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# Effect of Potassium and Nitrogen Levels on Productivity of Seds 12 Wheat Cultivar Under Delta North Condition.

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## ABSTRACT

Two field experiments were conducted in 2014/2015 and 2015/2016 seasons at the Experimental Farm of Fac. of Agric. Kafrelsheikh university in the first season and Desouque Area in the second season, Egypt, to study the effect of potassium levels (0,36, 48 kg $K_2O$/fed.), nitrogen levels (50, 65, 80 kg N/fed.) and their interaction on productivity of wheat cv. Seds 12. Treatments were arranged in split plot design with four replicates. The main plots included potassium levels, while nitrogen levels were allocated at the sub plots. The results revealed that increasing nitrogen rate from 50 to 80 kg N/fed. signficantly increased chlorophyl content, plant dry weight/$m^2$, plant height, LAI, flage leaf area, spike length, number of spikes/$m^2$, number of grains /spike, weight of 1000-grain, grain and straw yield (ton/ fed), harvest index and grain protein content in both seasons. There was no significant difference between 80 and 65 kg N/fed. in some mentioned traits.Application of potassium fertilizer resulted in significant increase in all the mentioned traits compared with control treatment (without K) in both seasons. Application of 48 kg $K_2O$ /fed. recorded the highest values of all previous studied characters.The interaction between potassium and nitrogen levels had a significant effect on LAI, number of spikes/$m^2$, number of grains /spike, weight of 1000-grain, grain yield (ton/ fed), harvest index and grain protein content in both seasons. Application of 80 kg N with 48 kg $K_2O$/fed produced the highest values of these traits in both seasons. However, chlorophyll content, flag leaf area and spike length were not affected by the interaction in the two seasons. The other traits were significantly affected by the interaction between nitrogen and potassium levels in one season, only. It can be concluded that application of 80 or 65 kg N along 48 kg $K_2O$ /fed could be recommended for optimum grain yield of wheat cv. Seds 12 at Kafr El-Shiekh Governorate.

**Keywords:**, nitrogen fertilizer, potassium fertilizer, seds 12 wheat cultivar, yield.

## INTRODUCTION

Wheat is considered one of the most important strategically crop in Egypt and in the world, increasing wheat productivity is a national target in Egypt to fill the gab between the local consumption and production. There are several ways for increasing the productivity of wheat, one of them is **nitrogen** and potassium fertilization process which plays **an important role in** the biochemical processes of the plant.

The response of wheat to chemical nitrogen was studied by several authors, Parveen Kousar *et al* ( 2015) and Kandil et al., (2011) found that increasing nitrogen levels from 0 up to 150 significantly increased the fertile tillers, plant height, spike length, number of grains per spike, 1000 grain weight, grain yield per plot and grain yield kg/ha. Khaled and Hammad (2014), Hafez (2007) and Abd El-Maaboud et al., (2006) recommended that increasing nitrogen levels from 0 up to 105 kg N/fed led to increasing of dry matter, LAI, plant height, n. of grains/spike, n. of spikes/$m^2$, 1000-grain weight, grain yield, straw yield and grain protein %. Khaled and El-Rawy(2012) and Abdel-Nour and Fateh (2011) reported that increments of nitrogen application rate up to 75 kg/fed gave no. of spikes/$m^2$, no. of grains/spike, 1000-grain weight, grains weight/spike, grain yield, biological yield and protein %. Hussain Iqtidar et al., (2006) showed that maximum plant height, total number of plants/m² , number of spikes /m², biological yield and grain protein content were observed at 200 kg N/ha. Trindade *et al* (2006) and Zagonel et al., 2002 found that nitrogen deficiency affects biomass production and solar radiation use efficiency by the plant with a great impact on grain yield and its components.

Tabatabaei *et al* (2014) showed that effect of potassium sulphate levels (Control, 80 kg/ha, 130 kg/ha and 160 kg/ha ) was significant on number of spike per $m^2$, number of grain per spike, number of spikelet per spike, protein content, biological yield, grain yield and straw yield., Robiul A. (2009) Yield contributing characters and yield exerted significant variation due to application of different levels of K and the best performance of the crop parameters was recorded when 36 kg K/ha was applied. Remarkable increase in grain, straw and total biomass yield was recorded in the same treatment. The highest protein content was recorded from 36 kg $K_2o$/ha., Asad and Muhammad (2014)) showed that yield components improved with increase in N and K levels. Based on the average of the two years, 180 kg N ha-1 in interaction with 90 kg $K_2o$ ha-1 enhanced grain yield by (47.4%), biological yield (28.5%), 1000 grain weight (29.2%), and grains spike-1 (24.6%) as compared with control, Youssef *et al* (2013) revealed that yield and its components were significantly affected by nitrogen and potassium levels, The protein content in wheat grains was increased with increasing N levels up to 288 kg N ha-1 in presence of 120 kg $K_2O$ ha-1. The previous treatment recorded the highest values for protein content in wheat grains and total chlorophyll content. Hussain et al., (2002) Investigations into the effect of three N, P and K levels (35-25-25, 70-50-50 and 105-75-75 kg ha-1 ) on growth, yield and quality of wheat they found that different NPK levels significantly affected plant height, Number of fertile tillers, 1000-grain weight, grain yield and grain protein content of wheat. The highest grain yield (4.99 t ha-1) was recorded with the application of 105-75- 75 kg NPK ha-1. Potassium content in the plant tissue is crucial to the proper functioning of several important biochemical and physiological processes that directly determine crop productivity.

Therefore, this investigation aimed to study the effect of nitrogen & potassium levels and their interaction on productivity of Seds 12 wheat cultivar.

## MATERIALS AND METHODS

Two field experiments were carried out in 2014/2015 and 2015/2016 seasons at the Experimental Farm of Fac. of Agric. Kafrelsheikh university in the first season and Desouque Area in the second season, Egypt, to study the effect of potassium levels (0, 36, 48 kg $K_2O$/fed.), nitrogen levels (50, 65, 80 kg N/fed.) and their interaction on productivity of wheat cv. Seds 12. The preceding crop was rice in the two seasons. Sample of soil was collected from (0-30cm layer) before the soil preparation from the experimental sites in both seasons to determine soil analysis. Soil analysis is presented in Table (1). The experimental soil was fertilized with 100 kg/fed. of calcium super phosphate (15.5% $P_2O_5$) during soil preparation. The experimental design was split plot with four replicates. The main plots were assigned to the three potassium levels and the sub plots to the three nitrogen levels. The sub plot area was 12 $m^2$ (3 x 4 m) in both seasons. The potassium fertilizer was applied in the form of potassium sulphat (48% $K_2O$) in one dose before the second irrigation. Nitrogen fertilizer in the form of urea (46.6 % N) was applied in three doses, 20% at sowing, 40% at the first irrigation and the last 40% at the second irrigation.

**Table 1. Soil analysis of the experimental soil.**

| Season | $EC_e$ (dS/m) | pH | Available (ppm) | | | Particle size distribution (%) | | | Texture class |
|---|---|---|---|---|---|---|---|---|---|
| | | | N | P | K | sand | silt | clay | |
| 1 st | 2.03 | 7.80 | 21.34 | 11.28 | 316 | 20.6 | 28.1 | 51.3 | clayey |
| 2 nd | 1.94 | 8.10 | 19.60 | 9.46 | 354 | | | | |

Seeds of the wheat cultivar Seds 12 were sown in the last of November in the two seasons. Seeds were uniformly broadcasted at the rate of 60 kg/fed. Other cultural practices were done as recommended. At heading, the following traits were recorded: Flag leaf area ($cm^2$) measured flag leaf area by Leaf Area Meter (Li-Cor 3100, Lambda Instruments Co., USA), Chlorophyll content (SPAD) was measured by portable chlorophyll meter (SPAD-502; Minolta Sensing Co., Ltd, Japan), dry weight of plants ($g/m^2$), leaf area index and plant height. At harvest, the following traits were determined: number of tillers/$m^2$, number of spikes /$m^2$, number of grains /spike, weight of 1000-grains (g), grain yield (t/fed.) and straw yield (t/fed.). Nitrogen percentage in the grains was determined by using Micro-Kjeldahl method and then multiplied by the factor (5.75) to obtain the grain protein percentage according to A.O.A.C. (1990).

The analysis of variance was carried out according to Gomez and Gomez (1984) for all collected data. Treatment means were compared by Duncan's Multiple Range test according to Duncan (1955). All statistical analysis was performed using analysis of variance technique by means of "MSTATC" computer software package.

## RESULTS AND DISCUSSION

### A. Growth characters:

Chlorophyll content in flag leaf, plant dry weight/m2, plant height, leaf area index (LAI) and flag leaf area of wheat at heading as affected by the levels of chemical nitrogen and potassium during 2014/2015 and 2015/2016 seasons are presented in Table (2).

Nitrogen levels showed a significant effect on all mentioned growth traits in both seasons. A significant increase in the most of these traits was accompanied with each increment of applied nitrogen. Such effect of nitrogen could be attributed mainly to its role in the stimulation of various physiological process including increase the chlorophyll content, cell division and cell elongation of internodes resulting in more tillers formation, leaf numbers and photosynthetic area (leaf area), which resulted in more photosynthetic production and consequently increased dry matter accumulation per unit area. The promoting effects of nitrogen on growth of wheat were reported by Parveen Kousar (2015), Khaled and Hammad (2014), Youssef *et al* (2013), Hafez (2007) and Abd El-Maaboud et al., (2006).

Application of potassium fertilizer resulted in a significant increase in Chlorophyll, plant dry weight/m2, plant height, leaf area index (LAI), and flag leaf area compared with control treatment (without K fertilizer)in both seasons. The level of 48 Kg $K_2O$ /fed significantly exceeded 36 Kg $K_2O$/fed in all mentioned traits in the two seasons. Such effect of potassium might have been resulted from the role of potassium content in the plant tissue is crucial to the proper functioning of several important biochemical and physiological processes that directly determine crop productivity and enhancing the soil biological activity which improved nutrient mobilization from organic and chemical fertilizers, increases of nitrogen metabolism, carbohydrates metabolism, enzymes activity, tissues growth, crop quality and resistance of crop which is closely related to the amount of absorbed nitrogen and then improve translocation of assimilates and thus improve the growth characters. These results were corresponded with those findings by Asad Alikhan (2014), Youssef (2013) and Hussain *et al.,* (2002).

The interaction between nitrogen and potassium levels had significant effect on leaf area index in both seasons, dry weight in the first seasons and plant height in the second (Table 2).

**Table 2. Some growth characters of wheat plants as affected by nitrogen and potassium levels in 2014/2015 and 2015/2016 seasons**

| Factors | Chlorophyll (SPAD) | | Dry weight ($g/m^2$) | | Plant height (cm) | | Leaf area index | | Flag leaf area ($cm^2$) | |
|---|---|---|---|---|---|---|---|---|---|---|
| kg N /fed. | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 |
| 50 | 36.98 c | 37.09 c | 985.5 c | 967.5 b | 94.17 c | 102.50 b | 2.68 c | 2.72 c | 25.51 c | 25.24 c |
| 65 | 42.54 b | 39.88 b | 1092.3 b | 1059.7 ab | 97.67 b | 108.08 a | 2.89 b | 2.89 b | 34.37 b | 34.02 b |
| 80 | 44.78 a | 43.1 a | 1178.1 a | 1132.9 a | 102.33 a | 108.17 a | 3.08 a | 3.08 a | 39.84 a | 39.58 a |
| F-test | ** | ** | ** | * | ** | ** | ** | ** | ** | ** |
| Kg $K_2o$/fed | | | | | | | | | | |
| 0 | 37.08 c | 36.61 c | 981.3 c | 881.3 c | 92.67 c | 103.08 b | 2.65 c | 2.64 c | 30.85 c | 30.49 c |
| 36 | 41.78 b | 39.25 b | 1106.8 b | 1083.42 b | 96.92 b | 105.58 b | 2.90 b | 2.98 b | 32.80 b | 32.54 c |
| 48 | 45.43 a | 44.58 a | 1206.6 a | 1195.42 a | 104.58 a | 110.08 a | 3.11 a | 3.10 a | 36.07 a | 35.81 a |
| F-test | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| Interaction | ns | ns | * | ns | ns | * | * | ** | ns | ns |

**In all tables: *, ** and ns indicate p <0.05, <0.01 and not significant, respectively. Means of each factor followed by the same letter are not significantly different at 5% level, according to Duncan's multiple range tests.**

Data in Table 3 show that the relative ranking of the interaction between nitrogen and potassium levels for leaf area index was inconsistent in both seasons. Combinations of 80 kg N/fed and 48 kg $K_2O$ /fed was among those treatments producing high leaf area index compared with application of 50 kg N/fed with any potassium level in the two seasons. These results might have been resulted from the quickly chemical nitrogen uptake by wheat roots and the role of potassium content in the plant tissue is crucial to the proper functioning of several important biochemical and physiological processes that directly determine crop productivity and enhancing the soil biological activity which improved nutrient mobilization from organic and chemical fertilizers which is closely related to the amount of absorbed nitrogen and then improve translocation of assimilates and thus improve the growth characters. which lead to enhancing the physical and biological soil properties and then may be caused to improving root growth, slowly released nutrients from chemical fertilizers which increasing the amount of absorbed nitrogen and thus improve the translocation of assimilates which results more vegetative growth in wheat plant. Similar results were obtained by Parveen Kousar (2015), Khaled and Hammad (2014), Youssef *et al* (2013), Hafez (2007), Abd El-Maaboud et al., (2006) and Trindade *et al* (2006).

**Table 3. Leaf area index character of wheat plants as affected by interaction between the levels of nitrogen and potassium levels in 2014/2015 and 2015/2016 seasons.**

| Treatments | | Leaf area index | |
|---|---|---|---|
| N Kg/fed. | $K_2o$ Kg/fed. | 1st season | 2nd season |
| | 0 | 2.38 d | 2.30 f |
| 50 | 36 | 2.67 c | 2.78 e |
| | 48 | 3.01 b | 3.09 bc |
| | 0 | 2.65 c | 2.78 e |
| 65 | 36 | 2.91 b | 3.01 c |
| | 48 | 3.12 a | 3.16 b |
| | 0 | 2.92 b | 2.92 d |
| 80 | 36 | 3.12 a | 3.16 b |
| | 48 | 3.22 a | 3.26 a |

B. **Yield and its components:**

Spike length, number of spikes/$m^2$, number of grains/spike, weight of 1000 grains, grain yield, straw yield/fed, harvest index and crude protein of wheat as affected by the levels of chemical nitrogen and potassium during 2014/2015 and 2015/2016 seasons are presented in Table (4&5).

Nitrogen levels had a significant effect on all yield and its components in both seasons, the greatest values of yield and its components were obtained from the application of 80 kg N/fed., but the lowest values of those components were recorded by 50 kg N/fed. These characters are genetically controlled but their effects are on the large basis which is determined by the environmental factor and mostly include the nutrients which are available in the soil and such favorable effect of mineral nitrogen on yield components might have been resulted from the quickly mineral nitrogen uptake by plant roots, which increased vegetative growth, photosynthetic area, which resulted in more assimilates products and consequently increased dry matter accumulation and translocation of more photosynthesis to grain. These findings were in conformity with those obtained by Parveen *et al.,* (2015), Khaled and Hammad (2014), Khaled and El-Rawy (2012), Abdel-Nour and Fateh(2011), Hafez (2007), Abd El-Maaboud *et al.,* (2006) and Hussain *et al.,* (2006).

Application of potassium fertilizer resulted in a significant differences in spike length, number of spikes/$m^2$, number of grains/spike, weight of 1000 grains, grain yield/fed, straw yields/fed and harvest index in both seasons, all yield and yield components significantly increased with gradually increasing of potassium levels from up to 48 kg $K_2o$/fed. in both seasons except straw yields/fed. in the first season which recorded the highest value at the level of 36 kg $k_2o$/fed., However, the lowest values were obtained from the untreated plants. This may be attributed to the effect quickly chemical potassium uptake by wheat roots and the role of potassium which lead to increases of nitrogen metabolism, carbohydrates metabolism, enzymes activity, tissues growth, protein synthesis, crop quality and improve vegetative growth in wheat plant which positively reflect on increasing yield and its

components.These results are in harmony with those obtained by by Asad Ali Khan and Muhammad (2014), Tabatabaei *et al.,* (2014), Youssef *et al.,* (2013) and Hussain *et al.,* (2002).

The interaction between the nitrogen and potassium levels had a significant effect on all yield and its components studied except spike length characters in the tow growing seasons.

With regard to the interaction between nitrogen and potassium levels on 1000 grain weight, grain yield and straw yield in both seasons, the data in table (6) show that the wheat plants received the combination of 80 kg N/fed with 48 kg $k_2o$ /fed. recorded the highest values of grain yield in both seasons without significantly differences with the combinations of 65 kg N/fed with 48 kg $k_2o$ /fed. in the first seasons. While, the combinations of 65 kg N/fed and 48 kg $k_2o$ /fed. recorded the greatest values of 1000 grain weight in both seasons It noticed from the data in Tables (6) that the combinations of 80 kg N/fed and 36 kg $k_2o$ /fed recorded the highest values of straw yields/fed in both seasons without significantly differences with the combinations of 80 kg N/fed with 48 kg $k_2o$ /fed. or 65 kg N/fed with 36 kg $k_2o$ /fed. in the second seasons The increase in grain yield might be due to the collective role of N and K where Nitrogen improves vegetative growth of wheat and K increases root growth and facilitates the translocation of nutrients and photoassimilates Tiwari, (2002). The lowest values of all mentioned characters obtained from the treatment of 50 kg N/fed without potassium. These findings were in conformity with Asad Ali Khan and Muhammad (2014), Tabatabaei (2014), Youssef (2013), Robiul Alami (2009) and Hussain *et al.,* (2002).

**Table 4. Spike length, Number of spikes/m2, number of grains/spike and weight of 1000 grains characters of wheat plants as affected by nitrogen and potassium levels in 2014/2015 and 2015/2016 seasons.**

| Treatments | Spike length | | N. of Spike /$m^2$ | | N. of grain/spike | | 1000 grain weight | |
|---|---|---|---|---|---|---|---|---|
| | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 |
| **N Kg/fed.** | | | | | | | | |
| 50 | 12.67 b | 11.5 b | 365.92 c | 359.25 c | 61. 25 b | 61.33 b | 42.65 b | 46.41 c |
| 65 | 14.00 a | 13.58 a | 425.08 b | 432.25 b | 64.33 b | 65.25 a | 48.09 a | 49.91 b |
| 80 | 15.08 a | 13.83 a | 467.75 a | 483.58 a | 69.42a | 68.92 a | 51.3 a | 53.91 a |
| F-test | ** | ** | ** | ** | * | * | ** | ** |
| $K_2o$ Kg/fed. | | | | | | | | |
| 0 | 13.25 b | 12.42 b | 365.92 c | 359.25 c | 55.58 c | 54.25 c | 43.73 c | 44.37 c |
| 36 | 14.16 a | 13.08 a | 425.08 b | 432.25 b | 64.58 b | 62.42 b | 46.57 b | 49.27 b |
| 48 | 14.33 a | 13.42 a | 467.75 a | 483.58 a | 70.17 a | 69.83 a | 51.74 a | 56.59 a |
| F-test | * | * | ** | ** | ** | ** | ** | ** |
| Interaction | ns | ns | * | ** | * | * | ** | * |

**Table 5. Grain yield, straw yield/fed, harvest index and crude protein characters of wheat plants as affected by nitrogen and potassium levels in 2014/2015 and 2015/2016 seasons**.

| Treatments | Grain yeild (ton/ fed.) | | Straw yeild ( ton/ fed) | | Harvest index | | Crude protein (%) | |
|---|---|---|---|---|---|---|---|---|
| **N** | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 |
| **Kg/fed.** | | | | | | | | |
| 50 | 2.45 c | 2.49 c | 3.37 c | 3.33 c | 0.42 b | 0.42 b | 10.19 c | 10.17 c |
| 65 | 2.71 b | 2.70 b | 3.52 b | 3.52 b | 0.43 a | 0.44 a | 10.67 b | 10.67 b |
| 80 | 2.84 a | 2.86 a | 3.62 a | 3.52 a | 0.44 a | 0.45 a | 10.99 a | 11.06 a |
| F-test | ** | ** | ** | ** | ** | ** | ** | ** |
| $K_2o$ Kg/fed. | | | | | | | | |
| 0 | 2.17 c | 2.16 c | 3.34 c | 3.30 c | 0.39 c | 0.39 c | 10.07 c | 10.05 c |
| 36 | 2.79 b | 2.81 b | 3.63 a | 3.45 b | 0.44 b | 0.44 b | 10.54 b | 10.57 b |
| 48 | 3.03 a | 3.08 a | 3.55 b | 3.53 a | 0.46 a | 0.47 a | 11.23 a | 11.30 a |
| F-test | ** | ** | ** | ** | ** | ** | ** | ** |
| Interaction | ** | ** | ** | Ns | ** | ** | ** | ** |

**C. protein content :-**

Data presented in Table (5) showed the effect of nitrogen and potassium levels on protein content. Nitrogen levels had highly significant effect on protein content in both seasons. Increasing nitrogen level up to 80 kg N/fed. caused a significant increase in protein content. While, the lowest values resulted from the level of 50 kg N/fed in the both seasons. May be these results due to increasing the translocation of nitrogen compounds to the grains which positively increase the protein content. These results are in agreement with those obtained by other investigators who reported that wheat grain protein content was increased with increasing nitrogen fertilization levels up to 80 kg N/fed. Allam (2005), Gafaar (2007), Khaled and El-Rawy(2012), Abdel-Nour and Fateh (2011) and Hafez (2007) .

Concerning the effect of different potassium levels on protein content, the data in table (5) showed that the level of 48 kg $k_2o$ /fed gave the highest protein content in the grains in both seasons. On the other hand the control treatment registered the lowest values of grains protein content in both seasons. These results may be due to the effect of potassium in improving translocation of nitrogen compounds to grains which positively reflect on grain protein. These results were harmony with those obtained by Tabatabaei (2014),

Robiul A. (2009), Youssef (2013), Hussain *et al.,* (2002).

Data in Table 6 show that the effect of interaction between nitrogen and potassium levels on protein content in both seasons. The highest significantly values were obtained from the combinations of 80 kg N/fed and 48 kg $K_2O$ /fed compared with the other combinations between nitrogen and potassium levels in the two seasons. These results might have been resulted from the quickly chemical nitrogen uptake by wheat roots and improving root growth, slowly released nutrients from chemical fertilizers which increasing the amount of absorbed nitrogen, the role of potassium content in the plant tissue is crucial to the proper functioning of several important biochemical and physiological processes that directly improve translocation of assimilates especially the translocation of nitrogen compounds to the grains which lead to enhancing the protein content. Similar results were obtained by Parveen Kousar (2015), Khaled and Hammad (2014), Youssef *et al* (2013), Hafez (2007), Abd El-Maaboud et al., (2006) and Trindade *et al* (2006).

**Table 6. 1000 grain weight, Grain yield (ton/ fed.), Straw yield (ton/ fed) and Crude protein characters of wheat plants as affected by by interaction between nitrogen and potassium levels in 2014/2015 and 2015/2016 seasons.**

| Treatments | | 1000 grain weight | | Grain yield (ton/ fed.) | | Straw yield ( ton/ fed) | | Crude protein | |
|---|---|---|---|---|---|---|---|---|---|
| N Kg/fed | $K_2o$ Kg/fed | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 | 2014/15 | 2015/16 |
| | 0 | 38.35 e | 39.08 e | 1.79 f | 1.84 g | 3.15 e | 3.14 e | 9.80 g | 9.62 h |
| 50 | 36 | 40.83 de | 43.95 de | 2.71 c | 2.73 d | 3.49 c | 3.48 d | 10.13 f | 10.16 g |
| | 48 | 48.78 bc | 56.2 ab | 2.86 b | 2.90 c | 3.48 c | 3.37 cd | 10.63 d | 10.80 d |
| | 0 | 42.43 d | 43.35 de | 2.22 e | 2.20 f | 3.35 d | 3.32 d | 10.10 f | 10.14 g |
| 65 | 36 | 47.73 c | 48.78 bc | 2.78 bc | 2.79 cd | 3.65 b | 3.52 ab | 10.54 d | 10.50 e |
| | 48 | 54.13 a | 57.6 a | 3.12 a | 3.12 b | 3.55 c | 3.44 bd | 11.37 b | 11.37 b |
| | 0 | 50.43 abc | 50.68 bc | 2.50 d | 2.43 e | 3.52 c | 3.43 d | 10.33 e | 10.38 f |
| 80 | 36 | 51.15 abc | 55.08 ab | 2.91 b | 2.90 c | 3.75 a | 3.58 a | 10.95 c | 11.06 c |
| | 48 | 52.33 ab | 55.98 ab | 3.11 a | 3.26 a | 3.61 b | 3.54 ab | 11.68 a | 11.73 a |

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## تأثير مستويات السماد النيتروجينى والبوتاسى على إنتاجية صنف القمح سدس١٢ تحت ظروف شمال الدلتا

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أجريت تجربتان حقليتان بالمزرعة البحثية لكلية الزراعة جامعة كفر الشيخ وباحدى المزارع الخاصة بمركز دسوق محافظة كفر الشيخ خلال موسمى ٢٠٠٧/ ٢٠٠٨ ، ٢٠٠٨/ ٢٠٠٩ لدراسة تأثير ثلاث مستويات من السماد النيتروجينى (٥٠ ، ٦٥ ، ٨٠ كجم أزوت /فدان) وثلاث معدلات من البوتاسيوم ( صفر، ٣٦ ، ٤٨ كجم بو٢أ/ فدان) و التفاعل بينهما على انتاجية صنف القمح سدس ١٢ وقد وزعت المعاملات فى تصميم القطع المنشقه فى أربع مكررات حيث اشتملت القطع الرئسية على مستويات النيتروجين المعدنى بينما أضيفت مستويات البوتاسيوم فى القطع الشقيه و كانت النتائج المتحصل عليها كما يلى :-اظهرت النتائج ان زيادة مستويات النيتروجين من ٥٠ الى ٨٠ كجم ن/ فدان ادت الى زيادة معنوية فى صفات محتوى الكلوروفيل ، الوزن الجاف للنبات/م٢ ، ارتفاع النبات ، دليل مساحة الاوراق ، مساحة الورقة العلم ، طول السنبلة ، عدد السنابل/م٢ ، عدد الحبوب/ سنبله ،وزن الالف حبه ،محصول الحبوب (طن/فدان) ، محصول القش (طن/فدان) ، دليل الحصاد ، محتوى الحبوب من البروتين (%) فى كلا الموسمين . هذا وقد اظهر مستوى ٨٠ كجم ن/فدان اعلى القيم لكل الصفات المدروسه السابقه بالمقارنه بباقى المستويات ، فى حين سجل مستوى ٥٠ كجم القيم الدنيا فى الصفات المدروسة السابقة ، لم يختلف معنويا كلا من مستوى٨٠ ،٦٥ كجم ن/فدان فى صفات الوزن الجاف/ نبات وارتفاع النبات وعدد الحبوب فى السنبلة فى الموسم الثانى فقط وفى صفة وزن الالف حبة فى الموسم الاول وفى صفة طول السنبلة ودليل الحصاد فى كلا الموسمين.اظهرت النتائج ان زيادة مستويات السماد البوتاسى من صفر الى ٤٨ كجم بو ٢أ قد سجل زيادة معنوية فى كل الصفات المدروسة من القمح مثل صفات الكلوروفيل ، الوزن الجاف للنبات/م٢ ، ارتفاع النبات ، دليل مساحة الاوراق ، مساحة الورقة العلم ، طول السنبلة ، عد السنابل/م٢ ، عدد الحبوب/ سنبله ،وزن الالف حبه ،محصول الحبوب (طن/فدان) ، محصول القش (طن/فدان) ، دليل الحصاد ، محتوى الحبوب من البروتين (%) فى كلا الموسمين ،هذا وقد سجل إضافة البوتاسيوم بمعدل ٤٨ كجم بو٢أ أعلى القيم معنوية فى كل الصفات السابقة المدروسة فيما عدا صفة محصول القش (طن/فدان) فى الموسم الاول مقارنة بمعاملة الكنترول التى سجلت القيم الدنيا فى حين لم يختلف مستوى ٣٦ كجم بو٢أ معنويا مع معدل ٤٨ كجم بو٢أ فى صفة طول السنبلة وقد سجل مستوى ٣٦ كجم بو٢أ اعلى القيم فى صفة محصول القش (طن/فدان) فى الموسم الاول فقط.اظهر التفاعل بين مستويات السماد النيتروجينى ومستويات السماد البوتاسى تأثيرا معنويا فى الوزن الجاف للنباتات/م٢ ومحصول القش (طن/فدان) فى الموسم الاول ، وفى صفة ارتفاع النبات فى الموسم الثانى ،وفى صفات دليل مساحة الاوراق ، عدد السنابل/م٢ ، عدد الحبوب/ سنبله ،وزن الالف حبه ،محصول الحبوب (طن/فدان) ، دليل الحصاد ، محتوى الحبوب من البروتين (%) فى كلا الموسمين بينما لم تتاثر معنويا كلا من صفةالكلوروفيل ومساحة الورقة العلم وطول السنبلة فى كلا الموسمين وصفة ارتفاع النبات فى الموسم الاول وصفة الوزن الجاف للنباتات/م٢ ومحصول القش (طن/فدان ) فى الموسم الثانى. اظهرت النتائج ان إضافة التسميد الازوتى بمعدل ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ / فدان أعطت القيم الأعلى معنوية فى دليل مساحة الأوراق ، محتوى الحبوب من البروتين (%) ، ومحصول الحبوب (طن/فدان) فى كلا الموسمين ودون اختلاف معنوى مع تاثير كلا من - معامله ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٣٦ كجم بو ٢أ/فدان او معامله ٦٥ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان على صفة دليل مساحة الأوراق فى الموسم الاول فقط وكذلك معامله ٦٥ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان على صفة محصول الحبوب (طن/فدان) فى الموسم الاول فقط هذا وقد سجلت معامله ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٣٦ كجم بو ٢أ/فدان أعلى القيم المعنوية فى صفة محصول القش طن/ فدان فى كلا الموسمين ودون اختلاف معنوى مع تاثير إضافة التسميد الازوتى بمعدل ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ / فدان ومعاملة٦٥ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان فى الموسم الثانى فقط بينما سجلت معاملة ٦٥ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان أعلى القيم المعنوية فى صفة وزن الالف حبة ودون اختلافات معنوية مع تاثير كلا من إضافة التسميد الازوتى بمعدل ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ / فدان او إضافة التسميد الازوتى بمعدل ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٣٦ كجم بو ٢أ / فدان فى كلا الموسمين او اضافة التسميد الازوتى بمعدل ٨٠ كجم ن/فدان فقط فى الموسم الاول او التسميد الازوتى بمعدل ٥٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان فى الموسم الثانى فقط. وقد سجلت معاملة اضافة التسميد النيتروجينى بمعدل ٥٠ كجم ن /فدان دون اضافة البوتاسيوم القيم الدنيا فى كلا من صفة دليل مساحة الأوراق، ووزن الالف حبة، محتوى الحبوب من البروتين (%) ، محصول الحبوب (طن/فدان) ، محصول القش (طن/فدان) فى كلا الموسمين . من النتائج السابقة يمكن التوصية بان إضافة ٨٠ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان اعطى اعلى إنتاجية من محصول القمح (صنف سدس ١٢) وقد جاء فى الترتيب التالى لها إضافة ٦٥ كجم ن/فدان مع مستوى البوتاسيوم بمعدل ٤٨ كجم بو ٢أ/فدان وذلك تحت ظروف هذه الدراسة.