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THE EFFECT OF STIMULATING SEEDS OF FIVE GENOTYPES BY SOAKING THEM WITH GIBBERELLIN ACID ON SOME GROWTH TRAITS OF BREAD WHEAT TRITICUM AESTIVUM. L.

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Abstract

The experiment was carried out in the agricultural research and experimentation fields of the College of Agriculture/University of Kirkuk, Shoraw region, for the agricultural season 2018-2019, in order to determine the effect of soaking seeds of five varieties of wheat (Kawz-Kalak-Al-Fayad-Florka-Ibaa 99) with three levels of gibberellin (0.0, 50, and 100).) mgGA3. L1 - The interaction between these studied factors on growth characteristics and yield components (number of branches - plant height - spike length - number of spikelets per spike - duration of germination crisis - spike weight - biological yield) and the results were as follows:- Increasing the number of branches gave the highest average of 2.59 branches. Plant at a concentration of 50 mg. L1 - while the level gave 0.0 mg. L1 - Gibberellin, the minimum average is 1.5 shta.plant, an increase in plant height, as the highest average gave 55.8 cm at a concentration of 50 mg. L-1) while the level was given as 0.0 mg. L1-) Gibberellin The lowest average for this trait is 48.53 cm, while in Oujda, the highest plant height for the Fayyad and Kalak genotypes reached (56.4 and 55.3) cm, respectively, and the lowest for the parental 99 genotype reached 48.4 cm. An increase in the average spike length occurred when soaked in gibberellin. At a concentration of (50 mg.L-1), the highest average was recorded at 7.1 cm, while the level (0.0 mg.L-1) gave the lowest average of 4.8 cm. It is also evident that an increase in spike length occurred with the Fayyad and Kalak genotypes, as they gave the highest average of 7.6 and 6.6 cm. Respectively, while the genotype of 99 parents gave the lowest average of 4.8 cm, the highest average gave 13.13 spikelets. Sunbulah 1- At the concentration of soaking in gibberellin (50 mg.L-1-) at the time when the comparison treatment (0.0 mg.L-1-) gave the lowest average gibberellin of 9.73 Sunbulah. spikelet -1, while the genotypes Khaos and Fayyad gave the highest spikes, reaching 13.2 and 12.8 spikelets. Spike 1 - respectively, while the two genotypes Florica and Epa 99 gave the lowest average, reaching 9.2 spikelets. Spike 1 - For both genotypes, the concentration of 50 was superior by giving it the shortest period of 12 days, followed by the concentration of 100, which reached 13 days. As for the comparison treatment without addition, it was delayed by 2 days. - 3 days for the two treatments, gibberellin 50 and 100. As for the different genotypes, there were no significant differences between them. The highest spike weight was 0.98 grams at the concentration of soaking in gibberellin)50mg.L-1) while the control treatment (0.0 mg.L-1-) gave gibberellin the lowest average of 0.53 g, while the Fayyad genotype gave the highest amount of 0.97 g while the genotype and the 99 parents gave the lowest average of 0.7 g. Soaking with gibberellin at a concentration of (50 mg.L-1-) gave the highest biological yield of 2.08 g, while the concentration of (0.0 mg.L-1-) gave the lowest gibberellin of 1.11 g. Clack, Fayyad, and Kaus excelled as they gave the highest average (1.8, 1.8, and 1). 6) respectively, at the time when Florca gave the lowest average biological yield of 1.05 g.

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Introduction

The most significant grain crop in the world and the first strategic food crop is wheat (Triticum aestivum L.). This significance stems from the grains' excellent ratio of proteins, carbs, vitamins, and gluten (Al-Younis et al., 1987). Even though Iraq is one of the original centers for the emergence of wheat and one of the countries that have the factors for the success of its cultivation, it ranks first in terms of agricultural and production. Despite this crop's distinguished location, its productivity is still below the necessary level; wheat production for the agricultural season (2016–2017) was estimated to be 1.31 tons. Hectare 1: 1.67 farmed acres yielding a total production of 2.19 million tons (Ministry of Agriculture, 2018).

Compared to the global average, Iraq's average yield per unit area remains below the needed level. This can be attributed to a number of factors, one of which is the underutilization of contemporary crop and soil management techniques, particularly nitrogen management, which plays a significant role in raising yield (Khan et al., 2010). Comparing growth rates and productivity to population consumption, they are deemed inadequate. There are a number of reasons for this productivity decline, the primary one being the inability to identify viable strategies for boosting output in a particular region. One of these methods is the application of plant growth regulators, a chemical biological tool used in agriculture that helps plants utilize their physiological potential and efficiently use nutrients, such as gibberellins. Gibberellins are one of the most advanced seed-stimulating methods available today (Moes and Stoble, 1991), and they have a major impact on crop components and output. One of the most significant of these hormones is gibberellic acid, which accelerates germination by inducing the hydrolysis enzymes required to break down nutrients and Beta- and alpha-amylase cells, a variety of enzymes—ribonuclease being the most significant—and proteins (Attiya and Jaddoa, 1999).

One of the ways to increase production is also the cultivation of different varieties that are suitable for the region and have high productivity, which increases vertical expansion. The key to good management is the use of suitable varieties. Varieties differ and differ genetically, depending on the length of the internodes, especially the upper internodes, which represents approximately half of the plant's height, and it is an important characteristic that can be used. In distinguishing varieties from each other (Muhammad, 2011), choosing grain varieties with high production and good adaptation to the climate is considered one of the most important means of improving yield. However, this remains of no real benefit unless this variety is grown in a suitable environment that enables it to demonstrate its productive capabilities, the aim of knowing the effect of soaking wheat seeds with different levels of gibberellin, the effect of using five varieties of wheat, and the interaction between these studied factors on growth characteristics and yield, ensuring an economic increase in wheat productivity and identifying the appropriate variety for the region

Lecturer review:

1-Plant Growth Regulators:

They are natural substances that the plant produces in very small concentrations or quantities in specific cells and move to other places in the plant and have their effect on all parts of the plant. Attiya and Waddoua (1999) indicated that individually or overlapping, on the quantitative and qualitative characteristics of the yield is due to their control. Most of the vital activities in plants, and the response to plant growth regulators varies according to their concentration and the stages

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of plant growth when used. Heller and Lance (2000) noted that plant growth regulators differ from animal hormones, as plant regulators have an impact on many different physiological processes in the plant body, such that this is reflected in more than one aspect of growth. Hormones act as chemical signals or stimuli to activate or inhibit growth. Growth (Peter, 2005). While Idris (2009) pointed out that growth regulators are non-nutritive organic compounds produced in very small quantities that work to inhibit, encourage, or modify plant physiological processes as they move from their places of production in the plant to their places of work in order to affect growth.

2- Seed Priming (Soaking):

Soaking wheat seeds with different chemical solutions resulted in an acceleration of the germination process and the number of branches. Several studies confirm the benefits of pre-stimulation treatment of seeds in early or rapid germination, deepening of roots, increased growth and germination within a wide range of temperatures and a high yield of wheat. Ghana) and Schillinger (2003), rice (Harris et al., 2005) and maize (Subedi and Ma, 2005).

(Sedghi et al., 2010) pointed out that it is the process of soaking seeds before planting for a certain period with plant growth regulators, vitamins, or salts. This is for the purpose of increasing germination by breaking seed dormancy or producing enzymes. The goal of seed stimulation is to increase the germination rate and improve seedling growth under a wide range of environmental conditions. The approved basis for this process is to expose the seeds to a certain osmotic potential by impregnating the seeds with water or buffers. Growing slowly to begin the metabolic processes of germination without actual germination occurring, in other words, without the growth of the embryo (root and shoot).

3-Gibberellin:

Gibberellins are a group of stimulating plant hormones that are terpene compounds, some of which are extracted from the fungus Gibberella fujiuroi. They are composed of four isoprene units and have a pocket structure containing ((19-20) carbon atoms (Saleh, 1991).

All gibberellins dissolve in water, are white in color, crystalline in shape, and solid in texture. They represent an important role within plant tissues in terms of growth and maturity, as well as in biological processes and chemical reactions. This is under a special enzymatic system in higher plants. Ogawa et al., (2003) indicated that gibberellins are produced in new leaves and roots, and in higher concentrations in seeds. They are also formed in stamens and transported to organize other floral parts and fruits. It is of great importance through its effect on DNA, ATP, leaf growth, stem elongation, and the development of flowering and fruits (Hodey, 1994) and (Salloum et al., 2011). As for the effect of gibberellin GA3, its physiological effects on plant growth, its role in the process of photosynthesis, and the activation of other vital activities that take place in parts of the plant cell are in cell division, increasing their elongation, increasing the height of the plant, the size of the leaves, and the root system, and the sum of these effects is in increasing productivity (Alexopoulos et al., 2006). . Physiologically, gibberellins are known to be effective compounds in gibberellin measurement experiments. Chemically, they consist of two cyclohexane rings and a cyclopentane ring, which is represented in Figure (1):

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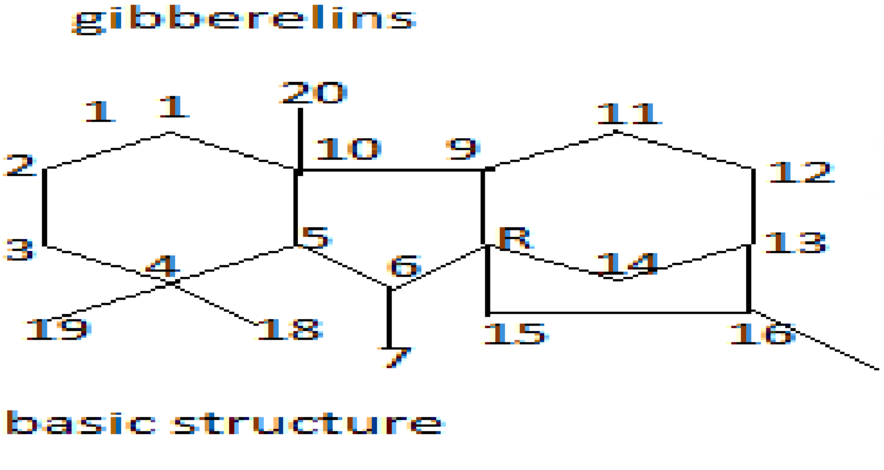

Figure (1) the chemical structure of gibberellin.

4-Physiological effect of gibberellin:

Gibberellin, according to Heller et al. (1990), has a variety of functions, including cell division, elongation between nodes and flowers, seed germination, embryo development, growth, and aiding flowers in long-day plants. It also activates alpha-amylase (A-amylase), which breaks down starch in seeds to promote embryo growth and make it easier for grain membranes to separate from seeds. Gibberellins promote the synthesis of nucleic acids that stimulate the enzymes involved in cell elongation and division, according to Abdoul and Abdel Azim (1986). This increases the phenotypic traits of the plant. According to Moore (1979), a number of critical physiological processes that control plant growth are significantly influenced by plant growth regulators and one of these regulators is gibberellic acid, which plays an important role in increasing leaf area by stimulating the elongation and expansion of cells, encouraging stem elongation and diameter, and increasing the efficiency of plants. In absorbing nutrients and thus increasing growth. Its physiological effects also include germination. Gibberellins stimulate the synthesis of alpha-amylase in seeds, especially in the grain membranes. Alpha-amylase has an important role in the germination of albuminous seeds because it allows the development of activity reserves that form albumin. This results in rice sugars that are used directly by the embryo (Lafon-1988). J), With regard to the vegetative phase, gibberellins of all kinds work to stimulate cell elongation, and this elongation is unusual because it leads to a large elongation of the stem that precedes the flowers in many biennial plants. Gibberellins can compensate for the process of squatting in some plants. Gibberellins have a role in increasing the elongation of stem phalanges, as gibberellins affect stem elongation by stimulating cell elongation and overcoming genetic dwarfism (Issa, 1990).

Sechatz and Endres (2009) stated that gibberellin acid is an organic compound produced in newly growing leaves and the developing tips of the shoots and roots, and one of its most important physiological effects is stimulating cell division and elongation, as it increases mitotic division in the areas below the meristematic apex, which affects the increase in the number of cells. It has a role in increasing the process of photosynthesis in plant leaves (Ghorat and Mohammed 2012). Gibberellin increases the effectiveness of the alpha-amylase enzyme in various environmental conditions (Sheykhbaglou et al.). 2014).

5-The effect of gibberellic acid levels on growth characteristics and yield of wheat crop:
Gibberellin stimulates the production of enzymes and elongates the stem due to its stimulation of cell division and elongation. It also stimulates flowering and seed germination (Attiya and Waddoua 1999).
Yassin (2001) indicated that gibberellin has a significant effect in increasing plant height and elongation as a result of its effect on the process of cell division, and that the process of cell division alone is not sufficient for the growth of an organism, as the cells must expand after their division, and gibberellin works to increase the size of the meristematic region (meristematic).) as well as increasing the percentage of cells that activate the division process. Farhan et al. (2009) indicated that using the growth regulator gibberellic acid at concentrations of (100, 50, 25) mg GA. L1- on the wheat crop led to superiority in characteristics, as the treatment (25 mg GA. L1- was superior to the other two treatments of gibberellin in the characteristics of plant height, dry weight and number of shoots of the plant. The values were: 44.6 cm. Plant1- and 2.2 gm. Plant1-, 4.1 Section. Plant 1 - respectively. In another research, Farhan and Al-Dulaimi (2011) indicated that spraying gibberellin at concentrations of (100, 50, 25, 0) mg GA. Liter 1 - on wheat the concentration exceeds (25) mg GA. Liter 1 - significantly gave the highest number of strands, dry weight, and number of grains per ear, and the values were (4.1) strands. Plant 1- and (2.2) grams. 1 plant and (28.9) tablets. Sunbulah 1- respectively, while the concentration was given (100) mg GA. L1 - The highest plant height reached (42.00) cm. In a field experiment conducted by Al-Naimi (2015) on the effect of spraying with gibberellic acid at four levels (450, 300, 150, 0) mg. Liter 1 - spraying with gibberellin (450) mg was recorded. Liter 1 - The highest average number of ears per square meter and the highest biological yield and number of grains per ear, as it reached (504.4, 425 ears. m2 -) and (14.29, 1198 tons. h1 -) and (35.21, 34.13 grains. Ear1 -) and (%) 23.05%, 20.65) in the two seasons, respectively. I found Al-Obaidi. (2015) when stimulated with plant growth regulators, including gibberellin, were significant in the characteristics of number of shoots, number of ears, and number of grains per ear, as they gave averages of (469) shoots. M2- and (444.1) ears. M2- and (49.52) tablets. Sunbulah 1 - respectively.

3-Materials and working methods:

3-1Experiment implementation site

The experiment was carried out in the agricultural research and experiment fields of the College of Agriculture/University of Kirkuk, Shoraw region, for the agricultural season 2018-2019, in order to determine the effect of soaking seeds of five varieties of wheat with three levels of gibberellin (0.0, 50, and 100) mg GA3. L1 - The interaction between these studied factors on growth characteristics and yield components, which was obtained from the Seed Inspection and Certification Department in Kirkuk Governorate.

3-2-Agricultural operations

Anvils were prepared containing soil consisting of a mixture of soil and peat moss at a ratio of 1:1, at a rate of 5 kg per anvil, and 5 seeds treated with gibberellin were planted according to the transactions dated 12-31-2018, and the anvils were watered immediately after planting.
It was implemented according to a randomized complete block design (RCBD) with three replications, and it included two factors, the first was soaking treatment with gibberellin at three

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concentrations: ("A1" = 0.0 mg GA. L1 - (soaking with distilled water only) and "A2" = treatment with 50 mg GA3. L1 - and "A3" = m. Treated with 100 mg GA3.L1-) The second included five varieties of wheat (Kawz-Klak-Al-Fayyad-Florka-Ibaa 99) and a procedure for summing the harmonics between them. The two treatments were randomly distributed among each other as a factorial experiment with three replicates to be the number of experimental units. (45) units.

3-3-Preparing gibberellin for soaking seeds:
Gibberellic acid, which was obtained from one of the specialized scientific laboratories for selling chemicals in Kirkuk, was prepared by dissolving gibberellin powder (GA3) at the required concentrations: the first (50 mg.L1- and the second 100 mg.L1-) with distilled water and stirring it until it was completely dissolved. The quantity required for soaking seeds is (45) experimental units. The pre-weighed and prepared seeds were placed in nylon buckets and then filled with gibberellic acid solution until the seeds were completely covered at concentrations of (0.0, 50 and 100) mg GA. 1 liter - It was kept in a dark place without access to light for 24 hours in the laboratory (Asli and Zanjan, 2012) of soaking, and then it was cultivated.
3-4-Studied characteristics:
3-4-1-Growth characteristics:
1-Total number of segments. M2-
An average was calculated for five plants from each experimental unit.
2- Plant height cm:
It was measured as the average height of five plants from each experimental unit and was measured from the soil surface level to the end of the spike of the main stem without SFA (Wiersma, 1986).
3-4-2-The yield and its components:
1-number of spikelets. -:
It was calculated as an average of five ears of corn from each experimental unit (Azizo Hamada, 2019).
2-Spike length (cm):
It was calculated as the average length of five ears from each experimental unit.
3-The weight of the spike is one gm.
Five ears of ears were measured with a weighing scale from each experimental unit.
4-Biological yield:
All of the plants above the soil surface (straw + grains) were taken by two plants randomly from each experimental unit, then dried in a soil laboratory oven at 70°C for two days, and the average weight of the two plants was taken in grams (Aziz 2019).
3-5- Statistical analysis:
Data were collected for the studied characteristics and analyzed statistically according to a randomized complete block design (R.C.B.D.) for each experiment using the statistical program (SAS), and the averages were compared with the Duncan test.

5- Results and discussion
1-Number of branches for each plant:
Table (1) and the Analysis of Variance Appendix (1) results demonstrate that the main factors' effects on the average of this trait differ significantly. It turns out that soaking in gibberellin

increased the number of species, as it produced the highest average of 2.59 plants at a concentration of 50 mg L1, while the level of 0.0 mg L1 produced a minimum average of 1.5 shta plants. The three genotypes (Kaos, Kalak, and Fayyad) showed no significant differences in their respective effects.
Table (1) and the Analysis of Variance Appendix (1) show that the components under study have a significant two-way interaction., as the interaction between gibberellin and genotype gave the highest average for the trait 4 Shatta. Plant when the combination (50 mg.L1-gibberellin and the genotype Al-Fayad) gave the combination (0 mg.L1-Gibberellin and Eba 99) the lowest average without giving any branching.

Table (1) the effect of genotypes, gibberellin, and the interaction between them on the trait (number of branches).

genotypes	Concentrations of soaking gibberellin			Rate of the effect of genotypes
	50	100	0	
Kaos	a3.3333	a3	a2.3333	a2.88
Klak	a3.3333	a2.3333	c1.3333	a2.33
Fayadh	a4	a3	a2.6667	a3.22
Florka	a2.3333	b2	c1.3333	b1.88
Aaba99	d0	d0	d0	c0
Average of soaking gibberellin	a2.59	b2.06	b1.5	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *
Given that gibberellin has a significant role in promoting the growth of lateral buds and vascular tissue, which in turn increases the number of plant shoots, the rise in this feature may be explained by gibberellin's beneficial effects (Davies, 1995). This outcome supported the findings of Farhan et al. (2009). Gibberellin was shown to increase the number of branches in wheat crops and (Khalaf and Salman, 2017) in barley crops. It was also observed that there was a substantial drop in the key parameters at the dose of 100 mg. L1: 50 mg of gibberellin concentration. L1: Gibberellin. This may result from exaggerations in the used concentrations of gibberellin, which may not be offset by an increase in the radical total, and therefore also not offset by the rapid supply of organic mineral substances represented (Saleh, 1991), which has a negative impact on the number of radicals per square meter. The three genetic structures (Kaws, Kalak and Fayyad) may be suitable for the climate of the region.
2-Plant height (cm): Table (2) makes it evident that genotypes and gibberellin, as well as their interaction, differ significantly. Gibberellin treatment clearly increased plant height, as the greatest average of 55.8 cm was obtained at a concentration of 50 mg L-1, whereas the amount was reported as 0.0 mg L-1. Gibberellin The maximum plant heights for the Fayyad and Kalak genotypes were 56.4 and 55.3 cm, respectively, while the lowest plant height was 48.4 cm for the Parents 99 genotype. The lowest average for this characteristic is 48.53 cm.

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Table (2) The effect of genotypes, gibberellin, and their interaction on the trait (plant height cm)

genotypes	Concentrations of soaking gibberellin			Rate of the effect of genotypes
	50	100	0	
Kaos	b55	de50	f47.333	b50.77
Klak	a58.333	b55	bc52.667	a55.33
Fayadh	a60	a57.667	cd51.667	a56.44
Florka	bc53.333	ef48	gf46.333	c49.222
Aaba99	bc52.667	ef48	g46.333	c48.444
Average of soaking gibberellin	a55.8	b51.7	c48.53	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *

Additionally, Table (2) and the Analysis of Variance Appendix (1) make it plain that there is a substantial two-way interaction in the effect on the average plant height. Specifically, it is evident that the interaction between genotypes at the 50 mg combination and gibberellin results in an increase in plant height. The maximum average for this feature was 60 cm when L1-Gibberellin and the Al-Fayad genotype were combined, whereas the lowest average was 46.3 cm when L1-Gibberellin and the Ebaa 99 genotype were combined.

The cause of the increase in plant height could be attributed to the beneficial effects of gibberellin, which increases the division and elongation of plant cells and plays a significant role in the growth and elongation of the plant's growing tops (Magome et al., 2004). This outcome aligns with the findings. Gibberellin was found to have a significant effect on plant height in both the wheat crop (Farhan et al., 2009) and the rice crop (Jadoua and Al-Silawi, 2012). Table 2 shows that the average of this trait decreased when the gibberellin concentration was not soaked in. The third (0.0 mg.l-1), which indicates the importance of soaking with gibberellin, while genotypes differ in response according to the type of genotype and according to the environmental conditions of humidity and temperature in the region.

3-Spike length (cm):

The results of Table (3) and the Analysis of Variance Appendix (1) indicate that there were significant differences in the effect on the average of this characteristic, as it is clear that there was an increase in the average of this characteristic when soaking in gibberellin at a concentration of (50 mg. L-1). The highest average was recorded at 7.1 cm, while it gave The level (0.0 mg.L-1) has the lowest average of 4.8 cm. It is also evident that there has been an increase in the average of this trait in the Fayyad and Kalak genotypes, as they gave the highest average of 7.6 and 6.6 cm, respectively, while the genotype of the 99 parents gave the lowest average of 4.8 cm. Binary interaction Table (3) indicates that the concentration of 50 gibberellin and the two genotypes Fayyad and Kalak gave the highest spike length, reaching 8.6 and 8.3 cm, respectively, while the non-soaking treatment with gibberellin 0.0 with the genotype Aba99 gave the lowest spike length, reaching 4 cm.

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Table (3) The effect of genotypes, gibberellin, and the interaction between them on the trait (spike length cm)

genotypes	Concentrations of soaking gibberellin			Rate of the effect of genotypes
	50	100	0	
Kaos	b6.6667	d5	f4.3333	b5.333
Klak	a8.3333	b6	c5.6667	a6.66667
Fayadh	a8.6667	b7	d5.3333	a7
Florka	b6	d5.3333	e4.6667	b5.333
Aaba99	b6	e4.6667	g4	b4.8889
Average of soaking gibberellin	a7.13	b5.6	c4.8	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *

This increase in the length of the spike may be due to the role of gibberellin in dividing, elongating, expanding, and increasing the size of the cells, which ensures an increase in the length of the spike. This result is consistent with what Al-Naimi (2015) and Hamed (2015) reached regarding an increase in the length of the spike. By the effect of gibberellin. The reason for the increase in the average spike length is due to an increase in the dry weight, plant height, and number of spikelets, which ensured an increase in the food manufactured through photosynthesis and its transfer from the source (leaves) towards the downstream (spike), which was reflected positively in the increase in the average of this characteristic.

4-Number of spikelets.

The results of Table (4) and the Analysis of Variance Appendix (1) indicate that there were significant differences in the average number of spikelets per spike when the seeds were stimulated with gibberellin, as the highest average gave 13.13 spikelets. - At the concentration of soaking in gibberellin (50 mg.L-1-) at the time when the comparison treatment (0.0 mg.L-1-) gave the lowest average gibberellin of 9.73. Spike -, while it is clear that there was a significant effect on the average of this trait when the genotypes differed, as the two genotypes, Khaos and Fayyad, gave the highest spikes, reaching 13.2 and 12.8 spikelets. Spike 1 - respectively, while the two genotypes Florica and Eba 99 gave the lowest average, reaching 9.2 spikelets. Spike 1 - for both genotypes.

It is also clear from Table (4) and the Appendix of the Analysis of Variance (1) that there is a significant two-way interaction in the effect of gibberellin and genotypes on the average number of sepals per spike, and that an increase in the average of this trait occurred when the interaction between gibberellin and genotypes occurred, as the combination gave (50 mg. liter 1 - gibberellin and Kaos). The highest average is 17 spikelets. Spike 1 - At the time when the combination treatment (0.0 mg.L1 - gibberellin and Ebaa 99) gave the lowest average for this trait, 9.2 spikelets. Sunbulah 1-.

Table (4) The effect of genotypes, gibberellins, and their interaction on the (number of spikelets)

Rate of the effect of genotypes Concentrations of soaking gibberellin genotypes

genotypes	Concentrations of soaking gibberellin			Rate of the effect of genotypes
	50	100	0	
Kaos	a17	d12	d10.667	a13.22
Klak	b13.333	d11.333	e10	b11.5
Fayadh	b14.667	d12.667	d11.333	a12.889
Florka	e10	f9.333	f8.333	c9.222
Aaba99	d10.667	f8.667	f8.333	c9.22
Average of soaking gibberellin	a13.13	b10.8	c9.7332	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *

The increase achieved in the average number of spikelets per spike may be attributed to the positive role of gibberellins in stimulating cell elongation, division and expansion, as Abdul and Abd al-Azim (1986) indicated that gibberellins activate the formation of nucleic acids that stimulate the enzymes responsible for the process of cell elongation and division, which led to an increase in characteristics. The phenotypic appearance of the plant, which reflects positively on this trait, and this result is consistent with the findings of (Al-Naimi. 2015) regarding an increase in the number of spikelets per spike due to the influence of gibberellin. It is clear from Table (4) that a decrease in this trait occurred when treated with a high concentration of gibberellin, and this may be attributed to An increase in breathing occurs when temperatures rise and drought occurs, which in turn leads to a decrease in the formation of dry matter, which negatively affects the average number of spikelets per ear.

5-A period of one day to germination.

The results of Table (5) and Appendix (1) showed that there were significant differences for this characteristic when adding gibberellin, as the concentration of 50 was superior to the one given for the shortest period of 12 days, followed by the concentration of 100 which was 13 days. As for the comparison treatment without addition, it was delayed by 2-3 days over the two gibberellin treatments. 50 and 100. As for the different genotypes, there were no significant differences between them. The average number of days to germination was 13.3 days. As for the interaction between the addition of gibberellin and the genotypes

It outperformed all genotypes with concentration 50 by giving them the fewest days required for germination, which was 12 days. This is attributed to the role of gibberellin in its effect on the enzymes inside the seed, encouraging embryonicity, and the effect of soaking on the seed coat, which facilitated and accelerated the germination process.

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Table (5) The effect of genotypes, gibberellin, and the interaction between them on the (period to germination day)

genotypes	Concentrations of soaking gibberellin			Rate of the effect of genotypes
	50	100	0	
Kaos	c12	b13	a15	a13.3
Klak	c12	b13	a15	a13.33
Fayadh	c12	b13	a15	a13.33
Florka	c12	b13	a15	a13.33
Aaba99	c12	b13	a15	a13.33
Average of soaking gibberellin	c12	b13	a15	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *

6-The weight of the spike is one gm.

The results of Table (6) and the Analysis of Variance Appendix (1) indicate that there were significant differences in the average spike weight when the seeds were stimulated with gibberellin. The highest average was 0.98 g at the gibberellin soaking concentration (50 mg.L-1) at the time when the comparison treatment gave (0.0 mg. L1-) Gibberellin has the lowest average of 0.53 g, while it is clear that there is a significant effect on the average of this trait when the genotypes differ, as the genotype gave Fayyad the highest amounting to 0.97 gm while the genotype and the 99 parents gave the lowest average amounting to 0.7 gm.

It is also clear from Table (6) and the Analysis of Variance Appendix (1) that there is a significant two-way interaction in the effect of gibberellin and genotypes on the average weight of the spike, and that an increase in the average of this trait occurred when the interaction between gibberellin and the genotype occurred, as the combination gave (50 mg. liter 1 - gibberellin and Fayyad). The highest average is 1.33 g. While the combination treatment (0.0 mg.L1 - gibberellin and Florica) gave the minimum average for this trait, 0.36 g.

The reason for the increase in spike weight, due to the effect of gibberellin, may be attributed to the increase achieved in the average spike length, an increase in dry weight, plant height, and the number of spikelets, which ensured an increase in the food substance manufactured through photosynthesis and its movement from the source (leaves) towards the downstream (spike), which was reflected positively. To increase the average of this characteristic.

Table (6) The effect of genotypes, gibberellin, and the interaction between them on the trait (spike weight in grams)

genotypes	Concentrations of soaking gibberellin			Rate of the effect of genotypes
	50	100	0	
Kaos	b0.96667	d0.73333	d0.56667	b0.755
Klak	b0.86667	d0.73333	d0.63333	b0.7444
Fayadh	a1.33333	b0.96667	d0.63333	a0.977
Florka	d0.73333	f0.46667	f0.36667	c0.522
Aaba99	b1.30	d0.63333	f0.46667	b0.7
Average of soaking gibberellin	a0.98	b0.706	c0.53	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *

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7- Biological yield (g) per plant: The results of Table (7) and the Analysis of Variance Appendix (1) indicate that there is a significant effect of the studied factors on the average of this characteristic, as using soaking in gibberellin at a concentration of (50 mg.L-1) gave the highest average of 2.08 grams while the concentration gave (0.0 mg.l1-) The lowest gibberellin is 1.11 g. It is clear from the table that there is a significant increase in this trait when the genetic compositions differ. Clack, Fayyad, and Kaus excelled as they gave the highest average (1.8, 1.8, and 1.6), respectively, while Florica gave the lowest average. 1.05 gm. As can be seen from the table, there was a significant increase in the interaction between soaking in gibberellin and the difference in genotypes, as the highest average was given by the Fayyad, Kaus, and Kalak genotypes when 50 mg per liter was useful, while the concentration (0.0 mg.L1-) gave the overlapping genotype Florica. The minimum average for this trait is 0.6 g. The increase in biological yield may be attributed to the positive effect of the studied factors, as gibberellin has a role in delaying plant aging and prolonging the period of leaves remaining green by stimulating chloroplasts, which leads to increasing the plant's ability to carry out the process of photosynthesis. It plays an important role in increasing leaf area by stimulating cell elongation and expansion, encouraging stem elongation and diameter, and increasing the plant's efficiency in absorbing nutrients, thus increasing growth (Moor. 1979), and that this increase in this trait is due to an increase in the number of shoots, the height of the plant, the rate at which the flag leaf remains green, and the number of ears, which ensures an increase in the biological yield.

Table (7) The effect of genotypes, gibberellin, and the interaction between them on the trait (biological quotient, gm)

genotypes	**Concentrations of soaking gibberellin**			**Rate of the effect of genotypes**
	50	**100**	**0**	
Kaos	a2.3	b1.5	c1.2333	a1.677
Klak	a2.3	b1.7667	b1.3333	a1.8
Fayadh	a2.5667	b1.7333	b1.3333	a1.87
Florka	b1.5	d1	e0.6667	c1.05
Aaba99	b1.7333	c1.1667	d1	b1.3
Average of soaking gibberellin	a2.08	b1.43	c1.11	

*The means followed by the same letters are not significantly different from each other according to Duncan's multinomial test at the probability level of 0.05 *

5-Conclusions and recommendations

5-1-Conclusions

1- Soaking the seeds with gibberellin exceeds 50 mg. Liter 1 - In the characteristics, the number of branches - the height of the plant - the length of the spike - the number of spikelets per spike - the duration of the crisis for germination - the weight of the spike - the biological yield.

2-The two genotypes, Al-Fayad and Kalak, were superior to the other genotypes, Kaozo Florka and B99, respectively.

5-2- Recommendation

1-Soak wheat seeds with gibberellin 50 mg. Liter 1 - and cultivation of the Al-Fayyad genotype within the Kirkuk Governorate area.
2- Conducting other research with other concentrations on other crops such as rice and barley within Kirkuk Governorate.

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