

ESTIMATION OF USING CHEMICAL FERTILIZERS EFFECT ON WHEAT CROP PRODUCTIVITY IN SALAH EL-DIN GOVERNORATE FOR THE PRODUCTIVE SEASON (2020-2021)

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Abstract:

The research dealt with the issue of chemical fertilizers for wheat crop in the world in general and particularly in Iraq, and it was found from the research that the consumption rates of chemical fertilizers in agricultural production in Iraq have increased, and this may be due to the expansion in reclamation and cultivation of new lands and the cultivation of high-production varieties to face the food shortages problem resulting from the increase in population, also, the farmer believes that by increasing the chemical fertilization rates, production will increase and achieve the highest profit, and the research aim is to know the current situation of fertilizers and to estimate the effect of using fertilizers on wheat crop productivity. The research also relied on the questionnaire form with a rate of 10%, represented by 152 forms that included the research community for the productive season 2020-2021., and the research found that the organic fertilizer has a positive effect on wheat productivity by (0.095%), as well as the compound fertilizer showed its significance on wheat crop productivity in the same percentage, as for the urea fertilizer, it was found to have a negative effect on wheat productivity, that, there is an extravagance in the amount used of this fertilizer.

Keywords: chemical fertilizers, wheat crop, food production

Introduction

Chemical fertilizer industry is considered one of the important strategic industries because it is closely related to food production, in addition to being one of the main production elements in Iraqi agriculture (Al-Qadi, 2017: p. 1). It also plays an influential and effective role in agricultural development, as it is one of the main factors for increasing agricultural production in the vertical direction to meet the limited cultivated areas, these chemical compounds are used to increase production and supply the soil and plants with the necessary nutrients, namely nitrogen, phosphate and potassium, (Al-Tatawi and Al-Bahnisi, 2015: p. 2). The Iraqi economy depends on the agricultural sector to provide food and clothing to the population, and the income obtained from this sector constitutes one of the main components of the Egyptian national income. Agricultural chemical fertilizers are considered one of the main production elements in Iraqi and international agriculture, (Abd al-Aal and Mustafa, 2019: p. 2). These chemical compounds were used to increase production and supply the soil and plants with the necessary nutrients, which are nitrogen, phosphate and potassium. Some studies have shown that the added quantities of these fertilizers exceed what the plant consumes, which constitutes an economic burden on the farmer on the one

hand, and a source of environmental pollution for the soil, groundwater, plants and humans on the other hand, (Morsi, 2011: p. 1). and for the growing increase in agricultural production and to meet the continuous demand for food and the resulting increase in the population, which is expected to reach nearly 10 billion people by 2050, according to United Nations reports (3:FAO, 2019) the need to secure food sources, both in quantity and quality, is steadily increasing, and to meet the growing demand for food, agricultural production must be increased to keep pace with the increase in population growth. And through two main methods, the first is horizontal, which means investing new areas and bringing them into the agricultural investment space, and the second is vertical, through the use of modern technologies that help intensify production in the same cultivated area. Such as raising new high-productivity hybrid varieties, increasing plant tolerance to environmental stresses, so that their productivity is not affected much by bad conditions, and using appropriate fertilizers and agricultural mechanization that saves a lot of costs, effort and time. The use of these methods led to a noticeable increase in agricultural production for various major crops in the world, in United States, for example, wheat production increased from 2 tons per hectare to about 10 tons per hectare (FAO, 2009: 7-13). that is, an increase of about 80%, and the same applies to most of the important agricultural crops in the world (wheat, barley, cotton, legumes, etc.), which also benefited from intensive agricultural techniques, and various fertilization methods, to increase production in varying proportions. Depending on the country and the degree of development and care for agriculture, as it is considered one of the important challenges faced by developing countries, and this increase in population has led to an increase in food demand, as food imports in the world rise , as wheat is considered one of the strategic crops on which the population depends (Al-Daabush, 2006: 14), and according to the statistics of the Food and Agriculture Organization FAO (2014), the demand for wheat consumption in the world has increased from 574 million tons in 2002 to reach 4.6 million tons in 2020. Then it begins to decline to reach 2784 million tons in 2021-2022.

2- The development of chemical fertilizer production in Iraq

The highest production value of nitrogen fertilizers in Iraq reached (47464.49) tons in 2014, and the lowest value of nitrogen fertilizers reached (96600) tons in 2010. As shown in Table (1), the highest production value of phosphate fertilizers in Iraq reached (27140) tons in 2013 The lowest value was (zero) in 2010 and 2011. As shown in Table (1) and Figure (2), the highest value and lowest value for potash fertilizers in Iraq were (zero).

The average annual production for the period (2004-2019) for each of nitrogen, phosphate and potash fertilizers, respectively, amounted to 113092.595 tons, 10207.8225 tons, zero. The annual growth rate of nitrogen, phosphate and potassium fertilizers, respectively, was (-0.02). (-0,11) (zero).

Table (1) Iraq's production evolution of chemical fertilizers for the period (2004-2019)

The years	Iraq's production of fertilizers (tons)		
	Nitrogen fertilizers	Phosphate fertilizers	potash fertilizers
average	113092.595	10207.8225	0

highest value	151720	27140	0
lowest value	31392.98	0	0
annual growth rate	-0.02	-0.11	0

The source: Food and Agriculture Organization of the United Nations (FAO), Statistics Yearbook and FAO website org. [www.fao.org. foostat](http://www.fao.org/foostat), (2004-2019)

2-5-1-3 Development and production of urea fertilizers in Iraq

The highest value of urea fertilizer in Iraq reached (312000) tons in 2006, and the lowest value of urea fertilizer reached (65663) tons in 2015. As shown in Table (2) and Figure (3), the average annual production for the period (2004-2019) of urea fertilizer in Iraq reached (239023,4615) tons. The annual growth rate reached (-0.058) tons, due to the decline in production. the growth rate is negative and the local production decreased due to the cessation of factories after 2003.

Table (2) Evolution of urea fertilizer production in Iraq (tons)

year	Production(ton)
average	239023.4615
Highest value	312000
Lowest value	65663
Annual growth rate	-0.058

Source: Food and Agriculture Organization of the United Nations (FAO), Statistics Yearbook and FAO website org. [www.fao.org. Faostat](http://www.fao.org/faostat) (2004-2019).

Chemical fertilizer exports:

Table (3) and Figure (4) showed that the highest value of nitrogen fertilizer exports in Iraq amounted (29918.04) tons in 2005, and phosphate fertilizers reached the highest value of their exports (1986,78) tons in 2004, and potassium fertilizers reached the highest value of their exports (722.9) tons in 2004, the lowest value of nitrogen fertilizer exports in Iraq was (zero) in 2010, and the lowest value of phosphate fertilizer exports was (zero) in 2005, 2006, 2007, 2008, 2010, and potash fertilizers in Iraq reached the lowest value of its exports (zero) in 2010. 2007,2008,2014,2019.

The average annual production of nitrogen fertilizer exports was (5468,613) tons, phosphate fertilizers reached (145,573125) tons, and potash fertilizers amounted to (60,399375) tons.

Imports of chemical fertilizers:

The highest value of Iraq's imports of nitrogen fertilizers reached (138695.72) tons in 2015, as shown in Table (5) and Figure (6), and the highest value of Iraq's imports of phosphate fertilizers (104,227.3) tons in 2019, as shown in Table (5) and form (7) and the highest value of Iraq's imports of potash fertilizers (8169.35) tons in 2019, as shown in Table (5) and Figure (8), due to the production lack in these years or due to the increase in the cultivated agricultural area, which

leads to an increase in the local demand for fertilizers, which leads to Due to product compatibility with local demand and because of the cessation of local factories producing fertilizers and the cost of producing fertilizers is higher locally, this is why we resort to importing, population density and food security.

the lowest value of Iraq's imports of nitrogen, phosphate and potassium fertilizers, respectively, was about (81.75) tons in 2006 (1282.02) tons in 2008 (110.96) tons in 2006.

The average annual production for the period (2004-2019) of imports of nitrogen, phosphate and potassium fertilizers, respectively, amounted to (45711,09438) tons, (20623,21563) tons, and (2630.69) tons, as shown in the same table and figure mentioned above.

Figure (6) the development of exports and imports of potash fertilizers in Iraq for the period (2004-2019)

year	Exports of fertilizers to Iraq (tons)			Imports of fertilizers in Iraq (tons)		
	Nitrogen fertilizers	Phosphate fertilizer	potash fertilizers	Nitrogen fertilizers	Phosphate fertilizers	potash fertilizers
average	5468.61375	145.573125	60.399375	45711.09438	20623.21563	2630.69
highest value	29918.04	1986.78	722.9	138695.72	104227.3	8169.35
lowest value	0	0	0	81.75	1282.02	110.96

The development of fertilizer use in Iraq:

Agricultural use ranges from the highest value of nitrogen fertilizers, which amounted to (180937.9) tons in 2019, as shown in Table (6), due to the increase in the agricultural plans of the Ministry of Planning, especially for strategic crops. The lowest value of nitrogen fertilizers reached (63236.84) tons in 2015, the average annual production of nitrogen fertilizers is (139105.3) tons.

The highest value of phosphate fertilizers in Iraq reached (95928.2) tons in 2018, and the lowest value of phosphate fertilizers was (6918) tons in 2004 as in Table (6) and Figure (10), and the average annual production of nitrogen fertilizers in Iraq about (48864, 5) tons.

The highest value of potash fertilizers in Iraq reached (5400) tons in 2011, and the lowest value of potash fertilizers reached (1000) tons in 2008, as shown in Table (6) and Figure (11), and the average annual production for the period (2004-2019) For potash fertilizers (3156,512) tons.

The years	Iraqi agricultural use of fertilizers (tons)		
	Nitrogen fertilizers	Phosphate fertilizers	potash fertilizers
average	139105.3	48864.5	3156.512
highest value	180937.9	95928.4	5400
lowest value	63236.84	6918	1000
annual growth rate			

Table (4) The development of agricultural use of fertilizers in Iraq for the period (2004-2019) tons

The development of chemical fertilizer production in Salah al-Din:

The highest amount of urea fertilizer used in the irrigated areas was in Tharthar region, where the amount of urea fertilizer reached (6539.76) tons because it is considered the largest branch in Salah al-Din, and the lowest amount of urea fertilizer used in Al-Zawiya reached (21.33) tons.

The highest amount of dab fertilizer used in Tharthar was (9446.32) tons, and the lowest amount of dab fertilizer used in Al-Zawiya was (30.81) tons. As in table (5).

Fertilizers used in the demolished areas of Salah al-Din Governorate:

The highest amount of urea fertilizer used in the demolished areas was in Al-Tharthar sub-branch (5086.48) tons, and the lowest amount of urea fertilizer used in Al-Zawiya sub-branch was (16.59) tons.

The highest quantity of dab fertilizer used in Tharthar reached (7266.4) tons, and the lowest amount of dab fertilizer used in Al-Zawiya was nearly (33.7) tons. As in table (8)

The effect of using chemical fertilizers on the productivity of wheat crop for the agricultural season 2021

To show the impact of chemical fertilizers use on wheat crop productivity in Salah al-Din for the research sample area for the agricultural season 2021, in order to study the relationship between the productivity of the wheat crop kg / dunum as the dependent variable (y) and the amount of chemical fertilizers, which is the amount of urea fertilizer (kg) y1, the amount of nitrogen fertilizer (kg) y2, the amount of organic fertilizer (kg)

Using the method of multiple regression in a different way linear and double logarithmic and semi-logarithmic as it was found that the double logarithmic function is the best and is in agreement with the economic, statistical and econometric logic, as following ;

$$Lny = -0.652 - 0.565Lny_1 + 0.286Lny_2 + 0.612Lny_3$$

$$t = (-3.58) \quad (-5.045) \quad (4.540) \quad (6.435)$$

$$F = 349.098$$

$$D.W = 1.989$$

$R_2=0.876$, $R_2=0.874$

When..

Ly= wheat crop productivity kg/donum

Lny1= urea fertilizer amount/kg

Lny2= compound fertilizer amount/kg

Lny3= organic fertilizer amount /kg

The results obtained from previous equation indicated the significance of the model at a significant level (5%). The flexibility of urea fertilizer was estimated at (-0.652%), meaning a 1% change in the amount of urea fertilizer leads to a decrease in productivity of the wheat crop by (-0.652%). If all other production factors remain constant, the flexibility of the compound fertilizer element was estimated at about (0.286), which means that a change of 1% leads to an increase in wheat crop productivity compound fertilizer amount by (0.286). The value of determination coefficient shows that about (87%) of the changes that occurred in wheat crop productivity It may be traced in compost elements.

It is clear from the foregoing that the organic fertilizer has a positive effect on the productivity of the wheat crop, as the higher the amount used by (0.095%), meaning a change of (1%), it leads to an increase in wheat productivity by the same percentage. as for the urea fertilizer, it was found that it has a negative effect on the wheat productivity, meaning that there is waste in the used amount of this fertilizer From the above equation, it appears from (t) test of significance of the estimated parameters. the (F) test also proved the function significance as a whole at a significant level (5%). The results showed that the value of the determination coefficient was (0.87), which means that (87%) of the fluctuations in the demand for fertilizers were caused by the independent variables included in the model, while the remaining percentage (13%) of those fluctuations were due to other variables that were not included in the estimated model. the standard tests passed the hypothesis and their results were identical to the economic logic of chemical fertilizers effect (urea, compound and organic) on the wheat crop productivity

Conclusions

Based on the findings of the results mechanism, there are a set of results.

1. The average annual production of each of nitrogen fertilizers, phosphate fertilizers, and potassium fertilizers, respectively, reached (113092.595 tons, 10207.8225 tons, zero), with an annual growth rate of (-0.02, -0.11, zero) respectively, for the period (2004-2019).
2. The average annual production of urea fertilizer in Iraq amounted to 239023,4615 tons, with a negative growth rate which reached (-0.058), due to the decrease in production for the period (2004-2019).
3. The average annual production of each of nitrogen fertilizer exports amounted to 5468,613 tons, phosphate fertilizers 145.573125 tons, and potash fertilizers 60.39937 tons for the period (2004-2019).
4. The average annual production of Iraq's imports of nitrogen, phosphate and potash fertilizers amounted to (45711.09438, 21563,20623,263.69) tons, respectively.

5. The average annual production of nitrogen, phosphate and potash fertilizers, respectively, was 139105.3 tons, 48864.5 tons and 3156,512 tons.
6. The organic fertilizer has a positive effect on wheat crop productivity by (0.095%). the compound fertilizer also showed its significant effect on wheat productivity at the same rate. As for the urea fertilizer, it was found to have a negative effect on wheat productivity, meaning that there is waste. In the amount used of this fertilizer.

Recommendations

1. Follow agricultural cycles and not grow stressful crops that lead to a deficiency of elements in the soil.
2. Directions for plant producers and growers in the use of recommended fertilizer doses.
3. Rehabilitation of local factories producing fertilizers and subsidizing the prices of locally produced fertilizers
4. The need to increase the chemical fertilizers production, especially urea, through the establishment of new production lines and factories in order to cover consumer needs.
5. Determine the quantities needed to import all kinds of fertilizers to meet the agricultural requirements.

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