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Evaluation of interaction effect of some herbicides and diammonium phosphate application on growth and yield of wheat

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ABSTRACT

The study was conducted during the 2023-2024 agricultural season in Nineveh Governorate, Tel Kaif District, Wannah location according to latitude and longitude (36.535916, 42.764820), located 60 km north of Mosul city center. The objective was to Evaluation of interaction effect of some herbicides and di ammonium phosphate application on growth and yield of wheat. The study included two factors: the first, Fertilization: Ground DAP fertilizer (18:46:0) applied once at planting, and Foliar DAP fertilizer (18:46:0) applied twice, first (Zadoks scale 17) 24/12/2023 and second (Zadoks scale 25) on 12/2/2024. The second: (Control, Timeline Trion EC , Atlantis OD , Pallas OD , Discipline OD , Axial 050 EC + U46-Combi fluid 6 SL(Mix) and Totic 10 EC + U46-Combi fluid 6 SL(Mix). The Planting was conducted in the experimental field on 26/11/2022 using the Babel 113 variety. The experiment was applied according to the international experiments system and designed based on the randomized complete block design (R.C.B.D) with three replicates. Foliar fertilization excelled in reducing the density and weight of weeds, recording (16.84 weeds.m-2 and 17.21 g.m-2) compared to soil fertilization. However, there were no significant differences between the fertilizers in all yield traits except for plant height, where soil fertilization outperformed foliar fertilization, recording 94.49 cm. The herbicide Discipline, (Mix) Axial+U46, and (Mix) Totic+U46 excelled in reducing the density and weight of weeds, recording (12.70, 13.48, and 13.16 weeds.m-2 and 12.11, 13.33, and 12.55 g.m-2) respectively. Additionally, the herbicide Discipline and (Mix) Totic+U46 excelled in the traits of the number of spikes and grain yield, recording (613.71 and 603.21 spikes.m-2 and 901.25 and 907.42 g.m-2).

تقييم تأثير تفاعل بعض مبيدات الأدغال واستخدام ثنائي فوسفات الأمونيوم على نمو وإنتاج القمح

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الخلاصة

نُفذت الدراسة خلال الموسم الزراعي (٢٠٢٣- ٢٠٢٤) في محافظة نينوى / قضاء تلكيف / ناحية وانه، الموقع حسب خط طول وعرض (٣٦.٥٣٥٩١٦,٤٢.٧٦٤٨٢٠) والتي تقع على بُعد (٦٠) كم شمال مركز مدينة الموصل لتقييم تقييم تأثير تفاعل بعض مبيدات الأدغال واستخدام ثنائي فوسفات الأمونيوم على نمو وإنتاج القمح. بعاملين الأول التسميد (سماد DAP الأرضي ١٨:٤٦:٠ دفعة واحد عند الزراعة و سماد DAP الورقي ١٨:٤٦:٠على دفعتين الأولى بتاريخ ٢٠٢٣/١٢/٢٤ (Zadoks scale 17) والثانية بتاريخ ٢٠٢٤/٢/١٢) (Zadoks scale 25) والعامل الثاني المبيدات (معاملة المقارنة و Timeline Trion EC و Atlantis OD و Pallas OD و Discipline OD و Axial 050 EC + U46-Combi fluid 6 SL(Mix) و Totic 10 EC + U46-Combi fluid 6 SL(Mix). تمت تهيئة الأرض وتنعيم التربة وأُجريت الزراعة في أرض التجربة بتاريخ (٢٠٢٢/١١/٢٦) بصنف (بابل ١١٣)، طُبقت التجربة وفق نظام التجارب العالمية وبتصميم القطاعات العشوائية الكاملةR.C.B.D)) وبثلاث مكررات. تفوق التسميد الورقي في خفض كثافة و وزن الادغال وسجلا (١٦.٨٤ دغل.م-٢ و ١٧.٢١ غم.م-٢) على التسميد الأرض، بينما لم تسجل فروقات معنوية بين الأسمدة في كل صفات الحاصل عدا صفة ارتفاع النبات تفوق السماد الأرضي على الورقي وسجل ٩٤.٤٩ سم. وتفوق مبيد Discipline، (Mix) Axial+U46و (Mix) Totic+U46في خفض كثافة و وزن الادغال وسجل (١٢.٧٠ ، ١٣.٤٨ و ١٣.١٦ دغل.م-٢ و ١٢.١١ ، ١٣.٣٣ و ١٢.٥٥ غم.م-٢) على التوالي. وكذلك تفوق مبيد Discipline و (Mix) Totic+U46 في صفات عدد السنابل وحاصل الحبوب وسجلا (٦١٣.٧١ و ٦٠٣.٢١ سنبلة.م-٢ ٩٠١.٢٥ و ٩٠٧.٤٢ غم.م-٢.

الكلمات المفتاحية : الحنطة، مبيدات الادغال، الخصوبة، الرش، الادغال.

INTRODUCTION

Wheat (Triticum aestivum L.) is one of the most abundant food crops in the world and belongs to the Poaceae family. However, yield can increase up to 11-fold if high-yielding varieties are adopted along with optimal use of fertilizers, irrigation, and herbicides (Wahab & Aljuburi, 2023.(

With the growing population, the Food and Agriculture Organization (FAO) projected that the world population would reach nine billion by 2050, necessitating a doubling of crop production to meet future food needs (FAO, 2020). According to global statistics, the world grain production in 2023/2024 is expected to be approximately 784.91 million metric tons (Statista, 2024.(

Statistics for the winter season of 2023 indicate that the total planted area for wheat crops reached 8,420,000 dunams, with a wheat production of 4,248,000 tons. The average yield per dunam, based on the total planted area, was estimated at 504.5 kg (ASGIS, 2023). Weeds are one of the most critical biological factors affecting agricultural production, causing reductions in the yields of various crops worldwide (Anthimidou et al., 2020). They lower the quality and quantity of crops and pose health risks to humans and animals. Weeds negatively impact crops by competing for light, nutrients, soil moisture, and space. One of the key reasons for reduced wheat yields is the failure to follow scientific methods in planting and managing wheat crops, particularly in weed control. Weeds can cause yield losses ranging between 30-50%, as they are a limiting factor in the growth and productivity of this crop (Halawa, 2019).

Herbicides are one of the most effective tools for controlling weeds and reducing losses in agricultural crop productivity. Chemical control is superior to traditional methods due to its ease of use, low cost, and rapid action in eliminating weeds and mitigating the damage they cause to the growth and yield of various crops (Matzrafi et al., 2017). The decline in wheat production is primarily due to soil fertility depletion, reduced fertilizer usage, and the loss of soil nutrients through wind or water erosion. Therefore, mineral fertilizers, especially those containing nitrogen, phosphorus, and potassium, have long been used to enhance soil fertility and improve the production of wheat and other crops, as these nutrients are the most limiting in nearly all soils (Jarecki et al., 2017). Foliar fertilization in wheat crops is crucial as it provides nutrients directly to the plants through the leaves, offering a quick and effective solution to replenish lost nutrients and stimulate plant growth, especially during critical growth periods (Mussarat et al., 2021). the aims of experiment: Evaluating six types of herbicides, five of which are distributed to farmers by the Plant Protection Directorate, to determine the most effective ones for controlling weeds in wheat fields. Comparing ground and foliar fertilization to determine which method is superior.

MATERIALS AND METHODS

The study was conducted during the 2023-2024 agricultural season in Nineveh Governorate, Tel Kaif District, Wannah Sub-district, at coordinates (36.535916, 42.764820), located 60 km north of Mosul city center. The aim was to evaluate herbicides and ground and foliar fertilization systems on the growth and yield of two varieties of bread wheat (Triticum aestivum L.) and the associated weeds.

Agricultural Practices*The land was prepared by plowing it twice in perpendicular directions using a moldboard plow and then smoothing the soil with disc harrows. Planting was done in the experimental field on 26/11/2022 using the Babel 113 variety, The experiment was irrigated supplementarily using fixed sprinklers, and the harvest was completed on 28/5/2023.

Experimental Design*The experiment was applied according to the factorial experiments system and designed based on the randomized complete block design (R.C.B.D) with three replicates. The area of each experimental unit was (1.5 × 3) (4.5 m²), with a distance of 2 meters between replicates and 1 meter between experimental units as buffer zones. Treatments were randomly distributed among the experimental units.

The objective was to evaluate herbicides and the ground and foliar fertilization system on the growth and yield of two varieties of bread wheat (*Triticum aestivum* L.) and associated weeds. The study included two factors: the first, Fertilization: Ground DAP fertilizer (18:46:0) applied once at planting, and Foliar DAP fertilizer (18:46:0) applied twice, first on 24/12/2023 and second on 12/2/2024. The second: (Control, Timeline Trion EC , Atlantis OD , Pallas OD , Discipline OD , Axial 050 EC + U46-Combi fluid 6 SL(Mix) and Totic 10 EC + U46-Combi fluid 6 SL(Mix.(

Studied Traits: Total Weed Number. (weeds/m²), Total Weed Weight (g/m²), Plant Height (cm), Flag Leaf Area (cm²), Number of Grains per Spike, Number of Spikes (spikes/m²), 1000-Grain Weight (g) and Grain Yield (g/m²)

Table (1) Herbicide information

Commercial Herbicide Name	Active Substance and Concentrate	Recommended usage rate	Target weeds
Timeline Trion EC	Pinoxaden + Clodinafop-Propargyl + Florasulam	١.٢٥ L.ha	Narrow and Broad-leaved weeds
Atlantis OD	Mesosulfuron Methyl 30 g/ kg + Iodosulfuron-Methyl 6 g/ kg + Mefenpyer- Diethyl 90g/ L	+ ٣٢٠ g.ha ٠.٥ L.ha surface against	
Pallas OD	Pyroxsulam 45g/ L	٤٥٠-٥٠٠ ml.ha	
Discipline OD	Diflufenican 5% w.v + Mesosulfuron Methyl 0.75% w.v + Iodosulfuron-Methyl 0.25% w.v + Mefenpyer- Diethyl 2.25% w.v	١.٢٥ L.ha	
(Mix) Axial 050 EC + U46-Combi fluid 6 SL	Pinoxaden 50g/ L + 2.4-D 35% + MCPA 30%	1-1.5 L.ha + 0.75-١ L.ha	
(Mix) Totic 10 EC + U46-Combi fluid 6 SL	Clodinafop- propargyl 20% + Cloquintocet mexyl 80% +2.4-D 35% + MCPA 30%	٦٠٠ cm3.ha + 0.75-١ L.ha	

RESULT AND DISCUSSION

1.Total Weed Number. (weeds/m²).

Table (2) illustrates the effect of fertilizers on the total weed count. Foliar fertilization showed significant superiority, recording the lowest rate of 16.84 weeds/m², while ground fertilization recorded the highest rate of 17.65 weeds/m². the reason might be that the soil fertilization applied at planting gave weeds a greater opportunity to grow compared to foliar fertilizers.

Regarding the effect of herbicides on the total weed count, the herbicides (Discipline, Axial+U46, Totic+U46) recorded the lowest rates, with 12.70, 13.48, and 13.16 weeds/m² respectively. The control treatment recorded the highest rate at 35.90 weeds/m². this might be because these herbicides are systemic and selective, absorbed through roots and leaves, spreading throughout the

plant to stop growth and eliminate or reduce weed plants. This is consistent with the findings of Brejea et al., 2020, and Aljuburi and Anter, 2021. The interaction results between fertilizers and herbicides showed that foliar fertilization combined with Discipline herbicide recorded the lowest rate at 12.12 weeds/m², while ground fertilization and foliar fertilization for the control treatment recorded the highest rates of 36.46 and 35.33 weeds/m² respectively.

Table (2) Effect of Fertilizers and Herbicides on the Total Weed Number (weeds/m²) for the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U46	(Mix) Totic+U46	Men's Fertilizer
Foliar	35.33 a	14.83 c d e	14.11 c-f	15.72 b c	12.12 g	12.95 f g	12.84 f g	16.84 b
Ground	36.46 a	14.42 c – f	15.16 b c d	16.72 b	13.28 e f g	14.02 c –f	13.49 d –g	17.65 a
Men's Herbicides	35.90 a	14.63 c	14.63 c	16.22 b	12.70 d	13.48 d	13.16 d	

Similar characters there are no significant differences at Level 5%

2.Total Weed Weight (g/m²).

Table (3) shows the effect of fertilizers on the trait of total weed weight. Foliar fertilization significantly outperformed, recording the lowest rate of 17.21 g/m², while ground fertilization recorded the highest rate of 18.20 g/m², the reason for the reduced weed weight in foliar fertilizers (Table 2) is consequently the lower dry weights of weeds in these treatments. The effect of herbicides showed that (Timeline Trio, Discipline, Axial+U46, Totic+U46) had the lowest rates, recording 12.90, 12.11, 13.33, and 12.55 g/m² respectively, while the control treatment recorded the highest rate of 42.37 g/m², Axial herbicide belongs to the group of sulfonylurea herbicides, which inhibit the biosynthesis of amino acids in weeds. This is consistent with the findings of Aljuburi (2021), who indicated that the use of herbicides reduced the dry mass of weeds. The interaction results between fertilizers and herbicides showed that foliar fertilization combined with (Discipline and Totic+U46) and ground fertilization combined with Discipline recorded the lowest rates of 11.76, 12.06, and 12.46 g/m² respectively, while ground fertilization for the control treatment recorded the highest rate of 44.03 g/m².

Table (3) Effect of Fertilizers and Herbicides on the number of Total Weed Weight (g/m²) for the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U46	(Mix) Totic+U46	Men's Fertilizer
Foliar	40.72 b	12.65 f g	14.74 c – f	15.45 c d	11.76 g	13.09 e f g	12.06 g	17.21 b
Ground	44.03 a	13.16 e f g	15.17 c d e	15.98 c	12.46 g	13.58 d – g	13.03 e f g	18.20 a
Men's Herbicides	42.37 a	12.90 c	14.95 b	15.72 b	12.11 c	13.33 c	12.55 c	

Similar characters there are no significant differences at Level 5%

3. Plant Height (cm).

Table (4) shows the effect of fertilizers on plant height. Ground fertilization significantly outperformed, recording the highest average of 94.49 cm, while foliar fertilization recorded the lowest average of 91.76 cm. The results of herbicide effects showed no significant differences between all treatments except for the Pallas herbicide, which recorded the lowest average of 77.80 cm, the reason might be that this herbicide causes a reduction in cell elongation, which consequently leads to a decrease in plant height compared to other treatments. The interaction results between fertilizers and herbicides indicated that ground fertilization for the control treatment

recorded the highest average of 97.93 cm, while ground fertilization with the Pallas herbicide recorded the lowest average of 80.73 cm.

Table (4) Effect of Fertilizers and Herbicides on the number of Plant Height (cm) For the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U 46	(Mix) Totic+U 46	Men's Fertilizer
Foliar	96.05 ab	93.87 b	94.38 a b	74.87 d	94.25 a b	93.85 b	95.07 a b	91.76 b
Ground	97.93 a	96.98 a b	96.18 a b	80.73 c	95.50 a b	96.97 a b	97.15 a b	94.49 a
Men's Herbicides	96.99 a	95.43 a	95.28 a	77.80 b	94.88 a	95.41 a	96.11 a	

Similar characters there are no significant differences at Level 5%

4. Flag Leaf Area (cm²).

Table (5) shows the effect of fertilizers on flag leaf area, indicating no significant differences between ground and foliar fertilization, with averages of 54.29 cm² and 53.99 cm² respectively, The superiority of the traditional fertilizer treatment might be due to the increased availability of nutrients in the soil solution and their absorption by the plant, especially nitrogen, which plays a crucial role in the formation of chlorophyll molecules, proteins, enzymes, hormones, and amino acids involved in cell division and elongation, thereby enhancing plant growth and height, this result is consistent with the findings of Mandal et al. (2015), who indicated that nitrogen plays an important role in increasing plant growth and height. The results for herbicides showed that (Timeline Trio and Discipline) recorded the highest averages of 55.59 cm² and 55.58 cm² respectively, while the control treatment recorded the lowest average of 51.57 cm², The use of herbicides on weeds associated with the wheat crop led to an increase in the flag leaf area, consistent with the findings of Paul et al. (2017) and Singh et al. (2020).The interaction results between fertilizers and herbicides indicated that ground fertilization combined with Timeline Trio herbicide recorded the highest average of 56.09 cm², whereas foliar fertilization for the control treatment recorded the lowest significant difference of 51.17 cm².

Table (5) Effect of Fertilizers and Herbicides on the number of Flag Leaf Area (cm²) For the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U 46	(Mix) Totic+U 46	Men's Fertilizer
Foliar	51.17 h	55.09 b c d	54.24 d e	52.74 g f	55.92 a b	53.62 e f	55.13 b c d	53.99 a
Ground	51.97 g h	56.09 a	54.17 d e	54.88 c d	55.24 a b c	53.46 e f	54.19 d e	54.29 a
Men's Herbicides	51.57 e	55.59 a	54.21 b c	53.81 c d	55.58 a	53.54 d	54.66 d	

Similar characters there are no significant differences at Level 5%

5. Number of Spikes (spikes/m²).

Table (6) shows the effect of fertilizers on the number of spikes, indicating no significant differences between ground and foliar fertilization, with averages of 572.11 spikes/m² and 570.54 spikes/m² respectively. The results for herbicides showed significant superiority for (Pallas, Discipline, and Totic+U46) recording the highest averages of 601.78 spikes/m², 613.71 spikes/m², and 603.21 spikes/m² respectively, while the control treatment recorded the lowest average of 469.83 spikes/m². The effectiveness and high efficiency of these herbicides in combating narrow and broadleaf weeds prevalent in the experimental fields in reducing their numbers and inhibiting their dry weights provided sufficient opportunity for wheat crop plants to consume and utilize all growth factors such as light, moisture, and nutrients. This increased the efficiency of the

photosynthesis process and the production of dry matter, which positively reflected on the transfer of this matter to the spikes, forming grains and increasing their numbers in the spike. This result is consistent with the findings of Kumar et al. (2019) and Wahab and Aljuburi (2023). The interaction results between fertilizers and herbicides indicated that ground fertilization combined with Discipline herbicide recorded the highest average of 620.33 spikes/m², while ground and foliar fertilization for the control treatment recorded the lowest averages of 468.47 spikes/m² and 471.20 spikes/m² respectively.

Table (6) Effect of Fertilizers and Herbicides on the number of Number of (spikes/m²) For the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U46	(Mix) Totic+U46	Men's Fertilizer
Foliar	471.20 g	596.92 b c	546.30 f	587.65 c d	607.08 abc	585.90 c d	598.70 abc	570.54 a
Ground	468.47 g	558.65 e f	561.53 e f	615.92 a b	620.33 a	572.15 d e	607.72 abc	572.11 a
Men's Herbicides	469.83 d	577.78 b	553.92 c	601.78 a	613.71 a	579.03 b	603.21 a	

Similar characters there are no significant differences at Level 5%

6. Number of Grains per Spike

Table (7) shows the effect of fertilizers on the trait of the number of grains per spike, indicating no significant differences between soil and foliar fertilization, with averages of (52.20 and 52.00) grains.spike-1. The same table also shows the effect of herbicides on the trait of the number of grains per spike, with the herbicides (Timeline Trio, Pallas, Axial+U46, and Totic+U46) recording the highest averages for the trait at (52.13, 52.53, 52.90, and 52.77) grains.spike-1, respectively, while the control treatment recorded the lowest average at (50.35) grains.spike-The reason for the superiority of herbicides in the trait of the number of tillers can be attributed to the effectiveness of these chemical herbicides in eliminating weed plants and limiting their growth. This reduces competition with crop plants and ensures the availability of nutrients, water, light, and space for the crop plants to form a larger number of tillers. This finding is consistent with the results of Wahab and Aljuburi (2023). The results of the interaction between fertilizers and herbicides on the trait of the number of grains per spike indicate that foliar fertilization with the herbicide (Axial+U46) recorded the highest average for the trait at (53.51) grains.spike-1, while soil and foliar fertilization for the control treatment recorded the lowest averages at (50.37 and 50.32) grains.spike-1, respectively.

Table (7) Effect of Fertilizers and Herbicides on the number of Number of Grain.Spikes-1 for the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U46	(Mix) Totic+U46	Men's Fertilizer
Foliar	50.37 b	51.89 a b	52.22 a b	52.51 a b	52.17 a b	53.51 a	52.76 a b	52.20 a
Ground	50.32 b	52.36 a b	51.91 a b	52.55 a b	51.83 a b	52.28 a b	52.78 a b	52.00 a
Men's Herbicides	50.35 b	52.13 a	52.06 a b	52.53 a	52.00 a b	52.90 a	52.77 a	

Similar characters there are no significant differences at Level 5%

7. ١٠٠٠Grain Weight (g).

Table (8) indicates the effect of fertilizers on the trait of 1000-grain weight, showing no significant differences between soil and foliar fertilization, with averages of (34.58 and 34.25)

grams, respectively. Similarly, Table (7) shows the effect of herbicides on the trait of 1000-grain weight, with the herbicides (Timeline Trio, Atlantis, Discipline) recording the highest averages at (35.26, 35.62, and 35.04) grams, respectively, while the control treatment recorded the lowest average at (32.47) grams. The increase in grain weight with herbicide treatment might be due to the reduced weed density and increased flag leaf area, which led to better translocation of photosynthates from source to sink, thereby increasing grain size. This finding is consistent with the results of Bari et al. (2020) and El-Taif (2021). The same table indicates that the interaction between fertilizers and herbicides on the trait of 1000-grain weight showed that soil fertilization with the herbicide (Axial) recorded the highest average at (36.05) grams, while foliar fertilization for the control treatment recorded the lowest average at (32.14) grams.

Table (8) Effect of Fertilizers and Herbicides on the number of 1000-Grain Weight (g) For the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U 46	(Mix) Totic+U 46	Men's Fertilizer
Foliar	32.14 e	34.95 a b c	35.19 a b	33.14 c d e	35.23 a b	34.51 a – d	34.57 a – d	34.25 a
Ground	32.81 d e	35.56 a b	36.05 a	33.82 a – d	34.84 a b c	34.34 a – d	34.62 a – d	34.58 a
Men's Herbicide	32.47 c	35.26 a	35.62 a	33.48 b c	35.04 a	34.42 a b	34.59 a b	

Similar characters there are no significant differences at Level 5%

8. Grain Yield (g/m²).

Table (9) indicates the effect of fertilizers on the trait of grain yield, showing no significant differences between soil and foliar fertilization, with averages of (819.83 and 825.40) grams, respectively. The same table also shows the effect of herbicides on the trait of grain yield, with the herbicides (Discipline, Totic+U46) recording the highest averages at (901.25 and 907.42) grams, respectively, while the control treatment recorded the lowest average at (647.42) grams. This result is attributed to the efficiency of the herbicides used, which significantly affected weed growth, leading to their superiority in growth traits and yield, and consequently increasing grain yield. These results are consistent with those obtained by Al-Jubouri (2021) and Evans et al. (2016). indicates the effect of the interaction between fertilizers and herbicides on the trait of grain yield, showing that soil and foliar fertilization with the herbicides (Timeline Trio, Discipline, Totic+U46) recorded averages of (866.83 , 886.83, 890.50 , 912.00, 890.00 and 924.83) grams, respectively, while soil and foliar fertilization for the control treatment recorded the lowest averages at (645.83 and 649.00) grams, respectively.

Table (9) Effect of Fertilizers and Herbicides on the number of Grain Yield (g/m²) For the season 2023-2024.

Fertilizer's	Control	Timeline Trio	Atlantis	Pallas	Discipline	(Mix) Axial+U 46	(Mix) Totic+U 46	Men's Fertilizer
Foliar	649.00 d	886.83 a	846.17 a b	725.33 c d	912.00 a	833.67 a b	924.83 a	825.40 a
Ground	645.83 d	866.83 a	858. 17 a b	763.50 b c	890.50 a	824.00 a b	890.00 a	819.83 a
Men's Herbicide	647.42 d	876.83 a b	852.17 a b	744.42 c	901.25 a	828.83 b	907.42 a	

Similar characters there are no significant differences at Level 5%

CONCLUSIONS

We conclude from the above that the use of foliar fertilizers reduces weed growth due to the lack or absence of nutrients reaching the roots of weed plants, thus limiting their growth. Additionally,

the lack of significant differences between fertilizers gives an advantage to foliar fertilizers and recommends their use due to their significantly lower costs compared to soil fertilizers. The herbicides Discipline and (Mix) Totic+U46 played a major role in suppressing weed growth, which in turn reflected positively on the yield and its components.

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