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RESEARCH ARTICLE

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Effect of Uncomposted Human Hair, Poultry Manure and Mineral Fertilizer On Eggplant (*Solanum Melongena* L.) Growth and Productivity.

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ABSTRACT

A pot experiment was conducted in Bakrajo Technical Institute field at open field During the growing season 2020, to find out the effects of uncomposted human hair (35 and 70 g), poultry manure (35 and 70 g) and mineral NPK 20:20:20 fertilizer (0.5 and 1 g) on the growth and yield parameters of eggplant (*Solanum melongena* L.). Results indicated significant increases in the number of leaves, stem diameter, fresh eggplant diameter, shoot weight (g), dry matter (g)and yield (g). Growth parameters showed significant positive results in the number of leaves, stem diameter, and fresh eggplant diameter. The lack of significant results for plant height, number of flowers, and number of eggplants per plant indicated that these factors may not have a substantial impact in this context. There was a positive correlation between plant height and the number of flowers and eggplants per plant, in which the taller plants had more flowers and eggplants. The correlation between shoots weight and number of leaves implies that plants with more leaves might produce heavier shoots. The negative, non-significant correlation between dry matter and most other growth and yield parameters might indicate that dry matter accumulation does not necessarily align with growth or yield improvements in this experiment. The increase in dry matter weight and yield further supports that these parameters positively impact overall productivity correlation coefficient recorded positive significant for number of flowers, number of eggplants per plant with plant height and also, shoots weight with number of leaves.

***Keywords*:** Uncomposted human hair, Eggplant, Poultry manure, Mineral fertilizer.

INTRODUCTION

Many studies have shown that uncomposted human hair waste may be used as a fertiliser source for crops when combined with municipal solid waste compost [1]. Wool waste generated during the cleaning of raw wool [2], and uncomposted human hair waste generated by hair salons are two examples of types of waste materials and manure matter for example (municipal hard waste, animal manure, untreated waste) are used in many agricultural land or cultivated area which are used for propagation and productivity. uncomposted human hair after cutting in barbershops would be typically suitable for agriculture growing as a non-compost form forestry wood land [2], because the hard manure uncomposted human hair can be used as a source of fertilizer and cleaning the environment by reusing it, also it has many other solid byproduct but not used for agriculture production despite of based same waste materials[3]. Uncomposted human hair can also be used in containers and greenhouses or protected covering places as a nutrient for growing in order to make uncomposted human hair waste commercially available, also for land properties improvement, especially in difficult soil-drainage lands. The poultry manure use is one of the biggest and quick growing domestic animal manufacturing constructions all over the world [3]. The lack of practice efficiencies of mineral fertilisers, along with their increasing costs and the need for naturally produced cooking foods, has led farmers to consider mineral fertilisers. Mineral fertilizer may raise soil fertility in spite of the crop production potential possibly by changes in soils physical and chemical properties including nutrient in soil structure and bioavailability. Some type of organic materials can increase crop yields due to improved soil through nutrient release during mineralization and decomposition. They may also improve soil physical properties for instance soil water content, bulk density, porosity and aeration. Moreover, they generally have a greater manure effect on subsequent crops than inorganic nutrient sources due to the slow release of their nutrients over time. Using organic amendments of soil, for example, manure, humic substances and mineral fertiliser, can play a positive role in improving soil physical properties [4], raising the content of organic soil carbon and increasing the quantity and quality of soil productivity [5].

The aim of this study is to assessment of non-composted hair waste materials compared with organic and chemical (N:P:K 20:20:20) fertiliser material for vegetable crop growth, especially eggplant (*Solanum melongena* L.) and increase in productivity as one of the source methods of nutrient and plant nutrition.

Materials and Methods

A pot experiment was conducted at Bakrajo Technical Institute, which is part of Sulaimani Polytechnic University. The pots contained three different types of growing media uncomposted human hair which denoted as (H) in two doses of weight bases [35 g 20 kg^{-1} soil (H_{35}) and 70 g 20 kg^{-1} soil (H_{70})], a mixture of growing media composed of poultry manure or organic fertilizer denoted as (O), with two doses [35 g 20 kg^{-1} soil (O_{35}) and 70 g 20 kg^{-1} soil (O_{70})], and mineral NPK 20:20:20 fertilizer denoted as (M) on two doses [0.5 g 20 kg^{-1} soil ($M_{0.5}$) and 1 g 20 kg^{-1} soil (M_1)]. These fertilizers were used to fertilize the plants twice; at planting time and 2 two weeks later.

Seeding eggplants

Seeds of eggplant (*Solanum melongena* L.) were sown in trays in March 2018 and then transplanted into pots of 30 cm diameter containing 10 kg of growing media in May 2020.

The normal cultural practices such as irrigation, weeding, disease and/or pest management were as done as necessary. The irrigation of the plants inside the pots was done regularly on a weight basis of growing media, in which samples were taken to determine the moisture depletion from the total available moisture in the media according to [6]. Using the water holding model for the calculation of wilting points and field capacity limits, and irrigation was done using good-quality water according to [7], and the modified Sulaimani irrigation water quality index SIWQI [8]. The range of average temperature recorded and saved between 20 to 43 ˚C.

Physiochemical soil analyses

Acidity (pH)and EC of soil sample were measured in 1:10, soil to distilled H_2O ratio solution in the way of using a glasses electrode - Conductance-Resistance meter (YSI 34) according to [9]. For organic matter (OM), firstly the content of organic carbon (OC) in soil samples were determined by Walkley-Black Method. Percent of total ($CaCO_3$%) was measured by using scheibiler calsimeter method according to [10]. The total content of the metals (Zn, Mn, Fe, and Cu) in soil sample were determined as recommended by the International Organization for Standardization (2013) through digestion of the soil samples in aquaregia (HCl: HNO3, 3:1 V/V) using the digester of Marsexpres 6 machine, (CEM corporation model measured by Atomic Absorption Spectroscopy, AAS (PerkinElmer model), Calcium Ca, magnesium Mg, sodium Na and potassium K were measured according to International Standard (Table 1).

Table 1. Soil physiochemical properties

Parameters	Units	Values
pH	-	7.3
EC	(dSm^{-1})	0.323
$CaCO_3$	(%)	24.2
OM		2.58
Ca	(mg kg^{-1})	4521
Mg		224
Na		49
K		202
P	(mg kg^{-1})	4.05
Fe		9.3
Zn		1.32
Cu		2.4
Mn		26

The vegetative growth parameters; the leaf number of plants from the top, middle and bottom of the plants was counted and the averages were calculated [11]. The height of plants measured from top soil of pots to the top of the apex [11]. Also, number of flowers, stem diameters were recorded. The fresh weights of plants were measured. fresh yield was recorded, dry matter weight (g) recorded for all treatments.

Statistical Analysis

The experimental data were analyzed using The statistical analysis software package (XLSTAT 2019). All statistical tests were performed at the 0.05 level of significance. Duncan's multiple range test was used to separate means. A correlation coefficient was used to determine the relationships among growth and yield parameters.

Results and Discussion

Effect of uncomposted human hair, poultry manure and mineral fertilizer on growth and productivity of eggplant (*Solanum melongena* L.)

In table 2 are summarized the effects of uncomposted human hair, poultry manure and mineral fertilizer on growth and productivity eggplant (*Solanum melongena* L.). Various significant differences obtained due to different types of fertilizer application with various doses, the results are important for enhancement of growth and yield of eggplant production.

Table 2. Effect of uncomposted human hair, poultry manure and mineral fertilizer on growth and productivity eggplant (*Solanum melongena* L.)

Treatments	Number of leaves	Plant height (cm)	No. of flowers	No. of eggplant per plant	Average stem diameter (cm)	Yield (g)	Fresh eggplant diameter (cm)	Shoots weight (g)	Dry matter weight (g)
H_{70}	24.7a	43. ^{a}	2.3 ^{a}	2 ^{a}	4.3 ^{a}	104 ^{a}	4.9 ^{ab}	38.3 ^{ab}	31 ^{ab}
H_{35}	20.3 ^{ab}	42.3 ^{a}	3 ^{a}	1.7 ^{a}	4.2 ^{a}	99.3 ^{a}	4.8 ^{ab}	41.3 ^{a}	32.3 ^{a}
O_{70}	17.3 ^{b}	33.3 ^{a}	2.7 ^{a}	2.3 ^{a}	2.8 ^{b}	101 ^{a}	5.3 ^{a}	34.7 ^{bcd}	28 ^{bc}
O_{35}	15.7 ^{b}	40.3 ^{a}	3 ^{a}	2 ^{a}	3.9 ^{a}	91 ^{b}	4.7 ^{ab}	36 ^{bc}	21.8 ^{d}
$M_{0.5}$	19.3 ^{ab}	45.3 a	2.3 ^{a}	1.7 ^{a}	4 ^{a}	84.3 ^{b}	3.9 ^{c}	35.7 ^{bc}	25.7 ^{c}
M_{1}	15 ^{b}	39 ^{a}	2.3 ^{a}	1.7 ^{a}	4.2 ^{a}	90.7 ^{b}	4.3 ^{bc}	31.7 ^{d}	21.7 ^{d}
C	15 ^{b}	33.3 ^{a}	2.7 ^{a}	1.7 ^{a}	3.1 ^{b}	46 ^{c}	3.9 ^{c}	33.7 ^{cd}	27 ^{c}
Pr > F(Model)	0.013	0.338	0.973	0.732	0.003	< 0.0001	0.005	0.004	0.0001
Significance	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes

Values followed by the same letter(s) within each column are significantly not different according to Duncan's multiple range test ($P \leq 0.05$).

Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of leaves per plant

Analyses of variance (Tables 2 and 3) show significant effect of uncomposted human hair, poultry manure and mineral fertilizer on number of leaves per plant, for uncomposted human hair, H_{70} was significant and recorded maximum value of 24.67 compared to H_{35} which gave a value of 20.34. However, $M_{0.5}$ recoded the least significant value of 19.34. Otherwise, O_{70}, O_{35}, Control and M_1 explained same significant level and least square means (17.34, 15.67,15, and 15) Respectively. Also, results indicated sum of squares 365.72 and mean squares 45.72. These results presented that uncomposted human hair with high concentration recorded high number of leaves per plant due to uncomposted soil physical properties and productivity. The results agree with previous studies [1, 12, 13 and14].

Table 3. Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of leaves

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	365.72	45.72	4.24	0.01
Error	12	129.53	10.79		
Corrected Total	20	495.238			

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on plant height (cm) of eggplant

Data presented in (Tables 2 and 4) and (Figure 1) show non-significant effect of uncomposted human hair, poultry manure and mineral fertilizer on plant height, however, with same group categorized of group A with least square means of (M0.5, H70, H35, O35, M1, C and O70) giving the values (45.34, 43, 42.34, 40.34, 39, 33.43, and 33.34), respectively. The reason may return to soil physical characteristics and environmental factors, also, the results recorded sum of squares 710.86 and mean squares 88.86. These results showed no significant differences recorded for plant height due to the mentioned reason. The results agree with [15, 16, 17 and18].

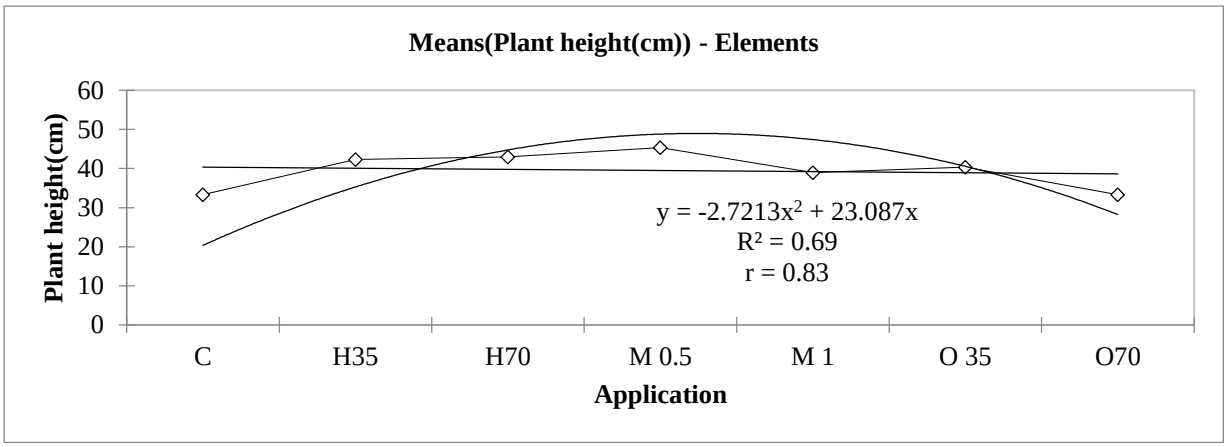

Figure 1. Effect of uncomposted human hair, poultry manure and mineral fertilizer on plant height (cm) of eggplant.

Table 4. Effect of uncomposted human hair, poultry manure and mineral fertilizer on plant height (cm) of eggplant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	710.86	88.86	1.28	0.338
Error	12	834.38	69.54		
Corrected Total	20	1545.24			

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of flowers per plant of eggplant

Results shown in Tables (2 and 5) and figure (2) explained non-significant effect of uncomposted human hair, poultry manure and mineral fertilizer on number of flowers per plant of eggplant, the least mean squares (3, 3, 2.67, 2.67, 2.34, 2.34 and 2.34) for the applications of (H_{35}, O_{35}, C, O_{70}, H_{70}, $M_{0.5}$, and M_1), respectively were resulted. These results could be affected by soil fertility and climate factors, since they recorded sum of squares 6.57 and mean squares 0.82. These results presented that no significant records occurred in the number of flowers per plant due to the mentioned factors. The results agree with [19, 20 and 21].

Table 5. Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of flowers per plant of eggplant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	6.57	0.82	0.25	0.98
Error	12	40.38	3.37		
Corrected Total	20	46.95			

Computed against model Y=Mean(Y)

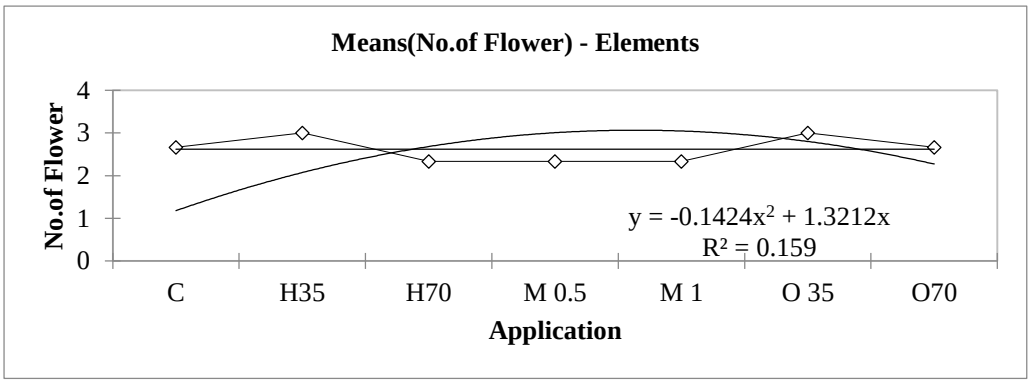

Figure 2. Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of flowers per plant of eggplant.

Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of eggplants per plant

Data shown in tables (2 and 6) explained non-significant effect of uncomposted human hair, poultry manure and mineral fertilizer on number of eggplants per plant, as it was noticed that the mean squares (2.34, 2, 2, 1.67, 1.67, 1.67, and 1.67) were noticed for the applications (O_{70}, H_{70}, $O_{35,}$ M_1, $M_{0.5,}$ C, H_{35}), respectively. The reason may be attributed to the effects of soil fertility and climate factors, results represented sum of squares 4/95 and mean 0.62. These results show that no significant Records occurred for number of flowers per plant due to the impact of applications and environmental factors. The results are in parallel with [21 and 22].

Table 6. Effect of uncomposted human hair, poultry manure and mineral fertilizer on number of eggplants per plant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	4.95	0.62	0.64	0.73
Error	12	11.62	0.97		
Corrected Total	20	16.57			

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on average stem diameter (cm) of eggplant

Analysis of variance (Tables 2 and 7) show significant effects of uncomposted human hair, poultry manure and mineral fertilizer on the averages of stem diameter of eggplants with letter A for applications (H_{70}, $H_{35,}$ M_1, $M_{0.5,}$ and $O_{35)}$, also the least mean squares (4.34, 4.22, 4.22, 4, and 3.89) respectively, were resulted. Later application (C and O_{70}) with B letters and least mean squares (3.1 and 2.83), respectively. the significant reason returns to the effect of high level of application use caused to improve soil properties and fertility, results represented sum of squares 6.46 and mean squares 0.81. These results showed clear significant records for average of stem diameter of eggplant as the impact applications. The results agree with [15, 23, 20, 24 and 25].

Table 7. Effect of uncomposted human hair, poultry manure and mineral fertilizer on average stem diameter (cm) of eggplant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	6.46	0.81	5.92	0.003
Error	12	1.64	0.14		
Corrected Total	20	8.09			

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on yield (g) per plant of eggplant

Tables (2 and 8) and figure 3 explained various significant effect of uncomposted human hair, poultry manure and mineral fertilizer on yield (g) per plant of eggplant caused by the high level of applications (H_{70}, $O_{70,}$ and $H_{35)}$ giving the least significant values (104, 101 and 99.34) with A letter. The second application group with significant level were ($O_{35,}$ M_1, and $M_{0.5}$) which received the letter B and least mean squares (91, 90.67 and 84.34), respectively . The later application with C letters had a least mean squares value of (46). The significant reason might be returned to the impact of the high level of application use caused to improve yield and soil fertility, as the results represented sum of squares 7053.62 and mean squares 881.70. These results explained high level use caused high productivity. The results were shown parallel with [15, 19, 26 and 28].

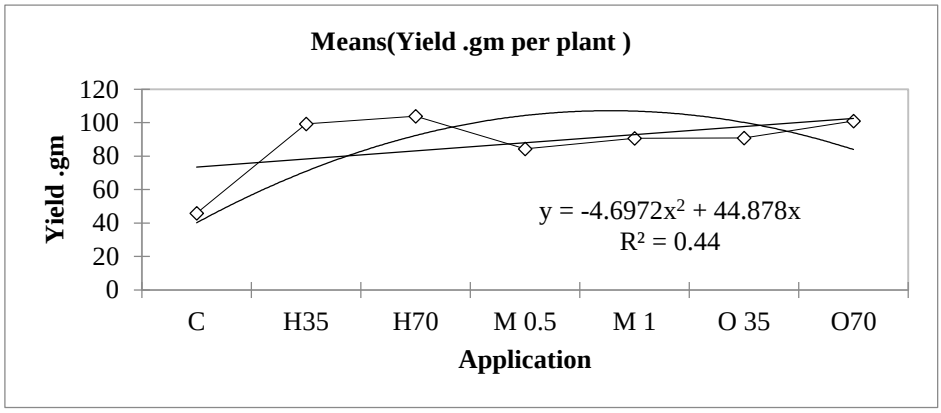

Figure 3. Effect of uncomposted human hair, poultry manure and mineral fertilizer on yield (g) per plant of eggplant.

Table 8. Effect of uncomposted human hair, poultry manure and mineral fertilizer on yield (g) per plant of eggplant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	7053.62	881.70	42.78	< 0.0001
Error	12	247.34	20.61		
Corrected Total	20	7300.95			

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on fresh eggplant diameter (cm)

ANOVA tables (2 and 9) explained various significant effect of uncomposted human hair, poultry manure and mineral fertilizer on fresh eggplant diameter of eggplant. The high level for applications (O_{70}) gave a significant value (5.27) with A letter. Whereas from the second group, a significant level of applications (H_{70}, H_{35}, and O_{35}) recoded letters A and B with least mean squares (4.87, 4.84, and 4.77). Next, applications (M_1) with letters B and also C , with a mean squares (4.3) value. Finally, Application ($M_{0.5}$ and C) with letter C and least significant means (3.94 and 3.87) were observed. The reason of various level of significant could return to the impact of the high level of application use which caused improvement in yield and soil fertility, results in sum of squares 5.02 and mean squares 0.63. These results explained that the high level of use caused high productivity. The results show agreement with [15 20, 23 and 29].

Table 9. Effect of uncomposted human hair, poultry manure and mineral fertilizer on fresh eggplant diameter (cm).

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	5.02	0.63	5.39	0.005
Error	12	1.40	0.12		
Corrected Total	20	6.41			

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on shoots weight of eggplant

Data presented in tables (2 and 10) explained various significant effect of uncomposted human hair, poultry manure and mineral fertilizer on shoots weight of eggplant. The high level for applications (H_{35}) gave a least significant value (41.34) and A letter. However, from the second significant group, the applications (H_{70}) recoded letters A and B least mean squares (38.34). Next, applications (O_{35} and $M_{0.5}$) with letters B and C, least mean square values were (36 and 35.67). Later (O_{70}) with least significant means (34.67) received the letters (B, C, and D), Otherwise, control received the least significant mean (33.67) and letters (C and D). Finally, the application (M_1) got the letter D and least significant means 31.67. The reason of various level of significant values may be caused by the impact of high level of application use which improved yield and soil fertility, results represented sum of squares 188.48 and mean squares 23.56. These results explained that the high level use caused high productivity. The results show agreement with [15, 20, 23 and 30].

Table 10. Effect of uncomposted human hair, poultry manure and mineral fertilizer on shoots weight (g) of eggplant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	188.48	23.56	5.73	0.004
Error	12	49.34	4.11		

Corrected Total	20	237.81

Computed against model Y=Mean(Y)

Effect of uncomposted human hair, poultry manure and mineral fertilizer on dry matter weight of eggplant

Data tables (2 and 11) and figure (4) explained various significant effect of uncomposted human hair, poultry manure and mineral fertilizer on dry matter weight of eggplant since the high level for applications (H_{35}) with the least significant values [32.34] received the letter A. However, from the second significant level, the application of (H_{70}) recoded letters A and B And the least mean square of [15]. Next, applications (O_{70}) with letters B and C with the least mean squares (28) value was recorded. Later (C and $M_{0.5}$) application and least significant means [27 and 25.67] with letters (C) were found. Finally, It was observed that the applications (O_{35} and M_1) received the least significant means (21.84 and 21.67) with letters D group. The reason of various level of significant values returns to the impact of high level of application use caused to improve yield and soil fertility, results represented sum of squares 367.62 and mean squares 38.46. These results explained high level use caused high productivity. The results show agreement with [15, 20, 23 and 30].

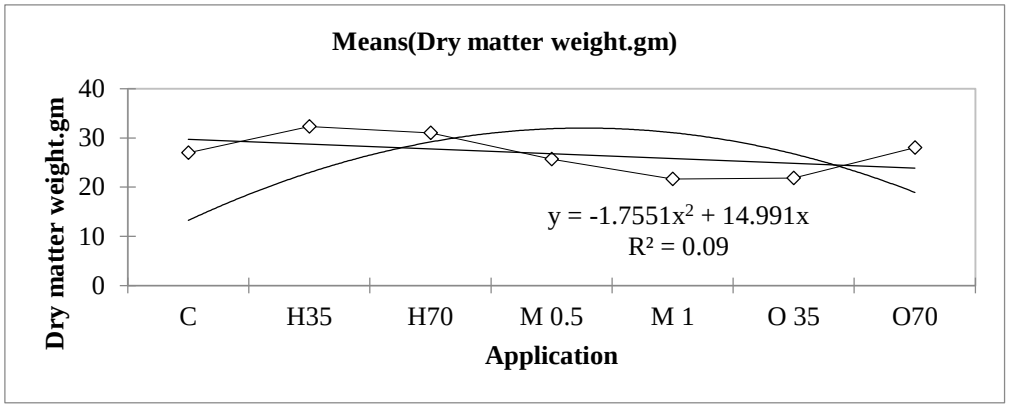

Figure 4. Effect of uncomposted human hair, poultry manure and mineral fertilizer on Dry matter weight (g) of eggplant.

Table 11. Effect of uncomposted human hair, poultry manure and mineral fertilizer on dry matter weight (g) of eggplant.

Source of variance	DF	Sum of squares	Mean squares	F	Pr > F
Model	8	307.62	38.46	12.25	0.0001
Error	12	37.67	3.14		
Corrected Total	20	345.29			

Computed against model Y=Mean(Y)

Correlation Coefficients among growth and yield parameters of eggplant

Table 12 Represent the correlation coefficients for nine growth and productivity characters of eggplant. Various relations recorded, in which most positive significant relation was noticed plant height and number of flowers which resulted in an (r) value of (0.51), the next significant positive correlation was noticed between number of eggplants per plant and plant height with number of flowers with (r) values of (0.53 and 0.89), respectively [23 and 31]. Later positive significant relation between fresh eggplant diameter and yield with (r) value of (0.69) was recorded. Likewise, other significant positive relationship was noticed between shoot weight and number of leaves which gave an (r) value (0.46) [31]. In contrary, negative non-significant correlations observed between number of leaves and number of flowers with (r) value (-0.04), later negative relations were observed fresh eggplant diameter (cm) with plant height and number of flowers which (r) values (-0.19 and -0.05), respectively. Finally, most negative non-significant relations were noticed among each dry matter Weight (g) per plant and plant height, number of flowers, number of eggplants per plant and average of stem diameter with (r) values (-0.003, -0.14, -0.11 and -0.03) [30 and 31]. Also, many non-significant relations between parameters of growth and yield of eggplant were recorded with positive values, as explained in table 12.

Table 12. Correlation Coefficients among growth and yield parameters of eggplant.

Variables	Number of leaves	Plant height (cm)	No. of flowers	No. of eggplants per plant	Average stem diameter (cm)	Yield (g)	Fresh eggplant diameter (cm)	Shoot weight (g)	Dry matter weight per plant (g)

Number of leaves	1								
Plant height (cm)	0.36	1							
No. of flowers	-0.04	0.51	1						
No. of eggplants per plant	0.006	0.53	0.89	1					
Average stem diameter (cm)	0.29	0.32	0.16	0.02	1				
Yield (g)	0.32	0.21	0.01	0.16	0.36	1			
Fresh eggplant diameter (cm)	0.23	-0.19	-0.05	0.06	0.02	0.69	1		
Shoot weight per plant (g)	0.46	0.09	-0.05	-0.07	0.31	0.39	0.38	1	
Dry matter weight per plant (g)	0.53	-0.003	-0.14	-0.11	-0.03	0.21	0.29	0.69	1

Conclusion

The results from this study explained that uncomposted human hair had positive effects and increased growth and productivity of eggplant, also, organic fertilizer or manure poultry increased growth and yield, finally mineral fertilizer with low concentration range use also caused significant improvements.

It is recommended to study high level of uncomposted human hair, and manure poultry range application recorded positive result with low concentration range use of mineral fertilizer.

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تأثير شعر الإنسان غير المخمر ومخلفات الدواجن والأسمدة المعدنية على نمو وإنتاجية الباذنجان

(*Solanum melongena* L)

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الخلاصة

اجريت الدراسة في حقل معهد بكرجو التقني BTI في الحقل المفتوح وفي تجربة الأصص عام 2020. تم اختبار شعر الإنسان غير المخمر بجرعتين

من الوزن (35 و 70 جم) (H35 و H70) وبقايا الدواجن الثانية (35 و 70 جم) (O35 و O70) والسماد المعدني المستخدم (N: P: K، (20:20:20(0.5 و 1 جم) (M0.5 و M1) على معايير النمو والغلة للباذنجان (Solanum melongena L). أشارت النتائج إلى زيادة معنوية موجبة في عدد الأوراق وقطر الساق وقطر الباذنجان الطازج والبراعم ووزن المادة الجافة (جم) والغلة (جم) مع عدم وجود معنوية لارتفاع النبات (سم) وعدد الأزهار لكل نبات وعدد الباذنجان لكل نبات. معايير النمو تشير النتائج الإيجابية المعنوية في عدد الأوراق وقطر الساق وقطر الباذنجان الطازج إلى تحسن في هذه الجوانب من نمو النبات وتطوره. عدم وجود معنوية تشير النتائج الخاصة بارتفاع النبات وعدد الأزهار وعدد الباذنجان لكل نبات إلى أن هذه العوامل قد لا يكون لها تأثير كبير في هذا السياق أو أن الاختلافات الملحوظة ليست ذات دلالة إحصائية. تشير رؤى الارتباط إلى أن الارتباط الإيجابي بين ارتفاع النبات وعدد الأزهار وعدد الباذنجان لكل نبات يشير إلى أن النباتات الأطول قد يكون لديها المزيد من الأزهار والباذنجان. يشير الارتباط بين وزن البراعم وعدد الأوراق إلى أن النباتات ذات الأوراق الأكثر قد تنتج براعم أثقل. قد يشير الارتباط السلبي غير الهام بين المادة الجافة ومعظم معلمات النمو والعائد الأخرى إلى أن تراكم المادة الجافة لا يتماشى بالضرورة مع النمو أو تحسينات العائد في هذه التجربة. كما تدعم الزيادة في وزن المادة الجافة والعائد أن هذه المعلمات تؤثر بشكل إيجابي على الإنتاجية الإجمالية سجل معامل الارتباط دلالة إيجابية لعدد الأزهار وعدد الباذنجان لكل نبات مع ارتفاع النبات أيضًا ووزن البراعم مع عدد الأوراق.

الكلمات المفتاحية: شعر بشري غير مُحَمَّل، باذنجان، مخلفات الدواجن، سماد معدني.