

**EFFECT OF SEED GENERATION AND TYPE OF ORGANIC MANURE SOLUTION
ON GROWTH AND YIELD OF HYBRID EGGPLANT**

Hamza M. Kadhum, M. N. Shaial, N. J. Radhi

Al-Musiab Technical College, Foundation of Technical Education, Iraq

Abstract

The experiment was conducted during the growing season of 2008-2009 at Kufa district in Najaf Governorate to investigate the response of Barcelona eggplant hybrid to seed generation (F1, F2) and 6 treatments of organic manure by mixing with water 1:10 v/v (i.e. poultry, Cow , Sheep, and broad bean manure). The above organic solutions were applied with rate of 3L/m² for 4 times in 60 days interval, while Chinese Humi Max manure was mixed with water by 1:200 v/v and applied with rate of 100 cm³/m² at the same intervals. The F1-seed generation gave the highest growth rates and fruit yield as compared with F2-generation. Also, the obtained results showed that the application of poultry and sheep manure solution increased significantly the growth and fruit yield as compared with other treatments. The favorable effects on growth and fruit parameters were obtained when growing eggplant by F1-generation and application of poultry or sheep solution.

Key words: seed generation; manure solution; *olanum melongena*; eggplant; growth; yield

INTRODUCTION

Eggplant (*Solanum melongena* L.) is a member of solanaceae family . It is one of the most important and popular oriental vegetable crops grow in Iraq for local consumption. The fruits are excellent source of roughage, carbohydrates, protein, vitamins A, B, C, potassium, iron and besides that medical benefits for patients of diabetes , asthma , gout and cholesterol (Matloub et. al.1989; Daunay et.al.2000).

Plant Production depends on many factors, the most important factor is variety and plant nutrition with compositing organic manure which is not available in high quantities in most countries. Therefore, the organic manure should be provided through liquid solution in order to economized and utilized in the proper mean.

The choosing of eggplant hybrids based on some factors, which enable to ensure high yield fruit quality besides the endurance of environmental variation and tolerance of pesticides. Generally F1-hybrids distinguished by hybrid vigor phenomenon, the studies are demonstrated that the genetic segregation does not happen in F1-individual plants, if the using parents are pure, while the self-pollination between first generation caused to produce second generation.

It is worth mentioning; that hybrid seed prices mostly are high due to the cost of pure line and the technical process of production. So, many companies are working to produce F2-seed generation (Riggs 88; Ingale and Patil 1997; Daunay 2007). Numerous studies indicate that organic manure provides the plant with most nutrient elements and the element deficiency rarely happened when applied. In addition it will improve the physical, chemical, and biological properties of soil, which will be inversed the availability of soil nutrient elements especially with alkaline reaction such as Iraqi soils (Tisdale et.al.1993; Seen and Kingman 1998; Eghball 2002). Increasing plant growth and yield due to liquid manure application have been reported by many workers on different crops (Kadhum

et.al. 1987; Al-Moshileh and Motawei 2007) on eggplant, (Kadhum et. al. 1989; Burgers and Levins 2007) on pepper, (Bohme and Thilua 1997) on tomato. Humic and fulvic acids application might successfully be used in low concentration to improve soil characteristics, plant nutrition. The growth and yield of pepper and tomato had been increased by fertilization of humic acid (Ertam Yildirim 2007; Yasar. Karakurt 2009).

The main objective of this study is to evaluate the performance of two seed generation (F1, F2) of Barcelona eggplant hybrid and the effect of 6 treatments of composting manure solution on the growth and fruit yield.

MATERIALS AND METHODS

The study was conducted in 2008-2009 at private field Kufa district of Najaf Governorate, air composting method had been used to prepare the poultry, cow, sheep, and broad bean manure which should be dried and ground. The manure were compacted on layer in trough with dimension (2 * 2 * 1.5 m), urea fertilizer was added by rate 1% of manure weight to activate the decaying processes. The heap should turnover two times per week to prevent temperature increasing. The decaying of animal manure had done after 3 months, while the broad bean manure decayed after 6 months. The color of manure became brown without ammonia odor (Hayes and Clap 2001). The table (1) shows some chemical characters of different organic manure before and after composting according to (A.O.A.C. 1975).

Table (1) some chemical properties of different organic manure before and after composting.

Organic manure	Chemical characters						
	Ec.of 5:1 dS.m ⁻¹	pH	Carbon g.kg ⁻¹	Nitrogen g.kg ⁻¹	C/N ratio	P ₂ O ₅ g.kg ⁻¹	K ₂ O g.kg ⁻¹
	before composting						
Poultry	9.27	8.14	275	29.5	11.5	12.2	9.3
Cow	7.24	7.36	317	19.4	16.7	7.5	15.3
Sheep	10.67	7.12	345	16.7	21.5	9.3	18.6

Broad bean	8.50	9.32	355	11.8	36.5	6.5	10.1
	After composting						
Poultry	1.65	6.28	255	30.9	9.5	14.2	23.4
Cow	1.71	6.53	300	28.0	10.7	8.7	21.4
Sheep	1.45	6.80	330	27.3	12.2	10.3	27.1
Broad bean	2.26	7.22	350	16.5	21.4	7.9	17.5

The experiment was arranged in split plot design with three replicates, where eggplant seed germination (F1 , F2) were arranged randomly within the main 2 plots, while organic manure treatments distributed in 6 sub-plots as control, cow, sheep, poultry , Humi Max-china origin and broad bean, which represented with symbol (S0, S1, S2, S3, S4, and S5) respectively. The F1-seed generation was imported from semillas company-Spain, while F2- generation produced locally in Kufa district.

The different manure solution was prepared by mixing with water at ratio (1:10) v/v (IFOAM 2000). The solution was applied with rate of (3 L/m²) for 4 times in 60 days interval by adding the solution in the bottom of ridge. The first discharge was added in 50% of plant flowering stage. The Humic Max liquid solution was mixed with water by (1:200 v/v) and applied with rate of (100 cm³/m²) according to the above method.

Eggplant hybrid seeds of Barcelona were sown on 25 July in 209 cell foam trays filled with mixture consisted of 1:2 of sandy soil and peat moss, seedling were planted 40 cm apart on both sides of flat board 160 cm width. Each experimental plot included 40 plants with net area of (12.4 m²). All agricultural practices were carried out accordingly.

Five plant were chosen randomly from each sub plot at 160 day after transplanting to record the growth rate , while the fruit yield obtained by harvesting from 24.11.2008 until 3.6.2009. The first 5 harvest considered as early yield. The obtained data were statistically analyzed and means separation were done using Duncan multiple test at 0.05 level according to SAS program (SAS 2000).

RESULTS AND DISCUSSION*Vegetative growth characters*

The growth rates of plants were significantly greater at F1- generation than F2 (table 2). The increasing percentage for leaves number, branches number, leaves area, dry weight of leaves and stem and total chlorophyll content were 10.89, 4.59, 57.49, 29.52, 22.88, and 9.55% respectively at F1-generation than F2. This is due to the homogeneity of F1-plants in growth according to genetic constitution and existence of hybrid vigor phenomenon. The obtained results are in agreement with those of (Madal and Dama 1993), where reported that F1 growth of eggplant was significantly greater than F2 of the same hybrid.

The results also show that the growth rates of the plants increased significantly with application of organic manure solution. The highest value of growth were obtained at poultry solution (S3) followed by sheep solution (S2), while the lowest values were recorded by the control plants (S0). These results may be due to the role of organic manure in improving the chemical, physical, and biological characters of soil (Tisdale et. al. 1993). In addition to decaying processes of different manure before they are applied may be contributed to availability of nutrient element such as NPK (table1), that are needed for optimal plant growth and development (Eghball 2002).

Regarding to the interaction effect, there were significant differences in all growth parameters, it could be stated that the highest growth rates were recorded by (F1S3) followed with (F1S2) treatment.

Table (2) Effect of seed generation, different manure solution and their interaction on vegetative character of eggplant.

Vegetative Character of Eggplant.						
characters	Leaf No.	Branch No.	Leaf area	Dry weight		Total chlorophyll
				Leaves	Stems	
Treatments	Effect of seed generation					
F1	65.21 a	6.11 a	4505.04 a	76.92 a	86.43 a	17.29 a
F2	58.81 b	5.48 b	2860.38 b	61.71 b	70.33 b	15.78 b
	Effect of manure solution					
S0	50.65 e	4.41 e	2363.88 e	56.18 e	60.42 f	12.10 d

		S1	64.26 c	6.08 c	3790.28 c	70.55 c	78.07 d	17.24 b
		S2	66.78 b	6.71 ab	4502.75 b	74.83 b	84.89 b	17.87 a
		S3	68.91 a	6.97 a	5105.51 a	82.49 a	92.12 a	18.86 a
		S4	65.35 c	6.51 b	3547.30 c	71.72 c	82.73 c	17.68 a
		S5	56.11 d	5.19 d	2786.65 d	60.13 d	72.06 e	15.96 c
		Effect of the interaction						
F1	S0	55.20 f	4.49 e	2960.80 f	59.53 g	67.46 h	12.58 f	
	S1	66.66 b	6.07 c	4755.56 c	78.29 c	86.88 c	18.25 b	
	S2	69.56 a	6.95 ab	5357.03 b	84.96 b	92.58 b	18.51 b	
	S3	71.60 a	7.26 a	6060.13 a	94.33 a	101.62 a	19.79 a	
	S4	67.93 b	6.76 b	4416.46 c	79.27 c	91.44 b	18.27 b	
	S5	60.33 e	5.31 d	3480.26 e	65.17 e	78.60 e	16.32 c	
F2	S0	46.10 g	4.33 e	1766.96 i	52.83 i	53.38 j	11.63 g	
	S1	61.86 d	6.08 c	2825.00 f	62.81 f	69.27 g	16.24 d	
	S2	64.00 c	6.48 bc	3648.46 e	64.69 e	77.20 e	17.22 c	
	S3	66.23 b	6.69 b	4150.90 d	70.65 d	82.62 d	17.46 c	
	S4	62.76 c	6.26 bc	2677.93 g	64.18 e	74.01 f	17.10 c	
	S5	51.90 f	5.07 d	2093.03 h	55.09 h	65.52 i	15.60 e	

Fruit yield and quality

Data presented in table (3) demonstrated that there were significant differences in yield and fruit quality between the plant of F1 and F2. The increasing percentage of fruit dry matter, fruit number/plant, fruit weight, early yield, and total yield were 10.81, 8.54, 18.59, 22.53, and 28.99% respectively at F1 generation than F2. The obtained results might be due to genetic constitution of F1-generation and existence of hybrid vigor phenomenon expressed with homogeneity of plant growth. These results were in accordance with those mentioned by (Daskalov et. al. 1974) concerning the eggplant of F1-generation.

All treatments of organic manure solution had a significant effect on fruit yield parameters except S4 and S5 treatments regarding the early yield. The highest rates of these characters was recorded by poultry solution (S3) followed with sheep (S2). These results might be due to the distinguish percent of NPK in poultry and sheep manure as compared with other manure, in addition to humic acids, organic matter and hormones, that have important role on growth physiological processes. These

effects were expressed on yield and fruit quality. The obtained results were in agreement with (Kadhum et. al. 1989; Al-Moshileh and Motawei 2007; Burgis and Levins 2007).

Table (3) Effect of seed generation, different manure solution and their interaction on yield and fruit quality of eggplant.

characters		Dry matter%	Fruit No./plant	Fruit weight(g)	Early yield kg/m ²	Total yield kg/m ²
Treatments		Effect of seed generation				
F1		10.81 a	33.28 a	174.99 a	4.73 a	18.24 a
F2		9.18 b	30.66 b	147.55 b	3.86 b	14.14 b
		Effect of manure solution				
S0		8.18 d	29.81 e	151.46 e	4.26 b	14.11 e
S1		9.99 cd	30.94 d	160.52 c	4.17 c	15.55 c
S2		10.60 b	33.09 b	167.19 b	4.51 a	17.30 b
S3		12.06 a	35.86 a	173.86 a	4.57 a	19.61 a
S4		10.08 c	31.65 c	160.33 c	4.28 b	15.86 c
S5		9.04 d	30.48 d	154.25 d	3.98 d	14.71 d
		Effect of the interaction				
F1	S0	8.64 g	30.73 d	163.04 f	4.14 f	15.63 f
	S1	10.75 c	32.25 c	172.97 d	4.66 d	17.40 c
	S2	11.56 b	33.99 b	181.30 b	5.00 b	19.23 b
	S3	13.59 a	38.73 a	191.90 a	5.40 a	23.18 a
	S4	10.83 c	32.29 c	174.36 c	4.81 c	17.56 c
	S5	9.47 f	31.70 d	166.38 e	4.37 e	16.45 d
F2	S0	7.71 h	28.89 f	139.88 k	4.37 e	12.60 k
	S1	9.23 f	29.64 e	149.07 i	3.69 gh	13.69 i

	S2	9.64 c	32.18 c	153.09 h	4.01 f	15.37 g
	S3	10.54 d	33.00 bc	155.82 g	3.75 g	16.04 e
	S4	9.33 f	31.01 d	146.30 j	3.75 g	14.15 h
	S5	8.62 g	29.26 e	142.13 j	3.58 h	12.97 j

Significant interaction effect was observed on all fruit parameters, and it could be mentioned that the plant of F1 generation and application of poultry manure recovered the highest values of fruit dry matter, fruit number/plant, fruit weight, early and total yield, where the values was 13.59%, 38.73 fruit, 191.90, 5.40 kg/m², and 23.18 kg/m² respectively followed with F1S2.

CONCLUSION

It could be concluded that F2 seed generation can be successfully used in case of the unavailability to provide with F1-generation, besides the application of poultry or sheep manure solution to obtain the highest vegetative growth parameter and fruit yield.

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