EFFECT OF TILLAGE SYSTEM AND SOWING METHOD ON GROWTH AND YIELD OF WHEAT (*TRITICUM astivium L.)* FOR ASSOCIATED WEED IN DRY LAND.

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ABSTRACT

A field experiment effect of tillage system and sowing method on growth and yield of wheat *Triticum astivium L.* for associated weed in the dry land. was carried out during the agricultural season 2019-2020 in two locations, the first in the Telkaif location (T) district 35 km north of the city center of Mosul, and the second in the Hamdaniya location (H) district 30 km southeast of the city center of Mosul, with different soil texture. The experiment included two factors. The first tillage systems: Conventional tillage system (CT) and Zero tillage system (ZT), The second: the Sowing method it includes planting with lines where the space between one line and another is (17, 34, 34×34 cm cross sowing). The experiment was designed according to a experiment system within (split-plot) using a completely randomized block design(R.C.B.D) and with three replications. The seeds were sown (variety Tal Afar 3) at a seed rate of 120 kg.ha^{-1} . fertilizer was added (NPK 15:15:15) 200 kg.ha^{-1} . The data were analyzed statistically the mean parameters were compared using the Duncan multi-range test. The results obtained are summarized as follows: The space (34 cm) and (34 x 34 cm) recored the largest amount of grain yield in both locations, and it was recorded at 427.99 g.m^{-2} and 411.15 g.m^{-2}, respectively, in Al-Hamdaniya, and 474.50 g.m^{-2} and 456.03 g.m^{-2} for the Tlekif . The space (34 x 34 cm) was effective in reducing the number and weight of the broadleaf weeds and it was recorded at 113.67 weeds.m^{-2} and 113.08 g.m^{-2} respectively, in Hamdaniya.

Keywords: Wheat, Tillage system, sowing method.

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تأثير نظم الحراثة وطرائق الزراعة نمو وحاصل الحنطة ***Triticum astivium L.*** والأدغال المرافقة لها في المناطق الديمية.

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الخلاصة

نفذت التجربة لدراسة تأثير نظم الحراثة وطرائق الزراعة نمو وحاصل الحنطة *Triticum astivium L.* والأدغال المرافقة لها في المناطق الديمية.خلال الموسم الزراعي 2019-2020 في موقعين ، الأول في قضاء Telkaif 35 كم شمال مركز مدينة الموصل والثاني في قضاء Hamdaniya 30 كم جنوب شرق مركز المدينة بنسجة ترب مختلفة. وتضمنت التجربة عاملين، الأول: نظم الحراثة: نظام الحراثة التقليدية Conventional tillage (CT)ونظام الزراعة الحافظة Zero tillage (ZT)والعامل الثاني: طريقة الزراعة ويشمل الزراعة بخطوط المسافة بين خط واخر (17 سم ، 34 سم ، 34×34 سم الزراعة المتقاطعة). نفذت تجربة منشقة وبتصميم القطاعات العشوائية الكاملة وبثلاث مكررات. زرعت البذور (صنف تلعفر3) وبمعدل بذار 120 كغم.هكتار$^{-1}$. واضيف السماد المركب (NPK15:15:15 200 كغم.هكتار$^{-1}$). تم تحليل البيانات إحصائياً تمت مقارنة متوسطات المعاملات باستخدام اختبار دنكن المتعدد المدى للمقارنة بين المتوسطات. تتلخص النتائج التي تم الحصول عليها على النحو التالي: تفوقت مسافة (34 سم) و (34×34 سم) اكبر كمية لحاصل الحبوب في كلا الموقعين وسجلت 427.99 و 411.15 غم.م$^{-2}$ على التوالي في الحمدانية و 474.50 و 456.03 غم.م$^{-2}$ لموقع تلكيف. وكانت مسافة (34×34 سم) فعالة في خفض عدد ووزن للأدغال العريضة الاوراق وسجلت 113.67 دغل.م$^{-2}$ و 113.08 غم.م$^{-2}$ على التوالي في موقع الحمدانية.

*البحث مستل من أطروحة الباحث الأول.

INTRODUCTION

Wheat is the leading grain and the most important food crop. Its importance is derived from the properties of gluten, which is a coherent string of endosperm proteins in which the grains are Grind, kneaded, and after fermentation, to be baked to produce a loaf of bread **(1)**. The production of wheat in Iraq was estimated at 4343 thousand tons for the 2019 agricultural season, an increase of (99.4%) over the production of the previous year.)100.7%) at the level of Iraq **(9).**

Spread in wheat fields in general, both types of narrow and broad leave weeds and cause fierce competition for the basic nutrients, moisture, and area, which reduces the wheat yield **(11).** The weeds adversely affect crop growth and productivity by competing with crops to resources such as light, water, and nutrients. The weed causes a reduction of up to 66% in the yield of wheat grains or more depending on the density and type of weeds **(15).**

Non-tillage agriculture is defined as carrying out the seeding process without prior plowing the field while minimizing soil agitation to a minimum when sowing, and it is a modern scientific view of an ancient application of the agricultural process practiced by humans relying on the ecological balance without damaging or wasting the natural resources of soil, water and organic and biological soil contents **(8). (13)** added that no-till farming is a key management strategy with spatial and temporal climate variations.

Optimum planting engineering (number and distribution of plants) is pre-requilocation for realizing the full genetic potential of a variety, which can be achieved through adjustments for seed rate and planting space **(10).** There are advantages to planting the crop with narrow seed line space over, wider seed line space is the increase in the number of shoots per unit area, and more efficient use of available water and nutrients from the soil. Increasing plant density, or modifying the canopy through the changing planting geometry, may lead to increased density and disease in some Crops **(14).** Agro-engineering affects light penetration into plant canopies per unit area and the microenvironment inside and around plant canopies. It should be in a way that minimizes competition and maximizes the use of resources (space, solar radiation, nutrients, and moisture) to achieve a higher quotient.

This study aims to find the advantages of the Zero tillage (ZT) system compared with conventional tillage (CT) under the influence of new climate changes and their effect on the yield, its components, and the associated weeds. And determining the best method of sowing method to achieve the largest and best quantity and quality of wheat yield in addition to its efficiency is to reduce the numbers and weights of the weeds.

MATERIALS AND METHODS

A field experiment was carried out during the agricultural season 2019-2020 in two locations, the first in the Telkaif location (T) district 35 km north of the city center of Mosul, and the second in the Hamdaniya location (H) district 30 km southeast of the city center of Mosul, with different soil texture. The experiment included two factors. The first tillage systems: Conventional tillage system (CT) and Zero tillage system (ZT), The second: the Sowing method it includes planting with lines where the space between one line and another is (17, 34, 34×34 cm cross sowing). The experiment was designed according to a experiment system within (split-plot) using a completely randomized block design(R.C.B.D) and with three replications, each plot represents a repeat-containing (15 treatments). The seeds were sown (variety Tal Afar 3) at a seed rate of 120 $kg.ha^{-1}$. fertilizer was added (NPK 15:15:15) 200 $kg.ha^{-1}$ The data were analyzed statistically in the SAS program and the mean parameters were compared using the Duncan multi-range test. The results obtained are summarized as follows: the studied traits: number of narrow-leaved $weed.m-^{2}$, number of broad-leaved $weed.m^{-2}$, dry weight (D.W.) of narrow-leaf weed $g.m^{-2}$, dry weight (D.W.) of broad-leaf $.m^{-2}$, the height of wheat plant /cm, and spike length.cm, the weight of spike

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grains.g, the weight of 1000 grains.g, and the grain yield g.m^{-2}.

RESULTS AND DISCUSSION

1 - The effect of tillage systems on the growth and productivity of wheat and the associated weeds.

The results of Table (1) for the tillage systems indicate that there are no significant differences between the tillage systems at the Hamdaniyah location despite the statistical superiority of the (ZT) system in the traits of the number of narrow weeds, the weight of the narrow weeds and the weight of the broad weeds compared to the (CT) system. No significant differences were found between the two tillage systems in the traits Spike length, grain weight per spike, the weight of 1000 grain, and grain yield. As for the Telekef location, we notice the significant superiority of the (CT) system in the characteristic of the number of narrow leaves, the weight of the seeds per spike, the yield of the grains, and the record of 6.777 weed.m^{-2}, 1.057 g.m^{-2} and 460.611 g.m^{-2}, respectively, compared with the (ZT) system. No significant differences were found between the two tillage systems in the weight of narrow weeds, the number of broad weeds, the weight of the broad weeds, the height of the plant, the length of the spike, and the weight of 1000 grains.

2 - The effect of the sowing method on the growth and productivity of wheat and the associated weeds.

The results of Table (2) for sowing methods at the Hamdaniya location show no significant differences between planting space in the traits of the number of broad weeds, the length of the spike, and the weight of 1000 grains, while space exceeded (34×34 cm) in the traits of the weight of the narrow weeds, the weight of the broad weeds, the height of the plant, the weight of the weight grains in the spike and the record. 5.152 g.m^{-2}, 113.08 g.m^{-2}, 108.807 cm, and 1.156 g.m^{-2}, respectively, and space of (34 cm) outperformed the spike length and grain yield, and scored 1.2005 g.m^{-2} and 427.99 g.m^{-2}, respectively. As for the Telkif location, there were no significant differences between the space for the traits of the number of broad weeds, the weight of the broad bushes, the height of the plant, the weight of the spike grains, and the weight of 1000 grains, while the distance was significantly higher by (34 cm) and (34×34 cm) in the trait of the number of narrow weeds, the weight of the thin weeds, the grain yield, and space (34) cm of spike length trait.

3 - The effect of tillage systems and sowing method on the growth and productivity of wheat and the associated weeds.

The results of the interaction in Table (3) for the Hamdaniya location showed the significantly superior of the (ZT) system with a distance of (34 cm) and (34×34 cm) in the characteristic of the number of narrow weeds and the number of broad weeds, in addition to the superiority of the distance of (34×34 cm) in the (CT) system and (ZT) system. They scored 108.45 g.m^{-2} and 117.71 g.m^{-2}, respectively. The space of (34×34 cm) was significantly superior to the (ZT) system in the characteristic of plant height and spike length, and it recorded 113.107 cm and 9.800 cm, respectively. There were no significant differences in the weight of 1000 grains. As for the Telekif location, all planting distances outperformed with the CT system in the quality of the number of narrow weeds and the weight of the narrow weeds, while the space of (34 cm) and (34×34 cm) with the (ZT) system outperformed in the quality of the number of narrow weeds and the weight of the narrow weeds, and there were no significant differences in the characteristic of Number of broad weeds, plant height and 1000 grains of weight. The (CT) system and (ZT) system, with a space of 34 cm, outperformed the quotient and scored 493.65 g.m^{-2} and 533.99 g.m^{-2}, respectively.

The tillage system (CT) at the Hamdaniya location to an increased in the number and density of the weeds, and this is consistent with what **(16)** Conventional tillage system (CT) as a result of tillage and turning

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the soil contributes to encouraging the emergence of some seeds buried on the surface of the soil as a result which helps them to germinate. On the other hand, the zero tillage system (ZT) reduces the number of narrow-leafed weeds compared to the Conventional tillage system (CT). The reason is that the zero tillage system (ZT) has reduced soil agglutination and thus the percentage of weed seed germinating on the soil surface decreases and this is consistent with what it found **(3) (2) (7).** As for Tilkaif location, there were no significant differences between the tillage system (CT) and the zero tillage system (ZT). The reason may be attributed to the increase in the amount of rain in this location and thus reduce the differences between them and this is consistent with what **(17)** found that zero tillage is more effective under dry climatic conditions, while it is less effective in heavy rainy seasons. the CT system gave the largest yield / m, and this is consistent with what **(12)** stated that under conventional tillage the result of better ventilation helps in penetration Deeper to the roots and thus more nutrients to be absorbed. Consequently, it helped cumulatively in achieving better growth under conventional tillage compared to (ZT) and the reason for the weight of grains per spike and increase in the grain yield. It does not agree with what was found **(5) (4)** that conservation agriculture gave the highest yield of tillage.

The sowing at a space of (34×34 cm) gave the lowest number and weight of broad-leaved weeds at the Hamdaniya location, and the reason is attributed to breaking the lines of light falling on the ground and thus reduces their access to weeds plants and limits their growth and this is consistent with what he mentioned **)7)** that space of (34×34 cm)reduces weights of broad-leaved weeds. space of (34×34 cm)of gave an increase in the height of the plant and the weight of the grains in the spike, and the space of (34 cm) was given greater for grains in both locations and this may be attributed to the wide distances produced a greater amount of dry matter and its deposition in the grains compared to the distance of 17 cm and this is consistent with what found **(6)** that space of (34×34 cm)gave the highest significant values of the grain yield.

the space of (34×34 cm) gave The fewest number of narrow weeds, the weight of the narrow weeds, the weight of the broad weeds, the height of the plant, and the length of the spike with the (ZT) system, and this is due to the efficiency of this space in restraining the growth of the weed due to the efficiency of cross-cultivation that objection the light lines and prevents the plant canopy from reaching the weed Limiting its growth and efficiency in harvesting water and providing it to the wheat plant.

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Table (1) The effect of tillage systems on the growth and yield of wheat and the associated weeds during the 2019-2020 agricultural season.

Tillage system	No. of Narrow weeds (.m^{-2})	No. of Broad weeds (.m^{-2})	D.W. of Narrow weeds (g.m^{-2})	D.W. of Broad weeds) (g.m^{-2})	height of plant. (cm)	spike length (cm)	Weight grains of spike (g)	Weight of 1000 grains (g)	Grain yield (g.m^{-2})
Hamdaniya									
(CT)	27.00 a	141.555 a	19.139 a	122.728 a	100.911 b	9.091 a	1.150 a	39.300 a	432.973 a
(ZT)	7.511 a	117.400 a	5.303 b	139.104 a	110.897 a	9.487 a	1.091 a	38.386 a	415.60 a
Telkaif									
(CT)	6.777 b	26.111 a	6.065 a	16.614 a	96.080 a	8.782 a	1.057 a	42.242 a	460.611 a
(ZT)	31.000 a	26.311 a	21.102 a	20.570 a	98.168 a	8.777 a	0.992 b	41.036 a	421.846 b

Table (2) The effect of sowing methods on the growth and yield of wheat and the associated weeds during the 2019-2020 agricultural season.

Sowing method	No. of Narrow weeds(.m^{-2})	No. of Broad weeds(.m^{-2})	D.W. of Narrow weeds (g.m^{-2})	D.W. of Broad weeds (g.m^{-2})	height of plant. (cm)	spike length (cm)	Weight grains of spike (g)	Weight of 1000 grains (g)	Grain yield (g.m^{-2})
Hamdaniya									
17 cm	12.167 a	150.73 a	12.218 ab	155.62 a	105.86 ab	9.046 a	1.006 b	38.446 a	358.71 c
34 cm	25.567 a	124.03 a	19.293 a	124.05 ab	103.047 b	9.301 a	1.2005 a	39.653 a	427.99 a
34*34 cm	14.033 a	113.67 a	5.152 b	113.08 b	108.807 a	9.520 a	1.156 a	38.430 a	411.15 b
Telkaif									
17 cm	40.900 a	24.867 a	28.382 a	15.683 a	95.700 a	8.743 b	1.036 a	42.068 a	393.12 b
34 cm	7.333 b	29.200 a	6.670 b	19.634 a	97.787 a	8.980 a	0.977 a	42.140 a	474.54 a
34*34 cm	8.433 b	24.567 a	5.700 b	20.463 a	97.887 a	8.616 b	1.061 a	40.710 a	456.03 a

Table (3) The effect of tillage systems and sowing methods on the growth and yield of wheat and the associated weeds during the 2019-2020 agricultural season.

Tillage system	farming methods	No. of Narrow weeds (.m^{-2})	No. of Broad weeds (.m^{-2})	D.W. of Narrow weeds (g.m^{-2})	D.W. of Broad weeds (g.m^{-2})	height of plant. (cm)	spike length (cm)	Weight grains of spike (g)	Weight of 1000 grains (g)	Grain yield (g.m^{-2})
Hamdaniya										
(CT)	**17 cm**	20.467 ab	139.07 ab	18.161 b	134.98 ab	101.627 cd	8.886 b	1.029 bc	39.147 a	359.09 c
	34 cm	37.533 a	150.67 ab	33.149 a	124.77 ab	96.60 d	9.146 ab	1.239 a	40.647 a	493.65 a
	34*34 cm	23.00 ab	134.93 ab	6.107 bc	108.45 b	104.507 bc	9.240 ab	1.182 a	38.107 a	446.17 b
(ZT)	**17 cm**	3.867 b	162.40 a	6.275 bc	176.26 a	110.093 a	9.206 ab	0.982 c	37.747 a	358.33 c
	34 cm	13.600 b	97.40 b	5.437 bc	123.34 ab	109.493 ab	9.456 ab	1.161 a	38.660 a	452.33 b
	34*34 cm	5.067 b	92.40 b	4.197 c	117.71 b	113.107 a	9.800 a	1.131 ab	38.753 a	436.13 b
Telkaif										
(CT)	**17 cm**	3.733 b	30.267 a	7.853 b	23.932 ab	94.600 a	8.773 b	0.992 ab	42.380 a	367.39 d
	34 cm	6.667 b	25.733 a	5.277 b	14.676 bc	97.933 a	8.850 b	1.069 a	43.087 a	533.99 a
	34*34 cm	9.933 b	22.333 a	5.067 b	11.236 bc	95.707 a	8.723 bc	1.110 a	41.260 a	480.45 b
(ZT)	**17 cm**	78.067 a	19.467 a	48.911 a	7.435 c	96.800 a	8.713 bc	1.080 a	41.756 a	418.85 c
	34 cm	8.000 b	32.667 a	8.063 b	24.592 ab	97.640 a	9.110 a	0.885 b	41.193 a	415.09 c
	34*34 cm	6.933 b	26.800 a	6.333 b	29.685 a	100.067 a	8.510 c	1.012 a	40.160 a	431.60 c

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