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Effect of Plant Density On The Morphological Trait For Different Varieties Of Wheat (*Triticum aestivum L.*)

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Abstract:
A factor experiment was carried out in the experimental field of Ankawa Research Center, during the spring season of 2023 to find out the effect of plant density on the morphological characteristics of different varieties of wheat. The RCBD design was used, and three varieties of wheat were planted: A99, H2, H4 and with three seeding levels (450, 400, 350) plants. M^2. Significant differences were found between the average plant density overlap with wheat varieties for the studied characteristics, the average overlap between the density exceeded (400) plants. M^2 and the variety H2 in all the characteristics studied on the rest of the average overlap between densities and varieties. Referring to the average interaction between the density (400) plants. M^2 and the variety H2 The value of the average overlap was (101.5 cm) for the plant length characteristic, (67.433 cm2) for the leaf area of the flag leaf, (8) spikes for the number of spikes per plant, (32.156, gm) for the weight of a thousand grains, and (81 gm) for the plant weight characteristic. We conclude that the density exceeds (400) plants. M^2 and for all the morphological qualities studied in terms of moral and value of the highest average.

Keywords: *Plant Density, Morphological Characteristics, Varieties, RCBD.*

1. Introduction

Wheat (*Triticum aestivum* L.) is one of the oldest crops that man has been cultivating and improving its qualities for thousands of years to the present day [1].

Wheat ranks second in the world in cereal production after corn, and first in cultivated area globally, with harvested areas reaching about 215.9 million hectares, with a productivity of about 765 million tons [2]. It ranked first in the list of consumer food commodities, as spelled grains provide adults with more than 25% of their daily protein needs and more than 50% of their daily energy needs [3].

It was found that there is a relationship between plant density and morphological traits, as the seeding rate is one of the most influential factors on grain yield and its components from other traits, and that ideal plant density achieves a high yield of genetic structures with the ability to branch [4].

The results of previous studies indicated differences in the response of different varieties of wheat to different plant densities [5,6]. It was found that the varieties can compensate for low or high plant densities by modifying the number of branches, the number of spikes per square meter, the number of grains in a spike, and the weight of 1000 grains. Newly developed wheat varieties may not require high seeding rates similar to traditional varieties [5].

The results of previous studies showed that choosing the appropriate variety and determining the seeding rate used in agriculture is one of the important things that must be taken into account by producers to obtain a high grain yield of good quality, as it is a determining factor for plants and has the greatest impact on most morphological qualities such as plant length and the number of leaves and branches that the plant passes through since its inception from the seed until it reaches adulthood [7,8]. The quantity and rates of sowing vary according to the cultivated areas and according to the planting dates [9].

2. Methodology

The seeds of the soft wheat varieties (Triticum aestivum L.) planted on 30/11/2022 in the field of Ankawa Research Center in Erbil Governorate, the land was tilled before planting and the field land was divided into blocks with a length of 3 m and a width of 1.5 m and an area of 4.5 m 2 for each block and each experimental unit included 8 lines, and the distance between one block and another 1m and between the repeaters 2m and the total number of blocks 27 blocks, After preparing the land, three different planting densities determined (350, 400, 450) plants per slab and three replicates of three different varieties of soft wheat (Hawler4, Hawler2, Adana99).

After that, the seeds sterilized with a fungicide Daxel before planting them, and when planting, DAP fertilizer consisting of Nitrogen (N), Phosphorous (P) and Potassum (K %0) was added in different proportions, namely N 16% and P 46% with the seeds during planting [10]. The seeds distributed at different densities and planted in slabs randomly according to the design of the complete random sectors RCBD with two factors. The rainwater falling in the area was completely relied on for irrigation.

The process of taking different and multiple measurements from a morphological point of view over the different stages of plant growth, which included (Plant height, tillers number, leaf area of flag leaf and blade leaf, dry weight of the plant, spike length, number of spikes per plant, number of grains in the plant, weight of 1000 grains, yield in hectares, until the plant is harvested.

The soil of the experiment field was analyzed at Ankawa Research Center in Erbil Governorate and Table (1) shows its physical and chemical properties.

Table 1: Physical and Chemical Properties of Experimental Field Soil at Ankawa Research Center in Erbil Governorate

Soil Sample	Particle size distribution			Texture Class	pH	EC	O.M	Total (N)	(P)	(K)
	Sand %	Silt %	Clay %	Silty clay	1:2	dSm^{-1}	%		ppm	
	g kg^{-1} soil									
Ankawast.	19	43	38		7.82	0.3	0.92	0.11	6.3	196

2.1 Data Collection

2.1.1 Plant Height (cm) :

Measure the height of the plant from the area of contact of the stem with the soil surface to the highest part of the plant using the graduated measuring ruler.

2.1.2 The Number of Tillers (Plant^{-1}):

The real number of branches on the true stem of each plant was Calculated.

2.1.3 Flag Paper Area (cm^2 Plant^{-1}):

Calculated according to the following Hunt equation: Flag leaf area = flag leaf length * middle width * correction factor (0.905) [11].

2.1.4 Leaf Space (cm^2 Plant^{-1}):

The leaf area was calculated according to Hunt [11] (1982) with the same equation:

Leaf area = leaf length * width at middle * correction factor (0.905)

2.1.5 Wet Weight of Green Parts (gm Plant^{-1}):

Plant samples were weighed before being dried in an electric oven.

2.1.6 The Dry Weight of Green Parts (gm Plant^{-1}):

Samples are dried in an electric oven with a drift fan at 70°C for 72 hours until constant dry weight is reached.

2.1.7 The Number of Spikes (Plant^{-1}):

The number of ears was calculated by 1 plant.

2.1.8 Spike Length (Cm) :

Measures the length of the spike from the base of the spike to the top of the spike for each plant.

2.1.9 Spike Weight (gm):

The average weight of one spike was measured.

2.1.10 The Number of Grains (spike $^{-1}$):

The average number of grains for ten spike per experimental unit after manually neglecting and cleaning these spike and according to the number of grains per spike.

2.1.11 The Weight of a Thousand Grains (Plant^{-1}):

The number of grains per plant was calculated. Weight 1000 tablets. I counted 1000 pills manually and then weighed each sample with a sensitive balance for each experimental unit.

2.1.12 Grain Yield (ton. h^{-1}):

After manual threshing of the harvested plants from a distance of 3 lines and a length of 50 cm from each experimental unit, and after isolating the straw from the grains and cleaning them well, the grains were weighed plus the grains used in estimating the weight of 1000 grains for the same treatment and then transferred the weight from the grain. m2 to tons. h-1 at 12% humidity [12].

2.1.13 Statistical Analysis:

The data obtained for growth characteristics and components of the obtained statistically were analyzed according to the method of analysis of variance for the design of R.C.B.D by the experiment of its two factors and the least significant difference test (LSD) was used to compare the arithmetic averages at the level of probability 5% [13].

3. Findings and Discussion

3.1 Plant Height

An important indicator of plant growth and development, indicating the growth rate and yield of the crop [14]. The height of the plant stem plays an important and vital role in the period of filling cereals with wheat, especially in the presence of harsh climatic conditions such as drought and heat stress, due to its ability to store carbohydrates that affect the filling and packaging of grains after flowering [15]. The shortening of the stem in some varieties is also considered one of the desired and required qualities for plant breeders, as increasing the height of the plant significantly causes the consumption of larger quantities of dry matter stored for the flowering stage, knots, and grain formation, which reflects negatively on the formation of spikes and the number of grains in them and their weight, which causes a decrease in the final yield [16]. The plant height characteristic was measured at three stages of plant growth showing the overlap between the three seed densities (450, 400, 350) with the three wheat varieties (Adana99, Hawler2, Hawler4). The results of Table (2) for the analysis of variance showed a significant difference in the characteristic of plant height between the overlap in seed density by 400 plants.1 m 2 and the Holler 2 variety, which amounted to (101.5 cm) if it significantly outperformed the rest of the interactions between densities and varieties. the overlap between the density of 400 plants.1 m2 and the variety Hawler4 gave the lowest average plant height characteristic and reached (72.433 cm). The difference in the height of the plant is due to the difference in the genetic structure between the varieties and also the difference between them in the number of nodes and lengths of phalanges, especially the upper phalange, which is an important characteristic in distinguishing between varieties and also may be attributed to environmental conditions such as water and soil [17,18]. This variation between taxa may be attributed to the fact that plant height is dominated mainly by the additional gene. The results showed a significant overlap between the rates of seeding and varieties. These findings are consistent with previous studies [19,20,8].

Table 2: Effect of overlap between plant densities and wheat varieties on plant height characteristics. cm measured for three stages of plant growth.

Density per 1m^2	Variety	Date reading 1/3/2023	Date reading 1/4/2023	Date reading 1/5/2023
450	Adana99	5.433 bc	17.873 ab	89.467 c
	Hawler2	5.443 bc	17.806 ab	99.2 b
	Hawler4	5.083 bc	16.79 cd	74.867 e
400	Adana99	5.643 a	18.146 ab	90.967 c
	Hawler2	5.663 a	18.466 a	101.5 a
	Hawler4	4.896 c	16.733 c	74.2 of
350	Adana99	5.496 ab	17.756 b	85.767 d
	Hawler2	5.58 a	17.223 bc	90.767 c
	Hawler4	4.986 c	16.426 d	72.433 f

3.2 The Number of Tillers. Plant^{-1}:

The number of tillers is one of the most important characteristics that indicate high wheat productivity under rain-fed cultivation conditions [16]. Nehme et al [21] pointed out that the number of tillers in the plant is one of the components that contribute to the stability of genotypes. The tillers number characteristic in the plant was measured at three stages of plant growth showing the overlap between the three seed densities (450, 400, 350) with the three varieties of wheat (Adana99, Hawler2, Hawler4). The results of Table (3) for the analysis of variance for the trait of the trillers showed that the overlap between the seed density exceeded 400 plants. m^2 and the Hawler2 variety which reached (8) As the highest average of this trait, significantly superior to the rest of the overlaps between the seeding rates and varieties of the same variety and other varieties, while the overlap between the density (400) and the Hawler4 variety was recorded, which amounted to (4.666) and this average did not differ significantly with the rest of the values of the Hawler4 variety and its overlap with the rest of the plant densities. The difference between taxa is due to the genetic makeup, which is the main factor of branch ability in wheat [22]. This applies to the findings of [23,24]. The branching rate was also found to be associated with drought tolerance and increased production [27].

Table 3: Effect of Overlap between Plant Densities and Wheat Varieties on Branching Characteristics. Plant^{-1} is measured for three stages of plant growth.

Density per 1m^2	Variety	Date reading 1/3/2023	Date reading 1/4/2023	Date reading 1/5/2023
450	Adana99	4 ab	7.333 b	6 c
	Hawler2	4.333 ab	8 a	7.333 b
	Hawler4	3.333 c	6 c	5 d
400	Adana99	4 ab	8 a	6 c
	Hawler2	4.666 a	8.333 a	8 a
	Hawler4	3 c	5.333 d	4.666 d
350	Adana99	3.666 bc	7.666 ab	6 c

	Hawler2	4.333 ab	8.333 a	7 b
	Hawler4	3 c	5.333 d	5 d

3.3 Flag Leaf Area. cm^2 plant^{-1}:

Studies have indicated that the science leaf is responsible for transporting more than 80% of processed foodstuffs to grains [26,19]. Previous studies have confirmed the work of the science leaf as a source of processed foodstuffs and the supply of cereals with these materials and that the ability of the science leaf to carry out this process significantly affects the weight of the grain [27]. This confirms the positive significant correlation between the highest average area of the flag leaf and the highest average weight of 1000 grains, both in the Hawler2 variety with a seed density of 400 plants. m^2. The results of Table (4) the overlap between sowing with a density of 400 plants. m^2 and the Hawler2 variety, where it gave the highest average for the flag leaf area and amounted to (67.433 cm^2), which did not differ significantly with the overlap of the same variety and the density of seeds (450), while the value of the lowest average share of the overlap between seeds with a density of 350 plants. m^2 and the Hawler4 variety, which reached (51.3 cm^2), did not differ significantly from the rest of the averages of the same variety and their interactions with all seeding rates. In total, the seeding level overlap exceeds 400 plants. m^2 with all varieties in the description of the flag leaf area.

Table 4: Effect of Overlap between Plant Densities and Wheat Varieties for Flag Leaf Area Characteristics. cm^2 plant^{-1} measured for three stages of plant growth.

Density per 1m^2	Variety	Date reading 1/3/2023	Date reading 1/4/2023	Date reading 1/5/2023
450	Adana99	2.816 a	5.826 a	58.7 bc
	Hawler2	2.836 a	5.81 ab	65.466 a
	Hawler4	2.72 ab	5.236 c	52.8 e
400	Adana99	2.88 a	5.89 ab	60.533 b
	Hawler2	2.883 a	6.033 a	67.433 a
	Hawler4	2.63 b	5.3 d	53.033 de
350	Adana99	2.82 a	5.76 bc	56.6 c
	Hawler2	2.866 a	5.546 cd	56.133 cd
	Hawler4	2.686 b	5.213 d	51.3 e

3.5 The Area of the Blade Leaf. cm^2 plant^{-1}:

The leaf area plays an important role in the efficiency of plant production as it increases the productivity of dry matter as the best part of the plant to carry out photosynthesis and receive the largest possible amount of sunlight thus increasing the weight and rate of grain filling [28]. The leaves of the blade have a major role in resisting drought and helping the plant to acclimatize, as the large leafy area loses water through the process of transpiration in larger quantities than plants with a smaller leaf area, thus determining the amount of water used by the plant and the amount of carbon fixed by photosynthesis [29]. Therefore, it is preferable to select varieties with a small leaf area to reduce the process of transpiration and water loss in dry areas such as Iraq, and this is consistent with the findings of the study conducted by Oulmi [28]. Returning to our study, we find that the results of Table (5) show that the overlap between the seed density exceeds 400 plants. m^2 and the Hawler2 variety, where it gave the highest average in the area of the blade leaf and amounted to (29 cm^2) and significantly outperformed the rest of the overlaps of the same variety and other varieties. While the lowest average for this trait (19.766 cm^2) of the overlap between the seed density was 350 plants. m^2 and the variety Hawler4. We conclude that the best plant density for this trait was at 400 plants. m^2 and for all varieties.

Table 5: Effect of Overlap between Plant Densities and Wheat Varieties on Blade Leaf Area Characteristic cm^2. $Plant^{-1}$ is measured for three stages of plant growth.

Density per $1m^2$	Variety	Date reading 1/3/2023	Date reading 1/4/2023	Date reading 1/5/2023
450	Adana99	1.82 ab	2.803 ab	24.333 cd
	Hawler2	1.816 ab	2.86 a	26.433 b
	Hawler4	1.686 abc	2.576 c	20.033 d
400	Adana99	1.836 ab	2.936 a	25.366 bc
	Hawler2	1.866 a	2.973 a	29 a
	Hawler4	1.64 c	2.63 bc	20.133 d
350	Adana99	1.783 ab	2.81 ab	23.2 d
	Hawler2	1.76 ab	2.63 bc	24.833 c
	Hawler4	1.656 bc	2.44 c	19.766 e

3.6 Wet Weight of Green Parts. gm^{-1}:

The results of Table (6) on the effect of the interaction between plant densities and wheat varieties on morphological characteristics and by comparing the average overlap between plant densities and the three wheat varieties for the wet weight characteristic of plant samples, it was found that the highest average was from the overlap between seeds with a density of 400 plants. m2 and the Hawler2 variety reached (3.47 gm), which did not differ significantly from its average at seed density (450) and the average variety Adana99 at seed density (400). The value of the lowest mean (2.79 gm) of the interference between the density of the seed was (350), which did not differ significantly from the rest of the average interference for the same variety with the rest of the levels of seed density.

3.7 The Dry Weight of Green Parts. gm^{-1}:

The results of Table (6) on the effect of overlap between plant densities and wheat varieties on morphological characteristics and by comparing the average overlap between plant densities and the three wheat varieties for the dry weight characteristic of plant samples, it was found that the highest average was from the overlap between seeds with a density of 400 plants. m^2 and the variety Hawler2, where it reached (0.42 gm) and did not significantly outperform the rest of the interactions of the same variety with other seed densities nor with the overlap of seed density (400) and the variety Adana99. While the value of the lowest average (0.233 gm) of the overlap between the seed density (350) and the Hawler4 variety did not significantly exceed the rest of the average overlap of the same variety and the rest of the other seed densities.

3.8 Spike Length. cm:

The length of the spike is one of the important characteristics positively associated with the final production and its positive association with the number and weight of grains in the spike, and studies have indicated that the final yield of grains is significantly affected by changes in the spike [30]. The increase in spike length may be attributed to the efficiency of photosynthesis and the accumulation of dry matter and nutrients in the plant and thus an increase in spike length [31]. Previous studies have shown that the difference in the length of the ears may be due to water deficit during the flowering stage, which leads to the shortening of the ears and reducing their number and weight [32]. Studies have also indicated that wheat varieties with large spikes are characterized by large numbers of grains per spike and have higher grain weights by the spike [33,34]. The results of Table (6) for the spike length characteristic showed that the highest average for this characteristic was (16.233 cm) resulting from the interference between the density (400) and the Hawler2 variety and significantly superior to the rest of the average overlaps, while it was found that the lowest average was for the overlap between the density (350) and the Hawler4 variety and amounted to (11.133 cm).

3.9 The Number of Spikes. Plant^{-1}:

The number of spikes in the plant is one of the most important characteristics of interest to plant breeders and researchers in the field of wheat when conducting their studies and selection processes on it, because the spikes are one of the main production components through which the productive capacity of the variety is known, and it is determined in the early stages of the plant's life, especially in the branching stage [35]. Studies have indicated that spikes are an indicator of final production, and have shown that the reasons for the variation between wheat varieties in this trait are due to the difference in their genetic makeup and ability to branch [36]. Returning to the results of Table (6) and comparing the average number of spikes, we find that the highest average was from the overlap between the seed density (400) and Hawler2 variety amounted to (8) spikes This mean significantly outperformed the rest of the average of the interventions. The lowest mean value (3.67) of the overlap between the seed density (400) and the Hawler4 variety. When comparing the highest average number of ears with the highest average branching, we find that the two averages are almost identical and positively correlated, as the highest average number of spikes reached (8) and the highest average branching amounted to (8.333), both as a result of the overlap between density (400) and the Hawler2 variety, which indicates that varieties with high branching ability produce the highest number of spikes, and this is identical to the results found by Mohammed and Kadhem [36].

3.10 Spike Weight. gm:

The results in Table (6) for the spike weight characteristic showed that the average overlap between the density (400) and the Hawler2 variety (4.736 gm) exceeded the rest of the average interactions between density and varieties. While the lowest average spike weight characteristic (3.183 gm) of the overlap between density (350) and the Hawler4 variety. The difference in spike weight rates is attributed to the genetic makeup of the varieties and the difference in the seed rates used and their interaction with the surrounding environment and service processes and this is consistent with the results of previous studies [37,38].

3.11 The Number of Grains. Plant^{-1}:

The plant grain count index is one of the most important factors that have a direct impact on grain yield, which is affected by the genetic nature of the plant and environmental factors and thus their impact on the increase in the number of grains in the ears [39]. The results recorded in this study on the average interference for this trait showed significant differences as shown in Table (6), where the highest average for this trait was (67.33) grains per plant as a result of the interference between the density (400) and the Hawler2 variety, superior to the rest of the average overlap, while the lowest average was (41.33) of the interference between the density (350) and the Hawler4 variety.

3.12 Weight 1000 Tablets. gm:

The results obtained from Table (6) for the weight of 1000 grains indicated that the highest average interaction between density and varieties for this trait was (32.156 gm) at the density level (400) and the Hawler2 variety, which did not differ significantly from the rest of the averages and surpassed all of them on the lowest average, which amounted to (27.303 gm) of the overlap between the density (400) and the Hawler4 variety.

3.13 Plant Weight. gm:

When observing the results of Table (6) for plant weight characteristics, we note that there are no significant differences between the average interactions of the three densities with the two varieties Adana99 and Hawler2 and significantly superior to the average overlap between the three densities and the Hawler4 variety. The highest average for this trait (81 gm) was due to the interference between the density (400) and the Hawler2 variety. The lowest average (77.333 gm) is due to interference between densities (400, 350) and the variety Hawler4.

3.14 Grain Yield. Ton. h^{-1}:

The results contained in Table (6) indicate a significant effect of seeding rates and plant density and their overlap with the varieties for this characteristic, where it is clear that the density (350) over the two densities (450, 400) in the three varieties in terms of the average values of the overlap between the densities and the three varieties, where it gave the highest average values for the three varieties and amounted to (2.8844, 2.707, 2.499 ton/hectare) for the varieties (Hawler2, Adana99, Hawler4) respectively.

The minimum average value for this trait (1.518 tons/hectare) of density interference (400) with the Hawler4 variety. The results indicated that there were no significant differences between the mean at density (350) and at the density level (400), the average interference with the Hawler2 variety exceeded the average overlap with the Hawler4 variety and there was no significant difference with the average interference Adana99. At the density level (450), it was observed that the average interference with variety Adana99 was significantly higher than the average overlap with the variety Hawler4 and there was no significant difference with the average interference Hawler2.

From the above, it is clear that the average overlap between the density (350) and the varieties is high on the average overlap between the higher densities and the varieties, and this may be attributed to the low precipitation of dry matter in the grains due to the intense competition for nutrients and light between plants within the unit area at high seeding rates, and these results agreed with the findings of previous studies [40,41].

Table 6: Effect of Overlap between Plant Densities and Wheat Varieties on Morphological Traits

Den per $1m^2$	Var	W before oven gm	W after oven Gm	Spike length (cm)	Num of spikes $plant^{-1}$	Spike weight (g. $plant^{-1}$)	Num grains. $Plant^{-1}$	1000 grains weight gm	Plant weight gm	yield. (ton/ hectare)
450a	A99	3.163 b	0.36 bc	14.33 c	5.67 c	3,66 e	48 e	31.61 a	79.33 ab	2.52 a
	H2	3.266 ab	0.386 a	15.267 b	7 b	4.393 b	61 b	32 a	79.66 ab	2.492 ab
	H4	2.896 cd	0.276 d	11.633 f	4.33 d	3.266 gh	44 f	29.49 ab	77.666 b	1.829 b
400b	A99	3.286 ab	0.386 ab	14.867 b	5.67 c	3.846 d	51.33 d	30.256 a	79 ab	1.988 ab

	H2	3.47 a	0.42 a	16.233 a	8 a	4.736 a	67.33 a	32.156 a	81 a	2.629 a
	H4	2.88 cd	0.266 d	11.267 f	3.67 e	3.363 fg	45.67 ef	27.303 b	77.333 b	1.518 b
350c	A99	3.193 b	0.33 c	13.633 e	5 cd	3.486 f	44.67 f	30.96 a	79.66 ab	2.707 a
	H2	3.07 bc	0.39 ab	14.867 b	6.67 b	4.066 c	55 c	31.866 a	80 ab	2.844 a
	H4	2.79 d	0.233 d	11.133 g	4 de	3.183 h	41.33 g	31.206 a	77.333 b	2.499 ab

Table 7: Correlation values for the studied traits by the effect of overlap between plant densities and varieties

	Plant Height. cm^2	tillers. Plant^{-1}	Flag Leaf Area. cm^2	Blade Leaf Area. cm^2	W before oven gm	W after oven gm	Spike length (cm	Num of spikes plant^{-1}	Spike weight (g. plant^{-1})	Num grains. Plant^{-1}	1000 grains weight gm	Plant weight gm	yield. (ton/ hectare)
Plant Height. cm^2	1												
tillers. Plant^{-1}	0.933**	1											
Flag Leaf Area. cm^2	0.907**	0.832**	1										
Blade Leaf Area. cm^2	0.976**	0.922**	0.910**	1									
W before oven gm	0.852**	0.775**	0.789**	0.894**	1								
W after oven gm	0.922**	0.838**	0.792**	0.925**	0.826**	1							
Spike length (cm	0.977**	0.912**	0.871**	0.964**	0.841**	0.936**	1						

Num of spikes plant^{-1}	0.911**	0.961**	0.849**	0.903**	0.755**	0.824**	0.919**	1					
Spike weight (g. plant^{-1})	0.935**	0.939**	0.849**	0.930**	0.764**	0.845**	0.901**	0.928**	1				
Num grains. Plant^{-1}	0.886**	0.905**	0.875**	0.882**	0.702**	0.797**	0.843**	0.894**	0.982**	1			
1000 grains weight gm	0.426*	0.388*	0.279	0.404*	0.258	0.422*	0.411*	0.338	0.382*	0.337	1		
Plant weight gm	0.637**	0.653**	0.525**	0.649**	0.669**	0.692**	0.632**	0.566**	0.591**	0.554**	0.347	1	
yield. (ton/ hectare)	0.300	0.370	0.094	0.291	0.320	0.322	0.350	0.321	0.251	0.187	0.572**	0.326	1

4. Conclusion

We conclude that the (400) plants. m^2 density gave the best results when interfered with different wheat varieties. The variety Hawler2 outperformed the rest of the varieties in most of the studied qualities by overlapping with all levels of density.

Therefore, we recommend adopting the density (400) plants. m^2 and variety Hawler2 and the overlap between them.

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