RESEARCH | Egyptian Journal of Agricultural Research | Field Crops

Misr 4: New Egyptian high yielding bread wheat cultivar

Kumber R.M.A.[1], I.A. Amin, S.M.A. Abdel-Dayem, S.M. Hammad, M.A. Abdel-Rahman, M.A. Hassan, M.A.M.A. El-Maghraby, M.Y. Ghoneam, H.M. El-Gharabawy, A.A. Hagras, T.H. Abd El-Salam, E.A. Abd El-Hameed, M.A. Aglan, Kh.I. Gad, W.Z.E. Farahat, A.T.H. Moustafa, S.T. Eissa, M.M. Mohamed, M.M.M. Abdel-Salam, G.A. Nour El-Din, Kh.El. Ibraheem, M.N.A. El-Hawary. M.S.M. Mahmoud. I.S.M. Abdel-Kader, M.N.T. Abdel-Kader, E.Gh. Galal, M.A. Darweesh, A.G. Abd El-Rady, M.S. Salous, S.A. Mohamed, A.A. Zain El-Abdeen, M.M.M. Yasseen, M.M. Mokhtar, M.M. Zakaria, A.I Abdel-Sadek, G.M.M. Soliman, A.F.A. El-Kot, A.M Sharshar, Y.S.I. Koubissy, Y.M. Faltaos, El-Masry EL.L.EL., Abdel-Hameed A.S., Y.A. El-Gohary, M.O.E. Mohamed, Z.A.A. El-Rashidy, A.M. Mostafa, E.M.A. Khalefa, A.H.A. Hussen, M.A.M.A. Gad Allah, A.M.S.H. El-Fana, A.M.A. Nagy, W.M.A. Ghanem, W.A.A. El-Hag, E.F. Morgan, D.A.M. Hamza, H.H.A. El-Feky, A.R.H. Ibrahem, M.A. Gouda, T.M. Shehab El Din, M.M.M. Abde-Aleem, M.A.M. Abo Shereef, M.A.M. Eid, A.A. Ageez, S.R.S. Sabry, N.S. Hanna, M.S.A Sharshar, E.M. Sadek, M.A. Moustafa, A.A. Hamada, S.E.A. Abdel-Majeed, A.M. Tammam, E.A.M. El-Sayd, H.A. Ashoush, N.R. Abdel-Fatah, H.S. Mahgoub, M.B. Tawfiles. H.I. Hendawy, H.S. El-Borhamy, A. Menshawy, W.A.M. El-Awady, S.H. Abo El-Ela, N.A. Reiad, A.A. Sewalam, S.A.M. Seleem. M.A. Ismail, S.M. Hassan, S.A. El-Sawi, R.A. Abdel Salam, F.A.M. Hefnawy, S.A. Ali, A.A. El-Hag, G.A. Shaaray, A.M. Gad-Allah, A.M. Abdel-All, A.A. Morad, M.E.E. Saleh[1], D. R. El-Naggar[2], G. A. Hermas[2], R.I. Omara[2].

Address:

[1] Wheat Research Department, Field Crops Research Institute, Agricultural Research Center, Egypt

[2] Wheat Diseases Research Department, Plant Diseases Research Institute, Agricultural Research Center, Egypt

* Corresponding author: **Mossad Abdelaleem,** *email: mossad_abdelaleem@hotmail.com*

Received: 05-01-2022; **Accepted**: 14-02-2022; **Published:** 07-06-2022 doi:10.21608/ejar.2022.114843.1193

ABSTRACT

The newly released bread wheat cultivar Misr 4 had been selected in the 2014/2015 growing season by Wheat Research Department, Field Crops Research Institute, Agricultural Research Center, Egypt, from the Stem Rust Resistant Screening Nursery (SRRSN), which is one of CIMMYT materials. In 2015/2016 growing season, the newly selected cultivar was evaluated in a screening yield trial for the exotic selections. In the view of its superiority, it raised up to be evaluated in the national preliminary yield trial (A trial BW) 2016/2017 growing season. Then in the two respective growing seasons of 2017/2018 and 2018/2019 it was evaluated in the advanced yield trial (D BW). The trials were conducted in 45 locations in old land of Delta and Upper Egypt in New Land. Results proved the high yielding ability of Misr 4 compared to the commercial bread wheat cultivars and its good grain yield stability under different environmental conditions. In addition to that, it has a high level of rust resistance. Thus, Wheat Research Department is recommending Misr 4 to be a commercial cultivar to be planted all over Egypt.

Keywords: Bread wheat, a new cultivar, stability, rust reaction.

INTRODUCTION

Wheat is the main cereal crop in Egypt and is considered the staple food for all the Egyptian people all over the country, as compared to other cereal crops. The area under wheat cultivation, in 2020/2021 growing season, reached about 3.4 million faddans (one faddan= 4200 m2) and the production was about 9.3 million tons of wheat grains, with average productivity of 18.28 ardab/faddan (Economic Affairs Sector, 2021).

With the increase in the population and the increase in the demand for food, especially bread, the local production of wheat grain is always insufficient for consumption requirements FAO 2020. Thus, the goal is to increase the total production either by increasing the planted area with wheat or by increasing the productivity per unit area. Since the available land area in the old lands, inside the Nile Valley, is limited and it is difficult to increase it, therefore the extension of the cultivation of wheat in the new lands outside the Nile Valley could be a possible solution. But these lands still with low fertility and suffer from a lack of irrigation water. The solution may be better to develop new varieties of wheat that are characterized by high productivity and appropriate to the environmental conditions prevailing in the areas of wheat cultivation and raise their productive efficiency.

Since 1970's, the last century, the Egyptian wheat breeders in the Wheat Research Department, separating wheat cultivated area into three macro-environmental zones, i.e. Old Lands of North and South Egypt, in the Nile Valley, and New Lands out the valley, which are newly reclaimed area. The Egyptian Research Department released a series of bread wheat cultivars to be grown in each zone according to its prevalent environmental conditions (Gomma *et al.,* 1979 and 1984; Ali et al., 1991; Ghanem *et al.,* 1996; El-Sayed *et al.,* 1996; Mitkees *et al.,* 1998, Shehab EI-Din *et al.,* 1999; Mosaad *et al.,* 2000, EI-Shami *et al.,* 2005; Shehab EI-Din *et al.,* 2005; Mahrous *et al.,* 2009; Moustaf *et al.,* 2010; Sadek *et al.,* 2013; (a,b and c), Hamada *et al.,* 2015; (a and b) and 2017 and Abdel Majeed *et al.,* 2017 and 2018).

As a result of this strategy and the development of new varieties, from the mid-1980s until the agricultural season 2020/2021, the wheat area increased from 1.37 to 3.42 million faddan (+ 142.16%), productivity from 13.22 to 18.28 ardab

per faddan (+ 38.28%) and total production from 18144026 to 62524360 ardab (+ 244.60%), according to the Economic Affairs Sector, ministry of agriculture, Egypt.

Rust diseases of wheat (*Triticum aestivum* L.) are still the most dangerous biotic stress that can potentially threaten wheat production in Egypt and in the most areas of the world where wheat is grown. Yellow, leaf and stem rusts are caused by *Puccinia striiformis* f. sp. *tritici*, *Puccinia triticina*f. sp. *tritici*and *Puccinia graminis* f.sp. *tritici*, respectively. They are the most common wheat diseases due to high yield losses and poor grain quality in susceptible wheat cultivars, especially under late growing dates (Roelfs *et al.,* 1992; Huerta-Espino *et al.,* 2011; Ali *et al.,* 2016).

The seriousness of these diseases is because spores come to Egypt every year from outside the country, as there is no alternative host in Egypt to complete the life cycle of the fungus. Thus, new races could come every year that are able to break the resistance in some wheat cultivars (Omara *et al.,* 2021). So, it must produce new wheat cultivars resistant to the new races of the three rusts. The objective of this work was to assess the grain yield superiority of the new variety Misr 4 and its stability under different wheat cultivation environments in the country, to be disseminated and distributed as a new cultivar to the farmers.

MATERIAL AND METHODS

The newly released bread wheat cultivar Misr 4 was selected in 2014/2015 growing season by Wheat Research Department, Field Crops Research Institute, Agricultural Research Center, Egypt, from the Stem Rust Resistant Screening Nursery (SRRSN), which is one of CIMMYT materials. The pedigree of Misr 4 is NS732/HER/3/PRL/ SARA// TSI/VEE 5/6/FRET 2/5/WHEAR/SOKOLL and the selection history is CM SA09Y007125-050Y- 050ZTM-0NJ-099NJ-0B-0EG.

In 2015/2016 growing season, the cultivar Misr 4 was tested for its yielding ability with the other promising exotic lines 2016/2017 growing season was tested in the preliminary yield trial (A BW) for grain yield and rust resistance with the six commercial bread wheat cultivars, i.e., Misr 2, Misr 3, Shandaweel 1, Sakha 95, Sids 14 and Gemmieza 11 in eleven locations.

Moreover, in the two respective growing seasons of 2017/2018 and 2018/2019 Misr 4 was evaluated in the advanced yield trial (D BW) with the commercial cultivars Misr 2, Misr 3, Shandaweel 1 and Sakha 95, in 2017/2018, and with Misr 3 and Sakha 95 in 2018/2019. The advanced yield trial was conducted in 21 and 19 locations in the two respective seasons. All the yield trials were grown in the Agricultural Research Stations, ARC, Egypt, which are distributed on the main agro-climatic zones of the country, i.e., old land in North Egypt (Delta), old land in South Egypt and irrigated new reclaimed land (out of the Nile Valley).

In the screening and the preliminary yield trials Misr 4 seeds were drilled in the experimental plot area of 4.2 m2 (6 rows X 3.5 m long X 20 cm apart), and broadcasted on an area of 10.5 m2 (3 m X 3.5 m) in the advanced yield trial. All the trials were planted using Randomized Complete Blok Design (RCBD) with four replications. All the recommended cultural practices for each zone were applied.

Before harvest, the number of spikes per square meter was calculated and ten random spikes were collected in each experimental plot to determine the average number of grains spike-1. At harvest time, all the area of each experimental plot was harvested and threshed. Grain yield was weighed and adjusted to ardab faddan-1.

In the two respective seasons of 2017/2018 and 2018/2019, in the advanced yield trials and from each experimental plot, the number of spikes m-1 (NS) was calculated from the central m2. Also, the number of grains spike-1 (NG) was calculated as an average number in ten randomly selected spikes. From the grain yield of each plot, 3 weights of 1000 kernels were collected to determine the average 1000 kernel weight in g (KW).

All the data were subjected to statistical analysis (Steel and Torrie, 1980). Stability parameters for grain yield of the advanced yield trial were calculated according to (Eberhart and Russell, 1966).

Evaluation of Misr-4 wheat cultivar against yellow, leaf and stem rusts infection under field conditions were conducted at six locations; Sakha, Gemmeiza, Nubaria, Itay El-barod, Kafr El-Hamam and Sids during 2017/2018 and 2018/2019 growing seasons. Misr 4 cultivar was sown in three replicates with a randomized complete block design. The experimental unit consisted of 3 rows (3 m long and 30 cm apart), each row was sown with 5 g of grains. The experiment was surrounded by a 1 m allay and 1.5 m belt, which served as a spreader of leaf rust susceptible entries (Morocco and *Triticum spleta saharences*). The spreader was artificially inoculated by dusting the plants with a mixture of uredinio spores and talcum powder at the ratio of 1:5 (w/w) according to Tervet and Cassel, (1951). Besides, the spreader plants were subjected to simultaneous injections with uredinio spors suspended in distilled sterile water including uredinio spores of different pathotypes of *Puccinia graminis* f. sp. *tritici* was obtained from Wheat Diseases Research Department, Plant Pathology Research Institute, in addition to the natural infection during wheat life cycle.

Disease severity (DS%) was reported for the six locations on Misr 4 cultivar, based on the percentage of leaf area covered with rust pustules. Field reaction of the three rusts infection types was classified into five categories, highly resistant (0), resistant (R), moderately resistant (MR), moderately susceptible (MS), and susceptible (S) according to Stakman et al. (1962). The DUS (Distinguish, Uniformity and Stability) test was done according to the International Union for the Protection of New Varieties of Plants (UPOV) by the Central Administration of Seed Certification.

RESULTS

The results of the preliminary yield trial in Table (1) show the grain yield in ardab per faddan for the new cultivar Misr 4 in comparison with the grain yield of six commercial cultivars grown in 11 locations including the regions of North and South Egypt and the new lands outside the valley. The results show the superiority of the new cultivar which produced a higher grain yield in all of the tested areas. In the region of northern Egypt, it ranked third, with an average grain yield of 32.62 ardabs per feddan. In the region of southern Egypt, it gave 25.92 ardabs per feddan and ranked second position. There were insignificant differences between the grain yield of Misr 4 and the higher grain yield of the other high yielding commercial cultivars.

However, the new cultivar ranked first when planted in the new reclaimed irrigated lands outside the valley, with an average yield of 18.17 ardab per faddan. When the combined analysis was applied for all the experiments all over Egypt (11 locations), the new variety proved its superiority and occupied the first position with an average yield of 22.75 ardab per faddan.

Table 1. Average grain yield (ardab/faddan) of Misr 4 and the six commercial cultivars in the preliminary yield trial in 2016/2017 growing season

Location	Cultivars								LSD05
	Misr 4	Misr 2	Misr 3	Shandaweel	Sakha 95	Sids 14	Gemmieza 11	Mean	
North Egypt									
Sakha	19.89	18.77	23.21	19.18	20.65	13.73	14.72	19.24	2.48
Gemmieza	26.76	23.87	26.60	23.15	26.80	21.53	23.41	24.79	2.69
Sers El-Laian	21.00	20.57	22.43	22.97	27.46	24.51	18.27	23.16	4.24
Kaffer El-Hamam	21.16	21.95	23.15	17.11	25.47	18.83	20.33	21.28	2.77
Etai El-Baroud	29.32	25.60	23.30	22.21	24.39	25.27	22.86	25.02	2.50
Mean	23.62	22.15	23.74	20.92	24.95	20.77	19.92	22.69	1.36
South Egypt									
Sids	29.18	28.11	30.04	28.75	28.14	28.63	30.91	28.81	ns
Shandaweel	21.49	20.60	24.25	19.55	17.19	20.69	21.80	20.63	5.01
Mattana	23.23	22.03	21.94	21.20	20.30	24.66	24.59	22.23	2.40
Kom Ombo	29.76	30.63	26.47	24.07	27.35	26.03	26.91	27.39	3.97
Mean	25.92	25.34	25.74	23.39	23.24	25.00	26.05	24.77	1.88
New land									
Nubaria	23.06	23.02	20.10	18.97	20.23	20.60	17.80	21.00	3.06
New Valley	13.28	11.48	11.79	9.43	11.90	14.11	9.72	11.99	2.35
Mean	18.17	17.43	15.49	14.20	16.06	17.35	13.76	16.45	1.98
Over all Egypt									
North Egypt	23.62	22.15	23.74	20.92	24.95	20.77	19.92	22.30	1.36
South Egypt	25.92	25.34	25.74	23.39	23.24	25.00	26.05	24.95	1.88
New land	18.17	17.43	15.94	14.20	16.06	17.35	13.76	16.13	1.98
Mean	22.75	21.64	21.81	19.50	21.42	21.04	21.03	22.14	0.99

ns: non -significant

The results in (Table 2) show the grain yield of the new cultivar Misr 4 in comparison with four commercial wheat cultivars, grown in 2017/2018 growing season, in the advanced yield trial grown in 18 locations in the old land, in the north and south of Egypt, and in newly reclaimed irrigated land.

The cultivar Misr 4 outperformed in North Egypt and scored the second order with an average grain yield of 22.16 ardab per faddan, without significant differences between it and the commercial cultivar Sakha 95 which recorded the highest grain yield (21.56 ardab per faddan).

In South Egypt, the cultivar Misr 4 achieved the third position with an average grain yield of 21.01 ardab per faddan, and also without significant differences between it and the two higher commercial cultivars, Misr 3 and Shandawil 1 (21.06 and 21.03 ardab per faddan, respectively).

Once again, the cultivar Misr 4 ranked first with an average grain yield of 15.05 ardab per faddan in the new land out of the valley.

At the level of all the locations where the trial was planted (18 locations), Misr 4 proved its superiority and grain yield stability. Misr 4 gave an average yield of 19.09 ardab per faddan, with a difference of 0.28 ardab from the commercial cultivar Shandaweel 1 the highest yielding cultivar.

Table 2. Average grain yield (ardab/faddan) of Misr 4 and the four commercial cultivars in the advanced yield trial in 2017/2018 growing season

Location	Cultivars						LSD05
	Misr 4	Misr 2	Misr 3	Shandaweel 1	Sakha 95	Mean	
North Egypt							
Sakha	21.08	20.02	19.98	18.51	20.87	20.09	ns
Gemmieza	25.76	26.73	25.97	22.38	27.31	25.63	1.69
Tag El-Ezz	16.32	16.08	15.89	16.24	16.84	16.27	ns
Etai El-Baroud	22.46	18.58	20.95	18.79	20.56	20.27	2.13
Sers El-Laian	25.74	21.09	21.87	22.04	25.13	23.16	2.37
Kaffer El-Hamam	23.33	23.07	21.97	21.67	22.43	22.49	1.93
Bahteem	20.47	22.47	25.87	27.13	24.73	24.13	3.40
Mean	22.16	21.13	21.78	20.97	22.55	21.72	0.98
South Egypt							
Sids	25.15	28.35	24.55	26.53	24.83	25.88	1.48
Mallawy	22.20	20.07	22.14	20.87	21.47	21.35	2.37
Shandaweel	20.62	19.59	19.55	19.25	16.16	19.06	ns
Mattana	23.26	22.76	24.87	22.25	22.64	23.16	2.63
Kom Ombo	13.80	13.00	16.60	16.27	11.27	14.19	2.18
Mean	21.01	20.75	21.56	21.03	19.27	20.73	1.55
New land							
Ismaelia	9.61	9.07	9.03	9.68	8.05	9.09	0.37
Nubaria	30.60	23.16	25.98	29.10	26.28	27.02	2.55
Assuit	16.81	13.98	16.64	15.56	15.97	15.79	ns
New Valley	13.58	13.09	13.80	13.72	14.28	13.69	ns
El-Ewaynat	6.72	10.63	5.55	7.32	7.34	7.46	2.07
El-Farafra	15.69	15.60	13.70	14.68	13.15	14.56	1.52
Mean	15.05	14.18	14.21	15.03	15.01	14.70	0.98
Over all Egypt							
North Egypt	22.16	21.13	21.78	20.97	22.25	21.72	0.98
South Egypt	21.01	20.75	21.56	21.03	19.27	20.73	1.55
New land	15.05	14.18	14.21	15.03	15.01	14.70	0.98
Mean	19.09	18.85	18.72	19.37	18.99	19.12	ns

The location of Nubaria Agricultural Research Station was classified as one of the newly reclaimed irrigated lands, but in the previous two growing seasons it was noted that the wheat grain yield in Nubaria was higher than the rest of the newly reclaimed irrigated lands, and it was almost equal to the productivity of the old land. That is because the Nubaria location is one of the oldest agricultural reclamation areas, which has undergone many agricultural seasons that changed the nature of the soil and increased its fertility. In 2018/2019 growing season, the Nubaria location was considered the same as the old lands inside the valley.

The data in Table 3 show the average grain yield of the new cultivar Misr 4 in comparison with two commercial bread wheat cultivars grown in the advanced yield trial in 2018/2019 growing season, grown in eight locations in North Egypt, five locations in South Egypt and three locations in the new land. The results confirmed the superiority of Misr 4, which yielded the highest grain yield in North and South Egypt with an average grain yield of 24.19 and 25.27 ardab per faddan, respectively, outperforming all the comparisons cultivars.

When performing the combined analysis for all the trials over all locations Table (3), Misr 4 significantly surpassed the commercial cultivars and gave the highest grain yield (20.10 ardab per faddan). The location of Nubaria Agricultural Research Station was classified as one of the newly reclaimed irrigated lands, but in the previous two growing seasons it was noted that the wheat grain yield in Nubaria was higher than the rest of the newly reclaimed irrigated lands, and it was almost equal to the productivity of the old land. That is because the Nubaria location is one of the oldest agricultural reclamation areas, which has undergone many agricultural seasons that changed the nature of the soil and increased its fertility.

In 2018/2019 growing season, the Nubaria location was considered the same as the old lands inside the valley. The data in Table 3 show the average grain yield of the new cultivar Misr 4 in comparison with two commercial bread wheat cultivars grown in the advanced yield trial in 2018/2019 growing season, grown in eight locations in North Egypt, five locations in South Egypt and three locations in the new land. The results confirmed the superiority of Misr 4, which yielded the highest grain yield in North and South Egypt with an average grain yield of 24.19 and 25.27 ardab per faddan, respectively, outperforming all the comparisons cultivars. When performing the combined analysis for all the trials over all locations Table (3), Misr 4 significantly surpassed the commercial cultivars and gave the highest grain yield (20.10 ardab per faddan).

Table 3. Average grain yield (ardab/faddan) of Misr 4 and the two commercial cultivars in the advanced yield trial in 2018/2019 growing season

Location	Cultivars				LSD05
	Misr 4	Misr 3	Sakha 95	Mean	
North Egypt					
Sakha	26.14	23.53	21.90	23.86	1.76
Gemmieza	30.86	25.11	26.83	27.60	2.50
Tag El-Ezz	18.91	15.78	16.43	17.04	2.38
Etai El-Baroud	22.83	23.27	24.26	23.45	1.95
Sers El-Laian	25.37	27.70	27.90	26.99	2.80
Kaffer El-Hamam	28.71	27.32	26.31	27.45	3.48
Bahteem	15.07	19.94	19.20	18.07	2.31
Noubaria	25.75	16.11	27.22	23.03	2.16
Mean	24.19	23.59	23.75	23.84	0.88
South Egypt					
Sids	31.16	21.40	29.95	27.50	2.49
Mallawy	22.73	20.90	21.27	21.63	2.27
Shandaweel	33.40	31.95	26.34	30.56	4.24
Mattana	21.11	23.92	22.64	22.56	ns
Kom Ombo	17.94	19.20	20.53	19.22	2.19
Mean	25.27	23.47	24.15	24.30	1.95
New land					
Ismaelia	9.58	9.07	10.02	9.25	1.40
Assuit	11.88	12.83	13.07	12.59	2.33
New Valley	11.08	13.26	11.71	12.02	ns
Mean	10.84	11.72	11.60	11.19	1.48
Over all Egypt					
North Egypt	24.19	23.59	23.57	23.84	0.88
South Egypt	25.27	23.47	24.15	24.30	1.95
New land	10.84	11.72	11.60	11.39	1.48
Mean	20.10	19.59	19.83	19.84	0.71

ns: non –significant

Tables (4 and 5) show the average values of the yield components of the new bread wheat cultivar Misr 4 along with the commercial cultivars in the advanced yield trials in the two respective growing seasons of 2017/2018 and 2018/2019.

Data in Table 4 showed that number of spikes m^{-2} of the new cultivar Misr 4 was higher than the average of all cultivars in all locations, except Sids. Number of spikes m^{-2} seems to be the major yield component which plays a great contribution in grain yield potential of the wheat genotype.

The highest number of spikes m^{-2} was observed in Mallawy site, El-Menia governorate, which, as known, it is characterized, during the period of winter growing season, by low temperature at night than the other governorates. That is reflected on increasing tillering capacity and leading to higher grain yield. It was observed that the average number of spikes m^{-2} in the New Valley was the lowest one. That is due to the lowest soil fertility as new reclaimed sandy lands with high temperature dominating the region.

Concerning to the overall mean of the number of spikes m^{-1} of the new cultivar Misr 4, at the national level, it recorded 418.3 spikes, which was the highest over all the other cultivars. That contributes to high grain yield of the new cultivar. However, number of grains $spike^{-1}$ of Misr 4 was less than the average of all other cultivarsin six locations, while it was higher than the average in three locations (Etai El-Baroud, Sids and New Valley) as shown in Table 4. On the other hand, 1000- kernel weight of Misr 4 was either less or higher than the mean of all other cultivars. These results confirm that tillering capacity and number of spikes m^{-1} had the largest contribution in Misr 4 grain yield superiority.

Similar results, of yield components, were also obtained in the second season Table (5).

Table 4. Means of yield components for Misr 4 and the four commercial cultivars in the advanced yield trial in 2017/2018 growing season.

Location	Trait	Cultivars						
		Misr 4	Misr 2	Misr 3	Shandaweel 1	Sakha 95	Mean	LSD05
North Egypt								
Gemmieza	NS	407	466	376	424	376	409.80	32.1
	NG	51	59	57	64	55	57.20	6.0
	KW	48.91	45.43	53.40	41.39	55.97	49.02	4.2
Etai El-Baroud	NS	415	401	412	431	394	410.60	ns
	NG	66	59	56	64	63	61.60	7.0
	KW	55.61	47.55	49.44	48.43	53.46	50.90	3.24
Sers El-Laian	NS	430	380	435	465	405	423.00	39.0
	NG	62	68	64	60	62	63.20	ns
	KW	49.85	45.33	47.15	45.10	47.95	47.08	1.8
Kaffer El-Hamam	NS	465	420	498	425	426	446.80	ns
	NG	53	67	58	60	59	59.40	ns
	KW	48.03	42.03	50.73	43.45	49.40	46.73	5.29
Bahteem	NS	444	425	418	424	415	425.20	ns
	NG	69	71	68	72	73	70.60	ns
	KW	41.60	47.38	45.55	46.00	45.40	45.20	ns
Mean of North Egypt	NS	432.2	418.4	427.8	433.8	403.2	423.08	
	NG	60.2	64.8	60.6	64.0	62.4	62.40	
	KW	48.8	45.5	49.25	44.9	50.4	47.78	
South Egypt								
Sids	NS	325	466	419	336	420	393.20	33.0
	NG	65	55	54	72	51	59.40	9.0
	KW	53.36	46.01	42.53	52. 51	51.24	51.24	3.2
Mallawy	NS	528	503	495	430	480	487.20	31.0
	NG	55	60	61	61	57	58.80	9.0
	KW	45.74	42.00	47.17	43.30	47.89	45.22	4.4
Mattana	NS	490	495	473	512	476	489.20	36
	NG	55	65	52	57	61	58.00	8
	KW	46.48	38.52	39.08	35.79	39.89	39.95	5.57
Mean of South Egypt	NS	447.7	488.0	462.3	426.0	458.7	456.5	
	NG	58.3	60.0	55.7	63.3	56.3	58.7	
	KW	48.5	42.2	42.9	39.5	46.3	46.34	
New land								
New Valley	NS	375	250	352	336	334	329.40	ns
	NG	67	71	57	57	65	63.40	ns
	KW	47.75	39.61	47.09	43.78	42.96	44.24	5.4
Mean of Egypt	NS	418.3	385.6	414.0	398.6	398.6	402.90	
	NG	61.8	65.3	57.7	61.4	61.2	61.50	
	KW	48.35	42.4	46.4	42.7	46.6	46.12	

NS: Number of spikes m^{-1}, NG: Number of grains $spike^{-1}$, KW: 1000-kernel weight (g) ns: non –significant

Table 5. Means of yield components for Misr 4 and the two commercial cultivars in the advanced yield trial in 2018/2019 growing season.

Location	Trait	Cultivars				
		Misr 4	Misr 3	Sakha 95	Mean	LSD05
North Egypt						
Gemmieza	NS	525	448	456	476.30	79.3
	NG	61	56	62	59.67	12.7
	KW	53.1	56.73	53.19	54.34	8.8
Tag El-Ezz	NS	388	372	383	381.00	ns
	NG	51	46	48	48.33	ns
	KW	50.95	44.58	45.53	47.02	6.20
Etai El-Baroud	NS	444	467	426	445.67	ns
	NG	60	55	53	56.00	10.19
	KW	51.33	49.43	49.23	49.99	2.40
Sers El-Laian	NS	485	450	440	458.33	ns
	NG	58	58	63	59.67	ns

	Table 5 continued					
	KW	51.93	54.33	50.03	52.10	12.20
Kaffer El-Hamam	NS	548	440	576	521.33	107.6
	NG	54	52	54	53.33	ns
	KW	51.57	48.43	56.27	52.09	10.27
Bahteem	NS	434	428	480	447.33	78.2
	NG	55	55	49	53.00	12.4
	KW	41.88	50.68	50.75	47.77	6.6
Mean of North Egypt	NS	470.7	434.2	460.2	454.9	
	NG	56.5	53.7	54.8	55.0	
	KW	50.2	50.7	50.8	50.6	
South Egypt						
Sids	NS	555	575	535	555.00	87.4
	NG	53	66	58	59.00	21.41
	KW	47.10	49.13	50.48	48.90	ns
Mallawy	NS	468	465	460	464.33	39.19
	NG	55	73	65	64.33	8.59
	KW	45.83	50.83	51.34	49.33	4.93
Shndaweel	NS	451	433	395	426.33	102.0
	NG	64	74	64	67.33	17.21
	KW	53.35	40.95	53.60	49.30	9.36
Mattana	NS	424	453	411	429.33	ns
	NG	52	59	60	57.00	12.63
	KW	51.35	45.10	46.08	47.51	6.49
Mean of South Egypt	NS	474.5	481.5	450.3	468.7	
	NG	56.0	68.0	61.8	61.9	
	KW	49.4	46.5	50.4	48.8	
New land						
Assuit	NS	258	302	322	294.00	34.73
	NG	64	58	79	67.00	10.41
	KW	32.56	38.75	41.78	37.69	2.20
Mean of Egypt	NS	401.1	405.9	410.8	405.9	
	NG	58.8	59.9	65.2	61.3	
	KW	44.1	45.3	47.76	45.7	

NS: Number of spikes m^{-1}, NG: Number of grains $spike^{-1}$, KW: 1000-kernel weight (g). ns: non –significant

Grain yield stability parameters:

Grain yield stability parameters of the two advanced yield trials in the two respective growing seasons of 2017/2018 and 2018/2019, were calculated according to (Eberhart and Russell, 1966). The stable cultivar was defined as the one which had a high average performance across a wide range of environments; the regression coefficient is equal to one and no deviation from regression mean square. The results in Table
revealed that the new bread wheat cultivar Misr 4 had good stability parameters than the other tested commercial cultivars at all agro environmental zones (North Egypt, South Egypt and new land), in one word, "all over Egypt".

Table 6. Grain yield (GY), ardab/faddan, stability for Misr 4 with the bread wheat commercial cultivars in 2017/2018 and 2018/2019 growing seasons.

Cultivar	GY	b	S^2d
2017/2018			
Misr 4	19.09	1.035	0.209
Misr 2	18.85	0.943	-3.991
Misr 3	18.72	1.039	1.574
Shandaweel 1	19.37	0.887	2.389
Sakha 95	18.99	0.999	0.823
2018/2019			
Misr 4	24.19	1.177	0.649
Misr 3	23.59	1.052	0.060
Sakha 95	23.57	0.963	0.086

b: Regression S^2d: Deviation from regression

Rusts reaction:

Misr 4 wheat cultivar was evaluated in six different locations at Sakha, Gemmeiza, Nubaria, Itay El-barod, Kafr El-Hamamand Sids during 2017/2018 and 2018/19 growing seasons compared to the check variety Morocco (Table 7). As for the yellow rust, Misr 4 was highly resistant (0) in the four locations of Sakha, Gemmeiza, Nubaria and Sids and it was moderately resistant in Kafr El-Hamam (TrMR and 10MR) in the two respective growing seasons compared to Morocco of 30S and 80S. While at Itay El-barod location, it was highly resistant (0) in the first season and moderately resistant in the second one. In case of leaf rust, Misr-4 was highly resistant (0) in all locations during the two growing seasons except at at Itay El-barod location in the second season, it was moderately resistant (TrMR), compared to Morocco of 20S and 60S. As for stem rust, Misr 4 was highly resistant (0) in the three locations of Gemmeiza, Nubaria, and Sids during the two seasons, while, it was moderately resistant in the second one at Kafr El-Hamam and Itay El-barod locations. Moreover, it was moderately resistant (10MR) in the second season and highly resistant (0) in the first one compared to the check variety Morocco of 20S and 60S in the two respective seasons.

Table 7. Final rust severity of Misr-4 wheat cultivar to yellow, leaf and stem rusts compared to the check variety Morocco at six locations during the two growing seasons.

Location	Cultivar	Wheat rust		
		Yellow rust	Leaf rust	Stem rust
2017/2018				
Sakha	Misr 4	0 [a]	0	10MR [b]
	Morocco	80S [c]	20S	20S
Gemmieza	Misr 4	0	0	0
	Morocco	60S	30S	10S
Nubaria	Misr 4	0	0	0
	Morocco	40S	50S	40S
Itay El-Baroud	Misr 4	0	TrMR	5MR
	Morocco	40S	40S	20S
Ksfr El-Hamam	Misr 4	TrMR	0	10MR
	Morocco	80S	20S	30S
Sids	Misr 4	0	0	0
	Morocco	30S	40S	50S
2018/2019				
Sakha	Misr 4	0	0	0
	Morocco	70S	20S	20S
Gemmieza	Misr 4	0	0	0
	Morocco	50S	30S	30S
Nubaria	Misr 4	0	0	0
	Morocco	40S	60S	40S
Itay El-Baroud	Misr 4	5MR	0	TrMR
	Morocco	50S	40S	20S
Ksfr El-Hamam	Misr 4	10MR	0	TrMR
	Morocco	70S	30S	40S
Sids	Misr 4	0	0	0
	Morocco	20S	40S	60S

a= Resistant, b= Moderately resistant and c= Susceptible

Distinguish, Uniformity and Stability (DUS) test:

The DUS test was done by the Central Administration of Seed Certification (CASC) for two successive seasons according to the International Union for the Protection of new Varieties of plants (UPOV). This test had been done before the registration and release of the new cultivar. Table (7) shows the morphological characterizations of the new bread wheat cultivar Misr 4 according to the UPOV regulations.

Table 7. Morphological characterization of the newly released bread wheat cultivar Misr 4

Characterization	Description
Pigmentation of coleoptiles	(1)
Growth habit	(1)
Anthocyanin coloration of flag leaf auricle	(1)
Flag leaf rolling	(7)
Number of days to 50% heading	(5)
Glaucosity of flag leaf sheath	(5)
Glaucosity of the spike	(3)
Glaucosity of ear neck	(5)
Plant height	(5)
Thickness of parenchyma wall	(7)
Spike shape	(2)
Density of ear	(3)
Spike length excluding awns	(5)
Presence of awns	(3)
Awns length	(5)
Spike color at maturity	(1)
Hair density at the lower edge of the rachis	(1)
Width of lower glume	(3)
Sheulder shape of glume	(1)
Length of glume beak	(3)
Shape of glume beak	(1)
Hair density in the lower glume	(1)
Shape of lemma beak	(1)
Grain color	(1)
Grain color density at phenol test	(9)

DISCUSSIONS

The high grain yield of the new variety Misr 4 in the preliminary yield trial, in eleven locations (Table 1), was as a result of selecting it from the evaluation experiments, in 2014/2015 and 2015/2016 growing seasons, when exotic materials were evaluated (2014/2015 growing season) and screening trials (2015/2016 growing season). The evaluation and selection were done on the basis of its high yielding ability and good growth performance. The results of the advanced yield trials (Tables 2 and 3), the most widespread all over the country, in a total of fourteen locations in the two respective growing seasons of 2017/2018 and 2018/2016, are in agreement with the results of the preliminary yield trial planted in 2016/2017 growing season and proved the superiority of Misr 4 in grain yield. These results may be due to the high tillering capacity and number of spikes m^{-1} had of Misr 4 (Tables 4 and 5), which could have the largest contribution to Misr 4 grain yield superiority. And also due to the high grain yield stability of the new cultivar Misr 4 across the different agro-climatic zones (Table 6).

In conclusion, our results demonstrated Misr 4's strong producing potential when compared to conventional bread wheat cultivars, as well as its superior grain yield stability under varying environmental circumstances. As a result, we highly advise that the novel bread wheat cultivar Misr 4 be cultivated in wheat-producing regions in Egypt. Wheat Research Department, Field Crops Research Institute, ARC, Egypt will conserve and distribute foundation seeds.

REFERENCES

Abd El-Majeed, S. E., Eissa, S. T., Abd EI-Hameed, A. S., lohamed, M. M., Hamada, A. A., EI-Saied, E. A. M., Tawfeles, M. B., EI-Borhamy, H. S. A., EI-Awady, W. A. M., Abo EI~Ela, S. H., Kombor, R. M. A., Sewelam, A. A., Ameen, L. A., Seleem, S. A. M., Hassan, S. M., Abd El-Dayem, S. M. A., Hammad, S. M., Abd El-Rahman, M. E., El-Sawy, S. A., Abd El-Samad, M., El-Maghraby, M. A. M. A., Abd EI-AI, A. M., Ghoneam, M. Y., Mourad, A. A., EI-Gharabawy, H. M., Moustafa, A. T. H., Abd EI-Salam, T. H., Hagrass, A. A., Aglan, M. A., Abd EIHameed, E. A. M., Gad, Kh. I. M., Farahat, W. Z. E., Ibraheem, Kh. E., Zakaria, M. M., Mahmoud, M. S. M., Morssy, A. M., Hassan, A. A. M., Abd EI-Lateef, I. S. M., Nathan, S. N., Abd EI-Kader, M. N. T., Galal, E. Gh., Abd EI-Salam, M. L., Nour EI-Dien, G. A., Yossef, M. Y. M., Darweesh, M. A. H., Abd EI-Rady, A. G., Gab Alah, M. M. M., EIHawary, M. N. A., Salous, M. S., Zein EI-Abdeen, A. A., Mohamed, S. A., Shehab EI-Dien, M. T., Yasseen, M. M. M., Abd EI-Sadek, A. I., Sharshar, A. M. S., EI-Masry, E. L. E., Moawad, E. E., EI-Gohary,Y. A., Koubisy, Y. S. I., Faltaos, Y. M., Soliman, G. M. M., Gendy, M. S. A., Mohamed, M. O. E., El-Mosselhy, O. M. A., El-Rashidy, Z. A. A., El-Saied, S. I., Gomaa, A. A., Ghanem, E. H., Mosaad, M. G., Abd EI-Lateef, A. H., Hanna, N. S., Ali, S. A., Eed, M. A. M., Saleh, M. E. E., Gouda, M. A., Hefnawy,

F. A. M., Egeez, A. A., Abd El~Fatah, N. R., Moustafa, M. A., Shehab El-Dien, T. M., El-Hag, A. A., Abo Shereef, M. A. M., Sabry, S. RS., AbddAleem, M. M. M., Sharshar, M. S. A., Gad Alah, A. M., Sharawy, G. A. M., Sadek, I. M. M., Tammam, A. M., Ismaiel, M. A., Reiad, N. A., Moussa, A. M. M., Hendawy, H. I., Ramadan, R . A., Abo Warda, A. M. A., and Ashoush, H. A. H. (2017). Wheat Research Dept., Field Crops Res. Inst. (FCRI), are, Egypt, Giza. New bread wheat cultivar SIDS 14. *Egyptian Journal of Plant Breeding,* 21(6), 1059- 1077.

Ali, A. M., Gomaa, A. A., Khalil, O. H. S., Ghanem, E. H., El-Sayed, F. E., Monofi, M. M. E., and Mosaad, M. G. (1991). Gemmeiza 1 and Giza 165, two new bread wheat cultivars in Egypt. *Assiut Journal of Agricultural Sciences (Egypt)*.

Abdel-Majeed S. E., Hamada, A. A., El-Saied, E. A. M., Toweefles, M. B., El-Borhamy, H. S., El-Awady, W. A. M., Kumber, R. M. A., Swelam, A. A., Amin, I. A., Sleem, S. A. M., Hassan, S. M., Abdel-Dayem, S. M. A., Hammad, S. M., Abdel-Rahman, M. A., El-Sawy, S. A., Hassan, M. A., El-Maghraby, M. A. M. A., Abdel-Al, A. M., Ghoneam, M. Y., Morad, A. A., El-Gharabawy, H. M., Moustafa, A. T. H., Abd El-Salam, T. H., Hagras, A. A., Aglan, M. A., Abd El-Hameed, E. A., Gad, Kh. I., Farahat, W. Z. E., Ibraheem, Kh. El., Zakaria, M. M., Mahmoud, M. S. M., Morsy, A. M., Abdel-Lateef, I. S. M., Nathan, S. N., Abdel-Kader, M. N. T., Galal, E. Gh., Mohiy, M. M., Eissa, S. T., Nour El-Din, G. A., Yossef, M. Y. M., Darweesh, M. A., Abdel-Hameed, A. S., Abd El-Rady, A. G., Mohamed, M. M., Gab Alah, M. M. M., El-Hawary, M. N. A., Salous, M. S., Zain El-Abdeen, A. A., Mohamed, S. A., Shehab Eldeen, M. T., Yasseen, M. M. M., Abdel-Sadek, A. I. Sharshar, A. M., El-Masry, E. L. E., Moawad, E. E., El-Gohary, Y. A., Koubissy, Y. S. I., Faltaos, Y. M., Soliman, G. M. M., Genady, M. S. A., Mohamed, M. O. E., El-Mosselhy, O. M. A., El-Rashidy, Z. A. A., El- Saied, S. I., Mostafa, A. M., Gomma, A. A., Ghanem, E. H., Abdel-Latif, A. H., Hanna, N. S., Ali, S. A., Eid, M. A. M., Saleh, M. S. S., Gouda, M. A., Hefnawy, F. A. M., Ageez, A. A., Abdel-Fatah, N. A. R., Moustafa, M. A., Shehab El Din, T. M., El-Hag, A. A., Abo Shereef, M. A. M., Sabry, S. R. S., Abde-Aleem, M. M. M., Sharshar, M. S. A., Gad-Allah, A. M., El-Shaaray, G. A., Sadek, E. M., Tammam, A. M., Ismail, M. A., Reiad, N. A., Moussa, A. M. M., Hendawy, H. I., Abdel Salam, R. A., Abo-Warda, A. M. A., Ashoush, H. A., and Abo El-Ela, S. H. (2018). Misr 3: A new Egyptian bread wheat cultivar. *Proceeding of The Seventh Field Crops Conference, 18-19 December 2018, Giza Egypt*, pp.191-207.

Ali, R. G., Omara, R. I., and Ali, Z. A. (2016). Effect of leaf rust infection on yield and technical properties in grains of some Egyptian wheat cultivars. *Menoufia Journal of Plant Protection*, *1*(1), 19-35.

Eberhart, S. T., and Russell, W. A. (1966). Stability parameters for comparing varieties. *Crop science*, 6(1), 36-40.

Economic Affairs Sector (2021). Ministry of Agricultural and Land Reclimation, Egypt. *Annual report.*

EI Shami, M.M., Shehab EI Din, T. M., Mostafa; M. A., Abdel Aleem, M. M., Mahrous, M. A., Ageez, A. A., Hamada, A. A., Bassiouni, A. H., Eid, M., Abdel-Ghani, A., Eskandar, M., Sabry, S., Sharshar, M., Sadek, E., Abo-Warda, A., Mousa, A. M., EI-Sayed, E., Ashoush, H., Towfeeles, M., Mahjoub, H., Moustafa, A., Hendawy, H., Hefnawy, F., Ali, S., Abdel-Karim, A., Menshawy, A., EI-Borhamy, H., Abdel-Fattah, M., EI- Shaaray, G. A., EI-Sawi, S., Kumber, R., Abo El-Ela, S., EI-Awady, W., Amin, I., Moussa, A., Abdel Dayem, S., Zakreia, M., Hammad, S., Swaliem, A., Gomaa, A., Khalil, O., Hegazi, K., Ghanem, E., Mitkees, R., EIMonofy, M., Mousa, A. M., Abdel-Latif, A., Hanaa, N., Khattab, A., and EI Shami, M. (2005). Gemmeiza 10: A New Egyptian high yielding and rust resistant bread wheat cultivar. *Journal of Agricultural Science, Mansoura University,* 30, 743-754.

EI-Sayed F.F., Ali, A. M. A. S., EI.Menoufi, M. M., Mitkees, R. A., Hamada, A. A., Mahrous, M. A., Shehab EI Din, T. M., EI Shami, M. M., Mostafa, M. A., Abdel- Ghani, A. M., Eman, M. M. S., Ali, A. M., Iskandar, M. H., Bassiouni, A. H., Eissa, A. M. K., Abdel-Gawad, Y. G., Kadria, H., and EI-Doudi, Y. H., (1996). An introduction to the new bread wheat cultivar Gemmeiza 3. *Journal of Agricultural Science, Mansoura University,* 21(11), 3811-3823.

FAO STAT(2020). Food and Agricultural organization of the united Nations. *Statistics Accessed on 05/03/2020*.

Ghanem, E. H., Ali, A. A., Hanna, N. S., Mahmoud, S. K., Sabry, S. R. S., Abd-El-Aleem, M. M., and Sherif, S. (1996). Grain yield and stability of the new bread wheat, *Triticum aestivum* L. cultivar Sids 1 in different agroclimatic zones of Egypt. *Bulletin of Faculty of Agriculture, Cairo University, (Egypt)*.

Gomaa A.S., Khalil, O. S., Abo Elenein, R. A., Hegazi K., Ghanem, E., Ali, Sh. A.A., EI- Sayed, F. F., Gouda, M. A., EI-Shami, M. M., Ageez, A. A., Saleh, M. E., EI-Hadidi, M., Atta, S. and Mosaad, M. G. (1984). Sakha 69 and Sakha 61: two new bread wheat high-yielding varieties. *Second General Conference of ARC, Giza, Egypt, April*, 9-11.

Gomaa A. S., Abo-Elenein, R. A., Dessouki, S. M., Sadek, M. M., Talaat, E. H., Khalil, O. H., Attia, S. A., Kadria, F. H., Enayat, H. G., and Gouda, M. A. (1979). Giza 157 and Sakha 8: two new bread wheat varieties. *First General conferance of ARC, Giza, Egypt, May*, 22-29.

Hamada, A. A., Abo-Warda, A. M., Abd El-Majeed, S. A., El- Sayed, E. A. M., Meshref, M. K., Towfelis, M. B., Ashoush, H. A., Hendawy, H. I., El-Borhamy, H. S. A., Rady, A. K. M., Moussa, A. M. M., El-Awady, W. A. M., Abd El-Nour, N. A. R., Abo El-Ela, S. H., Kunber, R. M. A., Swelam, A. A., Amin, I. A., Seleem, S. A. M. Khaled, M. A. I., Abd El-Dayem, S. M. A., Hamad, S. M., Hassan, S. M., Abd El-Rahman, M. E., Ramadan, R. A., El- Sawy, S. A., El-Maghraby, M. A. Hassan, M. A., Abd El-Aal, A. M., Murod, A. A., Moubark, M. Y., Moustafa, A. T. H., Abd El-Kreem, T. H., El- Gharabawy, H. M., Zakaria, M. M., Hagras, A. A., Mahmoud, M. S., Morsy, A. M., Mahmoud, A. A., Aglan, M. A., Abd El-Hamid, E. A. M., Farahat, W. Z., Gad, K. I. M., Ibrahem, K. E., Abd El-Kader, M. ,N. T., Nathan, S. N., Abd El-Latif, I. S. M., Galal, E. G., Abd El-Salam, M. M. M. Eesa, S. T., Abd El-Rahman, G. A. N., El-Hawary, M. N. A., Darweesh, M. A. H.,

El-Masry, M. Y., Abd El-Rady, A. G., Abd El-Hamed, A. S., Mohamed, M. M., Mokhtar, M. M., Zen El-Abdeen, A. A., Salus, M. S., Mohamed, S. A., Yaseen, M. M. M., Gomaa, A. A. Ghanem, E. H. Mosaad, M. G., El-Menofy, M. A., Mahmoud, S. K., Khattab, A. A., Abd El-Latif, A., Hanna, N. S., Moussa, M. A., Saleh, M. S., Gouda, M. A., El-Hag, A., Hefnawy, F. A., Ageez, A., Ali, S. A. Abd El-Fattah, N., Mostafa, M. A., Shehab El-Din, T., Salem, M. A. A., Abo-Sheref, M. A. M., Sabry, S. R. S., Abd El- Aleem, M. M. Sharshar, M. S., Gad-Allah, A. M., El-Shaarawy, G., Sadek, E. M., Tammam, A. M., Imbaby, I. A., and El-Shamy, M. M. (2015a) Sohag 4: A newly released durum wheat cultivar. *Egyptian Journal of Plant Breeding*, 19(7), 2053-2061.

Hamada, A. A., Abo-Warda, A. M., Abd El-Majeed, S. A., El-Sayed, E. A. M., Meshref, M. K., Towfelis, M. B., Ashoush, H. A., Hendawy, H. I., El-Borhamy, H. S. A., Rady, A. K. M., Moussa, A. M. M., El-Awady, W. A. M., Abd El-Nour, N. A. R., Abo El-Ela, S. H., Kumber, R. M. A., Swelam, A. A., Amin, I. A., Seleem, S. A. M., Khaled, M. A. I., Abd El-Dayem, S. M. A., Hamad, S. M., Hassan, S. M. Abd El-Rahman, M. E., Ramadan, R. A., El-Sawy, S. A., El-Maghraby, M. A., Hassan, M. A., Abd El-Aal, A. M., Murod, A. A., Moubark, M. Y., Moustafa, A. T. H., Abd El-Kreem, T. H., El-Gharabawy, H. M., Zakaria, M. M., Hagras, A. A., Mahmoud, M. S., Morsy, A. M., Mahmoud, A. A., Aglan, M. A., Abd El-Hamid, E. A. M., Farahat, W. Z., Gad, K. I. M., Ibrahem, K. E., Abd El-Kader, M. N. T., Nathan, S. N., Abd El-Latif, I. S. M., Galal, E. G., Abd El-Salam, M. M. M., Eesa, S. T., Abd El-Rahman, G. A. N., El-Hawary, M. N. A., Darweesh, M. A. H., El-Masry, M. Y., Abd El-Rady, A. G., Abd El-Hamed, A. S., Mohamed, M. M., Mokhtar, M.M., Zen El-Abdeen, A. A., Salus, M. S., Mohamed, S. A., Yaseen, M. M. M., Gomaa, A. A., Ghanem, E. H., Mosaad, M. G., El-Menofy, M. A., Mahmoud, S. K., Khattab, A. A., Abd El-Latif, A., Hanna, N.S., Moussa, M. A., Saleh, M. S., Gouda, M. A., El-Hag, A., Hefnawy, F. A., Ageez, A., Ali, S. A., Abd El-Fattah, N., Mostafa, M. A., Shehab El-Din, T., Salem, M. A. A., Abo-Sheref, M. A. M., Sabry, S. R. S., Abd El-Aleem, M. M., Sharshar, M. S., Gad-Allah, A. M., El-Shaarawy, G., Sadek, E. M., Tammam, A. M., Imbaby, I. A., and El-Shamy, M. M. (2015b). Giza 171: A new high yielding bread wheat cultivar. *Egyptian Journal of Plant Breeding,* 19(7), 2063– 2079.

Hamada, A. A., Abd EI-Majeed, S. E., El-Saied, E. A. M., Tawfeles, M. B., EI- Borhamy, H. S. A., EI-Awady, W. A. M., Abo El-Ela, S. H., Kombor, R. M. A., Sewelam, A. A., Ameen, I. A., Seleem, S. A. M., Hassan, S. M., Abd EI-Dayem, S. M. A., Hammad, S. M., Abd EI-Rahman, M. E., EI-Sawy, S. A., Abd EI-Samad, M., EI·Maghraby, M. A. M. A., Abd EI-AI, A. M., Ghoneam, M. Y., Mourad, A. A., EI·Gharabawy, H. M., Moustafa, A. T. H., Abd EI-Salam, T. H., Hagras, A. A., Aglan, M. A., Abd EI-Hameed, E. A. M., Gad, Kh. I. M., Farahat, W. Z. E. Ibraheem, Kh. E., Zakaria, M. M. Mahmoud, M. S. M. Morssy, A. M., Hassan, A. A. M., Abd EI-Lateef, I. S. M., Nathan, S. N., Abd EI-Kader, M. N. T., Galal, E. Gh., Abd EI-Salam, M. M. M., Eissa, S. T., Nour EI-Dien, G. A., Yossef, M. Y. M., Darvvccsh, M. A. H, Abd EI-Hameed, S., Abd EI-Rady, A. G., Mohamed, M. M., Gab Alah, M. M. M., EI.Hawary, M. N. A., salous, M. S., Zein EI-Abdeen, A. A., Mohamed, S. A., Shehab EI-Dien, M. T., Yasseen, M. M. M., Abd EI-Sadek, A., Elmassry, E. L., Sharshar, A. M. S., Moawad, E. E., Kobessy, Y. S., Faltaos, Y. M., EI-Gohary, Y. A., Soliman, G. M. M., Gendy, M. S. A., Gomaa, A. A., Ghanem, E. H., Mosaad, M.,G., Abd EILateef, A. H., Hanna, N. S., Ali, S. A., Eed, M. A. M., Saleh, M. E. E., Gouda, M. A., Hefnawy, F. A. M., Egeez, A. A., Abd EI-Fatah, N. R., Moustafa, M. A., Shehab EI-Dien, T. M., EI-Hag, A.A., Abo Shereef, M. A., Sabry, S. R. S., AbdelAleem, M. M. M., Sharshar, M. S. A., Gad Alah, A. M., Sharawy, G. A. M., Sadek, I. M. M., Tammam, A. M., Ismaiel, M. A., Reiad, N. A., Moussa, A. M. M., Hendawy, H. I., Ramadan, R. A., Abo Warda, A. M. A., Ashoush, H. A. H., Soliman. M., 1mbaby, I., and EI- Shamy, M.M. (2017). Misr 1 and Misr 2: Tow new high yielding and rust resistant bread wheat cultivar. Egypt. *Menoufia Journal of Plant Protection*, 2, 177-192 .

Huerta-Espino, J., Singh, R. P., Germán, S., McCallum, B. D., Park, R., Chen, W. Q., Bhardwaj, S. C., and Goyeau, H. (2011). Global status of wheat leaf rust caused by *Puccinia triticina*. *Euphytica,* 179, 143-160,

Mahrous, A.M., Abdel-Aleem, M. M., Shehab EI-Din, T., Mostafa, M., AbdelMajeed, S., Sabry, S., Sadek, I. M., Sharshar, M., Hamada, A., AboWarda, A., Moussa, A. M., Tammam, A., Meshref, M., EI-Sayed, E., Ashoush, H., Toweefles, M., Hendawy, H., Mahgoub, H. S., Mostafa, A., EI-Borhamy, H., Menshawy, A., Moussa, A., EI-Awady, W.M., EIHag, A., Kumbor, R., Seleem, S., Ramadan, R. A., Abdel-Nour, N. A., Sharawy, G., Hassan, S. M., Sewelam, A., EI-Saway, S., Abdel-Dayem, S., EI-Sebaey, A., Abdel-Rahman, M. A., Abo Al-Ela, S., Khaled, M., Amin, I., Zakaria, M., Hassan, M. A., Gad-Allah, A., Hammada, S., EI-Maghraby, M., Morad, A., Abdel-All, A. M., Hagras, A., Moustafa, A. T., Mamhoud, M., Moubarak, M., Hegazi, K. Gomaa, A., Khalil, O., Ghanem, E., Meetiks, R., EI-Menofy, M.,. Mahmoud, S. K., Hanna, N., Eid, M., Mosaad, M., Gouds, M. A., Ageez, A., Abdel-Fattah, M., Khattab, A., Abdel-Lattif, A .A., Eskander, M., Abdel-Fattah, N., Hefnawy, F., and Abdel-Samad, W. (2009). Grain yield and Stability of the new Egyptian bread wheat cultivar Sids 12. *Journal of Agricultural Science, Mansoura University,* 34(4), 3199-3209.

Mitkees, R. A., EI-Monofy, M. A., Hamada, A. A., EI-Sayed, F. F., Ageez, A. A., Mahrous, M. A., Ashoush, H., Gomaa, A. A., Khalil, O. H. S., Hegazi, K. F., Ghanem, E. H., Ali, A. A., Mosaad, M. G., EI-Shami, M. M., Bassiouni, A. H., Eissa, A. M. K., Shehab EI-Din, T. M., Abde-Aleem, M. M., Mahmoud, S. K., Eid, M. A. M., Mostafa, M. A., Iskandar, M. H., Hanna, N. S., Sabry, S. R. S., Abdel-Latif, A. H., Abo-Warda, A. M. A., Abdel-Gwad, Y. G., Mousa, A. M., Abdel-Majeed, S. A., Zaid, H. M., Tammam, A. M., Abdel-Fatah, N. R., Mosherf, M. Kh., EI-Sayed, E. A. M., Mahgoub, H. S., Toweefles, M. B., Abdel-Halim, S., Mostafa, A. K., Hefnawy, F. A., EI-Daoudi, Y. H., Khilifa, M. O., and EI-Shamy

M. M. (1998). Gemmeiza 5: A new Egyptian bread wheat cultivar. *Annals Agricultural Science Moshtohor University,* 36(1), 43-59.

Mosaad, M., EI- Monofy, M., Shehab EI-Din, T., Mitkees, R., Mahrous, M., Hamada, A., Ageez, A., Bassiouni, A., EI-Shami, M., Abdel-Aleem, M., Eid, M., Abdel-Ghani, A., Eskander, M., Hanaa, N., Sabry, S., Abdel-Latif, A., Sharshr, M., Sadek, E., Mostafa, M., Abo-Warda, A., Abdel-Gwad, Y., Mousa, A., Abdel-Majeed, S., Tammam, A., Abdel-Fattah, N., Moshref, M., EI-Sayed, E., Ashoush, H., Towfeeles, M., Mahjoub, H., Moustafa, A., Hefnawy, F., Hendawy, H., Ali, S., Abdel-Karim, A., Khattab, A., Abdel-Fattah, M., Menshawy, A., EI-Borhamy, H., Gomaa, A., Khalil, O., Hegazi, K., Ali, A., Ghanem, E., Mahmoud, S., and Khalifa, M. (2000). Gemmeiza 9: A new Egyptian high yielding and rust resistant bread wheat cultivar for Delta region. *Journal of Agricultural Science* Mansoura *University,* 25(12),7407-7419.

Moustafa, M. A., Sharshr, M.S., Shehab EI-Din, T., Abo-Shereef, M., AbdelMajeed, S., Abdel-Aleem, M., Sabry, S. R. S., Sadek, E. M., Hamada, A., Abo-Warda, A., Tammam, A., Moshref, M., EI-Sayed, E., Ashoush, H., Towfeeles, M., Hendawy, H., Mahjoub, H. S., Moustafa, A., EI-borhamy, H., Menshawy, A., Moussa, A., EI-Awady, W. M., EI-Hag, A., Kumber, R., Seleem, S., Ramadan, R. A., Abdel-Nour, N. A., Sharawy, G., Abdel-Dayem, S., Hassan, S. M., Sewelam, A., EI-Sawy, S., Hammad, S., Abdel-Rahman, M. A., Abo-Elela, S., Khaled, M. A., Amin, I. A., Zakaria, M., Hassan, M. A., Gad-Allah, A., EI-Maghraby, M .A., Morad, A., Abdel-AI, A. M., Hagras, A., Moustafa, A. T., Mahmoud, M. S., Mubark, M. Y., EI-Gharbawy, H, M. M., Mahmoud, A. A., Gomaa, A., Ghanem, E., Mitkees, R., EI-Monofy, M., Mahmoud, S. Kh., Hanna, N., Moussa, M. A., Gouda, M. A., Ageez, A., Salem, M. A., Khattab, A., Abdel-Latif, A., Eskander, M., Abdel-Fattah, N., Hefnawy, F. and Abdel-Samad, W. (2010). Sids 13: A new bread wheat cultivar. *Journal of Plant Production Mansoura University,* 1(1), 147-157.

Omara, R. I., Nehela, Y., Mabrouk, O. I., and Elsharkawy, M. M. (2021). The Emergence of new aggressive leaf rust races with the potential to supplant the resistance of wheat cultivars. *Biology*, *10*(9), 925.

Roelfs, A. P., Singh, R. P., and Saari, E. E. (1992). Rust Diseases of Wheat: Concepts and Methods of Disease Management. *CIMMYT, Mexico,* pp. 80.

Sadek, E. M., Ageez, A., EI-Menofy, M., Abo Shereef, M., Hamada, A., Moussa, A., Kumber, R., Sleem, S., EI- Shaaray; G., morad, A. A., Abdel- Majeed, S., Abo-Warda, A., Tammam, A., Mesherf, M., EI-Sayed, E. A. M., Ashoush, H., Toweefles, M., Hendawy, H., Mahgoub, H. S., Mostafa, A. K., EI-Borhamy, H., Menshawy, A., EI- Awady, W. M., Abd EI-Nour, N., AbdelDayem, S., Hassan, S. M., Swelam, A., EI- Sawy, S., Hamad, S., Abdel-Rahman, M. A., Abo EI-Ela, S., Khaled, M.A., Ramadan, R. A., Amin, I. A., Zakaria, M., Hassan, M. A., Gad-Allah, A., EI-Maghraby, M. A., Abdel-AI, A. M., Hagras, A., Mostafa, A. T., Mahmoud, M. S., Moubark, M. Y., Abd-EIKreem, T., Morsy, A. M., EI-Gharabawy, H., Aglan, M. A. A ., Farahat, W., Abd EI-Hamid, E. A.,M., Ragab, K.,E., Gad, K. I., Nathan Sh. E., Abdel-Latif, I. S. M., Abdel Kader, M. N., Gomaa, A., Ghanem, E., Mahmoud, S. Kh., Mosaad, M. G., Hanna, N., Moussa,M. A., Gouda, M. A., Salem, M. A., Khattab, A. Abdel-Latif, A., EI-Hag, A., Abdel- Fattah, N., Hefnawy, F., Mostafa, M. A., Sharshar, M. S., Shehab EI Din, T., Abde-Aleem, M., Sabry, S. R., Saleh, M. S., Imbaby A., and Hasan, M. A. (2013a). Gemmeiza 11: A new Egyptian high yielding and rust resistant bread wheat (*Triticum aestivum* L.) CULTIVAR. *Journal of Plant Production Mansoura University*, 4(11), 1599 - 1619.

Sadek E. M., Ageez, A., EI-Menofy, M., Abo Shereef, M., Hamada, A., Moussa, A., Kumber, R., Sleem, S., EI- Shaarawy, G., Morad, A. A., Abdel-Majeed, S., Abo-Warda, A., Tammam, A., Mesherf, M., El-Sayed, E. A. M., Ashoush, H., Toweefles, M., Hendawy, H., Hayam, S. M., Mostafa, A. K., EI-Borhamy, H., Menshawy, A., Wafaa, M. E., Nadia, A., Abdel-Dayem, S., Hassan S. H., Swelam, A., EI-Sawy, S., Hamad, S., Abdel Rahman M. A., Abo Al-Ela, S., Khaled, M. A., Ramadan, R. A., Amin, I. A., Zakaria, M., Hassan, M. A., Gad-Allah, A., El-Maghraby, M. A., Aza, M.A., Abdel-AI, M., Hagras, A., Mostafa, A. T., Mahmoud, M. S., Moubarak, M. Y., Abd-EI-Kreem, T., Morsy, A. M., EI-Gharabawy, H., Aglan, M. A. A., Farahat, W., Abd EI-Hamid, E. A. M., Gad, Kh. I., Shereen, N. N., Abdel-Latif, I. S. M., Abdel Kader, M. N., Gomaa, A., Hegazi, E. H., Mahmoud, S. Kh., Mosaad, M. G., Hanna, N., Moussa, M. A., Gouda, M. A., Mostafa, M. A., Sharshar, M. S., Shehab EI-Din, T., Abde-Aleem, M. M., Sabry, S. R., Salem, M. A., Khattab, A. A., Abdel-Latif, A., EI-Hag, A., Najwa, A., Hefnawy, F., Imbaby A., and EI-Shamy, M.M. (2013b). Gemmeiza 12- A new Egyptian high yielding bread wheat (*Triticum aestivum* L.) cultivar. *Journal of Plant Production Mansoura University,* 4(2), 183-204.

Sadek, E. M.; Tammam; A.M., Tawfelis; M. B., Amin; I. A., Hamada; A., Abo-Warda, A., Abdel-Majeed, S., Mesherf, M., EI-Sayed, E. A. M., Ashoush, H., Hendawy, H., Mahgoub, H. S., Mostafa, A. K., EI-Borhamy, H., Menshawy, A., Moussa, A., EIAwady, W. M., Abd EI-Nour, N. Abo EI-Eja, S., Kumber, R., Swelam, A., Abdel-Dayem, S., EI-Shaaray, G., Sleem, S., Hassan, S. M., Hamad, S., Khaled, M. A., EI-Sawy, S., Abdel-Rahman, M. A., Hassan, M. A., EI-Maghraby, M. A., Abdel-AI, Aza M. A., morad, A., Ramadan, R. A., Zakaria, M., Hagras, A., Mostafa, A.T., Mahmoud, M. S., Moubark, M .Y., Abd-EI-Kreem, T., Morsy, A.M., EI-Gharabawy, H., Aglan, M. A. A., Farahat, W. Abd EIHamid, E. A. M., Ragab, K., Gad, K. I., Nathan Sh. E., AbdelLatif, I. S. M., Abdel Kader, M. N., Mohiy, M. M., Gehan, A. N., Gomaa, A., Shehab EI Din, T., Mostafa, M. A., Abo Shereef, M.,. Sabry, S. R., Sharshar, M. S., Abde., M., Aleem, M., Gouda, A., EI-Menofy, M., Ageez, A., Ghanem, E., Mahmoud, S. Kh., Mosaad, M .G., Hanna, N., Moussa, M. A., Salem, M. A., Khattab, A., Abdel-Latif, A. EI-Hag, A., Abdel- Fattah, N., Hefnawy, F., Gad-Allah, A.,

Imbaby, I. A., and Elnagar, D. R. (2013c). Shandweel 1: A new bread wheat (*Triticum aestivum* L.) cultivar. *Journal of Plant Production, Mansoura Univeristy,* 4(8), 1169 -1183.

Shehab EI-Din, T., EI-Shami, M., Abdel-Latif, A., Mostafa, M., Abde-Aleem, M., Sharshar,M., Menshawy, A., EI-Borhamy, H., Hammad, S., Mahrous, M., Ageez, A., Bassiouni, A. Eid, M., Abdel-Ghani, A., Eskandar, M., Sabry, S., Sadek, I., Hamada, A., Abo-Warda, A., Abdel-Majeed, S., Tammam, A., Abdel-Fatah, N., EI-Sayed, M., Mosherf, E., Ashoush, H., Toweefles, M., Mahgoub, H., Moustafa, A., Hefnawy, F., Hendawy, H., Ali, S., Abdel-Karim, A., Abdel-Fatah, M., EI- Shaaray, G., EI-Sawi, S., Kumber, R., Abo Al-Ela, S., EI-Awady, W., Amin, I., Mousa, A., Abdel-Majeed, S., Mousa, A. M., Abdel Dayem, S., Zakeria, M., Swailem, A., Gomaa, A., Khalil, O. S., Kadria F, Hegazi, E., Ghanem, H., Mitkees, R., EI-Monofy, M., Hanna, N., Khattab, A., and Youssof, W. (2005). An Introduction to Sakha 94, The new bread wheat cultivar. *Journal of Agricultural Science Mansoura University,* 30, 91-101.

Shehab EI-Oin, T., Mitkees, R. A., EI-Shamy, M. M., Gouda, M. A., AbdelAleem, M. M., Abdel-Ghani, A. M., Hanna, N. S., Sadek, E. M. M., AboWarda, A. M., Mosherf, M. Kh., EI-Sayed, E. A. M., Mahgoub, H. S., Mostafa, A. K., Mosaad, M. G., Bassiouni, A. H., EI-Monofy, M. M. A., Mahmoud, S. Kh., Mahrous, M. A., Ageez, A. A., Eid, M. A. M., Iskandar, M. H., Mostafa, M. A., Hamada, A. A., Abdel-Gwad, Y. G., Mousa, A. M., Abdel-Majeed, S. A., Tammam, A. M., Abdel-Fatah, N. R., Ashoush, H., Hefnawy, F. A., Hendawy, H., EI-Din Ali, S., Toweefles, M. B., Abdel-Karim, A. A., Khattab, A. A., Gomaa, A. A., Khalill, O. H. S., Hegazi, K. F., Ghanem, E. H., Ali, A. A., EI-Sayed, F. F., Safik, I. and Abo El-Naga, S. (1999). Sakha 93 and Giza 168: Two new high yielding and rust diseases resistant bread wheat cultivars. *Journal of Agricultural Science, Mansoura University,* 24, 2157-2168.

Stakman, E. C., Stewart, D. M., and Loegering, W.Q. (1962). Identification of Physiologic Races of *Puccinia graminis tritici*. *United States Department of Agriculture, ARS E617,* pp. 53.

Steel, R. G. D., and Torrie, T. H. (1960). Principles and Procedures of Statistics. *A biometrical approach, 2nd Edition, McGraw-Hill Book Company, New York.*

Tervet, I., and Cassel, R. C. (1951). The use of cyclone separation in race identification of cereal rusts. *Phytopathology*, 41, 282-285.

مصر 4: صنف مصري جديد من قمح الخبز عالي المحصول

رضا محمد علي السيد قمبر، إبراهيم عبد الهادي أمين، صبحي محمد علي عبد الدايم، سعيد محمد حماد، ماجدة السيد عبد الرحمن، منال عبد الصمد حسن، ماهر عبد المنعم محمد علي، محمد يوسف غنيم مبارك، هدى مصطفى الغرباوي، عادل عبد العزيز هجرس، ثناء حمد عبد السلام، السيد علي محمد عبد الحميد، مؤمن عبد الوهاب عجلان، خالد إبراهيم محمد جاد، وليد زكي اليماني فرحات، أحمد طه حسن مصطفى، شريف ثابت عيسى، محمد مرعي محمد حمودة، محمد محي محمد عبد السلام، جيهان عبد الواحد نور الدين عبد الرحمن، خالد الدمرداش إبراهيم، محمد نبيل عوض الهواري، محمود شمروخ محمد محمود، إبراهيم صبري محمد عبد القادر، محمد نوبي طه عبد القادر، الحسين غلاب جلال، محمد عبد الكريم حسن درويش، أيمن جمال عبد الراضي، موسى شوقي سالوس، سيدهم عبد الخالق محمد، أحمد علي زين العابدين، محمد مصطفى محمد يس، مختار مراجع مختار، محمد مختار زكريا أحمد، عبد العزيز إبراهيم عبد الصادق، جمال محمد محمد سليمان، أحمد فوزي عبد النبي القط، أنس محمد صفاء الدين شرشر، ياسر سيد إبراهيم قبيصي، يوسف محسن فلتاؤس، السيد لطفي السيد البمصري، أشرف صلاح عبد الحميد، ياسر أحمد محمد الجوهري، محمد عمر الفاروق محمد، زينب أحمد عباس، أحمد محمد مصطفى رمضان، إباء محمد علي خليفة، أحمد حسين أحمد حسين، مها أحمد محمد أجمد جاد الله، أحمد محمد سليمان حسنين الفنة، عبد الفتاح محمد عبد الفتاح ناجي، وائل محمد عبد الفتاح غانم، ولاء عبد ربه عبد العزيز الحاج، عماد فايق مرجان، دعاء أحمد محمد حمزة، هند حسن أحمد الفقي، أسعد رضا حسن إبراهيم، محمد عادل جودة، تاج الدين محمد علي شهاب الدين، مسعد محمد محمود عبد العليم، محروس عبد الغني محروس، محمد علي موسى عيد، أنور عبد الخالق عجيز، سامي رضا صابر صبري، نبيل سليمان حنا، محمد صفاء الدين شرشر، إيمان محمد محمد صادق، مصطفى عزب مصطفى، أسعد أحمد حمادة، صلاح الدين أحمد عبد المجيد، أحمد محمد تمام، عز الدين عبد الرحمن محمد، حسن عبد الطيف حسن عشوش، نجوى راضي عبد الفتاح، هيام سيد محجوب، موريس بديع توفيليس، حمدي إبراهيم هنداوي، هاني سعد عبد الحميد البرهامي، عبد السلام منشاوي، وفاء عبد الحميد محمد العوضي، صباح حمزة أبو العلا، نادية عدلي رياض، عبد الله عبد المحسن سويلم، صبري أحمد محمد سليم، محمد عبد الكريم إسماعيل خالد، سهير محمود حسن، سيد عبده الصاوي، رمضان عبد السلام رمضان، فرغل عبد القادر مصطفى حفناوي، صلاح الدين عبد الحليم علي، عبد ربه عبد العزيز أحمد الحاج، جمال عبد الرازق شعراوي، أحمد محمد أحمد جاد الله، عزة محمد عبد العال، عبد الفتاح عبد الرحمن مراد، محمد السيد السعيد صالح[1]، دعاء راغب النجار[2]، جمالات عبد العزيز هرماس[2] ورضا إبراهيم عماره[2]

[1] قسم بحوث القمح، معهد بحوث المحاصيل الحقلية، مركز البحوث الزراعية، مصر
[2] قسم بحوث أمراض القمح، معهد بحوث أمراض النباتات، مركز البحوث الزراعية، مصر
*بريد المؤلف المراسل: mossad_abdelaleem@hotmail.com

الملخص

تم انتخاب صنف قمح الخبز الجديد مصر 4 في موسم النمو 2015/2014 من قبل قسم بحوث القمح ، معهد بحوث المحاصيل الحقلية ، مركز البحوث الزراعية ، مصر، من المجموعة العالمية لمقاومة صدأ الساق (SRRSN) ، كأحد المواد الواردة من مؤسسة CIMMYT . وفي موسم النمو 2016/2015 ، تم تقييم الصنف الجديد في تجارب الغربلة لاختبار محصول الحبوب، وفي ضوء تفوق الصنف الجديد، تم تقييم الصنف في تجربة المحصول الأولية على المستوى القومي (A Trial BW) في موسم النمو 2017/2016. ثم في موسمي النمو المتتاليين 2018/2017 و 2019/2018 تم تقييمه في التجربة المتقدمة (D BW) لتقييم المحصول من الحبوب في كافة مناطق زراعة القمح بالجمهورية، حيث أقيمت التجارب في 45 موقعًا في الأراضي القديمة في شمال وجنوب مصر وفي الأراضي الجديدة. أثبتت النتائج القدرة الإنتاجية العالية لمصر 4 مقارنة بأصناف قمح الخبز التجارية المنزرعة، وكذلك الثبات الجيد لمحصول الحبوب تحت الظروف البيئية المختلفة. بالإضافة إلى ذلك ، فالصنف الجديد يتمتع بمستوى جيد من مقاومة الصدأ. وعليه ، فإن قسم بحوث القمح يوصي بالصنف الجديد مصر 4 ليكون صنفًا تجاريًا ونشر زراعته بين مزارعي القمح.

الكلمات المفتاحية: قمح الخبز، صنف جديد، مكونات المحصول، الثبات، تفاعل الصدأ.