

INFLUENCE OF UREA AND CHICKEN MANURE ON PRODUCING NEW PLANTS AND VEGETATIVE GROWTH OF STRAWBERRY (*Fragaria x ananassa* Duch) “DARSELECT” PLANTS

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ABSTRACT

This study was performed during November 2020 to August 2021, in a private farm at Tishambik village, Kanimasi district, Duhok, Kurdistan region / Iraq on strawberry plants Darselect cultivar to find out the effects of four levels of soil application urea (0, 1, 1.5 and 2 g plant⁻¹) and three levels of chicken manure (0, 100 and 200 g plant⁻¹) on producing new plants and vegetative growth of strawberry plants. General obtained results showed that the incremental application of urea and chicken manure rates especially at (2g urea and 200g chicken manure) led to significant increase most of the studied parameters. The interaction between urea with chicken manure at high rates resulted in the highest values of number of runners (17 Plant⁻¹), length of runner (125.67 cm), number of seedlings (5.33 Runner⁻¹), number of seedlings (35.33 Plant⁻¹), dry weight of vegetative growth (26.60 g. plant⁻¹), the total nitrogen in leaves (3.79 %), phosphorus (0.83 %) and potassium (1.80 %).

KEYWORD: strawberry, Urea, Chicken manure.

INTRODUCTION

Strawberry (*Fragaria × ananassa* Duch.) is a perennial herbaceous plant and can grow in different climates, and adapted to temperate zones in the tropics and subtropics from high elevations of up to 3000 meters above sea level and have a nature highly heterozygous (Larson, 1994, Childers *et al.*, 1995). Darselect strawberry is a high-yielding, widely adapted plasticulture or matted-row cultivar and demands a significant amount of nitrogen and adequate amounts of potassium and magnesium to improve the performance of the fruit during its growth (<https://www.noursefarms.com> > Product > Darselect). Strawberries are most important for the people in the world because of attractive colors, delicious and pleasant aroma (Sharma and Yamdagni, 2000). The people can be put to use Strawberry plants as a decorative plant in the home's yard can help in addition to enhancing the appearance of the yard, nutrition is the another reasons can also be used in family (Ginandjar *et al.*, 2019). Strawberry plant grow fast and is

extremely adapted to environmental factors such as light, temperature range, nutrients, the quality of the water for the growing and increase vegetative part the plants needs adequate absorption of macronutrients to help enhancement photosynthetic demand (Li *et al.*, 2010). Strawberry plant can be grown in a variety of soil types, from heavy clay to light sand. The root system of plant is fibrous and the area confined this roots are 15-20 cm to the soil's top layer, and it thrives on light, porous soil that is nutrient-dense. (Sharma and Singh, 1999; Sharma, 2002). Using of organic manures is beneficial to plants because they provide plants with essential nutrients and may help to improve soil fertility by improving the structure and hydro-physical qualities of the soil. (Grandy *et al.*, 2002). Because of strawberry has shallow root system and a lot productivity is very responsible to nitrogen fertilizers, in related to plant size. Many researchers have reported on the stimulative effects of nitrogen fertilizer in strawberry cultivation on vegetative development. (Patrik and Martin, 1981; Moussa *et al.*, 1993). (Deng and

Woodward 1998) found that, when there is a lack of nitrogen, the overall biomass of strawberries suffers, in addition reducing the size of plant and fruits. (Kirschbaum *et al.* 2010) claim that, when N applications are submitted, the growth of plant exaggerated and are clearly evident, as the number of leaves grows, so does the sensitivity to diseases. (Abo Sedera *et al.*, 2009) studied that the application of nitrogen fertilizer with compost or alone at (2000 kg N) had a significant impact on strawberry vegetative growth. Chicken manure improves structures of soil, nutrient maintenance,

The goal of this research was to determine the impact of urea and chicken manure on producing new seedlings and vegetative growth of strawberry plant.

MATERIALS AND METHODS

The experiment was carried out during the November 2020 to August 2021, in a private farm at Tishambik village, Kanimasi distract, Duhok, Kurdistan regions / Iraq. The local elevation is 900 m on sea level. The weather in the area is (cold to moderate), with rainy season from October to May, the soil is a silty loam, in order to study the impact of four doses of urea (0, 1, 1.5 and 2 g plant⁻¹) and three levels of chicken manure (0, 100 and 200 g plant⁻¹) on growth of strawberry plant. The strawberry transplants was planted in 25/11/2020 in the experimental farm, area of the experimental plot was 12 m² contained three replications and each experimental unit have four plants, at the distance between each plant 40 cm and 50 cm between the rows. The test contained of twelve factorial treatments (four doses of urea, three levels of chicken manure). The used nitrogen source was urea, which was added manually three times during season growth, first 21 days from the date of planting, second the last week of March and third 1 May. Organic fertilizer source was chicken manure that contain high amount of mineral nutrients, uniformly and manually applied at the time of planting. After planting immediately irrigation was given in a light manner. and following irrigation is provided according to the crop's requirements.. From the beginning until the end of experiment drip irrigation was used. In this study, the experimental design was adopted the

Moisture-holding capability of soil, aeration and intrusion of water (Deksissa *et al.*, 2008). It has a high ratio of N, P, and K, as well as other vital nutrients. That provides phosphate and nitrogen to plants more easily than other organic manure sources (Garg and Bahla, 2008). (Mahadeen 2009) reported that the impact of chicken manure and N, P and K chemical fertilizer (20-20-20 + micro elements) on strawberry fruit productivity and quality, as well as soil chemical qualities and significantly increased fresh and dry weights of shoots by application of organic fertilizer.

Randomize Complete Block Design used the data was analyzed and compared according to the Duncan's Multiple Range Tests at 5% level (Al-Rawi and Khalafalla, 2000) used SAS program. The following data will be recorded. Number of runners (Plant⁻¹), length of runner (cm), Number of seedlings (Runner⁻¹), Number of seedlings (Plant⁻¹), dry weight of vegetative growth (g. plant⁻¹) by used oven dried at 70 °C until the weight of plant was fixed (Al-Sahaf, 1989), the total nitrogen, phosphorus and potassium percentage dry samples of plant leaves digested in the acid solution were estimated as follow: The nitrogen was determined by using Microkjeldhal apparatus described by (A.O.A.C. 1975), phosphorous was estimated by using ammonium vanadium the reading of sample was recorded by Spectrophotometer apparatus (410 nm) (Olsen and Semmers, 1982). Potassium was determined by Flame photometer apparatus (Jenway PEP7, U.K.) reported by (page, *et al.*, 1982 and A.O.A.C., 1995).

RESULTS AND DISCUSSION

1. Number of runners (Plant⁻¹)

Data in table (1) shows the number of runners of strawberry plants which was significantly affected by urea using (1.5 and 2 g) and chicken manure at level (200 g) as compared to the control treatment. In the case of a combination, a significant difference appears in term of number of runners especially at (2 g urea and 200 g chicken manure) compare with other interaction treatments.

Table (1):- Influence of urea and chicken manure on number of runners (Plant⁻¹) of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	3.33 f	5.33ef	9.67 cd	9.67 cd	7.00 c
100	12.00 b-d	8.67 de	12.00 b-d	13.33bc	11.50 b
200	12.00 b-d	14.00 ab	15.00 ab	17.00 a	14.50 a
Effect of urea	9.11 b	9.33 b	12.22 a	13.33 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

2. length of runner (cm)

Data present in table (2) reveal that using (2 g and 200 g) level of urea and chicken manure respectively significantly increased length of each runner.

Concerning the interaction between soil application of urea and chicken manure, the best data were measured for length of each runner of 2 g of urea with 200 g of chicken manure which was (125.67 cm) compared with some of other interaction treatments.

Table (2):- Influence of urea and chicken manure on length of runner cm of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	34.33 f	53.67ef	54.67ef	62.67 d-f	51.33 c
100	50.00ef	73.33 c-e	76.67 c-e	99.33 a-c	74.83 b
200	88.67 b-d	92.00bc	110.33 ab	125.67 a	104.17 a
Effect of urea	57.67 c	73.00 b	80.56 b	95.89 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

3. Number of seedlings (Runner⁻¹)

The data in table (3) clarified that significantly affected on number of seedlings per runner were obtained with treatments that received (2 g and 200 g) of urea and chicken manure respectively compared to control. The

interaction between application of urea at 2 g and chicken manure at 200 g had significant effect on number of seedlings per runner that was (5.33 seedlings. runner⁻¹) as compared with most of other interaction treatments.

Table (3):- Influence of urea and chicken manure on number of seedlings (Runner⁻¹) of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	2.00 e	3.33 c-e	3.33 c-e	3.00 de	2.92 c
100	4.00 a-d	3.67 b-d	3.67 b-d	3.67 b-d	3.75 b
200	3.33 c-e	4.67 a-c	5.00 ab	5.33 a	4.58 a
Effect of urea	3.11 b	3.89 ab	4.00 a	4.00 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

4. Number of seedlings (Plant⁻¹)

Number of seedlings per plant was increased by (1.5 and 2 g) of urea compared to control as shown in table (4). Also used of chicken manure at 200 g

had significant increased number of seedlings per plant which was (29.83. seedlings plant⁻¹) compared to control (21.83 seedlings plant⁻¹). The interaction between application urea at 2 g and

chicken manure at 200 g obtained the best record that was (35.33 seedlings plant⁻¹) compared to some other interaction treatments.

Table (4):- Influence of urea and chicken manure on number of seedlings (Plant⁻¹) of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	8.00 d	17.33 cd	33.00 ab	29.00 a-c	21.83 b
100	28.67 a-c	22.33bc	20.00 c	23.33bc	23.58 b
200	26.33 a-c	22.67bc	35.00 a	35.33 a	29.83 a
Effect of urea	21.00 b	20.78 b	29.33 a	29.22 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

5. Dry weight of vegetative growth (g. plant⁻¹)

Dry weight of vegetative growth of strawberry plant was significantly affected by urea addition at (1.5 and 2 g) and chicken manure at 200 g in comparison to the control

treatment clear in (table 5). Interaction also showed significant differences especially at (2 g urea and 200 g chicken manure) in compared to all other interaction treatments.

Table (5):- Influence of urea and chicken manure on dry weight of vegetative growth (g. plant⁻¹) of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	13.37 e	14.69 e	16.86 de	16.46 de	15.35 c
100	18.86 cd	14.88 e	21.69bc	20.08 cd	18.88 b
200	19.24 cd	22.20bc	24.56 ab	26.60 a	23.15 a
Effect of urea	17.16 b	17.26 b	21.04 a	21.05 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

6. Nitrogen percentage in leaves

Results in table (6) obviously revealed that soil application of urea at 2 g gave highest value of nitrogen percentage in leaf of strawberry plant (3.21 %). Application of chicken manure at 200 g level significantly increased nitrogen percentage in leaves of strawberry compare to the control. For the

interaction between urea and chicken manure, the results indicated that soil application of 2 g urea + 200 g chicken manure had the maximum significant nitrogen percentage (3.79 %). But minimum nitrogen percentage (2.16 %) was recorded of interaction between 0 g urea and 0 g chicken manure.

Table (6):- Influence of urea and chicken manure on nitrogen percentage in leaves of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	2.16 c	2.33bc	3.04 a-c	3.00 a-c	2.63 b
100	3.33 a	3.10 a-c	2.83 a-c	2.84 a-c	3.03 ab
200	2.97 a-c	2.89 a-c	3.32 ab	3.79 a	3.24 a
Effect of urea	2.82 a	2.77 a	3.07 a	3.21 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

7. Phosphorus percentage in leaves:

Table (7) cleared that soil application of urea to strawberry plant 1.5 g gave highest value (0.65 %) of phosphorus percentage in leaf of Darselect cultivar. Application of chicken manure showed (200 g) level of chicken manure significantly increased phosphorus percentage in leaf compared to

control. The same table shows that application of (2 g urea with 200 g chicken manure) significantly affected on phosphorus percentage the highest value was (0.83 %) compared to the lowest phosphorus percentage value was (0.22%) recorded in control.

Table (7): -Influence of urea and chicken manure on phosphorus percentage in leaves of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	0.22 e	0.40 c-e	0.72 ab	0.33 de	0.42 b
100	0.67 a-c	0.43 b-e	0.56 a-d	0.44 b-e	0.53 b
200	0.64 a-c	0.69 a-c	0.66 a-c	0.83 a	0.70 a
Effect of urea	0.51 a	0.51 a	0.65 a	0.53 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

8. Potassium percentage in leaves:

Table (8) clearly shows that application of both urea and chicken manure significantly affected on potassium percentage in leaf of strawberry plants. Which records the maximum value (1.47 %) at (2 g) dose urea and (1.62%) at (200 g) level chicken

manure compared to the control. Data showed that 2 g urea + 200 g chicken manure gave significantly the maximum potassium percentage in leaf compared to minimum value obtained at control (0 g urea + 0 g chicken manure).

Table (8):- Influence of urea and chicken manure on potassium percentage in leaves of strawberry “Darselect” plants

Effect of chicken manure g plant ⁻¹	Effect of urea g plant ⁻¹				Effect of chicken manure g plant ⁻¹
	0	1	1.5	2	
0	0.32 g	0.50fg	0.74 e-g	1.10c-e	0.66 c
100	1.00 d-e	1.26 a-e	1.16 b-e	1.51 a-d	1.23 b
200	1.47 a-d	1.56 a-c	1.66 ab	1.80 a	1.62 a
Effect of urea	0.93 b	1.11 b	1.19 ab	1.47 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

It's obvious from tables (1-8) that soil application of urea and chicken manure had significant effect on increasing strawberry seedlings parameters, vegetative growth, nitrogen, phosphorus, potassium percentage in leaves undertaken in this experiment of strawberry plant cv. Darselect, the positive effect of urea might be attributed to an increase in nitrogen absorption and its crucial function in chlorophyll synthesis and as a result, the photosynthesis and carbon dioxide assimilation processes (Jasso-chaverria *et al.*, 2005) leading to enhanced growth. Such desirable effects of application of nitrogen on vegetative growth parameters could be attributed to the nitrogen's ability to promote metabolic activity in order to aid in the production of more tissues and organs (Yagodin 1984). The effect of chicken manure on strawberry vegetative development has been observed could be attributed to the enhanced nutrient availability over a longer period of time throughout the planting season; this encourages plant growth to progress (Mohamed and Gabr, 2002). The number of runner of each plant can be increased might the organic matters contain of plant-growth regulating substances and improvement of soil biological function (Cristina and Jorge, 2011) through the application of chicken manure to soil. Organic amendments as well as helpful in cell division and cell elongation in meristematic region of plant, this was because of the production of plant growth substances IAA and GA (Gopalreddy, 1997; Willrich *et al.*, 1974; Sims, 1987).

Organic manures enhance strawberry plant vegetative development characteristics by enhancing soil aeration and promoting soil enzyme activity (Bhattacharyya *et al.* 2003). The maximum number of runners in chicken manures treated plants could be due to plant nutrients are readily available, assisting strawberry plants in their vegetative growth, (Younas and Ali 2012).

CONCLUSION

Based on the findings of the current investigation into the influence of urea and chicken manures on producing new plants and vegetative growth of strawberry can be drawn this conclusion. Additions of urea at 2g and chicken manure at 200g have a significant effect and increasing on number of runners, length of runner,

number of seedlings (Runner⁻¹), number of seedlings (Plant⁻¹), dry weight of vegetative growth, total nitrogen, phosphorus and potassium percentage in leaves. The interaction of urea with chicken manures in the high level the most effective treatment resulted in an increase in vegetative growth indices. We can conclude from this test the possibility of replacing the poultry or sheep manure and use fertilizer contain high amount of nitrogen or planting leguminous crops before planting strawberry in order to improve the parameters of vegetative growth.

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تأثير اليوريا وسماد مخلفات الدجاج على انتاج الشتلات جديدة و النمو الخضري لشتلات الشليك " Darselect "

الخلاصة

أجريت هذه التجربة خلال الموسم الزراعي تشرين الثاني 2020 الى اب 2021 في مزرعة خاصة بقرية تيشمبيك، بروارى بالا، اقليم كردستان / العراق. على نبات الشليك صنف Darselect لدراسة تأثير أربع جرعات من اليوريا (صفر و 1 و 1,5 و 2 غم. نبات⁻¹)، وثلاثة مستويات من مخلفات الدجاج (صفر و 100 و 200 غم. نبات⁻¹) على انتاج شتلات جديدة و النمو الخضري لشتلات الشليك. النتائج أظهرت ان زيادة اضافة اليوريا و مخلفات دجاج خاصة عند (2 غم يوريا و 200 غم مخلفات دجاج) على التوالي ، ادت الى تحسين معظم الصفات المدروسة. التداخل بين يوريا و مخلفات لدجاج عند التركيز العالي اعطت اعلى القيم من عدد المدادات (17 نبات⁻¹) و طول كل المدادة (125,67 سم) وعدد الشتلات (5,33 المدادة⁻¹) وعدد الشتلات (33,35 نبات⁻¹) والوزن الجاف للجزء الخضري (26,60 غم. نبات⁻¹) و محتوى النيتروجين في الأوراق (3,79%) والفسفور (0,83%) و البوتاسيوم (1,80%).

كلمات مفتاحيه: شليك , يوريا , سماد دجاج

كارتیکرنا خوراکى يوريا وة زبلئ مريشکى ل سةر ضیکرنا شتلين نی وة ساخلة تين شينکاتينى ذرووة کى شليک
شتلين جورئ " Darselect "

توخته

تظ ظة کولينه هاته ئة نجامدان دوة رزى َضاندنى تشرينا دووى 2020 تا تة باخا 2021 د ناف زة فية کا تايبة ل طوندئ تيشة مبيكى، بة روارى بالا، دهوك، هة ريما كوردستانا عيراقى. ل سةر رووة كى شليک جورئ دارسليكت. لدور كارتیکرنا ضوار قة بارين خوراکى يوريا (0، 1، 1.5، 2 غرام رووة ك⁻¹) وة سى قة بارين زبلئ مريشکى (0، 100، 200 غرام رووة ك⁻¹) ل سةر ضیکرنا شتلين نی وة ساخلة تين شينکاتينى. ئة نجام هوسا دياركن كو زيده كرنا خوراکى يوريا وة زبلئ مريشکى ب تابة ت د قة بارئ (2 غرام وة 200 غرام) ل ديفك بو ئة طة رى زيده كرنا تثرينا ساخلة تين هاتينة وة رطرتن. تیکة ل كرنا كارتیکرنا دناظبة را خوراکى يوريا وة زبلئ مريشکى د قة بارئ زيده دا بلندترين ري ّذة ذنمارا كشوكا (17 رووة ك⁻¹)، دريذاهييا هةر كشوكة كى (125.67 سم)، ذمارا شتلا (5.33 كشوك⁻¹)، ذمارا شتلا (35.33 رووة ك⁻¹)، كيشة يا هشك يا رووة كى (26.60 غرام رووة ك⁻¹)، ريذا طشتينا نايتروجينى د بة لطان دا (3.79 %)، فوسفور (0.83%)، وة ثوتاسيم (1.80%).

ووشا كليكى: شليک ، خوراکى يوريا ، زبلئ مريشکى