Effect of genotype and some treatments on the growth and yield of snake cucumber

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Abstract

The experiment was conducted in the spring season of 2023 in a field located 5 km south of Babylon province. The experiment was implemented as a factorial experiment consisting of two factors, a main factor and a secondary factor, using a split plot system. According to the randomized complete block design (R.C.B.D.) with three replicates, treatments were placed in the main plots, which are: S1 (spraying with water only), S2 (spraying NAA at a concentration of 100 $mg.L^{-1}$), S3 (spraying organic nutrients at a concentration of 3 $g.L^{-1}$), S4 (soaking the seeds with GA3 at a concentration of 750 $mg.L^{-1}$ for 24 hours before planting), and S5 (Soaking the seeds with ethephon at a concentration of 100 $mg.L^{-1}$ for 10 hours before planting) The genotype was placed in sub plots, which are V1 (genotype , Babylon Province), V2 (genotype , Najaf Province), V3 (genotype , Al-Qadisiyah Province), and V4 (genotype , Dhi Qar Province).) and V5 (genetic structure of Nineveh Province). The results showed a significant excelled of the V3 genotype in the traits: plant height, number of leaves, leaf area, dry matter percentage, number of female flowers, number of fruits, and the superiority of the V2 and V3 genotype s with no significant differences between them for the two traits. Plant yield and total yield. Treatment S2 was also significantly excelled in traits: plant height, number of main branches, number of leaves, leaf area, number of female flowers, number of fruits, plant yield, and total yield. As for the binary interactions, treatment (S2V3) was significantly excelled in traits. Plant length, number of main branches, number of female flowers, number of fruits, plant yield, total yield.

introduction

snake cucumber Cucumis melo var.flexuosus is a type of watermelon from a botanical point of view, but its fruits are often eaten fresh, just like the fruits of regular cucumbers. It is considered one of the important summer vegetable crops in Iraq that is consumed fresh or used in pickling[6] . It is believed that its original homeland is the Mediterranean basin, and it has good nutritional value because it contains vitamins (A, B, C) and some nutrients Mn, S, Fe, P, Ca, which have a moisturizing and soothing effect on the intestines. It is grown in Iraq in open fields in It has two spring and autumn crops, and it is grown under protected conditions [15]. It belongs to the watermelon cultivars (Al-Qawun), which includes the group of reticulated watermelon cultivars, the group of European watermelon cultivars, the cantaloupe cultivar, the group of smooth watermelon cultivars, the group of cantaloupe cultivars, the plant cultivar followed by Al-Ajur, and the snake cucumber cultivar [9]. Likewise, seven specific groups of watermelon are known at the present time from Including the snake cucumber, whose English name is Snake melon (or Snake cucumber [10] It is noted that the productivity of snake cucumber in Iraq is low, which can be improved by studying many factors affecting it, including genetic and environmental variations and the interaction between them, which gives the external

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appearance or phenotype. Therefore, environmental diversity affects the performance of agricultural cultivars, which reflects negatively on production, so it is a good choice. The appropriate cultivar is a major factor in increasing yields. Therefore, the trend has become to develop new cultivars characterized by genetic structures capable of adapting to the environment and giving high productivity[7] and the use of plant growth hormones, which have a major role in improving plant growth and productivity as they are natural organic compounds. Produced by the plant, some of which are artificial, which affect the metabolic and chemical processes, physiological activities, and various manifestations of the plant. The use of these regulators also causes a change in the hormonal content of the plant due to improved vegetative and flowering growth, as well as the positive direct relationship between the sex ratio and the plant's content of internal auxin, which has a major role. In increasing the number of female flowers [1]which reflects positively in improving quantitative plant indicators.

Materials and methods

The field experiment was conducted in a field located 5 km south of Babylon Province during the spring agricultural season of 2023. Samples of field soil were taken randomly and from different places before planting, at a depth of 30 cm from the soil surface area. The samples were air-dried, ground, and passed through a sieve with a diameter of 2. mm and were analyzed to determine some chemical and physical traits of the field soil. Such as pH 7.8, electrical conductivity 3.3 Dc/m^{-1}, organic matter percentage 0.75, nitrogen 51 PPM, phosphorus 6.5 PPM, potassium 340 PPM, sand percentage 56%, silt percentage 19%, clay percentage 25%. The experiment was implemented as a factorial experiment consisting of two factors, a main factor and a secondary factor using a split plot system, and according to the R.C.B.D. randomized complete block design with three replications, the treatments were placed in the main plots, namely S1 (spraying with water only), S2 (spraying NAA at a concentration of 100 $mg.l^{-1}$), and S3. (Spraying organic nutrients at a concentration of 3 $g.L^{-1}$) and S4 (soaking the seeds with GA3 at a concentration of 750 $mg.L^{-1}$ for 24 hours before planting) and S5 (soaking the seeds with ethephon at a concentration of 100 $mg.L^{-1}$ for 10 hours before planting) and the genotype s were developed. In the secondary plots, they are V1 (genotype of Babylon Province), V2 (genotype of Najaf Province), V3 (genotype of Al-Qadisiyah Province), V4 (genotype of Dhi Qar Province), and V5 (genotype of Nineveh Province). Traits were measured: plant length cm, number of branches ($branch.plant^{-1}$), number of leaves ($leaf.plant^{-1}$), leaf area cm^2, dry matter percentage %, number of female flowers ($flower.plant^{-1}$), number of fruits ($Fruit.\ Plant^{-1}$), plant yield (g), total yield ($tons.\ ha^{-1}$).

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Table (1) Some physical and chemical traits of field soil before cultivation

values	Units	traits
7.7		pH
3.3	Dc/ m-1	EC electrical conductivity
0.75	%	Organic matter
51	PPM	Nitrogen
6.5	PPM	Phosphorus
340	PPM	Potassium
56	%	Sand
19	%	Silt
25	%	Clay
Silty sand		Soil texture

Soil analyses were conducted in the laboratories of the Agriculture Directorate. Water and Soil Management Division

Results and discussion

It is clear from the results of tables (2 and 3) that the genotype s had a significant difference in the vegetative and quantitative indicators, as a significant superiority of the two genotype s V2 and V3 appeared in most growth traits. The appearance of significant differences between the genotype s for most traits is due to the difference in the constituent genes. For each genotype , it differs in the genetic expression of traits to a different degree and manner according to each of them. That is, the difference in the genes that control the inheritance of certain traits from others is due to the combined effect resulting from the interaction of genetic and environmental factors [5,7,13, 21]. Perhaps it is due to the variation between genotype s and then the dominance of genetic factors for each genotype to show a specific trait [8]. The difference in vegetative growth traits results from the difference in genetically derived cultivars and the extent to which they are affected by the environment [3,4] and they are consistent. The results with [11 ,18 ,19,23] indicate that there are significant differences between the genotype s for the above traits on cucumber plants. This is consistent with the findings of [2,20] who showed that the superior genetic factors responsible for growth in a cultivar reflect positively on the yield in that cultivar, and the reason may be due to the difference in the effect of the genes that make up each genotype on flowering and setting. Thus, it is reflected in the yield. [14] also stated that improving the vegetative and

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flowering growth traits improves the genetic performance due to higher rates of construction of nucleic acids (DNA and RNA) and the development of gene expression, which is reflected positively in the yield traits. Tables (2 and 3) for vegetative and quantitative traits show a significant superiority to treatment S2 (NAA spray). The significant effect can be due to the role of auxin, which works to stimulate the enzymes involved in the components of the cell wall and stimulate the enzymes that degrade some components of the wall. Therefore, it is believed that auxin causes the removal of calcium ions that The carboxyl groups bind to the materials that make up the wall, which leads to the decomposition of its components and an increase in its plasticity, which results in a decrease in the water potential of the cell, which increases the force of osmotic absorption, so water enters the cell, causing an increase in the size and breadth of the cell, in addition to the role of auxin in increasing the materials that go into building cell walls. Therefore, the processes of growth, elongation, and cell division increase [17, 22] and this was reflected positively in the vegetative traits (plant length, number of main branches, number of leaves, leaf area, percentage of dry matter of leaves). Therefore, treatment with NAA stimulated The processes of cell division and elongation led to the activation of protein synthesis, the provision of necessary elements for the plant, and the increase in the synthesis and accumulation of nutrients, which led to the superiority of vegetative indicators, especially the increase in the percentage of dry matter which gave an increase in quantitative indicators[12,16] .

Table (2) The effect of study factors on plant traits

Effect of genotype	Plant length cm	Number of branches. plants	Number of leaves. plants	leaves area cm^2	Dry matter percent % age	Number of female flowers	Number of fruits per plant	Plant yield (g)	Total yield tons/ha
V1	186.40	3.987	152.83	15328	21.67	15.067	10.311	1372.3	18.30
V2	175.83	4.905	180.39	18906	23.27	15.691	10.614	1652.0	22.03
V3	232.47	4.757	199.31	20397	23.29	16.711	12.160	1644.6	21.93
V4	166.48	3.863	129.14	12261	22.65	14.565	9.777	1264.9	16.86
V5	64.57	1.633	45.95	2476	20.70	12.307	6.759	471.1	6.28
LSD 0.05	4.483	0.3923	5.291	1099.9	0.931	0.3974	0.3453	49.05	0.654

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Treatments effect									
S1	149.72	2.992	99.11	9403	20.58	12.736	7.598	821.7	10.96
S2	178.71	4.758	213.94	21517	23.09	18.055	13.865	1805.6	24.07
S3	173.28	4.151	141.81	14133	22.85	14.832	10.175	1387.9	18.51
S4	160.79	3.294	110.81	10269	21.98	13.041	8.017	963.6	12.85
S5	163.25	3.950	141.93	14044	23.07	15.678	9.967	1426.1	19.01
LSD 0.05	4.522	0.4896	5.430	1062.4	1.123	0.6463	0.3320	78.74	1.050

S1 (spraying with water only), S2 (spraying NAA at a concentration of 100 mg.L-1), S3 (spraying organic nutrients at a concentration of 3 g.L-1), S4 (soaking the seeds with GA3 at a concentration of 750 $mg.L^{-1}$ for 24 hours before planting), S5 (Soaking the seeds with ethephon at a concentration of 100 $mg.L^{-1}$ for 10 hours before planting).

V1 (genotype , Babylon Province), V2 (genotype , Najaf Province), V3 (genotype , Al-Qadisiyah Province), and V4 (genotype , Dhi Qar Province).) and V5 (genetic structure of Nineveh Province).

Table (3) Bi-interactions of study factors

interaction effect	Plant length cm	Number of branches. plants	Number of leaves. plants	leaves area cm^2	Dry matter percentage %	Number of female flowers	Number of fruits per plant	Plant yield (g)	Total yield tons/ha
S1V1	185.11	3.109	111.04	11265	19.55	13.330	8.000	906.3	12.08
S1V2	161.89	3.887	112.96	11312	21.17	12.773	7.222	1022.8	13.64
S1V3	211.67	3.667	150.66	15597	21.17	14.000	8.993	1005.8	13.41
S1V4	136.22	2.855	85.11	7025	20.91	12.440	7.773	792.4	10.57
S1V5	53.72	1.443	35.78	1816	20.11	11.137	6.000	381.1	5.08
S2V1	185.66	4.887	224.67	24088	22.77	18.500	15.497	2015.1	26.87

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S2V2	183.00	6.069	307.00	31143	24.50	18.720	14.833	2168.3	28.91
S2V3	259.33	6.287	293.00	29139	24.89	22.110	18.330	2517.0	33.56
S2V4	184.22	4.755	189.15	20125	23.18	17.667	13.220	1849.7	24.66
S2V5	81.33	1.793	55.90	3092	20.10	13.277	7.443	477.9	6.37
S3V1	189.23	4.500	163.33	16167	22.27	14.500	10.327	1507.9	20.11
S3V2	200.67	4.985	155.33	17107	23.23	14.553	11.220	1659.4	22.13
S3V3	241.67	5.000	200.89	21523	24.02	17.000	12.110	1731.4	23.09
S3V4	173.67	4.305	130.44	12284	23.07	15.443	10.333	1478.3	19.71
S3V5	173.67	1.967	59.08	3587	21.69	12.663	6.887	562.6	7.50
S4V1	184.84	3.110	121.11	11343	21.22	13.870	8.067	995.0	13.27
S4V2	165.83	3.950	122.97	11668	22.88	13.133	7.577	1198.5	15.98
S4V3	222.66	4.466	181.00	19183	23.00	14.330	10.077	1264.6	16.86
S4V4	156.50	3.443	90.99	7285	22.18	12.643	8.300	919.9	12.27
S4V5	74.13	1.500	38.00	1868	20.63	11.227	6.067	439.8	5.86
S5V1	187.15	4.330	144.00	13777	22.53	15.133	9.667	1437.1	19.16
S5V2	167.79	5.637	203.67	23300	24.57	19.277	12.220	2210.9	29.48
S5V3	227.00	4.366	170.99	16542	23.34	16.113	11.290	1704.4	22.73
S5V4	181.80	3.955	150.00	14586	23.91	14.633	9.260	1284.0	17.12
S5V5	52.52	1.460	41.00	2015	20.97	13.233	7.400	494.0	6.59
LSD 0.05	9.753	0.8904	11.543	2376.6	2.096	0.9763	0.7456	119.93	1.599

S1 (spraying with water only), S2 (spraying NAA at a concentration of 100 mg.L-1), S3 (spraying organic nutrients at a concentration of 3 g.L-1), S4 (soaking the seeds with GA3 at a concentration of 750 mg.L^{-1} for 24 hours before planting), S5 (Soaking the seeds with ethephon at a concentration of 100 mg.L^{-1} for 10 hours before planting).

V1 (genotype , Babylon Province), V2 (genotype , Najaf Province), V3 (genotype , Al-Qadisiyah Province), and V4 (genotype , Dhi Qar Province).) and V5 (genetic structure of Nineveh Province).

Conclusion

1 - The results of the tables indicated that there was a discrepancy between the genotypes in their superiority for most of the studied indicators, and the superiority of the V2 and V3 genotypes in most of the vegetative and quantitative indicators.

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2- Treatment S2 showed significant superiority in all vegetative and quantitative indicators.

3- As for the binary interference treatments, the treatment (S2V3) showed a significant increase in most of the studied indicators.

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