Effect of spraying with nano potassium on yield traits and components of genotypes of bread wheat(Triticum aestivum L(.

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Abstract

A field experiment was carried out during winter agricultural season 2023-2024 AD in fields of a farmer in Laylan Zone of Kirkuk Governorate, which is about 19 km east of center of Kirkuk city to study effect of spraying concentrations of nano potassium on yield traits and its components for bread wheat genotypes. Experiment included seven genotypes. of soft wheat, six of them were introduced by International Center for Maize and Wheat Advance(ICARDA) namely V1,V 2, V3, V4,V 5 and V6 in addition to approved variety Ipaa 99 in Iraqi Agriculture. Experiment was implemented according to a Randomized Complete Block Design (R.C.B.D) in a split-plote arrangement with three replicates, As main Plots included three concentrations of nano-potassium spraying, were 0, 2, and 4 g. l-1 in two stages, first in branching stage was (ZGS:22)) and second in elongation stage was (ZGS:32)) while secondary plots Included Six genotypes (1, 2, 3, 12, 56 and 60) in addition approved variety Ipaa 99 in Iraqi Agriculture and traits of number of spikes per m2, number of grains per spike, weight of a thousand grains, biological yield, grain yield and harvest index were studied. Results showed that mean squares of genotypes were highly significant in all studied trait and V60 genotype in recording highest arithmetic means for number of spikes per m2 (378.557) spikes m2, number of grains per spike (41.563) spike grains-1, and weight of a thousand grains (40.266) g. Bioavailability (14191.11) kg ha-1, grain yield (6326.86) kg ha-1, and harvest index (44.303)%.Mean squares of concentrations of spraying with nanopotassium were highly significant in all traits. Concentration (4) g .l -1 sprayed on leaves gave highest arithmetic means for traits number of spikes per m2 (371.203) spikes. m2, number of grains per spike (41.851) grains. Spike-1 and weight of a thousand grains (40.462) and biological yield (15384.76) kg. ha-1, grain yield is (6252.75) kg. ha-1 and harvest index of(40.509)%. Mean squares of interaction between two study factors were highly significant in all traits under study. Combined treatment (V6 genotype + 4g .l-1 concentration of nano potassium) gave highest arithmetic means for traits of number spikes per m2 (402.602) and number of grains per spike (43.690) grains. Per spike-1 weight of a thousand grains is (43.266) g, biological yield (16716.7) kg.ha-1, and grain yield (7570.86) kg.ha-1 and compatible treatment (genotype v6 + second concentration K2 of nano potassium) gave highest mean harvest index of (45.293.%(

Keywords: bread wheat nano potassium, genotypes, yield traits and components

ISSN 2072-3857

Introduction

Wheat (Triticum aestivum L.) is one of most important cereal crops in Iraq and world due to its strategic role in achieving food security. It is from Poaceae family. Its importance lies in fact that its grains contain a high percentage of proteins and carbohydrates that are important in producing energy for humans. It is considered first crop in terms of cultivated area, production and consumption]15[World production rate reached 8018 million tons]16[At country level, production reached 2765 thousand tons and cultivated area reached 7487 thousand dunums]11]

Although Iraq is original homeland of its emergence, it still suffers from a decline in its productivity and quality. In order to fill gap between production rate and increase in population numbers, local varieties must be developed by introducing genotypes from specialized international centers with aim of expanding genetic variation and benefiting from them in Breeding and genetic advance programs are one of most important and fastest ways to improve field crops .

Potassium is one of necessary elements for plant. It plays important roles in growth of the Wheat crop because it activates more than 120 enzymes necessary in plant's vital and physiological processes and works to activate plant hormones, especially Gibberellin and auxin, which are important in forming origin of flowers and thus increasing number of grains. Spraying with potassium also contributes to increasing growth and production of wheat crops by increasing effectiveness of plant's vital processes.]24[It helps in opening and closing stomata, regulating osmotic potential of plant cells and increasing cell permeability, in addition to its contribution to process of carbon metabolism, cell division and resistance to plant diseases. Its deficiency leads to a reduction in number of leaves and their size lead to a reduction in capacity of source and a decrease in carbon representation, which in turn leads to a decrease in components of yield and the quality of grains. In order to improve crop productivity we must use modern agricultural techniques, including use of nano-fertilizers, which is one of solutions that addresses many problems through its good qualities in providing nutrients to plant, solving the problems of its readiness in the soil, and ease of compensating for deficiency through spraying, as well as reducing amount of added mineral fertilizers to soil and easily penetrates cell wall and prevents water and soil pollution]20.[It aims to evaluate performance of the six genotypes introduced in ICARDA, in addition to approved local variety IPAA 99 within Kirkuk Governorate as well as to demonstrate response of yield traits and its components of these genotypes to concentrations of spraying with nanopotassium

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Material and Methods

A field experiment was carried out during winter season 2023-2024 AD in field of a farmer in Laylan Zone of Kirkuk Governorate, which is about 19 km east of center of Kirkuk city to study effect of spray concentrations of nanopotassium on yield traits and its components for seven genotypes of bread wheat. Experiment included seven genotypes. of wheat, six of them were introduced by International Center for Maize and Wheat Improvement (ICARDA) namely V1, V2,V3, V4, V5 and V6 in addition to

ISSN 2072-3857

approved local variety IPAA 99, as shown in table)1(showing names proportions and sources of genotypes used in study .

Table 1. Names of genotypes, their proportions and their sources .

Genotypes	Pedigree	Source
1	Terbol	**ICARDA**
2	Atlas	**ICARDA**
3	Tesfa	**ICARDA**
12	ALMAZ-19/ETBW 4919/3NING MA I 9558//CHIL/CHUM18	**ICARDA**
56	DAJAJ-5/4/CHEN/AEGILOPS SQUAARROSA(TAUS)BCN/3/KAUZ/5/WBLL1*2/KIRITATI	**ICARDA**
60	DEBEIRA//SHUHA-8/DUCULA/3/PASTOR/SERI//PFAU	**ICARDA**
IPAA99	Yres/Bows/3/Jup/Biy/2SI/Yres	**Iraq**

Experiment was implemented according to a Randomized Completely Block Design (R.C.B.D.), in a split plots arrangement with three replicates. Nano potassium was used in the form of K2O% produced by Sadr Ahrar ALSharq Company, imported from AL Khdraa Agricultural Company Iraq Main plots included three concentrations of spray namely 0, 2, and 4 g. l-1 and in two stages first branching stage (ZGS:22) and second elongation stage (ZGS:32)) according to Zadock scale while genotypes occupied secondary plots including six varieties (1,2,3,12,56 ,60) in addition Comparison cultivar IPAA99.Analysis of physical and chemical traits s of field soil was conducted after mixing a homogeneous sample at a depth of 30 cm and results of analysis are as shown in table (2 .(

Table 2. Physical and chemical traits s of experimental soil before Sowing and at a depth of 30 cm.

Traits	Soil texture	Organic matter	macro elements			Soil separators			E.C Soil)(	PH)Soil(
			N	P	K	clay	Silt	Sand		
Measuring unit	–	Kg^{-1} Mg .	%	%	%	Mg. kg^{-1}			dsm^{-1}	–
measuring.	Measure	0.93	0.07	2.07	34.36	60	560	380	0.22	6.7

The experimental soil was prepared for planting by plowing, smoothing by plowing, smoothin and leveling it. Then land was divided into experimental units area of each experimental unit being (2 x 1.5 m2). Nitrogen fertilizer was added in form of urea (N46%) as a source of nitrogen, in an amount of 200 kg ha-1, in two batche first at planting. second was in stage of expelling spike. As for phosphate fertilizer, it was added at once in form of phosphorus pentoxide (48% P2O5) as a source of phosphorus before planting, in an

ISSN 2072-3857

amount of 200 kg ha Potassium fertilizer was added in form of potassium sulfate in one batch with agriculture (46% K2so4) as a source. For potassium in an amount of 200 kg ha-1.Experimental unit included 10 lines and distance between a line and a line was 20 cm. Seeds were planted in a swarm within one line, at a rate of 3.6 g per line at a depth of 3 cm for seeds quantity of seed used was 120 kg ha-1]13[Field was watered immediately after planting, and the watering process was repeated according to plant's need and weed control was carried out manually whenever necessary. When plants reached stage of physiological maturity, Traits were studied: number of spikes (m2), number of grains per (grain .spike-1), weight of 1000 grains (g), biological yield (kg.ha-1), grain yield (kg.ha-1), and harvest index.(%)

they were harvested on 5-11-2024, and they were statistically analyzed according to experimental design used (R.C.B.D) and in a split-plot arrangement once, and arithmetic means were compared according to Duncan's multiple range test and a probability level of 0.05 according to Excel SAS(4 .(

Results and Discussion

Results of analysis of variance in table(3) which shows means of squares of all studied traits, showed that effect of seven genotypes was highly significant at 0.01% probability level on traits of number of spikes per m2, number of grains per spike, weight of a thousand grains, biological yield and grain yield. reason is attributed to variation in compositions. genetic traits mentioned above depend on hereditary nature of these genotypes and extent of their response to environmental factors. As for mean squares of effect of three concentrations of spraying with nanopotassium it was highly significant for all traits studied. The reason may be due to role of spraying with potassium in activating enzymes responsible for vital processes in plant, such as energy metabolism. The synthesis and construction of starch reduction of nitrate formation of protein and transfer of sugar, which are important in formation of grains. Because genotypes are different in their genetic composition they behaved differently in response to spraying concentrations, since all metabolic activities are genetically controlled. effect of interaction between two study factors was highly significant in all traits studied. The reason is due to interaction between genetic and environmental variation, which is reflected in variation in phenotypic traits of genotypes.

ISSN 2072-3857

Table 3. Analysis of variance for traits of yield components represented by mean square (MS.(

S.O.V	d. f	Number of spikes)m^2(	Number of grains per spikes)p .s^{-1}(	Weight 1000 grains(g)	Biological yield ($kg.ha^1$)	Grain yield ($kg.ha^1$)	Harvest index (%)
R	2	7.089	0.084	0.077	70125.4	2307.42	0.662
A	2	30703.744**	119.105**	185.560**	133308636.7**	33152055.97**	128.07**
RA	4	2.536	0.552	0.164	29768.3	16277.96	1.379
B	6	8635.598**	18.591**	34.871**	7128657.1**	5806649.13**	152.58**
AB	12	225.318**	3.226**	3.001**	165028.6**	280449.07**	16.432**
Error	36	28.493	0.897	0.180	39076.2	1290.3	0.210
Total	62						
C .V		1.596	2.373	1.124	1.536	2.243	2.828

Number of spikes per(m2.(

Results of table (4) show that there are significant differences between arithmetic means of genotypes in trait as V60 genotype record highest mean for trait, amounting to (378.557) spikes per m2 while it differed significantly from Ipaa99 genotype which recorded lowest mean for trait amounting to (301.944)The reason for difference in genotypes is due to their genetic nature as well as ability of V60 genotype to produce largest number of active tillering]20[These results are consistent with]14[. They indicated that there are significant differences between genotypes in trait.

The results of table (4) indicate that there are statistical differences between arithmetic means of concentrations of spraying with nano potassium in trait as 4g.l-1 concentration recorded the highest mean for trait amounting to (371.203) while mean of trait decreased when spraying with nano potassium in control treatment 0g.l-1 with lowest mean for trait amounting to (294.853). The reason is due to role of potassium in increasing number of active branches carrying spikes which was reflected positively in increasing number of spikes per m2]22[. These results were consistent with]6[. who indicated that there were significant differences between concentrations of potassium spraying in trait.

Arithmetic means of interaction coefficients were significant for the trait as combination treatment 4g.l-1 andV60 gave highest mean for trait amounting to (402.602) while lowest average was for joint treatment 0g.l-1 and V56 with mean of (258.900). These results were consistent with]23[. They reported that there were statistical differences between Combination treatments in trait.

ISSN 2072-3857

Table 4. Arithmetic means for genotypes and concentrations of nano potassium spraying and their interaction with each other in number of spikes per (m2.(

Genotypes	K2	K1	K0	Mean
V1	345.175 d	305.400 g	270.250 i	306.942 e
V2	340.467 ed	345.000 d	310.167 g	348.918 c
V3	392.333 b	391.588 b	295.383 h	341.728 d
V4	387.898 b	370.627 c	320.060 f	359.528 b
V5	343.658 ed	301.667 hg	258.900 j	301.708 f
V6	402.602a	392.733b	340.335de	378.557 a
V7	335.167 e	301.787 hg	268.880 i	301.944 ef
Mean	371.203 a	336.811 b	294.853 c	$\bar{X}$ =334.289

Number of grains per spike (grain. Spike-1.(

We review from results of table (5) presence of significant differences between means of seven genotypes in trait as genotypes V60, V12 and V2 achieved highest arithmetic means for trait and they did not differ significantly trait as their means record(41.563, 40.707) and 41.388 grains. Spike-1 respectively while two genotypes V1 and Ipaa99 recorded lowest mean for trait amounting to (38.425 and 38.666) respectively which did not differ significantly between them. The reason for discrepancy in trait between genotypes is attributed to their difference in exploiting factors available for growth. During flowering stage to form largest possible number of fertile tillers and thus increase number of grains per spike or perhaps the genotypes differ in size of down stream]5[. These results were consistent with]17[. whose study results indicated that there were significant differences between genotypes in trait.

Data from same table showed that there were statistical differences between concentrations of spraying with nanopotassium in trait as concentration of 4g.l-1 was higher by an increase amounting to (11.115)% compared to control treatment. This is due to role of spraying with nanopotassium in controlling plant hormones that are related to emergence of florets and their fertilization as well as its role In building proteins necessary for building plant tissues during carbon assimilation process]2[Results were consistent with]21[who showed that there were significant differences between arithmetic means of spray concentrations for trait.

We note from results of same table that there are statistical differences between arithmetic means of interaction between two study factors, and combinatorial treatment 4g.l-1andV60 was recorded by giving highest mean for trait amounting to 43.690 (grain.spike-1) if it differs significantly from combinatorial treatments, second concentration with two genotypes V2, V60 and (4) g.l-1 with genotypes V1 and V2. and V3 with arithmetic means of (43.333, 42.500, 42.000, 42.466 and 42.133) grains per spike-1respectively, while interactive treatment 0g.l-1 and Ipaa99 gave lowest mean for adhesive amounting to (35.00) spike grains-1.These results were consistent with]19[who mentioned are significant differences between Combined treatments coefficients in trait.

ISSN 2072-3857

Table 5. Arithmetic means of genotypes and concentrations of spraying with nano potassium and their interaction with each other in number of grains per spike (grain spike-1.(

Genotypes	K2	K1	K0	Mean
V1	42.000 abc	37.650 ef	35.626 g	38.425 c
V2	42.466 abc	43.333ad	38.366 ed	41.388 a
V3	42.133 abc	39.656 d	37.766 ef	39.852 b
V4	41.666 bc	41.600 bc	38.856 ed	40.707ab
V5	39.633 d	38.503 ed	36.276 gf	38.137 c
V6	43.690 a	42.500 b	38.500 g	41.563 a
V7	41.366 c e	39.633 d	35.000 g	38.666 c
Mean	41.851 a	40.411 b	37.199 c	$\bar{X}$ =39.820

Weight of 1000 grain (g.(

Results of table (6) indicate that there are statistical differences between genotypes in the trait as two genotypes V60 and Ipaa99 recorded highest arithmetic means for trait and did not differ between them significantly, amounting to 40.266 and 39.902 g respectively, while V56 genotype recorded a decrease in trait with arithmetic mean It record 34.814 g and reason is due to duration genotypes ability to transfer products of carbon metabolism to downstream, especially during formation period (grain-filling period), which affected increase in weight of a thousand grains]7[results were obtained for all of]3[who found significant differences between genotypes in trait.

Results of table (6) showed that there were significant differences between arithmetic averages of concentrations of spraying with nano-potassium in trait as 4g.l-1 concentration gave highest mean for trait amounting to (40.462) g, while comparison treatment recorded lowest mean for trait amounting to (34.581) g. The reason is due to importance of potassium in delaying aging leaves of wheat plants and preserving their vitality and activity and thus maintaining efficiency of carbon metabolism for a longer period, which increased amount of dry materials manufactured in the leaves and transfer of their products to storage places in grains. Nano potassium also provides faster and higher absorption in ate stages of plant growth and in sufficient quantities which has enhanced From the ability of plants to benefit from added nutrients, especially during period of grain filling]1[he obtained identical results]6.]

Results of same table indicated that there were significant differences between arithmetic means of harmonic Combines treatment in trait as two combined treatments 4g.l-1andIpaa99 and 4g.l-1and V60 recorded highest means for trait amounting to (43.533) and 43.266) g, respectively, while the combined treatment 0g.l-1 andV56 gave lowest mean for trait amounting to (32.000) grams. The reason is due to 4g.l-1 concentration of potassium contributed to increasing results of carbon metabolism process and increasing its output from dry materials, which led to an increase in trait These results were consistent with]10[who found significant differences between compatibility coefficients on trait .

ISSN 2072-3857

Table 6. Arithmetic means of genotypes and concentrations of nanopotassium spraying and their interaction together in weight of 1000 grains (g.(

Genotypes	K2	K1	K0	Mean
V1	39.566 d	36.400 hg	32.850 l	36.272 d
V2	41.543 b	38.600e	36.000 hi	38.714 b
V3	40.660 c	37.130 g	34.050 k	37.280 c
V4	37.866 f	38.800 f	34.850 j	37.172 c
V5	36.800 g	35.643 i	32.000 m	34.814 e
V6	43.266 a	40.533 c	37.000 g	40.266 a
V7	43.533 a	40.850 bc	35.323 j	39.902 a
Mean	40.462 a	38.279 b	34.581 c	$\bar{X}$ =37.774

Biological yield (kg ha-1.(

Results of table (7) indicate that there are statistical differences between arithmetic means of seven genotypes for trait, as V60 genotype a record highest mean for trait, amounting to (14191.11) kg ha-1 and they differed significantly from two genotypes V12 and V1, which recorded lowest two arithmetic means for trait and did not differ between them statistically, amounting to (1265.67 and (12663.33) kg ha-1,respectively.The reason for superiority of genotypesV60 in number of spikes per m2 (Table 4), number of grains per spike (Table 5) and weight of a thousand grains (6), which was reflected as a final result in increase in biological yield per unit area. These results were reached in]8[. They found significant differences between genotypes in trait .

Results of same table showed that there were significant differences between concentrations of spraying with nano-potassium in trait, as 4g.l-1 concentration exceeded the highest rate of trait amounting to (15384.76) kg ha-1 while comparison treatment recorded lowest rate of trait amounting to (10345.71)) kg ha-1 and reason is due to role of potassium in activating all vital functions within plant, maintaining osmotic pressure of cells, activating enzymes responsible for all physiological processes in plants and regulating control of activities of plant's essential nutrients]25[. These results are in line with]21[who reported that there were significant differences between concentrations' of potassium spraying in trait.

The results of same table indicated that there were significant differences between arithmetic rates of the joint treatments in trait as joint treatment 4g.l-1 andV60 record highest mean for trait, which amounted to (16716.7) kg ha-1, compared to joint treatment 0g.l-1 and V56, which recorded lowest mean for trait which amounted to (9070.0) kg ha-1. These results were in line with]23[who reported that there were significant differences between compatibility coefficients in trait.

Table 7. Arithmetic means of genotypes and concentrations of nanopotassium spraying and their interaction together in biological yield (kg ha-1.(

Genotypes	K2	K1	K0	Mean
V1	15246.7 d	12536.7 h	10206.7 l	12663.33 d
V2	16250.0 b	13540.0 f	11210.0 j	13666.67 b
V3	15693.3 c	12983.3 g	10653.3 k	13110.00 c
V4	15240.0 d	12530.0 h	10200.0 l	12656.67 d
V5	14110.0 e	11400,0 ji	9070.0 n	11526.67 f
V6	16716.7 a	14180.0 e	11676.7 i	14191.11 a
V7	14436.7 e	12820.0 hg	9403.3 m	12220.00 e
Mean	15384.76a	12855.71b	10345.71c	$\bar{X}$ =12862.06

Grain yield (kg ha-1.(

Results of table (8) indicated that there were significant differences between genotypes in trait as V60 genotype had highest mean for trait, amounting to (6326.68) kg ha-1 while V56 genotype record lowest mean for trait, amounting to (3971.77) kg ha-1 and reason is due to superiority of genotypes in traits of number of spikes per m2 and weight of a thousand grains which together contributed to increasing grain yield these results agreed with]9[who reported that there were significant differences between genotypes in trait.

Data in table (8) shows that there are statistical differences between arithmetic means of nano-potassium spraying concentrations in trait as 4g.l-1 concentration exceeded the highest mean for trait amounting to (6252.75) kg ha-1compared to 0g.l-1 concentration, which recorded lowest mean for trait, amounting to (3749.41) kg ha-1, and this is due to role of potassium in increasing effectiveness of transport during grain filling period, as well as its role in increasing the accumulated dry matter as a result of increasing effectiveness of transfer of dry matter manufactured in leaves during grain filling stage and its role in increasing it as a result of increased activity of carbon assimilation process and its products manufactured at source and transported to downstream]18[These results were consistent with]21[who found significant differences between concentrations of spraying with nanopotassium in trait.

The results of same table showed that there were significant differences between interaction treatments in trait as joint treatment 4g.l-1 and V60 record highest mean amounting to (7570.86) kg ha-1 Compared to interactive treatment 0g.l-1 and V56 which gave lowest average for trait amounting to (2937.89) kg ha-1 and reason is attributed to fact that combined treatment 4g.l-1 andV60 excelled in number of spikes per m2 (Table 4), number of grains per spike (Table 5) and weight of a thousand grains (Table 6). These results agreed with]9[who reported that there were significant differences between interaction treatments in trait.

ISSN 2072-3857

Table 8. Arithmetic means of genotypes and concentrations of nanopotassium spraying and their interaction together in grain yield (kg ha-1.(

Genotypes	K2	K1	K0	Mean
V1	5705.14 f	4106.55 ih	3103.40 lk	4305.03 f
V2	6837.73 b	5673.01 e	4172.31 ih	5561.01 b
V3	6638.87 c	5003.45 f	3735.31 j	5125.88 d
V4	6073.35 d	5971.05 d	4269.29 h	5437.90 c
V5	4937.74 f	4039.67 i	2937.89 l	3971.77 g
V6	7570.86 a	6669.34 cb	4739.85 g	3626.68 a
V7	6005.57 d	4872.11 gf	3287.84 k	4721.84 f
Mean	6252.75 a	5190.74 b	3749.41 c	$\bar{X}$ =5064.301

Harvest index

.(%)

Results of table (9) showed that there were significant differences between arithmetic means of genotype in trait as V60 genotype record highest mean for trait, amounting to (44.303)%, while V1 genotype recorded lowest mean for trait, amounting to (33.391)%. This is due to superiority of V60 genotype in trait to variation in biological grain yield (Table 7 and 8), which was reflected in an increase in harvest index. These results were in line with]13[who found that there were statistical differences between genotypes in trait .

Results of same table indicated that there were significant differences between concentrations of spraying with nano potassium in trait, as concentrations 2g.l-1 and 4g.l-1 recorded highest means for trait and did not differ significantly between them as they record (40.134 and 40.509)%, respectively. Both concentrations differed from control treatment which recorded lowest mean for trait which was ((36.056%) The reason is attributed to the superiority of two concentrations in traits of grain yield and biological yield, which contributed to increasing harvest index. These results were consistent with results]21[who found statistical differences between concentrations of potassium spraying in harvest index.

Results of table (9) showed that there were significant differences between arithmetic means of the trait interaction treatments combined treatment 2g.l-1and V12 gave highest mean for trait, amounting to (47.672%), while combinatorial treatment 0g.l-1 andV1 gave lowest mean for trait, amounting to (30.404%). The reason is that this interactive treatment recorded a lower mean for biological yield (Table 7) and grain yield was higher compared to biological yield (Table 8) This result was reflected in interaction increase in harvest index and consistent results were obtained by]23[who indicated that there were significant differences between compatibility coefficients as a result of interaction between two study factors in trait.

ISSN 2072-3857

Table 9. Arithmetic means for genotypes and concentrations of spraying with nanopotassium and their interaction together in harvest index.(%)

Genotypes	K2	K1	K0	Mean
V1	37.422 f	37.238 cf	30.404 j	33.391 e
V2	42.091 c	41.902 c	32.349 i	40.410 c
V3	42.304 c	38.542 ef	34.916 h	38.587 d
V4	39.865 de	47.672 a	41.871 c	43.136 b
V5	34.995 h	35.433 hg	32.407 i	34.278 e
V6	45.293 b	47.032 ab	40.585 dc	44.303 a
V7	41.596 dc	38.007 ef	34.975 h	38.192 d
Mean Concentrations	40.509 a	40.134 a	36.056 b	$\bar{X} = 38.900$

Conclusion

We conclude from research that V60 genotype excelled in all traits under study, and concentration of 4 g.l-1 sprayed on the leaves of bread wheat plants achieved highest averages for traits under study. Also, compatible 4g.l-1 and V60 treatment recorded highest rates for yield traits and its components. We suggest cultivating V60 genotype under the conditions of Lilan region and adopting Spraying 4g.l-1 of nano potassium to increase grain yield of bread wheat

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ISSN 2072-3857