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# YIELD AND CHEMICAL COMPOSITION OF BREAD WHEAT CULTIVARS AS AFFECTED BY SOME SKIPPING IRRIGATION

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**ABSTRACT:** *Two field experiments were conducted at the Experiment and Research Center, Fac. Agric., Moshtohor, Benha Univ., Kalubia Governorate, Egypt, during the two growing seasons 2010/11 and 2011/12 seasons, to study the effect of five skipping an irrigation at tillering stage, elongation stage, heading stage, milk stage and filling stage on yield and chemical properties of five bread wheat cultivars (Giza 168, Sakha 94, Gemmaza 9, Sids 13 and Misr 1). The obtained results were as follows:*

*Skipping an irrigation at tillering, elongation and heading stages decreased flag leaf area, plant height, number of spikes $m^{-2}$, 1000-kernel weight, grain yield and straw yield compared with skipping irrigation at filling stage treatments. Moreover, skipping irrigation at tillering stage was earlier heading compared with other skipping irrigation treatments.*

*Wheat cultivars were significantly different in all traits studied. Gemmaza 9 cultivar gave the highest values of flag leaf area, plant height, spike length, No. of spikelets $spike^{-1}$, No. of spikes $m^{-2}$, seed index, grain yield and straw yield, also Gemmaza 9 cultivar was earlier heading (89.67 day) compared with other wheat cultivars.*

*Significant effect of interaction between skipping irrigation and wheat cultivars was obtained for all growth, yield and yield components except seed index. Skipping irrigation at tillering stage for Gemmaza 9 cultivar gave the highest value of No. of spikelets $spike^{-1}$ and surpassed the other 4 cultivars in early heading. While, skipping irrigation at milk stage for Gemmaza 9 cultivar gave the highest values of spike length and No. of spikes $m^{-2}$. Moreover, skipping irrigation at filling stage for Gemmaza 9 cultivar gave the highest values of flag leaf area, plant height, grain yield $fed^{-1}$ and straw yield $fed^{-1}$.*

*Skipping an irrigation at milk and filling stages decreased moisture, fat and carbohydrate contents, whereas, the same two treatments gave the highest values of protein, ash and fiber contents in wheat kernels compared with other irrigation treatments. The lowest values of moisture and charbohydrate contents were obtained by Giza 168 cultivar and also, the same cultivar gave the highest value of protein content, while, Sids 13 cultivar gave the highest value of ash content, Sakha 94 cultivar gave the highest value of fiber content and Misr 1 cultivar gave the highest value of fat content and in wheat kernals.*

*Skipping irrigation at filling stage for Giza 168 cultivar gave the lowest values of moisture and carbohydrate contents, also, the same treatment gave the highest value of protein content in wheat kernels. While, skipping irrigation at milk stage for Sids 13 cultivar gave the highest value of ash content and skipping irrigation at filling stage for Sids 13 cultivar gave the highest value of fiber contents. Whereas, skipping irrigation at milk or tillering stages for Giza 168 or Gemmaza 9 cultivars gave the highest value of fat content.*

**Keywords:** *Wheat, Cultivars, Skipping irrigation, Yield and Chemical composition.*

## INTRODUCTION

Wheat is considered the main source of food in the world and in Egypt. Raising wheat production through increasing productivity and increasing the cultivated area is an important national target to minimize the gap between the Egyptian production and consumption. In Egypt, the

wheat cultivated area is about 3.16 million feddans producing 8.795 million tons (Agric. Statistic Bulletin, 2012). Increasing wheat yield per unit area can be achieved by breeding high yielding varieties or improving the cultural treatments of the crop. Modern wheat varieties were developed to maximize grain yield under favorable environmental conditions (high input conditions especially water supply). In the light of the present national water policy concerning saving irrigation water expanding wheat area needs more searching for varieties produce high yield under suitable water regime. But safe saving an irrigation, beside it closely dependence on plant growth stage, is greatly influencing by a number of factors especially cultivars.

Many investigators had reported the effect of skipping an irrigation at deferent growth stages of wheat on yield and its components as well as chemical properties (El-Kalla *et al*, 1992; Abd El-Gawad *et al*, 1993; El-Monoufi and Harb, 1994; Abo-Shetaia and Abd El-Gawad, 1995; Ghandorah *et al*, 1997; Bayoumi, 1999; Eman, 2000; Sharaan *et al*, 2000; Abd-Alla Kotb, 2005 Ramadan and Awaad 2008 and El-Nady, 2009).

Several investigators showed that wheat cultivars differed in yield and its components as well as chemical properties (Mehasen, 1999; El-Hawary, 2000; Sharaan *et al*, 2000; Toaima *et al,* 2000; Abd El-hameed, 2002; Ali *et al,* 2004; Mehasen and Mohamed, 2005; Abu-Grab *et al,* 2006; Omar, 2007; El-Ganayni and Mahmoud, 2008; Hassan, 2008; El-Nady, 2009; Mehasen *et al*, 2009; Ashmawy *et al*, 2010; Abd El-Nour and Fateh, 2011; Mehasen *et al*, 2013 and Badwee, 2014).

Sharaan *et al,* (2000) studied the performance and productivity of five wheat varieties ( i.e., Sids 1, Sakha 8, Sakha 69, Giza 164, Giza 167) under three water regimes (i.e., skipping one irrigation at heading stage, skipping one at dough stage, and normal six irrigations). Significant interaction effects between water regimes and wheat varieties on plant height, number and weight of grains/spike and 1000-grain weight were detected in the combined analysis.

Therefore, the present investigation was designed to study the performance and productivity of bread wheat cultivars under different skipping an irrigation at growth stages, in Kalubia Governorate.

## MATERIALS AND METHODS

Two field experiments were conducted at the Experimental Research Center, Faculty of Agriculture at Moshtohor, Benha Univ., Kalubia Governorate, Egypt, during the two successive growing seasons 2010/11 and 2011/12, to study the effect of five skipping an irrigation at tillering stage, elongation stage, heading stage, milk stage and filling stage on yield and chemical properties of five bread wheat cultivars (Giza 168, Sakha 94, Gemmaza 9, Sids 13 and Misr 1). The soil was clay in texture with a pH value of 7.80, 7.78 and an organic matter content of 1.66, 1.75% and available N of 52, 55 ppm during the two growing seasons, respectively.

The treatments were assigned in a split-plot design with four replications. Irrigation treatments were arranged at random in the main plots while, cultivars of wheat occupied the sub-plots. The sub-plot area was 10.5 $m^2$ consisted of 15 rows of 3.5 m length and spaced 20 cm apart. Wheat cultivars were cultivated on November 25$^{th}$ and 27$^{th}$ in the first and second seasons, respectively. The preceding crop was maize in both seasons. The normal cultural practices were carried out as recommended in the area.

### Studied characters:

The studied traits were No. of days to 50% heading and flag leaf area ($cm^2$). Random samples of 10 guarded plants were taken from sub-plots at harvesting time to determine the following characters: plant height (cm), spike length (cm), and No. of spikelet $spike^{-1}$. For determining No. of $spikes/m^2$ and seed index (g) a sample of one square meter from each sub-plot was taken. Grain and straw yields (kg $fed^{-1}$) were estimated on whole sub-plot basis.

## Chemical analysis:

Moisture, protein, ash, fiber, fat and carbohydrates were determined according to the methods recommended by A.O.A.C. (2000).

## Statistical analysis:

Analysis of variance was done for the data of each season separately and the combined analysis of variance for two seasons was conducted testing the error homogeneity according to Snedecor and Cochran (1980) treatment means were compared using least significant difference test at 0.05 level of significance. Using the MSTAT-C Statistical Software package (Michigan State University, 1983)

## RESULTS AND DISCUSSION

## -Effect of skipping irrigations.

The mean values of the traits studied as affected by irrigation treatments are presented in Table (1). Skipping an irrigation at tillering, elongation, heading, milk and filling stages treatments showed significant differences in all traits studied in the combined analysis. Skipping one irrigation either at tillering or at elongation or at heading stages decreased all traits studied except No. of days to 50% heading, spike length, No. of spikelet spike$^{-1}$ and seed index. Skipping an irrigation at tillering, elongation and heading stages decreased flag leaf area, plant height, number of spikes m$^{-2}$, 1000-kernel weight, grain yield and straw yield by 15.54, 9.85 and 2.97%, 3.37, 2.58 and 2.01%, 54.16, 50.02 and 11.26%, 5.58, 4.38 and 4.66%, 13.00, 10.38 and 7.10% and 21.43, 18.74 and 14.86% respectively, compared with skipping irrigation at filling stage treatments. Moreover, skipping irrigation at tillering stage was earlier heading compared with other skipping irrigation treatments. The negative effect of yield and its components caused by skipping an irrigation could be explained on the basis of the loss of turgor which affects the rate of cell expansion and ultimate cell size. Loss of turgor is probably the most sensitive process to water stress, thus, decrement in growth rate, stem elongation and leaf expansion. In this connection, El-Kalla *et al*, (1992); Abd El-Gawad *et al*, (1993); El-Monoufi and Harb (1994); Abo-Shetaia and Abd El-Gawad (1995); Ghandorah *et al*, (1997); Bayoumi (1999); Eman (2000); Sharaan *et al*, (2000); Abd-Alla Kotb, (2005) and El-Nady (2009), reached the same conclusion.

## -Cultivars differences.

The results reported in Table (1) indicate clearly that, there were significant differences between the different wheat cultivars in all traits studied. Moreover; it is clear from Table (1) that Gemmaza 9 cultivar gave the highest values of flag leaf area (48.52cm$^2$), plant height (106.57 cm), spike length (14.00 cm), No. of spikelets spike$^{-1}$ (20.02 spikelets), No. of spikes m$^{-2}$ (335.6 spike), seed index (44.45 gm), grain yield (3376.8 kg fed$^{-1}$) and straw yield (3986.7 kg fed$^{-1}$). Also Gemmaza 9 cultivar was earlier heading (89.67 day) compared with other wheat cultivars. On the other hand, Giza 168 cultivar gave the lowest values of flag leaf area(44.90 cm$^2$), plant height (89.82 cm), spike length (10.82 cm), No. of spikelets spike$^{-1}$ (19.00 spikelets), No. of spikes m$^{-2}$ (300.0 spike), seed index (39.11 gm), grain yield (2442.3 kg fed$^{-1}$) and straw yield (3385.2 kg fed$^{-1}$). Also Giza 168 was latest heading (92.45 day) compared with other wheat cultivars. It could be concluded that varietal differences among wheat cultivars may be due to genetical make up. The superiority of Gemmaza 9 cultivar in grain yield (kg fed$^{-1}$) over other wheat cultivars might be due to the increase in yield components, namely, spike length, No. of spikelets spike$^{-1}$ and seed index. The results obtained by Mehasen (1999); El-Hawary (2000); Toaima *et al,* (2000); Abd El-Hameed (2002); Ali *et al,* (2004); Mehasen and Mohamed (2005); Abu-Grab *et al,* (2006); Omar (2007); El-Ganayni and Mahmoud (2008); Hassan (2008); Mehasen *et al*, (2009); Ashmawy *et al*, (2010); Abd El-Nour and Fateh (2011); Mehasen *et al*, (2013) and Badwee (2014) indicated marked differences among wheat varieties in growth, yield and yield components.

**Table 1. Growth, yield and yield components of wheat as affected by skipping irrigation and Cultivars (Combined analysis of 2010/11 and 2011/12 seasons)**

| Treatments | No. days to 50% heading | Flag leaf area ($cm^2$) | Plant height (cm) | Spike length (cm) | No. spikelet $spike^{-1}$ | No. spikes $m^{-2}$ | Seed index (g) | Grain yield (kg $fed^{-1}$) | Straw yield (kg $fed^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|
| Skipping at | | | | | | | | | |
| Tillering stage | 89.88 | 43.11 | 96.31 | 12.74 | 19.50 | 246.1 | 41.19 | 2625.9 | 3264.0 |
| Elongation stage | 90.39 | 44.90 | 98.02 | 12.98 | 19.42 | 252.9 | 41.30 | 2688.5 | 3338.0 |
| Heading stage | 91.02 | 46.83 | 99.57 | 11.83 | 18.95 | 341.0 | 40.83 | 2770.7 | 3450.8 |
| Milk stage | 91.65 | 48.50 | 101.02 | 12.74 | 19.47 | 355.1 | 42.03 | 2867.4 | 3983.3 |
| Filling stage | 92.21 | 49.18 | 102.18 | 12.74 | 19.67 | 379.4 | 43.11 | 2967.5 | 4013.7 |
| L.S.D at 5% | 0.20 | 0.19 | 0.51 | 0.08 | 0.31 | 3.37 | 0.51 | 24.3 | 87.9 |
| Cultivars | | | | | | | | | |
| Giza 168 | 92.45 | 44.90 | 89.82 | 10.82 | 19.00 | 300.0 | 39.11 | 2442.3 | 3385.2 |
| Sakha 94 | 90.66 | 47.66 | 99.15 | 13.05 | 19.55 | 333.5 | 42.20 | 2931.2 | 3704.7 |
| Gemmaza 9 | 89.67 | 48.52 | 106.57 | 14.00 | 20.02 | 335.6 | 44.45 | 3376.8 | 3986.7 |
| Sids 13 | 91.60 | 45.61 | 100.90 | 13.20 | 19.30 | 300.8 | 41.25 | 2560.2 | 3648.7 |
| Misr 1 | 90.96 | 46.46 | 99.00 | 11.96 | 19.15 | 300.6 | 41.46 | 2609.6 | 3274.3 |
| L.S.D at 5% | 0.16 | 0.19 | 0.68 | 0.10 | 0.25 | 3.20 | 0.35 | 17.2 | 96.9 |

## -Interaction effect:

Significant effect of interaction between skipping irrigation and wheat cultivars was obtained for all growth, yield and yield components except seed index namely, No. of days to 50% heading, flag leaf area, plant height, spike length, No. of spikelet $spike^{-1}$, No. of spikes $m^{-2}$, grain and straw yields $fed^{-1}$ (Table 2). Skipping irrigation at tillering stage for Gemmaza 9 cultivar gave the highest value of No. of spikelets $spike^{-1}$ (٢0.87 spikelet) and surpassed the other 4 cultivars in early heading (88.02 day). While, skipping irrigation at milk stage for Gemmaza 9 cultivar gave the highest values of spike length (١4.36 cm) and No. of spikes $m^{-2}$ (398.9 spike). Moreover, skipping irrigation at filling stage for Gemmaza 9 cultivar gave the highest values of flag leaf area (51.45 $cm^2$), plant height (109.75 cm), grain yield $fed^{-1}$(3591.6 kg) and straw yield $fed^{-1}$(4473.3 kg). On the other hand, skipping irrigation at tillering stage for Giza 168 cultivar gave the lowest values of flag leaf area (41.45 $cm^2$), plant height (84.37 cm), No. of spikes $m^{-2}$ (221.8 spike), grain yield $fed^{-1}$(2289.3 kg) and straw yield $fed^{-1}$(2975.6 kg). Skipping irrigation at heading stage for Giza 168 cultivar gave the lowest values of spike length (10.53 cm) and No. of spikelets $spike^{-1}$ (18.12 spikelet) while, skipping irrigation at filling stage for Giza 168 cultivar gave the latest heading (94.01 day). Similar results were also reported by Sharaan *et al*, (2000) and El-Nady (2009).

## -Chemical properties of wheat kernels:

Twenty five of wheat kernels sampls (five skipping an irrigation at tillering, elongation, heading, milk and filling stages treatments and five bread wheat cultivar i.e. Giza 168, Sakha 94, Gemmaza 9, Sids 13 and Misr 1), were analyzed for their chemical composition, i.e., moisture, ash, protein, fat, crude fiber and charbohydrate contents. The obtained results are shown in Tables (3&4).

**Table 2. Effect of the interaction between Skipping irrigation and Cultivars on growth, yield and yield components of wheat (over the combined analysis)**

| Treatments | | No. days to 50% heading | Flag leaf area ($cm^2$) | Plant height (cm) | Spike length (cm) | No. spikelet $Spike^{-1}$ | No. spikes $m^{-2}$ | Grain yield (kg $fed^{-1}$) | Straw yield (kg $fed^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|
| Skipping at | Cultivars | | | | | | | | |
| Tillering stage | Giz 168 | 91.07 | 41.45 | 84.37 | 11.02 | 19.00 | 221.8 | 2289.3 | 2975.6 |
| | Sakh 94 | 89.66 | 43.99 | 98.50 | 13.07 | 19.25 | 275.6 | 2748.0 | 3374.5 |
| | Gem 9 | 88.02 | 44.85 | 102.37 | 14.18 | 20.87 | 270.9 | 3198.3 | 3734.1 |
| | Sids 13 | 90.85 | 42.42 | 98.37 | 13.35 | 19.37 | 236.3 | 2454.8 | 3260.1 |
| | Misr 1 | 89.82 | 42.83 | 97.75 | 12.08 | 19.00 | 225.8 | 2439.0 | 2976.0 |
| Elongation stage | Giz 168 | 92.03 | 43.14 | 88.87 | 10.76 | 19.12 | 223.3 | 2351.2 | 3243.7 |
| | Sakh 94 | 89.89 | 45.97 | 98.00 | 13.45 | 19.75 | 276.1 | 2829.3 | 3140.6 |
| | Gem 9 | 88.75 | 46.63 | 102.75 | 14.62 | 19.62 | 278.4 | 3285.2 | 3787.6 |
| | Sids 13 | 91.04 | 43.85 | 102.37 | 13.80 | 19.25 | 244.4 | 2452.5 | 3392.5 |
| | Misr 1 | 90.22 | 44.92 | 98.12 | 12.26 | 19.37 | 242.5 | 2524.3 | 3125.6 |
| Heading stage | Giz 168 | 92.05 | 45.02 | 94.37 | 10.53 | 18.12 | 338.8 | 2424.3 | 3025.6 |
| | Sakh 94 | 90.00 | 48.02 | 97.12 | 12.13 | 19.12 | 363.9 | 2918.7 | 3721.2 |
| | Gem 9 | 90.03 | 48.46 | 109.25 | 13.26 | 19.50 | 364.5 | 3356.2 | 3631.2 |
| | Sids 13 | 92.98 | 46.27 | 99.50 | 12.20 | 18.87 | 322.3 | 2537.5 | 3332.5 |
| | Misr 1 | 90.04 | 46.40 | 97.62 | 11.02 | 19.12 | 315.8 | 2616.6 | 3293.3 |
| Milk stage | Giz 168 | 93.12 | 46.98 | 90.12 | 10.87 | 19.37 | 347.1 | 2521.1 | 4190.5 |
| | Sakh 94 | 90.66 | 49.20 | 98.87 | 13.15 | 19.37 | 375.9 | 3066.2 | 4186.2 |
| | Gem 9 | 90.42 | 51.22 | 108.75 | 14.36 | 20.50 | 398.9 | 3452.5 | 4207.5 |
| | Sids 13 | 92.10 | 47.15 | 104.12 | 13.10 | 19.12 | 320.0 | 2624.3 | 3965.6 |
| | Misr 1 | 91.95 | 47.97 | 103.25 | 12.21 | 19.00 | 333.8 | 2673.1 | 3416.8 |
| Filling stage | Giz 168 | 94.01 | 47.93 | 91.37 | 10.90 | 19.37 | 369.3 | 2625.3 | 3490.8 |
| | Sakh 94 | 93.10 | 51.15 | 103.25 | 13.47 | 20.25 | 376.0 | 3093.7 | 4221.2 |
| | Gem 9 | 91.15 | 51.45 | 109.75 | 13.56 | 19.62 | 385.5 | 3591.6 | 4473.3 |
| | Sids 13 | 91.05 | 48.34 | 100.12 | 13.56 | 19.87 | 381.1 | 2731.8 | 4273.1 |
| | Misr 1 | 91.76 | 50.20 | 98.25 | 12.23 | 19.25 | 385.0 | 2795.0 | 3560.0 |
| L.S.D at 5% | | 0.35 | 0.43 | 1.52 | 0.21 | 0.56 | 7.01 | 38.5 | 216.7 |

**Table 3. Chemical composition of wheat kernels as affected by skipping irrigation and Cultivars (Combined analysis of 2010/11 and 2011/12 seasons)**

| Treatments | Moisture% | As a dry weight basis% | | | | |
|---|---|---|---|---|---|---|
| | | Protein | Ash | Fiber | Fat | Carbohydrates |
| Skipping at | | | | | | |
| Tillering stage | 9.68 | 11.33 | 1.64 | 2.37 | 2.06 | 82.60 |
| Elongation stage | 9.60 | 11.14 | 1.56 | 2.47 | 2.10 | 82.73 |
| Heading stage | 9.28 | 11.26 | 1.52 | 2.42 | 2.14 | 82.66 |
| Milk stage | 8.56 | 12.24 | 1.94 | 3.00 | 1.50 | 81.32 |
| Filling stage | 8.58 | 12.11 | 1.56 | 3.13 | 1.18 | 82.02 |
| Cultivars | | | | | | |
| Giza 168 | 8.75 | 12.99 | 1.56 | 2.64 | 1.82 | 80.99 |
| Sakha 94 | 9.56 | 11.76 | 1.62 | 2.90 | 1.92 | 81.80 |
| Gemmaza 9 | 9.24 | 11.92 | 1.54 | 2.63 | 1.90 | 82.01 |
| Sids 13 | 8.88 | 10.56 | 1.82 | 2.74 | 1.42 | 83.46 |
| Misr 1 | 9.24 | 10.87 | 1.78 | 2.47 | 2.00 | 82.88 |

**Table 4. Chemical composition of wheat kernels as affected by skipping irrigation and cultivars (Combined analysis of 2010/11 and 2011/12 seasons)**

| Treatments | | Moisture % | As a dry weight basis% | | | | |
|---|---|---|---|---|---|---|---|
| Skipping at | Cultivars | | Protein | Ash | Fiber | Fat | Carbohydrates |
| Tillering stage | Giza 168 | 9.0 | 12.80 | 1.6 | 2.20 | 2.5 | 80.90 |
| | Sakha 94 | 9.9 | 11.49 | 1.6 | 2.73 | 2.2 | 80.98 |
| | Gemmaza 9 | 9.5 | 11.97 | 1.5 | 2.23 | 2.2 | 82.10 |
| | Sids 13 | 10.0 | 10.00 | 1.8 | 2.25 | 1.6 | 84.35 |
| | Misr 1 | 10.0 | 10.39 | 1.7 | 2.46 | 1.8 | 83.65 |
| Elongation stage | Giza 168 | 9.8 | 11.87 | 1.4 | 2.50 | 2.2 | 82.03 |
| | Sakha 94 | 9.7 | 11.32 | 1.5 | 2.90 | 2.1 | 82.18 |
| | Gemmaza 9 | 9.8 | 11.72 | 1.5 | 2.24 | 2.5 | 82.04 |
| | Sids 13 | 8.7 | 10.15 | 1.7 | 2.31 | 1.5 | 84.34 |
| | Misr 1 | 10.0 | 10.64 | 1.7 | 2.38 | 2.2 | 83.08 |
| Heading stage | Giza 168 | 8.5 | 13.00 | 1.5 | 2.40 | 1.9 | 81.20 |
| | Sakha 94 | 9.8 | 11.21 | 1.6 | 2.70 | 2.5 | 81.99 |
| | Gemmaza 9 | 9.4 | 11.51 | 1.4 | 2.38 | 1.9 | 82.81 |
| | Sids 13 | 9.5 | 10.13 | 1.6 | 2.31 | 1.9 | 84.06 |
| | Misr 1 | 9.2 | 10.43 | 1.5 | 2.31 | 2.5 | 83.26 |
| Milk stage | Giza 168 | 8.6 | 13.41 | 1.8 | 3.00 | 1.2 | 80.59 |
| | Sakha 94 | 9.2 | 12.35 | 2.0 | 2.90 | 1.6 | 80.60 |
| | Gemmaza 9 | 8.7 | 12.54 | 1.7 | 3.00 | 1.6 | 81.16 |
| | Sids 13 | 7.8 | 11.20 | 2.3 | 3.38 | 1.2 | 82.01 |
| | Misr 1 | 8.5 | 11.36 | 1.9 | 2.61 | 1.9 | 82.23 |
| Filling stage | Giza 168 | 8.0 | 13.91 | 1.5 | 3.10 | 1.3 | 80.19 |
| | Sakha 94 | 9.2 | 11.43 | 1.4 | 3.20 | 1.2 | 82.77 |
| | Gemmaza 9 | 8.8 | 11.87 | 1.6 | 3.30 | 1.3 | 81.93 |
| | Sids 13 | 8.4 | 11.33 | 1.7 | 3.46 | 0.9 | 82.61 |
| | Misr 1 | 8.5 | 11.51 | 1.6 | 2.61 | 1.6 | 82.68 |

Data in Table (3) cleared that the lowest values of moisture contents and charbohydrate contents in wheat kernels were 8.60, 8.54% and 81.32, 82.02% were obtained for skipping irrigation at milk stage and skipping irrigation at filling stage treatments, respectively. Also, the same two treatments gave the highest value of protein content in wheat kernels were 12.24 and 12.11% were obtained for skipping irrigation at milk stage and skipping irrigation at filling stage treatments, respectively. Morever, skipping irrigation at milk stage treatment gave the highest value of ash content in wheat kernels was 1.94% compared with other skipping irrigation treatments. Whereas, skipping irrigation at filling stage treatment gave the highest value of fiber content in wheat kernals was 3.13% compared with other skipping irrigation treatments. On the other hand, skipping an irrigation at heading, elongation, and tillering stages treatments gave the highest value of fat content in wheat kernels were 2.14, 2.10

and 2.06% respectively, compared with other skipping irrigation treatments. Moisture, fat and charbohydrate contents decreased when irrigation deficiency treatments were done during the last two periods of plant age (milk and filling stages) while, protien, ash and fiber contents increased when irrigation deficiency treatments were done during the last two periods of plant age (fruiting and maturing stage).

Data also indicated that the lowest values of moisture contents and charbohydrate contents in wheat kernels were 8.71 and 80.99 % respectively, were obtained by Giza 168 cultivar compared with other cultivars. Also, the same cultivar gave the highest value of protein content in wheat kernels (12.99%) compared with other cultivars. While, , Sids 13 cultivar gave the highest value of ash content(1.82%), Sakha 94 cultivar gave the highest value of fiber content(2.90%) and Misr 1 cultivar gave the highest value of fat content in wheat kernels (2.00%) compared with other cultivars.

From the results presented in Table (4), it could be noted that moisture contents of wheat samples ranged from 7.8 to 10.0%, protein from 10.0 to 13.91 %, ash from 1.4 to 2.3%, fiber from 2.20 to 3.46%, fat from 0.9 to 2.5% and total Carbohydrates from 80.19 – 84.35%. Skipping irrigation at filling stage for Giza 168 cultivar gave the lowest values of moisture and charbohydrate contents in wheat kernels were 7.8 and 80.19% respectively. Also, the same treatment gave the highest value of protein content in wheat kernels (13.91%). While, skipping irrigation at milk stage for Sids 13 cultivar gave the highest value of ash contents (2.3%) and skipping irrigation at filling stage for Sids 13 cultivar gave the highest value of fiber contents (3.46%). Whereas, skipping irrigation at milk or tillering stages for Giza 168 or Gemmaza 9 cultivars gave the highest value of fat contents (2.5%).

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# تأثير حرمان بعض أصناف قمح الخبز من بعض الريات علي المحصول والصفات الكيميائية

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## الملخص العربى

أقيمت تجربتان حقليتان بمركز البحوث والتجارب بكلية الزراعة بمشتهر – جامعة بنها– محافظة القليوبية– مصر خلال موسمى الزراعة ٢٠١٠/١١ و ٢٠١١/١٢ م لدراسة تأثير خمس معاملات لتحريم رية في مراحل مختلفة من حياة النبات وهي (تحريم رية في طور التفريع، تحريم رية في طور الاستطالة، تحريم رية في طور طرد السنابل، تحريم رية في الطور البني للحبوب و تحريم رية في الطور العجيني للحبوب ) علي المحصول والصفات الكيميائية لخمسة أصناف من القمح الخبز وهي (جيزة ١٦٨، سخا ٩٤ ، جميزة ٩ ، سدس ١٣ ومصر ١)

**–ويمكن تلخيص أهم نتائج التحليل المشترك للموسمين فيما يلى.**

- أدت معاملات تحريم رية في أطوار التفريع والاستطالة وطرد السنابل الي نقص معنوي في صفات مساحة ورق العلم (سم$^{٢}$) ، طول النبات (سم) ، عدد السنابل/م$^{٢}$ ، وزن ال١٠٠٠ حبة (جم) ، محصول الحبوب ومحصول القش (كجم/فدان). وكذلك أدت معاملة تحريم رية في طور التفريع الي التبكير في صفة طرد ٥٠% من السنابل. كما ادت معاملات تحريم رية في طوري الاستطالة وطرد السنابل الي نقص معنوي في صفتي طول السنبلة (سم) وعدد ابراج السنبلة عن بقية معاملات الري الاخري.
- كانت هناك اختلافات معنوية بين الاصناف في جميع الصفات المدروسة. سجل صنف جميزة ٩ أعلى متوسطات لكل من مساحة ورقة العلم (سم$^{٢}$) ، طول النبات (سم) ، طول السنبلة (سم) ، عدد أبراج السنبلة ، عدد السنابل/م$^{٢}$ ، وزن ال١٠٠٠ حبة (جم) ، محصول الحبوب ومحصول القش (كجم/فدان). علاوة علي ذلك كان صنف جميزة ٩ أفضل الأصناف في صفة التبكير لطرد السنابل مقارنة بالاصناف الأخرى.
- تأثر معنويا كل من عدد الأيام لطرد ٥٠% من السنابل ، مساحة ورقة العلم ، طول النبات ، طول السنبلة ، عدد أبراج السنبلة ، وعدد السنابل في المتر المربع ، محصول الحبوب والقش للفدان بالتفاعل بين معاملات الري و أصناف القمح.
- أدت معاملتي تحريم رية في الطور اللبني وطور امتلاء الحبوب الي نقص في النسب المئوية لكل من الرطوبة، للدهون والكربوهيدرات في حبوب القمح. بينما ادت نفس المعاملتين الي زيادة في النسب المئوية لكل

من البروتين ، الرماد والالياف الخام. أما بالنسبة للأصناف فقد سجل صنف جيزة ١٦٨ أقل قيم للنسب المئوية لكل من الرطوبة والكربوهيدرات وأيضا سجل نفس الصنف أعلي قيمة للنسبة المئوية للبروتين. بينما سجل صنف سدس ١٣ أعلي قيمة للنسبة المئوية للرماد ، سجل صنف سخا ٩٤ أعلي قيمة للنسبة المئوية للألياف وسجل الصنف مصر ١ أعلي قيمة للنسبة المئوية للدهون في حبوب القمح.

- أعطت معاملة التفاعل بين كل من تحريم رية في طور امتلاء الحبوب لصنف جيزة ١٦٨ أقل نسبة مئوية لكل من الرطوبة والكربوهيدرات وأيضا اعطت نفس المعاملة أعلي نسبة المئوية للبروتين في الحبوب. بينما أعطت معاملة التفاعل بين كل من تحريم رية في الطور اللبني و طور امتلاء الحبوب لصنف سدس ١٣ أعلي قيم للنسبة المئوية لكل من للرماد والألياف علي الترتيب. وعند تحريم رية في الطور اللبني أو طور امتلاء الحبوب لصنف جيزة ١٦٨ أو صنف جميزة ٩ تم الحصول علي قيمة للنسبة المؤية للدهون في الحبوب.