333	3.667	3.333	3.333
	2		2.667	3.667	4.000	3.000
	3		3.667	4.000	3.333	3.333
	4		3.000	4.000	3.333	3.333
6 months	1	4.000	4.000	3.667	4.000	4.000
	2		4.000	4.000	4.000	4.000
	3		3.667	4.000	4.000	4.000
	4		3.667	4.000	4.000	4.000
9 months	1	5.000	3.667	4.000	4.000	4.000
	2		4.000	4.000	4.000	4.000
	3		4.000	4.000	4.000	4.000
	4		4.000	4.000	4.000	4.000
F-test= **						
L.S.d at 5 %= 0.489						

Table 8. Grain yield of wheat grains as affected by storage periods, types of packages and grains treatments.

Storage periods	Storage methods	Fumigants				
		untreated	1	2	3	4
0 month	1	27.00	33.10	29.87	29.90	28.70
	2		29.20	29.60	29.70	28.63
	3		30.03	29.67	29.53	28.90
	4		32.93	29.83	29.67	28.87
6 months	1	25.00	26.20	25.43	25.40	25.90
	2		26.13	25.57	25.40	26.00
	3		26.07	25.70	25.73	26.37
	4		26.23	25.90	25.80	26.33
9 months	1	24.00	25.30	25.10	24.70	24.80
	2		24.90	25.00	24.57	24.10
	3		25.07	25.27	24.63	24.27
	4		25.03	25.23	25.30	25.17
F-test= **						
L.S.d at 5 %= 0.23						

References

A.A.C.C. (2000). Approved Methods of the American Association Cereal Chem. St. Paul, MN, U.S.A. AM. Assoc. Cereal Chem.

Abdelaal HAS and Thilmany D (2019). Grains Production Prospects and Long Run Food Security in Egypt. Sustainability 11(16):4457.

Al-Bedak, O.A., Teama, E.A., Ali, E. A., Said, M.T., Shalaby, E. M., & Moharram, Z. A. (2020). Impact of fumigation with phosphine on viability of wheat grains stored for six months at two levels of moisture content, in addition to description of four new records of associated fungi and assessment of their potential for enzymatic production. Journal of Basic & Applied Mycology (Egypt), 11, 77-97.

Ali, SM, Adams Jr RH. (1996). The Egyptian food susbsidy system: Operation and effects on income distribution. World Development 24: 1777-1791.

Ali, A.G.M.: M.A.Omar., A.I. Nawar., & S.Sh. El-Tabbakh. (2016). Effect of Sowing Date and Nitrogen Fertilization Level on Growth and Productivity of Some Durum and Bread Wheat Varieties. Alex. Sci. Exch. J. 37(4): 541-549.

Baka, ZAM (2014). Plant extract control of the fungi associated with different Egyptian wheat cultivars grains. Journal of plant protection Research 54(3): 231-237.

Dessalegn T, Solomon T, Kristos TG, et al. (2017). Post-harvest wheat losses in Africa: An Ethiopian case study. In: Langridge P, Achieving sustainable cultivation of wheat Volume 2: Cultivation techniques. Burleigh Dodds Science Publishing 85-104.

Ellis, R.H.; T.D. Hong and E.H. Roberts. (1992). The low-moisture-content limit to the negative logarithmic relation between seed longevity and moisture content in three susbsecies of rice. Ann. of Bot., 69: 53-58.

Hemming, D. j., Chirwa, E. W., Dorward, A., Ruffhead, H. J., Hill, R., Osborn, J., … Phillips, D. (2018). Agricultural input subsidies for improving productivity, farm income consumer welfare and wider growth in low- and lower-middle-income countries: a systematic review. Campbell Systematic Reviews, 14(1), 1-153. https://doi.org/10.4073/csr.2018.4.

Hakansson, Wennerark M., JaGersta, D. (2006). Bread making and storage of varions wheat fraction affect vitamin E. Journal of food Science Volume 57, Iusse 5, Pages 1205-1209.

M. M., & Hasan, M. R. (2006). Efficacy of malathion in controlling Tribolium castaneum Herbst (Coleoptera: Tenebrionidae). Bangladesh Journal of Scientific and Industrial Research, 41(3), 239-244.

Marahatta, S. (2021). Assessment of the effectiveness of storage structures for maintaining the quality of maize seed stored at different moisture levels. Journal of Agriculture and Natural Resources, 4(1), 96-110.

Mersal, I.F.: A.A. El-Emam and M. Amal (2006). Effect of storage period, seed moisture content and insecticides treatments on wheat (*Triticum aestivum L)* seed quality. Ann. of Agric. Sci., Moshtohor, 44(1): 111-124.

Raza, S.; S. Khalil; K. Nassem; M.A. Gilani; M. Amjad; R. Maqsood and S.M.S. Naqvi (2010). Effect of household storage receptacles on physic chemical characteristics of wheat. Sarhad J. Agric., 26(2): 275-287.

Shrestha, A., I & Shrestha, J. (2017). Production, problems and decision making aspects of maize seed producer in Banke district, Nepal. Azarian Journal of Agriculture, 4(6), 212-216.

Phillips, T.W. and J.E. Throne (2010). Bio-rational approaches to managing stored product. Ann. Rev. of Entom., 55: 357-397.

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اثر استخدام عبوات وظروف تخزين مختلفه على محصول وجودة حبوب قمح الخبز

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الملخص

أجريت تجربة معملية خلال ٢٠١٩ فى معمل فحص واعتماد التقاوى – مزرعة قسم المحاصيل البحثية- كلية الزراعة- جامعة اسيوط لدراسة تأثير فترات التخزين وعبوات التخزين ومواد التبخير على حيوية وجودة حبوب قمح الخبز صنف جميزة١١. استخدم لذلك تصميم كامل العشوائية بثلاث مكررات. تشير النتائج الى التاثير المعنوي لفترات التخزين وعبوات التخزين ومواد التدخين على صفات الجودة ومحصول الحبوب على حبوب قمح الخبز صنف جميزة١١. بالاضافة الى التاثير المعنوي لمعظم التفاعلات علي معظم الصفات محل الدراسة. حيث تم الحصول على اعلى قيم لمتوسطات محصول للحبوب للفدان (٣٠,٢٥) من معاملة صنف جميزة١١ بالفوسفين بمعدل .١٨جم/٢كجم وتخزينه فى عبوة البرطمان الزجاج وهذه افضل معامله وعلى الجانب الاخر اقل قيم لمتوسطات محصول للحبوب للفدان (١٠,٢٤) من معاملة الحبوب بمبيد الملاثيون بمعدل ٢ جم /٢كجم وتخزينه فى عبوة اكياس بلاستيك. بينما تم الحصول على اعلى نسبة من الجلوتين الجاف (١١) من معاملة الحبوب بالفوسفين بمعدل .١٨جم/٢كجم وتخزينه فى عبوة البرطمان الزجاج لمدة ٩ شهور، وأعلى قيمه لوزن الهكتولتير (٦٥) من معاملة الحبوب بالفوسفين بمعدل .١٨جم/٢كجم وتخزينه فى عبوة البرطمان الزجاج لمدة ٦ شهور واعلى قيمه لوزن الالف حبه (٦٥,٣٣) من معاملة الحبوب بالفوسفين بمعدل .١٨جم/٢كجم وتخزينه فى عبوة الاكياس الخيش لمدة ٦ شهور، واطول وقت للتخمر(٣٨,٣٣) من معاملة الحبوب بالفوسفين بمعدل .١٨جم/٢كجم وتخزينه فى عبوة الاكياس الخيش لمدة ٦ شهور. ويلاحظ ان نسبة الدقيق وجودته تقل بزيادة فترة التخزين.