



RESEARCH ARTICLE

ASSESSMENT OF RESPONSE IBA 99 WHEAT VARIETY FOR ZERO TILLAGE UNDER MANY NUTRIENT RATES

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ABSTRACT

This research was carried out at the Technical Institute of Wasit governorate in Iraq in the agricultural area of the Hay district for evaluate the effect of the zero tillage farming system and compare it with traditional Tillage farming with applied four rates of urea 46% fertilizer (zero, 30, 40, 50 kg / d and three rates of superphosphate 20% fertilizer (zero, 30, 40 kg / d.) on some vegetative growth and yield traits for wheat Iba-99 variety in agricultural season 2016- 2017. Where planted seeds at rate 40 kg / donum equal 240 g /plot, by using RCBD design with three replicates. The results showed an increase in the zero tillage culture than traditional culture in the level 0.05, but did not differ significantly from the traditional culture at 0.01 probability in all vegetative and yield traits. The values were superior in the zero tillage culture as follows: Plant length 81.3cm, Number of tillers 7 /plant, Spike length 11.5 cm, Number of spikes 302/m², Number of grains 51/spike, Weight of a thousand grains 43, 2 g and total grains yield 3,680 tons / hectare while values of traditional agriculture were ; Plant length 81.2cm, Number of tillers 6/ plant, spike length 11.4 cm, Number of spikes 301/m², Number of grains 50/spike, Weight of 1000 grain 42.1 g and total grains yield 3,520 t / h. showed the urea fertilizer superior at a rate of 50 kg / d in all of traits; Plant length 92.3cm, Number of tillers 9 /plant, Spike length 11.9 cm, Number of spikes 307/m², Number of grains 57/spike, Weight of 1000 grain 46.4 g and total grains yield 4,160 tons / h, showed the superphosphate fertilizer superior at a rate 40 kg/h in all traits ; Plant length 88.6cm, Number of tillers 8 /plant, length of spike 11.6 cm Number of spikes 304 / m², Number of grains 55/ spike, Weight of 1000 grain 45.2 gm and total grains yield 4,060 t / h. The interaction between the zero tillage culture system and both levels of fertilizer (Nitrogen 50, Phosphate 40 kg / d) showed significant superiority in probability level 0,05 and not differs in probability level 0,01 in all traits, where total grain yield reached 4,269 and 4,165 ton/ h respectively. Conclusion that both N,P fertilizers kinds were better than the interaction between traditional farming and both 2 kinds of fertilizer in all traits of plant. Evaluates the zero tillage system farming better than traditional farming due to improving of all traits of plant in addition of its ecological, economical importance in achievement of sustainable agricultural development.

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INTRODUCTION

The wheat (*Triticum aestivum*) consider annual winter cereal crops belong to (Poaceae or Graminae) family, The total cultivated area of wheat for 2016 in Iraq was 3,697,200 donums and the production was 3,052,900 at a rate of 826 kg / donum (Ministry of Agriculture in Iraq, 2016). Wheat planting by a widely form in the world an in terms of its importance comes of consumed in first grade and representative the essential pillar for food security in the word, including Iraq which suffers from shortage of food, (Kathim and Janabee, 2011).

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Iraq consumptive 3-4 million ton/yearly where fill the shortage by import (Khalid, 2006 and Marwan, 2004) expected the gap between the wheat yield production and the import will increase on 2020 to reach more than 4 ton. Therefore, This require a looking for applying new techniques for rise the yield production of wheat in less of cost such as zero tillage culture, where was the major importance aim for Iraqi agriculture with elicitation a new cultivars as Iba-99 wheat variety, also by expanded the agricultural lands. In study on wheat of Semeto variety In Erbil; effect of two system of plowing with and without tillage on two speed of drill equipment under semi-arid region, found Semeto without tillage was Superior to with tillage (Maulood, 2005 and Hassen, 2015). In research about effect of four level of nitrogen and three level of irrigation (50%, 75%, and 100% of field capacity) in use Semeto as

anew variety by comparative with Durum wheat shown the result that nitrogen with 50% irrigation water caused increase the yield (Hassen, 2015). In study mentioned that the grain yield increased when field capacity at 50% for varieties; Sham 6, Bekal and Iba 99, in following proportions; 68.14, 61.91 and 72.24% respectively by comparative with control (without irrigation) in depending on rainfall as zero tillage (Awais, 2003). In other study mentioned that the yield of wheat grain increased from 2.61ton/ha as control in depending on rainfall to 4.61ton/ha when added 68mm as supplemental irrigation with zero tillage (Hassen and Thanoon, 2011). In general form the irrigation system by using 30mm with duration one month it caused increase on vegetative and yield characters without plowing. The zero tillage in arid and semi-arid region is an important system for crop productivity by the reason of maintaining of soil moisture. This study focus on effect of two agricultural systems first zero tillage by comparative with traditional culture by applying Iba-99 of wheat variety with supplying the plant nutrient requirements by 4 rates of urea 64% and 3 rates of superphosphate 20% fertilizers. It is necessary to improve the productivity of wheat and to innovate modern methods to increase the productivity of the unit of the area. Hence, comes the attention of this research by applying of zero tillage culture, which is one of the sustainable environmental farming techniques aiming to achieve sustainable food production in dry and tropical farming areas, give great flexibility in the agricultural process through the optimal utilization of resources and the preservation of soil moisture by covering the remnants of the previous crop, which increases fertility after decomposition, the process is summarized by placing seeds on the surface of the soil at a depth of 7 cm or depth which crop type is suited by the shape of a groove by using of special seeds drill without plowing. It is important to increase the agricultural production by 15-25% by its compared with traditional agriculture, provide 30% of the time, 40% of employment, 60% of fuel consumption, 40% of water discharges, reduce and facilitate the rates of seed and the way of cultivation then to maintain irrigation water consumption to the level 50%, reduce soil erosion, helps on the recycling of plant waste in the land, activated the role of microorganisms in the analysis of organic compounds and rehabilitation it for non-organic compounds to achieve the case of adsorption and absorption through the roots, helps to reduce the spread of weeds and contribute to the follow a long time of crop rotation. Zero tillage is an agriculture without plowing or minimum a tillage or a system in which crops are planted pre-prepared soil by doing a narrow incision in sufficient depth and width to properly lay and cover seeds. The conservation agriculture aims to reduce soil service operations and thus reduce production costs. That any system of agriculture is affected by several factors, including soil type, kind of crop, the nature of the climate and the extent of the use of mechanization of agriculture as well as the use of timely irrigation of the plant in addition to the control of agricultural pests where characterize by conservation agriculture in the maintain of organic matter, which is the basic indicator of the quality and safety of soil (Ankeny, 1995). Organic matter has an effect on soil fertility, in special on proportion of N / C (Stevenson, 1994). Study mentioned, soil productivity decreases as degradation result of organic matter (Bauer, 1994). Traditional tillage effects on factors that control the nutrient dynamics of soils (Pekrun, 1998). Based on the percentage of organic residues that remain on the soil surface, we can observe two different types of tillage's; traditional tillage and zero tillage (Köller, 2000). Land productivity in which zero

tillage agriculture is applied increased than traditional agriculture (Smiley, 1993), shown other researches positive impact of zero tillage in physical, chemical and biological properties of soil by special form in warming regions (Kochhann, 1996). Pointed some studies in Accad Arabic Center, the zero tillage doing by high economical coefficient by comparative with traditional culture where be lowest the cost of production for many agricultural crops from them wheat crop about 25% by comparative with traditional culture, therefore, zero tillage doing depends up on without tillage or minimum tillage to maintain the soil renewable, because the soil consider as organism were traditional culture display the soil for sun rays and fast drying which effected on microorganisms of soil, in addition the plowing of soil with deep plow will be damage the organic matter which will be lowest in water filtration and bad aeration, in final effects on mineral available by the reason of less organic matter. From zero tillage properties the continuously conservation for soil covering by residue of crop which prevent soil from water erosion and sun heat (Ayman Alshahada Aluoda, 2010). Summarize the advantages of zero tillage culture; lowest of employment needs, less of fuel needs. Less of mechanical applying, improving of soil permeable, improving of soil depth profile, productivity sustain and limit of carbon gas emission where contribute in the less of air pollution (Saad, 2014). Therefore, consider the zero tillage culture system alternative culture system or sustainable culture (Nabeel, 2012), chosen of Wheat plant in this study comes, that the Wheat crop consider strategic crop and first in consumption in global level and in Iraq due to its richest in nutrient energy ;70 % carbohydrates, 11-14% protein, 2-3 % oil, 1,7 % mineral, 10.7 % fiber and supply energy 350 calorie . The aim of study to comparative between two agricultural systems; zero tillage and traditional farming under the effect of urea and phosphate fertilizer by applying Iba-99 of Wheat variety in ecological conditions for Hay district of Wasit governorate in Iraq.

Notice: Donum = 50x50 m = ¼ hectare

MATERIALS AND METHODS

This study was conducted in the agricultural season of 2016/2017 of Alhay district which distance 45 km from Wasit (Kut) governorate, located in middle region of Iraq. The total area of Wasit Governorate 20744 km². It is located specifically in the eastern part of central Iraq, which extends between the latitude lines (27 – 31), (30 – 33) north and between the longitude lines (30-45), (30-46) east, where soil texture was clay as in Table (2). To evaluate the impact of two agricultural systems ; zero tillage and traditional farming on vegetative and productivity properties of Wheat variety Iba-99. Cultivated the variety in 15/11/2016 by seed rates 240 g /plot by average 40 kg/donum, planted in rows their distance 15 cm, area of plot 15m², was fertilized the soil by 2 types; urea 46% in 4 rates of nitrogen fertilizer (zero, 30, 40 and 50 kg / donum, applied in two stages first through planting and the second through tiller stage, with three levels of superphosphate 20% fertilizer (zero, 30 and 40 kg / donum applied in planting stage. The Iba-99 variety of Wheat was planted by using the complete randomized block design (CRBD) with three replications by area plot 3x5 m². applied all crop management on the plots after planting. The samples were taken by area 1 m² using a wooden square by dimensions 1x1 m² from the middle of each plots, data recorded for each experimental units for study following characteristics; plant

height cm, number of tillers, spike length cm, number of seeds / spike, number of spikes / m², weight of 1000 seed and total of grain yield ton/h. The data were analyzed statistically according to (CRBD) design and compared the mathematical means due to Duncan test at probability levels of 5% and 1% by depending to text book (Al-Rawi, 1980).

RESULTS AND DISCUSSION

In current the sustainable ecological agriculture has been come one of the essentials in the sustainable productivity to achieve a food security particularly in wheat crop because it was the main crop in production and occupy of wide lands in world and Iraq, that the selection of zero tillage with wheat Iba-99 variety due to the variance rates of phosphorous and nitrogen fertilizer and their comparative with traditional farming where distinguish the study region characterize by follows climate elements in Table (1); annual average temperature range between 9 c0 in winter to 45 c0 in summer by average 26.064 c0, humidity average 39.540% and total annual rainfall 134.5 mm, where hot climate, high moisture looses and less rainfall (Ministry of Environment in Iraq, 2017).

traits from the traditional culture, the values were superior in the zero tillage culture were: Plant length 81.3cm Number of tillers 7 /plant, Spike length 11.5 cm, Number of spikes 302 / m², Number of grains 51 /spike, Weight of 1000 grains 43,2 g and the total grain yield 3,680 ton / hectare while values of traditional culture were ; Plant length 81.2cm, Number of tillers 6 /plant, spike length 11.4cm, Number of spikes 301/ m², Number of grains 50/spike, Weight of 1000 grain 42.1 g and the total of grains yield 3,520 t/h. Table (Marwan, 2004), shows the superior of nitrogen fertilizer at rate of 50 kg/d in all traits as following ; Plant length 92.3cm, Number of tillers 9/plant, length of spike 11.9cm, Number of spikes 307/ m², Number of grains 57/spike, Weight of 1000 grains 46.4 g and the total of grain yield 4,160 t / h. Table (5) shows the superior of phosphate fertilizer at rate 40 kg/d in all traits ; Plant length 88.6cm, Number of tillers 8 / plant, length of spike 11.6 cm Number of spikes 304 / m², Number of grains 55/spike, Weight of 1000 grains 45.2 gm and the total of grains yield 4,060 t / h. The interaction between the two culture systems and both rates of fertilizers (Nitrogen 50, Phosphate 40 kg / d) showed significant superiority in all traits. The applying of nitrogen and phosphate fertilizer by rates 50, 40 kg / d, respectively is better than the conventional culture

Table 1. Average monthly value of climate elements of was it governorate station 2016-2017

Month	Temp. c	Humidity %	Rainfall mm
Jan.	11.77	7.5	31
Feb.	14	63	17.5
Mar.	18	65.64	21
Apr.	25	45.35	12
May	32	31	1
June	44	24	-
July	45	25	-
Aug.	38	25	-
Sep.	31	26	1
Octob.	31	39	7
Nov.	14	55	20
Dece.	9	68	24
Annual average	26.064	39.540	134.5

Table 2. Soil analysis in study region explain Physical and chemical characters

Properties	Value
Orgnic mater	0.9
E.C dsm	2 mm
Cation Exchange capacity Meq.100g soil	39
available N ppm	6.5
Available p ppm	10.5
Soluble K ppm	200
Caco3 g. kg	31
Soil texture	Value
Sand	21
	%
Clay	52
	%
Silt	27
	%
Texture class	Clay

Table (2) Explain soil analysis in study region the texture was clay (Research Station of Wasit Governorate, 2016). The aim of research how to activation the relationship between environmental factor that represented by farming method and genetic factor by use the Iba-99 variety with supplying its nutrient needs and their reflection on vegetative growth & yield characters. Table (3) shows the variance between zero tillage and traditional farming ,that the zero tillage showed an increase than traditional culture at level of 0.05 but did not differs significantly at level 0.01 in all vegetative and yield

system at all rates of nitrogen and phosphate fertilizers. Table (6) shows the interaction between the zero tillage culture system and both rates of fertilizer (Nitrogen 50, Phosphate 40 kg / d) showed significant superiority in probability level 0,05 and not differs in probability level 0,01 in all traits. where yield production reached 4,269 and 4,165 ton/ h respectively. Conclusion that N,P fertilizers both kinds were better than the interaction between traditional farming and both kinds of fertilizer in all traits of plant, this consistent with (Hassan and

Table 3. The effect of culture system on vegetative & yield properties without fertilizer in plant

Culture system	Plant length cm	Spike length cm	Tillers number/plant	spikes number/m ²	Seeds number/spike	Weigh of 1000 seed gm	Yield ton/h
Zero tillage	a81,3	a11,4	7a	a302	51 a	a43,2	3,680a
Traditional culture	a81,2	a11,4	6b	b301	b50	b42,1	3,520a

Means preceded by similar do not differ among than the level of probability of 0.01

Table 4. The effect of urea fertilizer rates on vegetative & yield properties

Urea rate kg/d	Plant length cm	Spike length cm	Tillers number/plant	spikes number/m ²	Seeds number/spike	Weigh of 1000 seed gm	Yield ton/h
Zero	c81,3	b11,4	bc7	C302	d51	C43	3,680bc
30	bc90,1	b11,6	b8	bc305	c54	b45,8	3,800b
40	a92,3	a11,8	a9	b306	b56	a46,1	3,760b
50	a92,3	a11,9	a9	a307	7a5	a46,4	4,160a

Table 5. The effect of superphosphate fertilizer rates on vegetative & yield properties

Superphosphate kg/d	Plant length cm	Spike length cm	Tillers number/plant	spikes number/m ²	Seeds number/spike	Weigh of 1000 seed gm	Yield ton/h
Zero	b81,3	a11,4	b7	b302	bc51	b43,2	3,680b
30	b82,3	a11,4	a8	b303	b53	a45,1	3,840b
40	a88,6	a11,6	a8	a304	a55	a45,2	4,060a

Table 6. The effect of interaction between agriculture systems and the rates of N, P fertilizers on vegetative & yield of plant

System of culture	Fertilizers rate	Plant length cm	spike length cm	Tillers number/plant	spikes number/m ²	Seeds number/spike	Weigh of 1000 seed gm	Yield ton/h
Zero tillage	N zero	c81,3	b11,4	b7	b302	b51	B43,2	3,680b
	N 30	b90,2	b11,6	b8	a 305	55a	A45,1	3,760b
	N 40	a92,3	b11,8	a9	a306	a56	A46,1	4,000a
	N 50	a92,3	a12,9	a9	a307	a56	A46,4	4,269a
	P zero	b81,3	b11,4	b7	b302	b51	B43,2	3,680b
	P 30	b82,3	b11,4	b8	b303	b53	A45,1	3,840b
	P 40	a88,6	b12,6	a8	a304	a55	A45,2	4,165a
	Traditional culture	N zero	b81,2	b11,4	b8	b301	b50	B42,2
Traditional culture	N 30	b90,1	b11,5	a9	b304	b54	A45,7	4,160a
	N 40	a92,3	b11,8	a9	a306	a56	A46,1	4,163a
	N 50	a92,3	a11,8	a9	a306	a56	A46,5	4,164a
	P zero	b81,3	b11,4	b7	b302	b51	b43,2	3,525b
	P 30	b82,3	b11,4	a8	b303	b53	45,1a	3,800a
	P 40	a88,6	a12,6	a8	a304	a55	a45,2	4,840a

Thanon, 2015; Pashkan, 2010; Mohammed Othman, 2012; Maroof, 2006). Evaluates the zero tillage system farming better than traditional farming due to improving of all traits of plant in addition of its ecological, economical importance in achievement of sustainable agricultural development.

Conclusions and Recommendations

That zero tillage system gave positive results where increased the Iba-99 wheat yield in area unit in the study region due to improving vegetative characteristics which reflected in yield. So advice to applied zero tillage for the follows reasons:

- It is important to increase the agricultural production by 15-25%.
- Provide 30% of the time.
- Provide 40% of employment.
- Provide 60% of fuel consumption.
- Provide 40% of water discharges.
- Reduce and facilitate the rates of seed and the way of cultivation.
- Maintain irrigation water consumption to the level 50%.
- Reduce soil erosion.

- Helps on the recycling of plant residues in the land,
- Activated the role of microorganisms in the analysis of organic compounds and rehabilitation to non-organic compounds to achieve the case of adsorption and absorption through the roots,
- Helps to reduce the spread of weeds and contribute to the follow a long time of crop rotation.

REFERENCES

- Al-Rawi Kh. Mahmoud, 1980. "Design and analysis of agricultural experiments", Dep. of Field Crops, Faculty of Agriculture and Forestry, Mosul University.
- American Society of Agronomy, Madison, WI, pp 539-579.
- Ankeny, I.A. 1995. Soil and Water Conservation Society. (1995). Farming for a better environment: A white paper. Soil Water Conserv.Soc.
- Awais, *et al*, 2003. Water harvesting of traditional techniques to develop the drought environment, *International center for agricultural researches in arid regions (ICARDA)*, No. 2, Elope, Syria.
- Ayman Alshahada Aluoda, 2010. Agriculture and Water Journal in Arabic Nation, Number, 26, 2010.

- Bauer, A., Black, A.L. 1994. Quantification of the effect of soil organic matter content on soils productivity. *Soil Science Society of America Journal* 58: 186-193.
- Hassan and Thanon, Hassen S.A, 2015. Effect of supplementary irrigation on production of three wheat crops varieties in Mosul governorate of northern Iraq, *Applied irrigation science journal*, Vol., 40, NO. 1, pp.,91-114.
- Hassen and Thanon, 2011. Management of supplementary irrigation of wheat crop in Mosul region, the second conferences of Technical Education in Baghdad, pp.54-58.
- Hassen, S.A., 2015. Effect of supplementary irrigation on production of three wheat crops varieties in Mosul governorate of northern Iraq, *Applied irrigation science journal*, Vol., 40, NO. 1, pp.,91-114.
- Kathim and Janabee *et al*, 2011, Showing appreciation Response wheat crop in Iraq for the period 1991-2002, *Journal of Iraqi agricultural sciences*,73 (5):pp., 73-79.
- Khalid *et al*, 2006, Economic and standard analysis of the cost functions on the production resources for the wheat crop in irrigational agriculture of Hawija / Kirkuk province, *Journal of Tikrit*, University of Agricultural Sciences, Volume (6), No (3) 2006.
- Kochhann, R. A. 1996 –Alraoes das characteristics fisicas, Quimicase Biologicas do solo, sob sistema de plantio Direto, Rsumos, I conferenica -6- 9 -1996 Annual de plantio, Direto, pp17- 25, 4 Aldea, Nort Editora-Passo, Fundo, Rs., Brazil.
- Köller, K., and B. Rump. 2000. Tillage in Agricultural Engineering, Yearbook 2000, 12, 79–84, Land wirtschaftsverlag GmbH, Münster.
- Maroof *et al*, 2006. Evaluation of drought resistance in some local and newly introduced cultivars of wheat to Iraqi Kurdistan on the basis of growth, yield and quality. *Zanco. J. Sci.* 18(1).
- Marwan Z .R, 2004, measuring gap size of the self-sufficiency of wheat crop in Iraq for the period (2011-2020), *Journal of Baghdad College*, Economy Science, Issue No.2014 pp.,141-152.
- Maulood, N., 2005. Evaluation of grain quality properties of some Iraqi and ICARDA selected durum wheat cultivars, *Mesopotamia J.of Agr. MosulUniv.*, Vol.33,No1,pp.1-8.
- Ministry of Agriculture in Iraq, 2016. Office of Agricultural Research, *Data of Agricultural Crops*, Issue 2; P,7
- Ministry of Environment in Iraq, Meteorological Station of Wasit, Climate factors for 2016/2017.
- Mohammed Othman. 2012. Comparative Study of Some DurumWheat Genotypes Under the Rain Fed Condition of Duhok Governorate, *Journal of Tikrit Univ. For Agri. Sci.* Vol. (12) No. (4). Page 170-173.
- Nabeel, Fathee Alsayed Kendil, 2012. Zero Tillage System the Alternative Agricultural System, Arabic center for studies of Arid region,
- Pashkan *et al*, 2010. Effect of nitrogen levels and water stress on the yield and quality of two cultivars of wheat, Vol .3, No.1, pp.180-188.
- Pekrun, C. and W. Claupein 1998. For schungzur reduzierten Bodenbearbeitung in Mitteleuropa: eine Literaturübersicht, *Pflanzenbauwissenschaften*, 2, 160.
- Research Station of Wasit Governorate, Soil analyses, 2016/2017.
- Saad, Flayeh Hassan, 2014. Zero Tillage Agriculture, General Office for Agricultural Research.
- Smiley, R.W., and D.E. Wilkins. 1993. Annual spring barley growth, yield, and root rot in high- and low-residue tillage systems. *J. Prod. Agric.* 6:270–275.
- Stevenson, 1994. Humus chemistry: genesis composition reaction, John and Sans, Newyork. 2nd edition, Edition/ Format: Print book, San Francisco Public Library Main Library
