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Quality and Yield Components Assessment of Some Bread Wheat Genotypes

Alaa M. E. A. Shahein[1], Nagwa I. Shalaby[1] and Kh. E. Ragab[2]
[1]Seed Technology Res. Dep., Field Crops Res. Institute, ARC, Egypt.
[2] Wheat Res. Dep. Field Crops Res. Institute, ARC, Egypt.
Corresponding author: dr.alaashahein@gmail.com

Abstract

This study was conducted at Sakha Agricultural Research Station, ARC, Egypt, during 2018/2019 and 2019/2020 seasons, to evaluate quality and kernels yield components of some local wheat genotypes. In this study, seven bread wheat cultivars (Misr1, Misr2, Gemmiza11, Shandaweel1, Sakha95, Misr3, and Giza171) and 12 wheat lines have been used. The research has been established as a completely randomize design with three replicates. Genotypes had highly significant effects on quality and yield components traits. The results indicated that Shandaweel1, Giza171and Line7 gave the tallest plants. Gemmiza11 produced the tallest spikes, while, Shandaweel1 gave the high number of spikelets per spike. The highest values of spike kernel weight and number of kernels per spike produced by Line12.Line 4 and Line11 gave the highest1000-kernel weight. Line10 gave the lowest moisture and the highest ash content. The highestcrude protein percentage, wet gluten and dry gluten percentage was obtained from Line4. Misr2 and Line10 produced the highestoil percentage. While, the highest fiber and carbohydrate contents were obtained by Line8 and Line2, respectively. Both of cultivarsShandaweel1 and Line11 produced the highest starch content and Line3 gave the highest hectoliter weight.The correlation analysis showed that spike kernels weight observed positive relationship with hectoliter and between spike kernel weight and number of kernel per spike. On the other hand, protein content percentage observed positive relationship with wet and dry gluten content. In addition, there is positive correlation between ash and both of oil and fiber content.

Key words: *wheat genotypes*, chemical composition, wet and dry gluten, spike characteristic.

Introduction

In Egypt, wheat is the main winter cereal crop. Wheat has a special importance in Egypt because the local production is not sufficient to face the annual requirements**Gharib *et al.*(2016)**.The cultivated area reached more than 3.1 million feddan wheat in the winter season of 2018/2019 produced an average of 18.5 ardab/fed of the grain production. Yields exceed 2.76 t fed^{-1} under irrigation in Egypt (FAO) (2016).Wheat is one of the most important cereal crops in the world, which is grown both in arid and semiarid regions of the world **Tunio*et al.*(2006)**.Bread wheat (*Triticumaestivum* L.) is the world's most important grain crop and it covers more of the earth's surface than any other food crop. It is an essential staple crop around the world and it is yield is positively affected by global climatic change. The productivity of wheat is influenced by various biotic or abiotic stresses **Abdelaal*et al.*(2018)**.The global requirements for wheat by the year 2020 is forecasted around 950 million tones to face the food requirements imposed by the increase in population growth and this target will be achieved only, if global wheat production is increased by 2.5% **Barutçular*et al.*(2017)**.Wheat is a good source of crude fiber which has been shown to reduce the risk of colon cancer disease. Fiber has also been shown to reduce blood cholesterol and lower diabetes risk. These potential health benefits of increasing dietary fiber have led to greater demand for wheat fiber as an additive in processed foods. Yield and seed quality of wheat are remarkably influenced by the effects of environment during grain fill.

Lozhkin*et al.*(2020) reported significant variations in grain yield and its components of wheat genotypes. **Saffer-ul-Hassan *et al.*(2004)** reported that there were highly significant variation among wheat genotypes for number of grains per spike, protein (%), plant height, grain yield, grain filling period and spikelets per spike. On the other hand there were insignificant variationsin spike length,spike kernels weight and 1000 grain weight. **Raza*et al.* (2018**) reported that there were highly significant differences among wheat genotypes in plant height, 1000-kernel weight and grain yield m^{-2}.**Abdel-Kereem and El- Saidy(2011)** reported that the variation among wheat genotypes under normal condition were highly significant for plant height, number of spikesm^{-2}, number of kernels per spike, 1000-kernel weight, oil % and protein content. **Rehmat *et al.*(2017)**reported that the analysis of variance exhibited that all the genotypes performed significantly (P≤0.05) variable for plant height, days to flowering, grain per spike, total grain weight. Ali, 2017 found that the differences among bread wheat cultivars were significant for number of 1000- grain weight, grains per spike, and protein percentage. **Karaman(2020)** reported that there was a significant variation among wheat cultivars for 1000-grain weight and wheat grain is primarily composed of starch, protein, and fiber. In addition to food uses, wheat grain can have many diverse end uses based on grain composition. The quality of technological properties of wheat varieties is depending on specific parameters i.e. protein content, starch deposition, carbohydrate, wet gluten content, dry gluten content. Gluten content is one of the most important parameter used to evaluated wheat quality.

The rate and duration of wheat grain development, protein accumulation and starch deposition are influenced by environmental variables such as water, temperature and fertilizer**Tayyar and Gul(2008)**. Numerous studies indicate that environmental conditions, such as distribution of precipitation, growing-season temperature, light intensity and humidity during grain fill, sowing time, plant density and fertilizer are known to have significant effects on wheat yield and quality.

Hussein *et al*. (2018) reported that sakha93 cultivar was higher in crude fiber and oil % (2.35% and 2.56%) than other cultivars, while the lowest in wet gluten content.**Tayyar and Gul(2008), Mallick*et al*.(2013) and Tawfeuk and Gomaa(2017)**found that there are differences in hectoliter weight, grain moisture, protein %, ash% and wet gluten content between the different varieties. The aim of the present study was to evaluate spike and grain physical and chemical characteristics of some local bread wheat genotypesunder the conditions of Egypt to high quality and yield components.

Materials and Methods

This Investigation was conducted in the Experimental Farm and Seed Technology Laboratory, Sakha Agricultural Research Station, Egypt during the two successive wheat seasons, 2018/2019 and 2019/2020. The experimental site is located at 30.94 North Latitude, 30.11 East Longitude with an elevation of about 6 m above sea level. Nineteen diverse bread wheat genotypes(Table 1) were selected from the genetic stocks of the bread wheat-breeding program at Sakha Agric. Res.Stationbased on their spike and grain characteristics, to evaluate them for some important yield related characteristics and seed chemical composition. The materials contain seven local cultivars, and twelve lines. Each genotype was planted in one row, 2mlong and 30 cm between genotypes. The sowing date was on 20thNovember in the two seasons. The technical recommendations of growing wheat crop were applied at the appropriate time.

At Harvest time, plant height (cm) was measured. Ten uniformed spikes of each genotypewere randomly taken and the remained spikes were harvested and threshed to obtain seeds. At the Seed Technology Laboratory, spike and grain characteristics (spike length (cm), number of spikelets per spike, spike kernel weight (g), number of kernel per spike and 1000-kernel weight (g)) were measured.

The tested grains were ground to a fine powder and pass through 2 mm mesh for chemical analysis. Crude protein, oil %, crude fiber, ash %, total carbohydrate content, moisture content %, sugar and starch were determined according to the procedures outlined in Association of Official Agricultural Chemists A.O.A.C. (2000). Hectoliter weight (ghL^{-1}) was determined for dockage-free grain sample using Seed buro Hectoliter Mass Device and electronic balance. Wet and dry gluten percentage was measured using hand washing method for 25g flour according to standard method of American Association of Cereal Chemists (AACC, 10-38, **Anonymous, 1983**),while the starch percentage was detected in the washing water by drying and weighted. The hydration capacity of gluten was calculated as follows:

Hydration percentage= ((wet gluten-dry gluten) x 100) /dry gluten.

The collected data of the two seasons were subjected to combined analysis of variance (ANOVA) for the completely randomized design to each experiment, as mentioned by Gomez and Gomez (1984) using MSTAT-C (1990) computer software and the means of genotypes were compared using Fisher's protected LSD at 0.05probability level. Correlation and cluster analysis were done using SPSS 25th statistical computer program.

Table 1. Name and pedigree of the studied bread wheat genotypes

Cultivar or line	Pedigree	Selection history
Misr1	OASIS/SKAUZ//4*BCN/3/2*PASTOR	CMSS00Y01881T-050M-030Y-030M-030WGY-33M-0Y-05
Misr 2	SKAUZ/BAV92	CMSS96M03611S-1M-010SY-010M-010SY-8M-0Y-0S
Gemmiza11	BOW"S"/KVZ"S://7C/SER182/3/GIZA168/SAKHA61	GM7892-2GM-1GM-2GM-1GM-0GM
Shandaweel1	SITE/MO/4/NAC/TH.AC//3*PVN/3/MIRLO/BUC	CMSS93B00567S-72Y-010M-010Y-010M-3Y-0O-0HTY-0SH

Sakha 95	PASTOR/SITE/MO/3/CHEN/AEGILOPS SQUARROSA (TAUS) //BCN /4/WBLL1	CMA01Y00158S-040POY-040M-030ZTM-040SY26M-0Y-0SY-0S.
Giza 171	SAKHA 93 / GEMMEIZA 9	S.6-1GZ-4GZ-1GZ-2GZ-0S
Misr 3	ATTILA*2/PBW65*2/KACHU	CMSS06Y00582T-099TOPM-099Y-099ZTM-099Y-099M-10WGY-0B-0EGY
Line 1	DVERD2/AE-SQUARROSA(214)// 2*BCN/3/ GIZA 168	S.15541-3S-3S-1S-0S
Line 2	GEMMEIZA3/HUBARA5	GM8869-1GM-2GM-2GM-2GM-0GM
Line 3	CHEN/AEGILOPSSQUARROSA (TAUS)// BCN /3/2*KAUZ/4/HAAMA-11	S.16276-018S-010S-3S-0S
Line 4	BL1133/3/CMH 79A.955*2/CNO 79// CMH 79A.955/ BOW"S"/4/GIZA164/ SAKHA61 /5/MAI "S" /PJ//ENU "S"/3/KITO/ POTO.19 //MO/ JUP/ 4/K134 (60)/ VEE	S.16583-5S-1S-2S-0S
Line 5	CHAM-4/VENAC-1	ICW94-0002-2AP-0L-3AP-0AP
Line 6	CMH83.2578GANFRENCH /6/ CMH79A. 955/4 /AGA/ 3 /4*SN64/CNO67//INIA66/5/NAC	
Line 7	JUB/ZP//COC/3/PVN/4/GEN/5/BOW//BUC/BUL/6/VEE#5//DOVE/BUC	CMSS93Y02816T-28Y-010Y-010M-010Y-7M-0Y
Line 8	SW89.3243/CBRD	CMSS92M00926S-015M-0Y-050M-0Y-18M-0Y
Line 9	THB/KEA//PF85487/3/MILAN	CMSS95M00522S-0100M-050Y-050M-5AL-8AL - 0M-0LPY-3SJ-0Y
Line 10	WL7060/TURACO	CMB90M1004-9M-1Y-10M-1Y-6M-3KBY-05KBY-0B
Line 11	WBLLI*2/BRAMBLING	CGSS01B00062T-099Y-099M-099M-099Y-099M-22Y-0B-0S
Line 12	CRDN/ PASTOR // GIZA168	CGM9262-3GM-3GM-IGM-3GM-4GM-0GM

Results and Discussion

The mean values of the studied genotypes for plant height, spike length, number of spiklets per spike, spike kernels weight, number of kernels per spike and 1000- kernel weight are illustrated in Table 2. The highest plant height values were obtained fromShandaweel1, Giza171 and Line7 (115.8, 115.8, and 115.0 cm, respectively). While, the lowest plant height valuewas obtained from Line4(94.2cm). The highest spike length values were obtained from Gemmiza11 (16.3 cm). For number of spikelets per spike, the highest valuewas obtained from Shandaweel1 (28.0 spikelet) in the combined analysis. Meanwhile, the lowest number of spikelets per spike has been obtained from Line3 by 19.8.**Dogan and Kendal (2012), Kaya and Akcura (2014), Mut*et al*.(2018), Karaman (2020)** and **Lozhkin*et al*. (2020)** reported that there were a highly significant differences among wheat genotypes in plant height and number of spiklets per spike.

Table 2. Yield components as affected by variation of nineteen bread wheat genotypes (average of two seasons 2018/2019 and 2019/2020).

Genotypes	Plant height (cm)	Spike length (cm)	No. spikelets per spike	Spike kernels weight (g)	No. of kernels per spike	1000-kernel weight (g)
Misr1	**108.3**	**11.9**	**21.2**	**2.5**	**63.5**	**40.6**
Misr2	**112.5**	**13.2**	**23.8**	**2.6**	**73.8**	**39.0**
Gemmiza11	**108.3**	**16.3**	**25.2**	**2.6**	**70.8**	**40.9**
Shandaweel1	**115.8**	**14.9**	**28.0**	**2.8**	**86.2**	**36.2**
Sakha95	**113.3**	**12.7**	**23.5**	**3.6**	**75.5**	**42.9**
Giza 171	**115.8**	**13.5**	**24.2**	**4.1**	**66.8**	**48.6**
Misr3	**105.8**	**12.9**	**24.0**	**4.1**	**75.5**	**46.0**
Line1	**95.0**	**12.4**	**23.2**	**4.2**	**103.3**	**38.7**
Line2	**100.8**	**11.2**	**22.8**	**3.4**	**78.0**	**47.4**
Line3	**95.8**	**11.0**	**19.8**	**3.3**	**67.3**	**47.1**
Line4	**94.2**	**12.3**	**20.8**	**3.8**	**70.8**	**55.3**
Line5	**108.3**	**11.6**	**24.2**	**2.3**	**55.2**	**37.4**
Line6	**112.5**	**14.5**	**25.0**	**5.7**	**115.8**	**45.1**
Line7	**115.0**	**14.5**	**25.3**	**4.0**	**109.3**	**37.2**
Line8	**97.5**	**13.7**	**23.2**	**4.0**	**103.2**	**44.7**
Line9	**108.3**	**13.4**	**23.8**	**2.6**	**59.5**	**40.1**
Line10	**99.2**	**11.8**	**21.5**	**2.2**	**55.8**	**37.3**
Line11	**100.0**	**13.3**	**20.5**	**2.6**	**79.2**	**54.2**
Line12	**95.8**	**15.2**	**23.2**	**5.7**	**123.3**	**47.4**
$LSD_{0.05}$	**4.14**	**1.02**	**1.56**	**0.32**	**2.95**	**2.74**

$LSD_{0.05}$, least significant differences at 0.05 probability level.

The highest spike kernels weight values were obtained from Line6 and Line12 (5.7 g), while the lowest value was obtained Line10 (2.2g).As the Table2 shows, the highest number of kernel per spike were obtained from Line12(123.3 kernel), while the lowest values were obtained from Line5 and Line10 (55.2 and 55.8, respectively).For 1000-kernel weight, the highest mean values were obtained from Line4 and Line11by 55.3 and 54.2, respectively. Meanwhile, the lowest 1000-kernel weightvalues were obtained from Shandaweel1, Line7 and Line 10 (36.2, 37.2 and 37.3g, respectively).**Ozen and Akman (2015), Ali, (2017), Raza*et al*. (2018)and Lozhkin*et al*. (2020)** found that significant differences among wheat genotypes for number of 1000-grain weight and number of kernels per spike.**Dogan and Kendal (2012), Kaya and Akcura (2014), Sharif and Cacan (2017), Mut*et al*.(2018), Karaman (2020)** reported that there were a highly significant differences among wheat genotypes for 1000-grain weigh**.** The mean values of the studied genotypes for moisture content, crude protein oil content, ash content %, crude fiber % and total carbohydrate are illustrated in Table 3. The moisture content of the wheat genotypes was found significantly lower in line10 (10.9%) and Misr1 (10.9%) and the higher grain moisture was recorded forline3 (11.8). The highest grain protein contents values were obtained for the line4 (16.8%) and the lowest values were obtained for the line11 (13.4 %). Variation in protein content might be attributed to environmental and growing conditions as well as genetic makeup of the cultivars **Kaur*et al*. (2013)**.For oil percentage, the highest values were recorded for the cultivar Misr2 (2.3 %) and line10(2.3 %). While, the lowest oil percentage recorded by line2 (1.1 %).

The highest ash content was recorded for Line10 (1.6 %), while the lowest value was recorded for line2 (1.1 %). For Crude fiber the highest values were recorded for Line8 (2.9 %), while the lowest values were recorded for line9 (1.5 %). For total carbohydrate the highest values were recorded for line2 (81.9 %) while the lowest values recorded for line4 (77.7 %).The differences between the genotypes in the studied traits are due to many factors, including: genetic differences, fertilization, irrigation and environmental conditions such as (rain, heat, relative humidity, and etc…).**Hussein *et al*.(2010), Mut*et al*.(2018)** showed that significant differences between wheat genotypes in protein%, oil%, fiber%, carbohydrate content, ash%, starch%, fat% and hectoliter weight.**Mallick*et al.* (2013), Kaya and Akcura (2014)** found that there were significant differences among wheat cultivars for starch, protein, sugar and oil percentage.

Table 3. Chemical composition of grains as affected by variation of nineteen bread wheat genotypes (average of two seasons 2018/2019 and 2019/2020).

Genotype	Moisture content %	Crude Protein %	Oil content %	Ash %	Crude fiber %	Total carbohydrate %
Misr1	**10.9**	**14.7**	**1.5**	**1.4**	**2.6**	**79.9**
Misr2	**11.1**	**14.1**	**2.3**	**1.5**	**2.6**	**79.5**
Gemmiza11	**11.7**	**14.7**	**1.6**	**1.4**	**2.4**	**80.0**
Shandaweel1	**11.7**	**13.9**	**2.1**	**1.3**	**2.3**	**80.4**
Sakha95	**11.7**	**14.6**	**1.9**	**1.3**	**2.3**	**80.0**
Giza 171	**11.6**	**13.9**	**1.5**	**1.1**	**2.1**	**81.4**
Misr3	**11.5**	**16.0**	**1.6**	**1.4**	**2.3**	**78.7**
Line1	**11.6**	**15.0**	**1.9**	**1.3**	**2.2**	**79.6**
Line2	**11.8**	**14.1**	**1.1**	**1.1**	**1.8**	**81.9**
Line3	**11.8**	**15.6**	**1.5**	**1.3**	**1.9**	**79.7**
Line4	**11.3**	**16.8**	**1.8**	**1.4**	**2.3**	**77.7**
Line5	**11.7**	**15.0**	**1.6**	**1.2**	**1.7**	**80.5**
Line6	**11.1**	**15.6**	**1.1**	**1.2**	**2.2**	**79.9**
Line7	**11.3**	**14.9**	**1.9**	**1.2**	**2.2**	**79.7**
Line8	**11.0**	**14.5**	**1.7**	**1.5**	**2.9**	**79.4**
Line9	**11.2**	**14.6**	**1.5**	**1.1**	**1.5**	**81.4**
Line10	**10.9**	**15.7**	**2.3**	**1.6**	**2.7**	**77.8**
Line11	**11.2**	**13.4**	**2.0**	**1.1**	**1.8**	**81.8**
Line12	**11.0**	**14.8**	**1.4**	**1.2**	**2.2**	**80.5**
$LSD_{0.05}$	**0.016**	**0.013**	**1.471**	**0.008**	**0.014**	**0.021**

$LSD_{0.05}$, least significant differences at 0.05 probability level.

The mean values of starch contents, sugar content, hectoliter weight (g), wet gluten, dry gluten and hydration % for the bread wheat genotypes are illustrated in Table 4. The highest starch contents value was obtained from both line11 (64.9%),while the lowest value was obtained from the line2 (56.5%). For sugar %, the highest value was recorded for the cultivar Misr3 (9.0%), while the lowest value was recorded for line1 (6.1 %). The highest hectoliter weight value was recorded for Line3 (59.2g), meanwhile the lowest value was recorded for the cultivar Misr1 (44.9 g).

Table 4. Mean values of starch, sugar, hectoliter weight, wet gluten, dry gluten and hydration as affected by variation of nineteen wheat genotypes (average of two seasons 2018/2019 and 2019/2020**).**

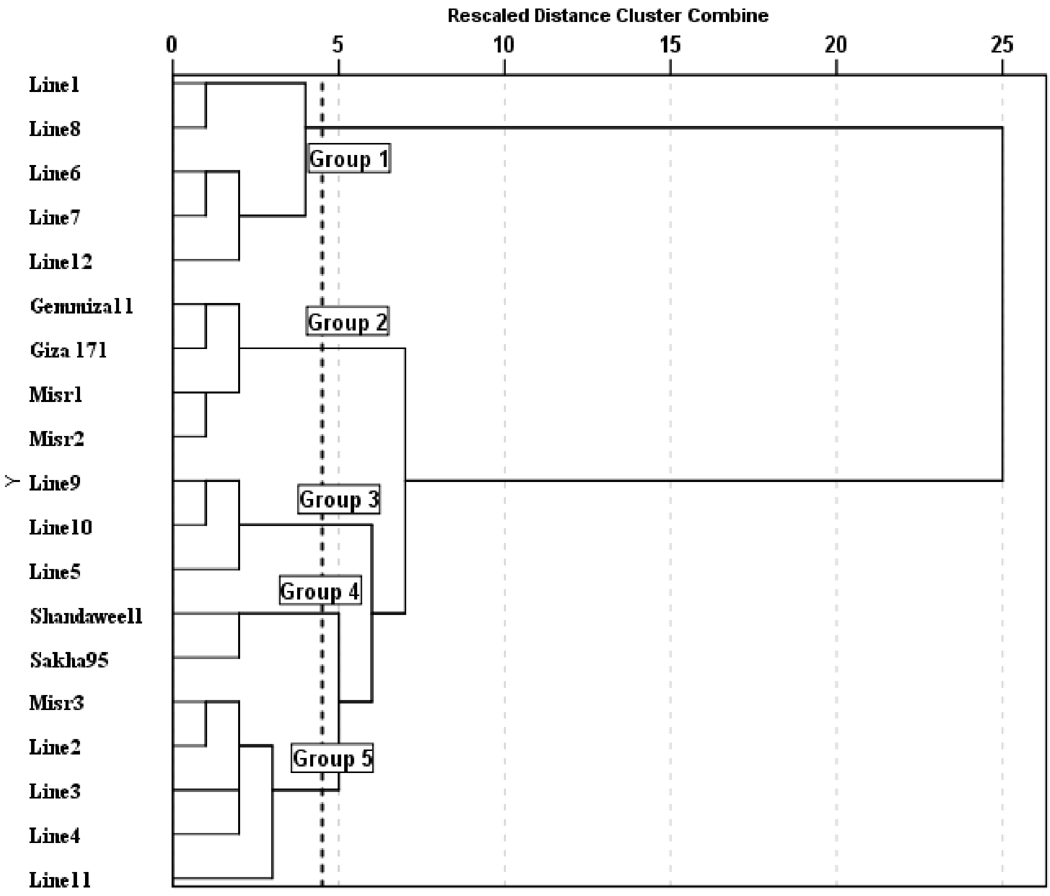
Genotype	Starch %	Sugar %	Hectoliter weight (g)	Wet gluten %	Dry gluten %	Hydration %
Misr1	60.5	8.3	44.9	24.2	9.7	149.6
Misr2	61.5	7.7	47.7	27.2	10.7	154.6
Gemmiza11	59.1	7.0	54.2	29.5	12.1	143.1
Shandaweel1	62.9	7.4	53.3	22.9	8.6	165.8
Sakha95	61.2	6.9	58.4	26.7	9.6	180.9
Giza 171	61.6	7.4	56.6	29.9	12.1	147.4
Misr 3	51.0	9.0	57.0	30.8	11.6	164.7
Line1	60.6	6.1	58.2	29.4	10.9	170.9
Line2	56.5	7.4	57.4	29.7	11.7	153.9
Line3	62.0	7.8	59.2	25.1	9.4	166.9
Line4	58.9	6.8	51.6	38.5	14.5	167.7
Line5	62.5	6.9	56.6	30.4	11.8	158.0
Line6	60.9	8.2	56.6	31.9	12.0	162.4
Line7	61.9	7.8	55.8	23.7	9.2	158.3
Line8	61.9	7.3	52.7	25.4	9.6	164.5
Line9	62.5	7.1	53.6	28.0	10.3	172.5
Line10	58.8	8.1	48.1	29.1	10.5	177.6
Line11	64.9	7.0	57.4	18.4	7.4	149.2
Line12	61.5	7.4	56.8	28.3	11.0	158.6
LSD0.05	3.17	0.01	0.34	0.08	0.04	1.06

$LSD_{0.05}$, least significant differences at 0.05 probability level.

Line4 produced the highest wet and dry gluten contents (38.5 and 14.5%, respectively), while line11 gave the lowest wet and dry gluten percent (18.4 and 7.4%, respectively).For hydration percentage, Skha95 cultivar created the uppermost hydration% (180.9%), while the lowest hydration percentage was (143.1%) recorded by Gemmiza11cultivar. Gluten content is a primary important factor responsible for the quality and wheat flour dough strength **Tawfeuk and Gomaa (2017).Tayyar and Gul (2008), Ceseviciene*et al*. (2009), Makawi*et al*. (2013), and Tawfeuk and Gomaa (2017)** reported that there are significant difference between bread wheat genotypes in hectoliter weight, grain moisture, protein content, ash and wet gluten. **Ivanova*et al.* (2013) and Karaman (2020)** reported that there were variations among genotypes on test weight, protein content and wet gluten.

The dendrogram derived from cluster analysis in respect of spikes, grain physical and chemical characteristics of the nineteen bread wheat genotypes classified into five groups are depicted in Figure 1. It was showed that five wheat genotypes fell in group1, four genotypes in group 2, three genotypes in group 3, two genotypes in group 4 and five genotypes in group 5. The group 1 showed desirable mean values for spike length, number of spikelets per spike and spike kernels weight Table 2. Group 2 showed high mean values for 67, carbohydrate, sugar, and dry glutenTable 3 and 4. Group 3 showed desirable mean values for wet glutenTable4. Group 4 showed high mean values for plant height, number of spikelets per spike, moisture, carbohydrate, starch and dry gluten. Group 5 showed desirable mean values for 1000 kernels weight, hectoliter, crude protein and sugarTable 3 and 4. It worthy mention that all the lines fell in groups (group 1,3 and 5) different from the cultivars groups (group 2 and 4) except Misr 3 in group 5. So these lines may be used as donor to improve those characteristics in wheat breeding program. Also, the bread wheat cultivars Misr 3, Sakha 95 and shandaweel1were different from other cultivar**s.**

Figure 1:



Dendrogram of the nineteen bread wheat genotypes based on cluster analysis ward's linkage method for the two season means of spike and quality characteristics.

The simple correlation coefficients among all studied characteristics are present in Table 5. Plant height was positively correlated with number of spikelets per spike(r = 0.70). Spike length was positively correlated with number of spikelets per spike and (r = 0.65) and number of kernels per spike (r = 0.52).

Spike kernel weight was positively correlated with the number of kernels per spike (r = 0.82) but negatively with oil contents percentage (r = -0.47). Moister percentage was positively correlated with hectoliter (r = 0.65).The crude protein percentage wasnegativelycorrelated with each of total carbohydrate percentage (r = - 0.79) and starch percentage (r = -0.51), while positivelycorrelated with wet gluten (r = 0.70) and dry gluten (r = 0.59). The oil content percentage was positivelycorrelated with ash percentage (r = 0.54). Ash percentage was positive correlated with crude fiber content percentage (r = 0.86), while negatively correlated with total carbohydrate (r = - 0.85) and hectoliter (r = - 62). Crude fiber was negatively correlated with total carbohydrate (r = - 0.65) and hectoliter (r = - 0.58). Starch percentage was negatively correlated with sugar percentage (r = - 0.48), wet gluten (r = - 0.52) and dry gluten (r = - 50). Wet gluten had high positive correlation with dry gluten. Generally, among spike characteristics, only spike kernels weight showed strong positive relationship with hectoliter and negative with oil percentage. Among the chemical characteristics, carbohydrate percentage showed negative relationship with crude protein, ash and crud fiber. Protein content showed negative relationship with total carbohydrate and starch and positive relationship with wet and dry gluten these results are in accordance with those described by **Martini and Kuhn (1999), Krejčirova*et al*. (2006), Kučerová (2006) and Tayyar and Gul (2008).**

Conclusion

Our results showed a marked influence in nineteen genotypes on its spike and grain characteristics and quality characteristics. Line 12 was produced highest spike kernels weight and number of kernels/spike. While, Shandawel1 cultivar was gave the highest number of spiklets per spike and starch content. On the other hand Line4 produced highest protein content, wet gluten and dry gluten. Line 10 gave the highest oil and ash contents and lowest moisture content%. The correlation analysis showed that spike kernels weight observed strong positive relationship with hectoliter and negative with oil percentage. On the other hand, the chemical characteristics, total carbohydrate content observed negative relationship with crude protein, ash and fiber content. And the negative correlation between protein content percentage and total carbohydrate content and starch and positive relationship with wet and dry gluten content.The cluster analysis showed that the studied lines were different in their spike, physical and chemical characteristic from the studied cultivars except Misr 3,so these lines may be used as donor to improve those characteristics in wheat breeding program.

Table 5. Simple correlation (r) between spike and quality characteristics for the studied bread wheat genotypes.
*and ** significance at 0.05 and 0.01propability levels, respectively.

Characteristic	Plant height	Spike Length	Number of spikelet per spike	Spike kernels weight	Number of kernels per spike	1000 kernels weight	Moisture %	Crud protein %	Oil content %	Ash %	Crud fiber %	Total carbo hydrate %	Starch %	Sugar %	Hecto-liter	Wet gluten	Dry gluten	Hydr-ation %.
Plant height	1.00																	
Spike length	0.37	1.00																
Number of spikelet per spike	0.70**	0.65**	1.00															
Spike kernels weight	-0.13	0.32	0.14	1.00														
Number of kernels per spike	-0.10	0.52*	0.30	0.82**	1.00													
1000-kernels weight	-0.45	-0.12	-0.55*	0.35	0.06	1.00												
Moisture%	0.12	-0.14	0.24	-0.08	-0.21	0.02	1.00											
Crud protein%	-0.37	-0.25	-0.27	0.25	-0.05	0.12	-0.03	1.00										
Fat content %	0.06	-0.02	0.02	-0.47*	-0.18	-0.36	-0.19	-0.10	1.00									
Ash%	-0.21	-0.05	-0.17	-0.16	-0.10	-0.21	-0.38	0.41	0.54*	1.00								
Crudfiber%	-0.02	0.20	0.06	0.07	0.19	-0.21	-0.40	0.15	0.42	0.86**	1.00							
Total carbohydrate content %	0.28	0.13	0.19	-0.05	0.04	0.11	0.25	-0.79**	-0.41	-0.85**	-0.65**	1.00						
Starch%	0.14	0.18	0.01	-0.15	0.12	-0.10	-0.17	-0.51*	0.23	-0.22	-0.22	0.40	1.00					
Sugar%	0.27	-0.03	0.02	0.09	-0.04	-0.06	-0.31	0.22	-0.16	0.26	0.31	-0.24	-0.48*	1.00				
Hectoliter	-0.10	0.05	0.11	0.45	0.32	0.30	0.65**	-0.04	-0.40	-0.62**	-0.58*	0.40	0.01	-0.29	1.00			
Wet gluten%	-0.19	-0.13	-0.01	0.31	-0.10	0.20	0.14	0.70**	-0.30	0.14	0.02	-0.45	-0.52*	-0.09	-0.01	1.00		
Dry gluten	-0.13	-0.05	0.02	0.28	-0.11	0.24	0.17	0.59**	-0.37	0.07	0.01	-0.33	-0.50*	-0.08	-0.02-	0.97**	1.00	
Hydration %.	-0.21	-0.31	-0.07	0.08	-0.00	-0.20	-0.04	0.44	0.29	0.29	0.04	-0.45	-0.08	-0.10	0.09	0.18	-0.07	1.00

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تقدير صفات الجودة و مكونات المحصول لبعض التراكيب الوراثيه لقمح الخبز

آلاء محمد المهدي أحمد شاهين[1] و نجوي إبراهيم شلبي[1] وخالد الدمرداش رجب[2]

1 قسم بحوث تكنولوجيا البذور – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – مصر.

2قسم بحوث القمح – معهد بحوث المحاصيل الحقلية – مركزالبحوث الزراعية –مصر

أجريت هذه الدراسة فيالمزرعة البحثية ومعمل قسم بحوث تكنولوجيا البذور بمحطةِ البحوث الزراعية بسخا–كفرالشيخ–مصر. خلال موسمي 2019/2018 و2020/2019 لتقدير صفات الجوده و مكونات المحصول لبعض التراكيب الوراثية لقمح الخبزوهي 7 أصناف من قمح الخبز (مصر 1، مصر2، جميزة11، شندويل1، سخا95، مصر 3 وجيزة 171) و12 سلاله. وكان التصميم المستخدم هو التصميم كامل العشوائية في ثلاثة تكرارات. كان للتراكيب الوراثية تأثير علي صفات السنبلة وصفات الجوده للحبوب. وأن كلا من الصنف مصر 2 وشندويل 1 وسخا 95 وجيزة 171 والسلالة 6 والسلالة 7سجلت أطول النباتات. وسجل الصنف جميزه11 اطول سنبله،سجل الصنف شندويل1 أكبر عددمن السنيبلات في السنبلة. كان عدد ووزن حبوب السنبلة أعلي للسلالة 12،سجل كلا من السلالة 4 والسلالة 11 أعلى قيمة لوزن 1000 حبه. وسجلت السلالة 10 أقل نسبة رطوبة وأعلى محتوى من الرماد. سجلت أعلى نسبة من البروتين الخام والجلوتين الرطب والجلوتين الجاف للسلالة 4. سجل كلا من الصنف مصر 2 والسلالة 10 أعلي نسبه زيت في الحبوب. وكان أعلى محتوى من الألياف للسلالة 8 وأعلى محتوى من الكربوهيدرات كان للسلالة 2. أعطي كلا من الصنف شندويل1والسلاله 11أعلي محتوى للنشا وأعطت السلالة 3أعلي وزن هكتولتر.كان هناك ارتباط معنوي موجب بين وزن حبوب السنبلة وكلا من وزن الهكتولتروعدد الحبوب لكل سنبله وكان هناك ارتباط معنوي بين كلا من محتوي البروتين وكل من الجلوتين الرطب والجاف. و كان هناك ارتباط موجب بين الرماد و الزيت و بين الرماد و الألياف في الحبوب.