https://doi.org/10.26682/ajuod.2022.25.2.9
Journal of University of Duhok., Vol. 25, No.2 (Agri. and Vet. Sciences), Pp 93-107, 2022

IMPACT OF CULTIVARS, PLANTING DATES AND CHICKEN MANNERS ON VEGETATIVE GROWTH AND YIELD OF ONION (*ALLIUM CEPA* L.)

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(Received: August 1, 2022; Accepted for Publication: October 16, 2022)

ABSTRACT

The study was examined the effects of three planting dates (1st October, 15th October, and 1st November) and three levels of chicken manures (0, 1000, and 1500 g.m^{-1}) on two cultivars of onion (Texas Early white and Early white Grano) during the growth season 2021–2022 at the vegetable research farm of the Protected Cultivation Department, Zakho Technical Institute/Dohuk Polytechnic University. The results showed that there were no significant differences between two cultivars in all traits excepted the cultivar Texas was superior over cultivar Grano in number of leaves plant^{-1}. Planting date at 1st October led to significant differences in plant length (cm), number of leaves plant^{-1}, mean bulb weight (g), number of stored leaves bulb^{-1}, total yield (t.ha^{-1}), N%, P%, K% and S% in bulbs. Application chicken manures especially 1000 g.m^{-1} significantly increased all traits. The combination among (cultivar Texas, 1st October planting date and 1000 g.m^{-1} chicken manure significantly enhanced the plant length (66.14 cm), number of leaves plant^{-1} (18.18), mean bulb weight (328.51 g), number of stored leaves bulb^{-1} (13.11), total yield (38.55 t.ha^{-1}), N% (2.64%), P% (0.432%), K% (4.32%) and S% (0.661% in bulbs.

KEYWORDS: onion, planting dates, chicken manures, cultivars

INTRODUCTION

The onion (*Allium cepa* L.), a member of the Alliaceae family, is one of the most significant and well-liked vegetables and spice crops grown in the world (Mishra *et al*., 2013). The flavor of onions is well known, and they are often used to enhance the flavor of meals such as gravies, soups, stew stuffing, fried fish, and meat (Rashid *et al*., 2016). In Iraq, onions are cultivated as a commercial vegetable crop. The overall area under cultivation in Iraq in 2020 was around 4567 donum, with a total production of 10727 tons and 2348.8 kg.donum^{-1} (Central Statistical Organization, 2020). The mature bulb has a little amount of starch as well as significant amounts of sugar, protein, and vitamins A, B, and C. According to the National Onion Association, onions' nutritional breakdown is as follows: moisture (89%), sugar (4%), protein (1 %), fiber (2 %), and fat (1 %) (Adeyeye *et al*., 2017).

Varying cultivars of the same species cultivated in the same area produce different yields since the performance of a cultivar primarily relies on the combination of genetic composition and environment. Cultivar crops perform differently under different agro-climatic conditions (Jilani and Ghafoor, 2003). In a field experiment, Ijoyah *et al*. (2008) evaluated the yield performance of four onion varieties and discovered that some other varieties performed better than the commonly grown onion varieties by the farmers. Three distinct onion cultivars were tested by Shah *et al*. (2012), who came to the conclusion that the Parachinar local variety produced a greater yield. Soleymani and Shahrajabian (2012) found that the cultivars had a substantial impact on the weight of fresh foliage, plant height, bulb weight, total yield, favored yield, total percentage of dry matter, and

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nitrate content of the bulb. Numerous writers claimed that onion cultivars had a major impact on onion yield and bulb output (Ali *et al*., 2018).

Onion planting dates are a reflection of the overall impact of edaphic elements and all environmental circumstances on growth, bulb output, and quality, all of which vary greatly from area to region. Therefore, the best planting times are crucial for maximum onion growth, bulb output, and quality (Misra *et al*., 2014). According to Teshome *et al*. (2014), planting dates had a substantial impact on plant height. Onions planted in October grew to their greatest height compared to those planted in November.

Inorganic fertilizers may be effectively replaced by organic fertilizers like chicken manures. Organic fertilizers may be found locally in big amounts and are a less expensive way to increase soil fertility. They also have a big impact on increasing the soil's ability to store moisture, the microbiological activity in the soil, and eventually the structure of the soil (Russel and Marsah, 1997). Numerous studies found that using chicken manure to the soil boosted onion production and yield criteria (Yoldas *et al*., 2011; Ali *et al*., 2018). Investigating the effects of various planting dates and chicken manure on various onion cultivars' development, bulb yields, and component yields under the environmental circumstances of the Kurdistan Region is one of the study's particular goals.

MATERIAL AND METHODS

This experiment was carried out during growing season 2021-2022, to investigate the effect of three planting dates (1st October, 15th October and 1st November) and three levels of chicken manure (0.0, 1000 and 1500 $g.m^{-1}$) on growth and yield of two cultivars of onion [Texas Early white (A1) and Early white Grano (A2)] crop grown in the field of protected cultivation department in Zakho technical institute/Dohuk polytechnic university, Duhok/Iraq. The land was ploughed twice, and then it was divided into lines, drip irrigation system of the field was done before planting, also chicken manure analyzer added to the soil a week before transplanting. Seed were sown three times (1st October, 15th October and 1st November), after two month the seedling were transferred on (1st December, 15th December and 1st January), at distance of 15 cm between plants and 50 cm between lines.

This study consisted of 18 treatment (2*3*3) implicated in a factorial experiment with Randomized Complete Block Design (RCBD). Each treatment was replicated three times, each unit of experiment was two lines. The collected data subjected to analysis variance and means separated through Duncan Multiple Range Test at alpha level of 0.05%. Data were analyzed statistically by using SAS program (SAS, 2007).

Experimental measurements were as follows:

1-Vegetative growth characteristic

a- Plant height (cm)
b- Number of leaves $plant^{-1}$
c- Dry shoots biomass (g)

2-Yield characteristic

a- Mean weight of bulb (g)
b- Number of stored leaves $bulb^{-1}$
c- Total yield ($t.ha^{-1}$)

3-Chemical characteristic in bulbs

a- Nitrogen%
b- Potassium%
c- Phosphors%
d- Sulfuric%

RESULTS

Table (1) showed that there were no significant effects on cultivars on terms of plant length. Planting date at 1st Oct. gave the highest significant plant length (56.39 cm) as compared to other planting dates. Chicken manure at 1000 and 1500 $g.m^{-1}$ significantly increased plant length (59.83 and 52.25 cm) respectively. For the interaction between cultivars and planting dates, the best interaction was observed between cultivar A1 and 1st Oct. planting date which gave (56.65 cm). Interaction between cultivars and chicken manures had significant effects, the highest plant length was obtained between cultivars A1 and 1000 $g.m^{-1}$ chicken manure (59.84 cm). As for the interaction between 1st Oct. planting date and 1000 $g.m^{-1}$ gave the highest value (65.94 cm). The triple interaction among three factors had significant differences, the best interaction was observed among cultivar A1, 1st Oct. sowing date and 1000 $g.m^{-1}$ chicken manure (66.14 cm).

Table (1): Effect of cultivars, planting dates, chicken manures and there interaction on plant length (cm) of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting dates	Mean effect of cultivars
		0	1000	1500		
A1	**1st Oct.**	46.06 f	66.14 a	57.73 b	56.65 a	51.37 a
	15th Oct.	44.60 fg	58.59 b	50.34 e	51.18 b	
	1st Nov.	40.78 g	54.80 b-e	43.31 fg	46.30 c	
A2	**1st Oct.**	45.18 fg	65.73 a	57.47 bc	56.13 a	52.56 a
	15th Oct.	43.72 fg	58.48 b	53.37 c-e	51.86 b	
	1st Nov.	42.52 fg	55.25 b-d	51.30 de	49.69 b	
Mean effect of chicken manures		43.81 c	59.83 a	52.25 b	**Mean effect of planting dates**	
Cultivars* chicken manures	**A1**	43.82 d	59.84 a	50.46 c		
	A2	43.80 d	59.82 a	54.05 b		
Planting dates*chicken manures	**1st Oct.**	45.62 e	65.94 a	57.60 b	56.39 a	
	15th Oct.	44.16 ef	58.53 b	51.86 d	51.52 b	
	1st Nov.	41.65 bc	55.03 c	47.31 e	47.99 c	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Results in Table (2) revealed that cultivar A1 was superior over cultivar A2 on number of leaves plant^{-1} (14.73). 1st Oct. sowing date gave the maximum value (15.93). Chicken manures at both level significantly increased leaves number plant^{-1} (15.49 and 14.37) respectively. Interaction between cultivar A1 and 1st Oct. sowing date gave highest value (16.69). The interaction between cultivars and chicken manures had significant differences, the maximum leaves number plant^{-1} was noticed between cultivar A1 and 1000 g.m^{-1} chicken manure (16.28). The best significant interaction between sowing date and chicken manure was observed between 1st Oct. sowing date and 1000 g.m^{-1} chicken manure, which gave (17.47). The interaction among three factors was significant effects, the highest value noticed among cultivar A1, 1st Oct. sowing date and 1000 g.m^{-1} chicken manure (18.18).

Table (2): Effect of cultivars, planting dates, chicken manures and there interaction on number of leaves plant^{-1} of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting dates	Mean effect of cultivars
		0	1000	1500		
A1	1st Oct.	14.44 a-e	18.18 a	17.44 ab	16.69 a	14.73 a
	15th Oct.	12.22 de	16.33 a-c	15.10 a-d	14.55 bc	
	1st Nov.	10.89 ef	14.33 b-d	13.67 b-e	12.96 c	
A2	1st Oct.	13.11 c-e	16.76 a-c	15.67 a-d	15.18 ab	12.95 b
	15th Oct.	11.00 ef	15.00 a-d	13.33 c-e	13.11 c	
	1st Nov.	8.33 f	12.33 de	11.00 ef	10.55 d	
Mean effect of chicken manures		11.67 b	15.49 a	14.37 a	Mean effect of planting dates	
Cultivars* chicken manures	A1	12.52 cd	16.28 a	15.40 a		
	A2	10.81 d	14.70 ab	13.33 bc		
Planting dates*chicken manures	1st Oct.	13.78 c-e	17.47 a	16.56 ab	15.93 a	
	15th Oct.	11.61 ef	15.67 a-c	14.22 b-d	13.83 b	
	1st Nov.	9.61 f	13.33 c-e	12.33 de	11.76 c	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

It is clear from Table (3) that there were no significant effects between tow cultivars. Also planting date had no significant effect on dry shoot biomass. Using 1000 g.m^{-1} chicken manure gave the highest significant value (15.78 g). The interaction between A1cultivar and 1st Oct. planting date gave highest value (13.81 g). While the best interaction between cultivars and chicken manures was obtained between A1 cultivar and 1000 g.m^{-1} chicken manure (16.16 g). Interaction between 15th Oct. and 1000 g.m^{-1} chicken manure gave the higher value (15.81 g). The triple interaction among three factors had significant differences and the best interaction was among A1 cultivar, 1st Nov. planting date and 1000 g.m^{-1} chicken manure (16.81 g)

Table (3): Effect of cultivars, planting dates, chicken manures and there interaction on dry shoot biomass (g) of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting dates	Mean effect of cultivars
		0	1000	1500		
A1	1st Oct.	9.46 d	15.89 ab	16.08 ab	13.81 a	13.53 a
	15th Oct.	9.44 d	15.77 a-c	14.11 bc	13.11 ab	
	1st Nov.	9.01 d	16.81 a	15.20 a-c	13.67 ab	
A2	1st Oct.	9.39 d	15.59 a-c	14.91 a-c	13.29 ab	13.09 a
	15th Oct.	9.59 d	15.85 ab	14.50 bc	13.31 ab	
	1st Nov.	9.44 d	14.79 a-c	13.75 c	12.66 b	
Mean effect of chicken manures		9.39 c	15.78 a	14.76 b	Mean effect of planting dates	
Cultivars* chicken manures	A1	9.30 c	16.16 a	15.13 ab		
	A2	9.47 c	15.41 ab	14.39 b		
Planting dates*chicken manures	1st Oct.	9.42 c	15.74 a	15.50 ab	13.55 a	
	15th Oct.	9.52 c	15.81 a	14.31 b	13.21 a	
	1st Nov.	9.22 c	15.80 a	14.48 ab	13.17 a	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Table (4) showed that there were no significant differences between two cultivars on mean weights of bulb (g). Planting date at 1st Oct. gave the maximum value (256.97 g) while the minimum value was obtained at 1st Nov. (223.33 g). Using chicken manures led to increase mean bulb weights, particularly 1000 g.m$^{2-1}$ chicken manure (254.09 g). The highest significant interaction between cultivars and planting date was noticed between A1 cultivar and 1st Oct. planting date, which gave (261.43 g). As for the interaction between cultivars and chicken manures was significant effects, the maximum value was observed between A1 cultivar and 1000 g.m^{-1} chicken manure (261.34 g). Interaction between 1st Oct. planting date and 1000g.m^{-1} chicken manure gave the higher significant (320.16g). Interaction among three factors had significant differences, the higher value was observer among cultivar A1, 1st Oct. planting date and 1000 g.m^{-1} chicken manure (328.51 g), while the lower interaction was among cultivar A2, 1st Nov. planting date and 1500 g.m^{-1} chicken manure (105.33 g).

Table (4): Effect of cultivars, planting dates, chicken manures and there interaction on mean bulb weights (g)of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting dates	Mean effect of cultivars
		0	1000	1500		
A1	1st Oct.	181.65 ef	328.51 a	274.12 c	261.43 a	211.63 a
	15th Oct.	173.34 fg	288.67 bc	214.19 d	225.40 b	
	1st Nov.	156.06 fg	166.84 fg	121.25 hi	148.05 c	
A2	1st Oct.	172.37 fg	311.81 ab	272.29 c	252.16 a	202.26 a
	15th Oct.	168.55 fg	286.40 bc	208.85 de	221.27 b	
	1st Nov.	152.39 fg	142.32 gh	105.33 i	133.35 c	
Mean effect of chicken manures		167.39 c	254.09 a	199.34 b	Mean effect of planting dates	
Cultivars* chicken manures	A1	170.35 c	261.34 a	203.19 b		
	A2	164.44 c	246.85 b	195.49 b		
Planting dates*chicken manures	1st Oct.	177.01 d	320.16 a	273.20 b	256.79 a	
	15th Oct.	170.95 de	287.54 b	211.52 c	223.33 b	
	1st Nov.	154.23 e	154.58 e	113.29 f	140.70 c	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Table (5) revealed that cultivars had no significant effects on number of stored leaves bulb^{-1}. 1st planting date gave the maximum number of store leaves bulb^{-1} (11.40) compared with other planting dates which gave (10.27 and 9.42) respectively. Chicken manures had significant effect on number of stored leaves bulb^{-1}, the highest value was noticed from 1000 g.m^{-1} chicken manure (11.59). Concerning the interaction between cultivars and planting dates significantly increased number of stored leaves bulb^{-1}, the maximum number was obtained from (A1 cultivar and 1st planting date) which gave (11.63). Interaction between A1 cultivar and 1000 g.m^{-1} chicken manure gave the maximum number of stored leaves bulb^{-1} (11.92). Interaction between planting dates and chicken manures was significant effects, the higher number was noticed between 1st Oct. planting date and 1000 g.m^{-1} chicken manure (12.89). The interaction among (cultivar A1, 1st Oct. planting date and 1000 g.m^{-1} chicken manure) was the most potent treatment which gave the highest number of stored leaves bulb^{-1} (13.11).

Table (5): Effect of cultivars, planting dates, chicken manures and there interaction on number of stored leaves bulb^{-1} of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting dates	Mean effect of cultivars
		0	1000	1500		
A1	1st Oct.	9.77 e-h	13.11 a	12.00 a-c	11.63 a	10.56 a
	15th Oct.	8.44 h	12.00 a-c	10.88 c-e	10.44 b	
	1st Nov.	8.44 h	10.66 c-f	9.78 e-h	9.63 cd	
A2	1st Oct.	9.88 e-g	12.66 ab	11.00 c-e	11.18 a	10.17 a
	15th Oct.	8.44 h	11.44 b-d	10.44 d-f	10.11 bc	
	1st Nov.	8.66 gh	9.66 e-h	9.33 f-h	9.22 d	
Mean effect of chicken manures		8.94 c	11.59 a	10.57 b	Mean effect of planting dates	
Cultivars* chicken manures	A1	8.89 d	11.92 a	10.89 bc		
	A2	9.00 d	11.26 ab	10.26 c		
Planting dates*chicken manures	1st Oct.	9.83 de	12.89 a	11.50 bc	11.40 a	
	15th Oct.	8.44 f	11.72 b	10.66 cd	10.27 b	
	1st Nov.	8.55 f	10.16 cd	9.55 e	9.42 c	

The results in Table (6) revealed that there were no significant differences between two cultivars. Planting date at 1st Oct. gave the maximum significant total yield (30.13 t.ha^{-1}) compared to other planting dates. Using 1000 g.m^{-1} chicken manure gave the highest value (29.81 t.ha^{-1}). The better interaction occurred between A1 cultivar and 1st Oct. planting date which gave (30.67 t.ha^{-1}). Concerning the interplay between cultivars and chicken manures, the data clearly showed that A1 cultivar with 1000 g.m^{-1} chicken manure resulted in higher total yield (30.66 t.ha^{-1}). The interplay through planting dates and chicken manures, showed that (1st Oct. planting date and 1000 g.m^{-1} chicken manure) resulted in better total yield (37.57 t.ha^{-1}). For the interaction among three factors, the data revealed that interaction among (A1 cultivar, 1st planting date with 1000 g.m^{-1} chicken manure) gave the best total yield (38.55 t.ha^{-1}).

Table (6): Effect of cultivars, planting dates, chicken manures and there interaction on total yield (t.ha^{-1}) of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting dates	Mean effect of cultivars
		0	1000	1500		
A1	1st Oct.	21.31 ef	38.55 a	32.16 c	30.67 a	24.83 a
	15th Oct.	20.34 fg	33.87 bc	25.13 d	26.45 b	
	1st Nov.	18.31 fg	19.58 fg	14.23 hi	17.37 c	
A2	1st Oct.	20.22 fg	36.59 ab	31.95 c	29.59 a	23.73 a
	15th Oct.	19.78 fg	33.60 bc	24.50 de	25.96 b	
	1st Nov.	17.88 fg	16.70 gh	12.36 i	15.65 c	

Mean effect of chicken manures		19.64 c	29.81 a	23.39 b	**Mean effect of planting dates**	
Cultivars* chicken manures	**A1**	19.99 c	30.66 a	23.84 b		
	A2	19.29 c	28.96 a	22.94 b		
Planting dates*chicken manures	**1st Oct.**	20.77 d	37.57 a	32.06 b	30.13 a	
	15th Oct.	20.06 de	33.74 b	24.82 c	26.20 b	
	1st Nov.	18.10 e	18.14 e	13.29 f	16.51 c	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

The data in Table (7) displays that cultivars had no significant effect on nitrogen percentage. The highest nitrogen percentage was obtained at 1st Oct. planting date (2.32%), while the lowest nitrogen percentage was at 1st Nov. planting date (1.88%). Using chicken manures significantly increased nitrogen%, the maximum value was noticed at 1000 $g.m^{-1}$ chicken manure (2.36%) as compared with other treatments. The interaction between cultivars and planting date had a significant effect on nitrogen percentage, the maximum nitrogen (2.34%) was obtained as a result of the interaction between (cultivar A1 and 1st Oct. planting date). The interaction between cultivars and chicken manures had a significant effect, the best interaction was observed between cultivar A1 and 1000 $g.m^{-1}$ chicken manure (2.36%). The combination between (1st planting date and 1000 $g.m^{-1}$ chicken manure) appeared to be the most effective interaction treatment, which gave maximum nitrogen (2.62%). The triple interaction among (cultivar A1, 1st Oct. planting date with 1000 $g.m^{-1}$ chicken manure) gave the highest nitrogen (2.64%).

Table (7): Effect of cultivars, planting dates, chicken manures and there interaction on N% of onion plant.

Cultivars	**Planting date**	**Chicken manures ($g.m^{-1}$)**			**Cultivars* Planting dates**	**Mean effect of cultivars**
		0	**1000**	**1500**		
A1	**1st Oct.**	2.02 de	2.64 a	2.35 b	2.34 a	2.10 a
	15th Oct.	1.78 f	2.28 bc	2.15 c-e	2.07 b	
	1st Nov.	1.67 f	2.17 b-e	1.81 f	1.88 c	
A2	**1st Oct.**	2.00 e	2.61 a	2.31 bc	2.30 a	2.08 a
	15th Oct.	1.74 f	2.25 bc	2.15 c-e	2.05 b	
	1st Nov.	1.67 f	2.18 b-d	1.78 f	1.88 c	
Mean effect of chicken manures		1.81 c	2.36 a	2.09 b	**Mean effect of planting dates**	
Cultivars* chicken manures	**A1**	1.82 c	2.36 a	2.10 c		
	A2	1.80 c	2.35 a	2.08 c		
Planting dates*chicken manures	**1st Oct.**	2.01 e	2.62 a	2.33 b	2.32 a	
	15th Oct.	1.76 fg	2.27 bc	2.15 d	2.06 b	
	1st Nov.	1.67 g	2.18 cd	1.80 f	1.88 c	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Table (8) noticed that there were no significant differences between two cultivars on phosphorous%. Planting date at 1st Oct. gave the highest significant value (0.409%) compared with 15th Oct. and 1st Nov. planting date, which gave (0.399 and 0.383%) respectively. The maximum phosphorous percentage was obtained at 1000 $g.m^{2-1}$ chicken manure (0.424%). The interaction between (cultivar A2 and 1st Oct. planting date gave the maximum significant value (0.411%). Concerning the interaction between cultivar A1 and 1000 $g.m^{-1}$ chicken manure gave the highest value (0.425%) compared with other treatments. Data reported in the same table revealed that the maximum phosphorous percentage was found from interaction between 1st Oct. planting date and 1000 $g.m^{-1}$ chicken manure (0.432%). The highest value was obtained from the interaction treatment (cultivars A1 and A2, 1st Oct. planting date and 1000 $g.m^{-1}$ chicken manures) which was (0.432%), while the lowest value (0.337%) was obtained from the interaction among (cultivarA2, 1st Nov. planting date and 0 $g.m^{-1}$ chicken manure).

Table (8): Effect of cultivars, planting dates, chicken manures and there interaction on P% of onion plant.

Cultivars	Planting dates	Chicken manures ($g.m^{-1}$)			Cultivars* Planting dates	Mean effect of cultivars
		0	**1000**	**1500**		
A1	**1st Oct.**	0.382 fe	0.432 a	0.411 bc	0.408 ab	0.398 a
	15th Oct.	0.370 fg	0.423 ab	0.407 b-d	0.400 bc	
	1st Nov.	0.343 h	0.419 a-c	0.391 de	0.385 d	
A2	**1st Oct.**	0.388 e	0.432 a	0.412 bc	0.411 a	0.396 a
	15th Oct.	0.365 g	0.420 a-c	0.406 cd	0.397 c	
	1st Nov.	0.337 h	0.417 a-c	0.392 de	0.382 d	
Mean effect of chicken manures		0.364 c	0.424 a	0.403 b	**Mean effect of planting dates**	
Cultivars* chicken manures	**A1**	0.365 c	0.425 a	0.403 b		
	A2	0.363 c	0.423 a	0.403 c		
Planting dates*chicken manures	**1st Oct.**	0.385 d	0.432 a	0.412 bc	0.409 a	
	15th Oct.	0.368 e	0.422 ab	0.406 c	0.399 b	
	1st Nov.	0.340 f	0.418 b	0.392 d	0.383 c	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

The data in Table (9) demonstrated that there was no significant impact between two cultivars on potassium percentage. Planting date at 1st Oct. recorded the maximum value of potassium (4.19%). Chicken manures at both levels (1000 and 1500 $g.m^{-1}$) significantly enhanced potassium percentage (4.14 and 4.04%) respectively compared with control. Results indicated that the interaction between (cultivar A1 and 1st Oct. planting date) gave the highest significant value (4.22%). The maximum potassium percentage (4.19%) was observed from interaction between (cultivar A1 and 1000 $g.m^{-1}$ chicken manure). The interaction between planting dates and chicken manures had a significant effective on potassium percentage, the interaction between (1st Oct.

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planting date and 1000 g.m^{-1} chicken manure) gave the maximum value (4.30%). The interaction among (cultivar A1, 1st Oct. planting date and 1000 g.m^{-1} chicken manure) was the most effective treatment which gave the highest potassium (4.32%).

Table (9): Effect of cultivars, planting dates, chicken manures and there interaction on K% of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting date	Mean effect of cultivars
		0	**1000**	**1500**		
A1	**1st Oct.**	4.09 a-f	4.32 a	4.23 a-d	4.22 a	4.07 a
	15th Oct.	3.94 c-f	4.16 a-e	4.05 a-f	4.05 ab	
	1st Nov.	3.83 f	4.08 a-f	3.95 c-f	3.95 b	
A2	**1st Oct.**	4.02 a-f	4.28 ab	4.20 a-d	4.16 a	4.00 a
	15th Oct.	3.85 ef	4.03 a-f	3.95 b-f	3.94 b	
	1st Nov.	3.79 f	3.97 b-f	3.87 d-f	3.88 b	
Mean effect of chicken manures		3.92 b	4.14 a	4.04 a	**Mean effect of planting dates**	
Cultivars* chicken manures	**A1**	3.95 bc	4.19 a	4.08 ab		
	A2	3.89 c	4.09 ab	4.01 bc		
Planting dates*chicken muners	**1st Oct.**	4.06 bc	4.30 a	4.22 ab	4.19 a	
	15th Oct.	3.90 cd	4.09 bc	4.00 b-d	4.00 b	
	1st Nov.	3.81 ab	4.03 b-d	3.91 cd	3.92 b	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Table (10) shows that the cultivars had no significant effect on sulfur percentage. 1st Oct. and 15th Oct planting date significantly increased sulfur% which gave (0.631 and 0.624%) respectively compared with 1st Nov. planting date (0.604%). Using chicken manure at 1000 g.m^{-1} gave the maximum sulfur (0.646%). The combination between cultivar A1 and 1st Oct. planting date gave the highest value of sulfur percentage (0.636%). The interaction between (cultivar A1 and 1000 g.m^{-1} chicken manure) significantly increased sulfur% which gave (0.654%). Concerning the interaction between planting date and chicken manure, the maximum sulfur was revealed from (1st Oct. planting date and 1000 g.m^{-1} chicken manure) which gave (0.655%). The best triple interaction was noticed from interaction among (cultivar A1, 1st Oct. planting date and 1000 g.m^{-1} chicken manure) which was (0.661%), while the minimum value was obtained from the interaction among (cultivar A2, 1st Nov. planting date and 0 g.m^{-1} chicken manure) which was (0.571%)

Table (10): Effect of cultivars, planting dates, chicken manures and there interaction on S% of onion plant.

Cultivars	Planting dates	Chicken manures (g.m^{-1})			Cultivars* Planting date	Mean effect of cultivars
		0	**1000**	**1500**		
A1	**1st Oct.**	0.605 c-g	0.661 a	0.643 a-c	0.636 a	0.625 a
	15th Oct.	0.591 e-g	0.657 a	0.636 a-d	0.628 ab	
	1st Nov.	0.578 fg	0.642 a-c	0.614 c-f	0.611 bc	
A2	**1st Oct.**	0.599 d-g	0.648 ab	0.627 a-e	0.625 ab	0.614 a
	15th Oct.	0.591 e-g	0.645 a-c	0.621 a-e	0.619 ab	
	1st Nov.	0.571 g	0.621 a-e	0.601 d-g	0.598 c	
Mean effect of chicken manures		0.589 c	0.646 a	0.624 b	**Mean effect of planting dates**	
Cultivars* chicken manures	**A1**	0.591 d	0.654 a	0.631 bc		
	A2	0.587 d	0.638 ab	0.617 c		
Planting dates*chicken manures	**1st Oct.**	0.602 c	0.655 a	0.635 a	0.631 a	
	15th Oct.	0.591 cd	0.651 a	0.629 ab	0.624 a	
	1st Nov.	0.574 d	0.632 ab	0.608 bc	0.604 b	

Mean within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

DISCUSSIONS

The strength of the crop's hormones, its genetic makeup, and favorable climatic circumstances might all contribute to the disparities between cultivars (Kandil *et al*., 2010). A similar outcome was noticed by (Soleymani and Shahrajabian, 2012). The large genetic variations among the cultivars examined may be the cause of the nutritional and phytochemical contents of onion bulbs.

Results in tables (1, 2 and 3) showed that the Plant length, number of leaves plan^{-1}, and dry weight all rose considerably after an early planting (1st October planting date). This can be the result of the favorable environmental circumstances that prevailed for a certain amount of time and had a good impact on plant development. Early planting gives the plant adequate time and a relatively higher temperature, which encourages the most vegetative development (Hamma, 2013). A 1st October planting date early enhanced production yield parameters, The high average temperature in the early planting date and the low average temperature in the late planting date during the growth period may be to blame. These factors encouraged good foliage growth and the formation of a large canopy able to enhance photosynthesis, increasing the accumulation of dry matter, bulb weight, and total bulb yield haktare^{-1}. The results are consistent with (Caruso *et al*., 2013 and Bharti & Ram, 2014). Late planting often limits the photoperiod needed for vegetative development, and when the temperature rises, the plant begins to create bulbs, which results in low bulb production (Misra *et al*., 2014).

The application of organic manures, such as chicken manure, has a substantial impact on vegetative and yield metrics. This may be due to the fact that these nutrients aid in the activation of enzymes, the creation of chlorophyll, the synthesis of protein, the development of roots, and cell

division. Plants get both macro and micronutrients from organic fertilizers. These nutrients improved the soil's fertility and the crop's access to more organic matter, which improved the absorption of several nutrients (nitrogen, phosphorous and potassium). The NPK increases the rate of photosynthesis and the cell division of plant tissues, increasing the weight and yield of the bulbs via increased organic matter metabolism. The results are consistent with (Ewais *et al*., 2010; Dina *et al*., 2010 and Ali *et al*., 2018). According to Kandil *et al*. (2013), chicken manure was the source of organic manure that produced the tallest plants when applied as a soil supplement. Noticed that employing chicken manure increased the number of leaves plant^{-1} compared to an untreated plant (Blay *et al*., 2002; Dapaah *et al*., 2014 and Bashir *et al*. 2015). Mousa and Mohamed (2009), which showed that the treatment of chicken manure enhanced the total dry biomass, improved mean weight bulb, and yield compared to the control, also support the findings of the present research. By giving the plant with nitrogen, the organic fertilizers improve the weight of the bulbs. The higher yield and yield characteristics with chicken manure may be due to nitrogen's quick availability and use for a variety of internal plant processes for the creation of carbohydrates. These carbohydrates may later go through hydrolysis and become reproductive sugars, which aided to increase yield (Mahala *et al*. (2018).

CONCLUSIONS

According to the results of this study we can concluded that the planting date at 1st Oct. planting date in both cultivars is beneficial in increasing all the traits undertaken in this study. Application of chicken manure caused increase in all vegetative growth characters, yield characters and chemical characters in bulb. The interaction treatment between the three factors led to high and positive effects on the vegetative growth, yield quantity and chemical character of onion plant.

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کارتێکرنا دەمێن چاندنێ و زبلێ مریشکا ل سەر سالوخەتێن کەسکاتیێ و بەرهەمێ چەندی و چونیەتی یێ پیڤازێ (Allium cepa L.)

پوختە

ئەڤ ڤەکولینە هاتە بجهئینان ژ بو تاقیکرنا کارتێکرنا سێ دەمێن چاندنێ (1 تشرینا ئێکێ، 15 تشرینا ئێکێ، 1 تشرینا دووێ) وسێ تیراتیێن زبلێ مریشکێ (0, 1000، 1500 کگم.م-1) ل سەر دوو جورێن جودا ێن پیڤازێ (تیکساسا سپی، گرانویا سپی) ل سالا 2021-2022 ل زەڤیێن کەسکاتیێ یێن پیمانگەها تەکنیکی زاخو، زانکویا پولیتەکنیك –دهوك. ئەنجاما دیارکر کو چ کارتێکرنێن پێش چاق دناڤبەرا هەردوو جۆرێن پیڤازا نەبون ل سالوخەتان ژبلی جورێ تکساس یێ سەرکەفتی بو ل سەر جورێ گرانو د ژمارا بەلگان رووەکی-1. چاندنا توڤی ل 1 تشرینا ئێکێ بو ئەگەرێ درێژیا رووەکی (سم) و ژمارا بەلگان رووەکی-1و گێشەیا پیڤازێ (گم) و وژمارا بەلگێن سپی پیڤاز-1 وبەرهەمێ هەمیشە (تن.هکتار-1) و وریژا ناتروجینی وریژا فسفوری وریژا پوتاسیومی وریژا کبریتێ د سەرکا دا. زبلێ مریشکا (1000 کگم.م-1) باشترین کارتێکەر بو ژ بو زێدەکرنا هەمی سالوخەتان. لیکدانا سێ قولی دناڤبەرا (جورێ تکساس و1 تشرینا ئێکێ و 1000 کگم.م-1زبلێ مریشکا) زێدەهێن بەرجاڤ هەبون ل سالوخەتێن درێژیا رووەکی (66,14سم) و ژمارا بەلگان رووەکی-1 (18,18) وگێشەیا پیڤازێ (328,51گم) و وژمارا بەلگێن سپی پیڤاز-1(13,11) وبەرهەمێ هەمیشە (38,55تن.هکتار-1) و وریژا ناتروجینی (2,64) وریژا فسفوری (0,432) وریژا پوتاسیومی (4,32) وریژا کبریتێ (0,661) د سەرکان دا.

تاثير مواعيد الزراعة ومخلفات الدواجن على النمو الخضري والحاصل لصنفين من البصل (*Allium cepa* L.)

الخلاصة

اجريت هذه التجربة, لدراسة تاثير ثلاث مواعيد زراعية (1 تشرين الاول, 15 تشرين الاول, 1 تشرين الثاني) وثلاث مستويات من مخلفات الدواجن (0, 1000, 1500) غم.م$^{-1}$ على صنفين من البصل (تكساس الأبيض المبكر) و (والجرانو الأبيض المبكر). خلال موسم النمو 2021-2022 في حقل الخضراوات التابع لقسم الزراعة المحمية كلية تقنية دهوك/ معهد تقنية زاخو. بينت النتائج بان لم يظهر اختلافات معنوية بين الصنفين من البصل ماعدا صنف تكساس تفوق معنويا على صنف كرانو في صفة عدد الاوراق نبات$^{-1}$. موعد الزراعة 1 من تشرين الاول ادى الى اختلافات معنوية في طول النبات (سم) وعدد الاوراق نبات$^{-1}$ ومعدل وزن البصلة (غم), وعدد الاوراق المخزونة بصلة$^{-1}$ والحاصل الكلي (طن.هكتار$^{-1}$) والنسبة المئوية للنايتروجين والفوسفور والبوتاسيوم والكبريت في الابصال. مخلفات الدواجن خاصة 1000 غم.م$^{-1}$ ادى الى زيادة معنوية في جميع الصفات. والتداخل الثلاثي بين الصنف تكساس و1 تشرين الاول و1000 غم.م$^{-1}$ من مخلفات الدواجن ادت الى زيادة معنوية في طول النبات (66,14 سم) وعدد الاوراق نبات$^{-1}$ (18,18) ومعدل وزن البصلة (328,51غم), وعدد الاوراق المخزونة بصلة$^{-1}$ (13,11)والحاصل الكلي (38,55طن.هكتار$^{-1}$) والنسبة المئوية للنايتروجين(2,64) والفوسفور (0,432) والبوتاسيوم (4,32) والكبريت (0,661) في الابصال.

الكلمات المفتاحية: البصل, مواعيد الزراعة, مخلفات الدواجن, الاصناف