Response Of Soybean Genotypes To Different Planting Dates

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Abstract

A field experiment was conducted using a randomized complete block design (R.C.B.D), in the Al-Mussaib project area located within latitude 32 degrees north and longitude 44.30 degrees east, during the agricultural season 2024, to study the effect of Genotypes and planting date on some traits of the yield and its components of soybeans, by making three replicates. The experiment included five Genotypes of soybeans (Warka, Andalus, Rami, Shaima, Yamasawya), and four planting dates 1st April ,15th April , 1st May ,15th May. The following characteristics were measured: (dry matter/g, its weight was calculated after drying the plants at 70°C, for 48 hours, number of pods plant-1, number of seeds pod, weight of 100 seeds (g), and calculating the yield of (10) plants from the two middle lines when the crop was fully mature .(

After collecting the data, it was statistically analyzed and the arithmetic averages were compared on the basis of the least significant difference (LSD) at a significant level of 0.05. The results showed that the Genotypes Yamasoya was significantly superior to the other Genotypes, as it recorded the highest percentage of dry matter, which amounted to 339.83g . As for the Genotypes Andalusia, it recorded the highest percentage of the number of pods, which amounted to 292.75 pods, while the Shaimaa outperformed the other, as it recorded the highest percentage of the number of seeds, which amounted to 3.417 and the highest percentage of the weight of 100 seeds, which amounted to 13.33g. It also recorded the highest percentage in the yield of 10 plants, which amounted to 932.2 g .

Differences were found for the binary interaction between Genotypes and planting dates in dry matter, as the interaction Yamasuya was superior in the first date with the highest percentage reaching 417.67g , Differences were also found for the binary interaction between Genotypes and planting dates in the number of pods, as the interaction Shimaa was superior in the third date, obtaining the highest percentage reaching 278.67, and the interaction Shimaa in the third date recorded the highest percentage reaching 3.667 for the number of seeds. Differences were also found for the binary interaction between Genotypes and planting dates in the weight of 100 seeds, as the interaction Shimaa was superior in the first date with the highest percentage reaching 14.00, and the interaction Shimaa was superior in the third date with the highest percentage reaching 960.3 g for the yield of 10 plants.

Keywords: Soybean; Genotypes; Planting Date .

Introduction

Soybean (Glycine max L.) is a crop of the legume family fabaceae that is important medically and industrially because it contains amino acids necessary for the human body, which makes it an excellent source of complete protein, especially for vegetarians [1]. globally, soybeans occupy an important position as an oil crop and a rich source of protein [2]. the united states of america ranks first in the world in terms of total production,

followed by brazil and argentina [3]. soybeans provide green fodder, hay, or silage for animals, in addition to the fact that its cultivation in the soil improves the properties of the soil and increases its fertility by fixing atmospheric nitrogen biologically by root nodule bacteria, which makes it an important source of nitrogen in plants that are grown in rotation with it, especially in soils of areas with low fertility. it is also cultivated to be used as green fertilizer that is mixed with the soil, enriching it with nitrogen. it is believed that its original homeland is southeast asia, especially in china. its cultivation has spread from its origin in the northern provinces of china to the subtropical and temperate climates [4], the current study aims to evaluate the performance of several soybean Genotypes in the middle euphrates region and determine the best of them?, and to determine the best planting dates for different soybean growth, in addition to showing the best interaction between different varieties and dates.

Material and Methods

The field experiment was conducted in the Al-Mussaib project area located within latitude 32 degrees north and longitude 44.30 degrees east during the 2024 agricultural season to study the effect of Genotypes and planting date on some of the yield and its components of soybeans. the experimental land was plowed twice perpendicularly, then leveling and smoothing operations were carried out, and soil samples were taken at a depth of (30 cm) for the purpose of conducting physical and chemical analyses of the field soil (Table 1 .(

Table 1. Physical and chemical properties of the field soil.

Adjective		Unit of Measure	Value
pH		-	7.4
Ec		ds. m^{-1}	2.5
N		$mg.kg^{-1}$	35
P		$mg.kg^{-1}$	18.28
K		$mg.kg^{-1}$	110.204
Organic matter		Percentage	27.7
	Sand	g kg^{-1} soil	446
Soil separators	silt	g kg^{-1} soil	403
	Clay	g kg^{-1} soil	151
Soil texture		-	Sandy/Loams

Traits Studied

.1Dry matter-plant (g) was calculated by drying the plants at 70°C for 48 hours and then weighing them.

.2Number of pods-plant.

.3Number of seeds-pod.

.4Weight of 100 seeds (g(

.5Yield of ten plants: When the crop was fully ripe, ten plants were taken from the two middle lines and the weight of the yield of ten plants was calculated.

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Experimental Design and Cultivation

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A factorial experiment was conducted according to the randomized complete block design (RCBD) with three replicates. the experiment included two factors: the first factor was five Genotypes of soybeans (warka, andalus, rami, shaima, yamasoya) and the second factor was four planting dates (1 April , 15 April, 1 May , 15 May). the experimental land was divided into three sectors, each sector included (20) experimental units with an area of (3x3m). the experimental units were isolated from each other by a distance of (2 m) and included (4 rows), the distance between one row and another was (75 cm) and between one hole and another was (25 cm) the soil was fertilized by adding 160 kg h-1 , the first with planting and the second during flowering [5], and phosphate fertilizer was added in one batch at a rate of 120 kg h-1 P2O5 [6] before planting, and all crop service operations were carried out according to the recommendations followed and the irrigation process according to the plant's need.

Statistical Analysis

The statistical analysis was conducted using the statistical program SAS (Statistical Analysis System) [8] and the arithmetic means were compared on the basis of the least significant difference LSD at a significant level of 0.05

Results And Discussion

Results

Table (2) Effect of Genotypes, planting date and their interaction on dry matter (g/plant-1 (

Planting dates / Genotypes	**1/4**	**15/4**	**1/5**	**15/5**	**Mean of Genotypes**
Warka	183.33	183.33	185.67	151.67	**176.00**
Andalus	235.33	250.67	245.00	204.67	**233.92**
Rami	295.00	297.67	225.00	210.00	**256.92**
Shaimaa	324.67	307.67	297.33	231.67	**290.33**
Yamasuya	417.67	401.67	344.67	195.33	**339.83**
Mean dates	**291.20**	**288.20**	**259.53**	**198.67**	
$L.S.D_{(0.05)}$	Genotypes **6.206**	Planting dates **2.075**	Genotypes *Planting dates **11.215**		

The results of the statistical analysis in Table (1) showed significant differences between the Genotypes in the dry matter, as the composition Yamasuya significantly outperformed the other Genotypes, as it recorded the highest percentage of 339.83 g/plant-1 compared to the lowest percentage of 176.00 g recorded by the Genotypes Warkaa. The results of the table also showed significant differences between the planting dates, as the date (15/4) achieved the highest percentage of 288.20 g, while the date (15/5) achieved the lowest percentage of 198.67 g/plant-1 Differences were found for the binary interaction between the Genotypes and planting dates in the dry matter, as the interaction (Yamasuya in the first date) outperformed the highest percentage of 417.67 g/plant-1, while the interaction (Warkaa in the fourth date) recorded the lowest percentage of 151.67 g/plant-1

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Table (3) The effect of Genotypes, planting date and their interaction on the number of pods Plant-1

Planting dates / Genotypes	1/4	15/4	1/5	15/5	Mean of Genotypes
Warka	172.33	166.67	152.00	131.67	**155.67**
Andalus	274.33	297.67	304.33	294.67	**292.75**
Rami	211.33	219.67	209.33	201.00	**210.33**
Shaimaa	256.00	263.00	278.67	249.67	**261.83**
Yamasuya	146.00	127.67	123.67	123.00	**130.08**
Mean dates	**212.00**	**214.93**	**213.60**	**200.00**	
$L.S.D_{(0.05)}$	Genotypes **3.116**	Planting dates **4.063**	Genotypes *Planting dates **6.499**		

It is noted from the results of the statistical analysis in Table (3) that there are significant differences between the Genotypes in the number of pods, as the Andalus outperformed the other Genotypes significantly, as it recorded the highest percentage of 292.75 pods Plant-1 compared to the lowest percentage of 130.08 pods Plant-1 recorded by the Yamasoya Genotypes. The results of the table above showed significant differences between the planting dates, as the date (15/4) achieved the highest percentage of 214.93 pods Plant-

While the date (15/5) achieved the lowest percentage of 200.00 pods Plant-1 Differences were also found for the binary interaction between the Genotypes and planting dates in the number of pods, as the interaction (Shaimaa in the third date) outperformed the highest percentage of 278.67pods Plant-1 while the interaction (Warkaa in the fourth date) recorded the lowest percentage of 131.67 pods Plant-1.

Table (4) Effect of planting date and Genotypes and their interaction on the number of seeds per pod-1

Planting dates / Genotypes	1/4	15/4	1/5	15/5	Mean of Genotypes
Warka	2.667	3.333	2.667	3.000	**2.917**
Andalus	3.000	2.667	3.000	3.333	**3.000**
Rami	3.333	3.000	3.333	2.667	**3.083**
Shaimaa	3.333	3.333	3.667	3.333	**3.417**
Yamasuya	2.000	2.333	2.333	2.000	**2.167**
Mean dates	**2.867**	**2.933**	**3.000**	**2.867**	
$L.S.D_{(0.05)}$	Genotypes **0.429**	Planting dates **0.297**	Genotypes *Planting dates **0.803**		

The results of the statistical analysis in Table (4) indicate that there are significant differences between the Genotypes in the number of seeds, as the composition Shimaa outperformed the other Genotypes, as it recorded the highest percentage of 3.417 seeds per pod-1, compared to the lowest percentage of 2.167 recorded by the Genotypes Yamasuya. The results of the table above showed that there were significant differences between the planting dates, as the date (1/5)

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achieved the highest percentage of 3.000 seeds per pod-1.

while the dates (1/4) (15/5) achieved the lowest percentage of 2.867 seeds per pod-1.

Differences were also found for the binary interaction between the Genotypes and planting dates in the number of seeds, as the interaction (Shimaa in the third date) outperformed the highest percentage of 3.667 seeds per pod-1, while the interaction (Yamasuya in the first and fourth dates) recorded the lowest percentage of 2.000 seeds per pod-1.

Table (5) Effect of Genotypes and planting date on the weight of 100 seeds (g(

Planting dates / Genotypes	**1/4**	**15/4**	**1/5**	**15/5**	**Mean of Genotypes**
Warka	9.33	9.67	9.33	9.33	**9.42**
Andalus	11.67	11.33	12.00	11.33	**11.58**
Rami	10.67	11.33	11.00	10.00	**10.75**
Shaimaa	14.00	13.67	13.33	12.33	**13.33**
Yamasuya	7.33	8.00	6.33	7.33	**7.25**
Mean dates	**10.60**	**10.80**	**10.40**	**10.07**	
$L.S.D_{(0.05)}$	Genotypes **0.942**	Planting dates **0.840**	Genotypes *Planting dates **1.813**		

It is noted from the results of the statistical analysis in Table (5) that there are significant differences between the Genotypes in the weight of 100 seeds, as the composition Shaimaa outperformed the other Genotypes significantly, as it recorded the highest percentage of 13.33 g compared to the lowest percentage of 7.25 g recorded by the Genotypes Yamasuya. The results of the analysis showed that there are significant differences between the planting dates, as the date (15/4) achieved the highest percentage of 10.80 g ,

while the date (15/5) achieved the lowest percentage of 10.07 g. Differences were also found for the binary interaction between the Genotypes and planting dates in the weight of 100 seeds, as the interaction (Shaimaa in the first date) outperformed the highest percentage of 14.00, while the interaction (Yamasuya in the first and fourth dates) recorded the lowest percentage of 7.33.

Table (6) The effect of Genotypes, planting date and their interaction on the yield of 10 plants(g(

Planting dates / Genotypes	**1/4**	**15/4**	**1/5**	**15/5**	**Mean of Genotypes**
Warka	586.3	567.0	525.7	520.3	**552.1**
Andalus	781.3	846.0	867.7	900.0	**848.8**
Rami	879.7	835.0	822.3	801.0	**834.5**
Shaimaa	883.3	914.0	960.3	971.0	**932.2**
Yamasuya	980.7	850.0	865.7	514.3	**802.7**
Mean dates	**822.3**	**804.2**	**808.3**	**741.3**	
$L.S.D_{(0.05)}$	Genotypes **15.70**	Planting dates **16.84**	Genotypes *Planting dates **31.21**		

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It is noted from the results of the statistical analysis in Table (6) that there are significant differences between the Genotypes in the yield of 10 plants, as the Shimaa outperformed the other Genotypes significantly, as it recorded the highest percentage of 932.2g compared to the lowest percentage of 552.1g recorded by the Genotypes Warkaa. The results of the table above showed significant differences between the planting dates, as the date (1/4) achieved the highest percentage of 822.3 g.

while the date (15/5) achieved the lowest percentage of 741.3 g. Differences were also found for the binary interaction between the Genotypes and planting dates in the yield of 10 plants, as the interaction (Shimaa in the third date) outperformed the highest percentage of 960.3g, while the interaction (Yamasawiya in the fourth date) recorded the lowest percentage of 514.3g.

Discussion

The reason for the difference between the genetic structures in the characteristics of the crop and its components (Table 26) is due to the difference in the genetic and hereditary nature of the cultivated genetic structures and their suitability to the prevailing environmental conditions in the area of cultivation and the climatic and soil conditions (Table 1). These results were consistent with what was reached by [8], [9], [10], that the reason for the difference in the characteristics of the crop due to the effect of planting dates may be attributed to the difference in temperatures and the effect of the photoperiod, which contributed to the early emergence of some study indicators. These results were consistent with what was reached by [11], [12], [13]. Some studies related to heat accumulation in different environments and agricultural dates have indicated great importance to researchers and plant breeders in order to evaluate the relative adaptation of plants, including the soybean crop [14.[

Conclusions & Recommendations

In light of the results obtained, we can conclude that the Genotypes and planting date led to a significant increase in all study indicators, especially the Genotypes of Shimaa. This is an indication of the possibility of exploiting these varieties for repeated planting dates during repeated agricultural cycles. As for the planting date (1/4), according to the conditions of the obtained experiment, this date outperformed the rest of the dates to suit the climatic conditions at the end of spring and the beginning of summer.

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