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The Effect of Gibberellin and Salicylic on Some Indicators of Wheat (*Triticum estivum L* and Barley (*Hordeum vulgare L*) Growth

By

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Abstract:

This experiment occurs in girls of Education collage Kufa university to know Different concentrations of Gibrillinacid (40, 60, 80) mg/L and Salsalic acid concentrations(10,20,30)mg/L in some growth indicates for each(Triticumaestivum L and Hordeumd vulgare L)this experiment include culturing seeds of Triticumaestivum and Hordeumdistichu in plastic pot after Treatment with each of Gibrillinic acid and salsalic acid according to concentration mention above The results appeared that using Gibrillin acid and salsalic acid in concentrations(80 mg/ L) and (30 mg/L) respectively causing to increase significantly in stem Length and Leaf area and Leaves content of total chlorophyl

Introduction

Wheat (*Triticum estivum L.*) and barley (*Hordeum vulgare L.)* are among the most important grain crops in Iraq. Due to the importance of grains as human food, God mentioned them in the Holy Quran in more than one chapter. Wheat is one of the oldest crops known to man. It is cultivated on a large scale worldwide, belonging to *Graminae* family. It is one of the world's first grain crops in terms of its cultivated area and its global production of about (616.8) million tons, according to the World Food and Agriculture Organization (FAO). Iraq's annual production of wheat is (2.2) million tons with a planted area of (1.8) million hectares as the main crop, occupying wide area of consumer's life (1).

Wheat cultivation is of strategic importance due to its wide exchange in the international market. This has led many developing and developed countries to adopt economic policies aimed at developing the crop and undermining its import in order to achieve self-sufficiency. This means that the government seeks to increase its competitiveness of this crop and reinforce its sources of foreign exchange. Wheat has the advantage of being one of the basic food commodities on which many categories depend, especially those with limited or low incomes. This fact has given wheat political and military importance over its economic importance. History of economic thought is rich in the events of countries collapsed following grain deals. Iraq, as one of the developing countries with abundant agricultural resources, abundant water and an convenient climate, has for many years adopted the method of developing wheat cultivation through direct government support and through the provision of credit and tax facilities. However, wheat cultivation development plans in Iraq needs to be studied and evaluated in order to address deviations and develop accurate perceptions of future plans (2).

Barley is used in the treatment of heart disease and cholesterol, and helps in the treatment of many cases of depression, as well as diabetes, hypertension and many cancers. It also protects from exposure to disorders that lead to sleeping disorders, being a sedative of various body organs. Wheat on the other hand treats problems of indigestion and colitis, helps treat anemia, and restore vitality and activity for elderly people. It also treats the problems of infertility, of male and female, and reduce the

symptoms of aging diseases. Both wheat and barley look very similar, but there are some differences in the components of each (3)

Gibberellin is one of the most important plant hormones, which is mainly produced from double turbines and has a production center in the root growing points and plant growing points, and leaves. Gibberellin plays an important role in the growth and development of plants during their normal life cycle. Gibberellins are transported in fully growing plants, especially in their roots with the juice in the wood. Gibberellins have a positive role in cell growth and division and help plants to respond to the physiological conditions of environmental stress (4)

Besides increasing the ability of plants stimulation of manufacturing some enzymes such as (alpha-amylase), reducing leaves and flowers falling and increasing the resistance of the plant (5). It was found that spraying Gibberellins on plants increases the overall growth rate of plant and crop, cause an increase in soft and dry growth, increase the seed yield, and has a large role in the expansion of leaves (6). As stated by (7), the use of Gibberellins significantly increases the diameter of the leg and dry weight of root growing and plant growing points.

Salicylic acid is a plant hormone that plays an important role in the growth and development of plants and has physiological effects on the process of photosynthesis, maintenance of plant organelles, and the process of transpiration. It also assumes the task of taking and transferring of ions (8) and has a significant role in making anatomical changes in the leaves and stems of plants. It also changes the composition of plastids (9). In addition, it has a regulatory and chemical role in the various metabolism processes in plants (10).

Materials and Methods

1 - Grain preparation for cultivation

Wheat and barley grains were obtained from a cultivated field in Najaf, the Rice Research Center. They were isolated in the laboratory for testing by the method of Sultani (11) of Martin et al., (1990) in sterilization of grains. They were sterilized with Sodium Hypochlorite at (5%) by soaking the seeds in it for five minutes then the seeds were washed (4-5 times) with distilled water to remove the sodium hypochlorite solution.

2. Soil preparation for cultivation

Silty clay was taken from the ring experiment site. It was sown with a 2 mm diameter sieve and then sterilized with formalin (10%) and left for 24 hours to dry. Then it was placed in plastic pots of 2 kg size, 10 grains of wheat were planted and watered.

3- Preparation of solutions

First: Growth Regulator (Gibrelin Solution):

The Gibberellin solution (GA3), manufactured by British chemicals company Flagro, was prepared at three concentrations (40.60.80 mg / L) with weights of (40.60.80 mg) of Gibberellin powder in (1) liter of distilled water to obtain the required concentrations by dilution.

Second: Growth hormone (Salicylic acid)

Salicylic acid was used in the form of white granules at concentrations of (10,20,30) mg / L and then dissolving the weights of salicylic acid from (10,20,30) in (1 liter) of distilled water to obtain the required concentrations by dilution.

Application of treatments

The seeds of wheat and barley were planted in plastic pots (2 kg) where 10 seeds were planted in each. A week after germination, they were incubated into 5 plants, and sprayed manually with Gibberellin and salicylic acid into saturation once a week until the age of 45 days. Several drops of the liquid detergent were added to each of the spray solutions. The comparison treatment was sprayed with distilled water only.

4- Attributes studied:

1. Leg height

A metal tape was used to measure the height of the leg in centimeters from the ground surface to the beginning of the staminate contact with the leg (12)

2 - Paper area

The paper area was measured according to (13)

According to the following equation:

Leaf area=L*Y*0.785

L = height of leg (cm) Y = maximum width of paper (cm)

3- Determination of leaf content of total chlorophyll:

The chlorophyll content of wheat and barley plant leaves was assessed by a 5O2-SPAD chloropylmeter, prepared by Minolta, Japan, by reading 4 leaves per experimental unit (sapling). The rate was taken (14) and measured in SPAD UNIT according to (15)

Statistical analysis

The results were statistically analyzed by SPSS for statistical analysis of data obtained from the study using the completely random design (CRD) in both experiments. Mean treatment of the experiments were compared by selecting (L.S.D) the least significant difference at 0.05 (16).

Results

Table (1) Comparison of Gibberellin concentrations for (leg height, paper area and chlorophyll) in wheat plant

Concentrations	Leg length	Leaf area	chlorophyll
Control	27.63cm	13.71	27.1
gibberellin 40 %	28.06cm	14.16	27.5
gibberellin 60 %	36.98cm	15.83	29.1
gibberellin 80 %	46.3cm	19.36	30.9
LSD	8.7 Sign 60%,80%	3.3 Sign 80%	2.4 Sign 80%

Table (1) shows that the use of Gibberellin acid resulted in a significant increase in both leg height, paper area and chlorophyll for wheat. The study showed that adding Gibberellin by increasing concentration, increased the leg height from (27.63) in the control to (46.3) at 80%, also the paper area increased from (13.71) in the control to (19.36) at 80%, as well as the rate of chlorophyll which increased from (27.1) in control to (30.9) at the same concentration.

Table (2) Comparison of Gibberellin concentrations for leg height, paper area and chlorophyll in barley plant

Concentrations	Leg length	Leaf area	chlorophyll
Control	14.9cm	7.84	13.8
gibberellin 40 %	19.6cm	9.17	16.2
gibberellin 60 %	21.6cm	11.15	19.3

gibberellin 80 %	24.5cm	13.17	25.3
LSD	6.4 Sign 60%,80%	4.2 Sign 80%	5.4 Sign 80%

The study showed that adding Gibberellin acid by increasing concentration, increased the leg height from (14.9) in the control to (24.5) at 80%, also the paper area increased from (7.84) in the control treatment to (13.17) at 80% as well as the chlorophyll rate which increased from (13.8) at the control treatment to (25.3) at the same concentration.

Table (3) Comparison of Salicylic concentrations (for height of leg, leaf area and chlorophyll) in wheat plant.

Concentrations	Leg length	Leaf area	chlorophyll
Control	27.63cm	13.71	27.1
10 %salicylic	24.9cm	13.83	27.3
salicylic 20 %	26.7cm	16.85	27.9
salicylic 30 %	28.8cm	19.64	28.8
LSD	1.8 Sign 10 %	3.6 Sign 30%	Non Sign

As shown in Table (3), the use of salicylic acid resulted in a significant increase in both leg height, leaf area and chlorophyll for wheat. The study showed that the addition of salicylic acid and increasing concentration, increased the leg height from (27.63) in the control treatment to (28.8) at 30% and it increased the leaf area from (13.71) in the control treatment to 19.64 at the 30%. As for chlorophyll, there are no differences when the concentration increased to 30%.

Table (4) Comparison of salicylic concentrations (for leg height, paper area and chlorophyll) in barley plant

Concentrations	Leg length	Leaf area	chlorophyll
Control	10.16cm	5.56	13.8
10 %salicylic	11cm	6.23	22.8
salicylic 20 %	14.86cm	7.14	24.5
salicylic 30 %	14.9cm	7.84	25.3
LSD	2.7 Sign 30 %	1.9 Sign 30%	10.2 Sign30%,20%

Table (4) shows that the use of salicylic acid resulted in a significant increase in height of leg, paper area and chlorophyll for wheat. The study showed that adding salicylic acid and increasing concentration increased height of leg from (10.16) in control to (14.9) at 30% which the is also the case for paper area which increased from (5.56) in the control treatment to (7.84) at the 30%, as well as the chlorophyll rate which increased from (13.8) at control to (25.3) at the same concentration.

Discussion

The results of the current study, tables (1, 2, 3, 4), showed that the increase in leg height, paper area and chlorophyll for wheat and barley plants treated with Gibberellin acid and salicylic acid is because these two compounds affect the total biological processes in the plant. Such processes include photosynthesis which is important for cell growth as well as cell division, formation of pigments, increase in the content of chlorophyll, and the transformation of starch into sugars followed by a decrease of water stress, which causes water to enter the cells and thus the elongation. It also has an effect on the stimulation of antioxidants, taking ions and increasing the size of

chloroplast and number of grana resulting in increasing all indicators of vegetative growth in it. This is consistent with what was stated in (17, 18, 19, 20, 21, 22, and 23). The results of the current study also agreed with (24, 25, 26, 27, 28, and 29) by increasing in the paper area and chlorophyll ratios. This is due to the role of Gibberellin acid in delaying tissue aging, delaying chlorophyll degradation, stimulating photosynthesis and eliminating the inhibitory role of abscisic acid in leaves.

Conclusion

Through the results of the present study we can conclude the following:

The Gibberellin and salicylic acid have a role in increasing vegetative growth indicators. This is reflected in increased leg height, paper area, and chlorophyll content by increasing concentration.

Recommendations

The current study revealed a number of points that need to be studied. Accordingly, the researcher recommend the following:

1- Conducting a cellular study to determine the effect of Gibberellin and salicylic acids in the division stages of wheat and barley plants.

2- Measuring the effect of these factors on the yields of wheat and barley.

3- Comparing the effect of these factors on more than two plants.

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