

## THE RESIDUAL EFFECT OF LIQUID POULTRY MANURE ON THE GROWTH AND N, P, K CONTENT OF MAIZE CROP

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**Summary:** The main object of this study is to evaluate liquid poultry manure as a fertilizer to solve the problem of the farm and environment and also to see the residual effect of liquid poultry manure on the yield and N-P-K content of maize crop, tobacco-waste and farm yard manure treatments were also included in this experiment for comparison.

The experiment was laid out on completely randomized design with 10 treatments and 3 replications in greenhouse conditions. Pots containing 4 kg of air dried soil was used. Liquid poultry manure at the rates of 0, 1.5, 3.0, 4.5, 6.0, 7.5 t/da (on dry basis) were applied at band, whereas tobacco waste at the rates of 3 and 4 t/da and farm yard manure at the rates of 2.5 and 5.0 t/da were mixed with soil and kept at field capacity for one month. Cumhuriyet wheat variety was sown and harvested 9 weeks after sowing. After harvesting wheat plants, H-2274 maize variety was sown in the same pots and grown for 8 weeks to study the residual effect of organic fertilizers used in this research.

According to the results of this experiment, increasing rates of liquid poultry manure (LPM), tobacco-waste (TW) and farm yard manure (FYM) significantly increased the dry matter yield (DMY) and N,P,K uptake of maize crop than that of control plants. Maximum DMY (20.50 g/pot) was obtained with 4.5 t/da rate of LPM, while dry matter yield of control plants was 3.67 g/pot.

**Key Words:** Residual effect, poultry manure, maize, N, P, K content.

### SIVI TAVUK GÜBRESİNİN MISIR BİTKİSİNİN GELİŞİMİ VE N,P,K KAPSAMI ÜZERİNE KALICI ETKİSİ

**Özet:** Araştırmanın amacı, sıvı haldeki tavuk dışkılarının gübre olarak değerlendirilmesi ile çiftlik ve çevre sorunlarına yardımcı olmak aynı zamanda bu tip gübrelere mısır bitkisinin kuru madde miktarı ile N,P,K kapsamına etkilerini tesbit etmektir. Araştırmada ayrıca karşılaştırma amacıyla tütün tozu ve çiftlik gübresi uygulamalarına da yer verilmiştir.

Araştırma, sera koşullarında tesadüf parselleri deneme desenine göre üç tekerrürlü ve on işlemli olarak yürütülmüştür. Denemede, Fidanlık kampüs arazisinden alınan toprak ile 4 kg toprak alabilen saksılar kullanılmıştır. Kuru esasa göre 0,1.5., 3.0, 4.5, 6.0, 7.5 t/da dozlarında sıvı tavuk gübresi banda uygulanmış, 3 ve 4 t/da dozlarında tütün tozu ile 2.5 ve 5.0 t/da dozlarında çiftlik gübresi toprakla karıştırılmış ve hepsi de yaklaşık bir ay inkübasyona bırakılmıştır. Saksılara Cumhuriyet buğday çeşidi ekilerek yaklaşık 9 haftalık bir gelişmeden sonra hasat edilmiştir.

Araştırma sonuçlarına göre, artan dozlarda sıvı tavuk gübresi, tütün tozu ve çiftlik gübresi, tanışa göre kuru madde miktarı ile bitkilerce N,P,K alımını artırmıştır. En yüksek kuru madde miktarı ortalama 20.50 g/saksı ile 4.5 t S.T.G/da uygulamasından elde edilmiştir. En düşük kuru madde miktarı ise ortalama 3.67 g/saksı ile tanıkta gerçekleşmiştir.

**Anahtar Kelimeler:** Kalıcı etki, tavuk gübresi, mısır, N, P, K kapsamı

#### Introduction

About 2.4 to 2.8 million tonnes of fresh poultry manure is available in Turkey. According to Aydeniz et al (1977), 65 % of N, 50 % of P and 75 % of K in poultry manure become available within first year application. The rest of the plant nutrients become gradually available to plants in the remaining years.

Out of 5900 poultry farms (Erensayin 1991), there are some modern farms whose waste is removed in liquid form. Hence it is going to be a big problem of farms. More over there are no well developed

equipments available at present in Turkey for applying the waste to the fields. The main object of this study is to evaluate this type of liquid fertilizer to solve the problem of the farm and environment and also to see the residual effect of liquid poultry manure on the yield and NPK content of maize crop, tobacco-waste and farm yard manure treatments were also included in this experiment for comparison.

#### Materials and Methods

The experiment was laid out on completely randomized design with 10 treatments and 3 replications

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in greenhouse conditions. Soils from fidanlık campus and pots having 4 kg of air dried soil were used. Liquid poultry manure at the rates of 0, 1.5, 3.0, 4.5, 6.0, 7.5 t/da (on dry basis) were applied at band, whereas tobacco-waste at the rates of 3 and 4 t/da and farm yard manure at the rates of 2.5 and 5.0 t/da were mixed with soil and kept at field capacity for one month. Cumhuriyet wheat variety was sown and harvested 9 weeks after sowing.

After harvesting the wheat plant, H-2274 maize varieties (five seeds) was sown in order to determine the residual effect of organic fertilizer.

Liquid poultry manure contains 85-86 % water, 3.63 % N, 1.82 % P and 1.1 % K (on dry basis). Tobacco-waste contains 2.28 % N, 0.104 % P and 2.38 % K, whereas farm yard manure contains 0.5 % N, 0.11 % P and 0.41 % K (on dry basis). The physical and chemical properties of the soil used in the experiment are given in Table 1.

The experimental soil has 28.00 % field capacity and 3.30 % CaCO<sub>3</sub> content. The organic material content of this soil is 2.75 %. Available P and K content are 8.76 and 11.20 kg/da respectively.

N, P and K contents were determined by Chapman and Pratt (1961), Baker et al.(1964) and Richard (1954) respectively.

## Results and Discussions

**Dry Matter Yield (DYM) and N, P, K Contents of Maize crop:** Residual effect of different rates of liquid poultry manure (LPM), tobacco-waste (TW) and farm yard manure (FYM) on the dry matter yield and N-P-K content of maize crop is given in Table 2.

Different rates of LPM, TW and FYM increased the DMY of maize crop significantly as compared to control plants. The maximum DMY of 20.50 g/pot was obtained with 4.5 t/da rate of LPM, as compared to 3.67 g/pot of control plants. Data are in consistence with the findings of Aydeniz et al (1977) for pepper and tomato plants.

**Table1.** Some physical and chemical properties of the experimental soil

% Sand	32.36
% Silt	32.92
% Clay	34.72
Field Capacity	28.00
pH	7.50
CaCO <sub>3</sub> (%)	3.30
O.M (%)	2.75
Available P (kg/da)	8.76
Available K (kg/da)	11.20

\* 100 ppm P was applied in the form of KH<sub>2</sub>PO<sub>4</sub> per pot

**Table 2.** Dry matter yield and N,P,K, contents of maize crop in shoot.

Manures (t/da)	D.M.Y. (g/pot)	% N dw	% P dw	% K dw
Control	3.67 e	1.20 f	0.240	1.76 d
L.P.M				
1.5	7.86 cd	1.33 e	0.247	1.88 d
3.0	17.61 a	1.57 cd	0.250	2.40 c
4.5	20.50 a	1.63 c	0.243	2.62 b
6.0	18.18 a	1.78 ab	0.240	2.78 ab
7.5	18.43 a	1.90 a	0.230	2.95 a*
T.W.				
3.0	10.79 bc	1.65 bc	0.270	2.27 c
4.0	12.05 b	1.70 bc	0.250	2.38 c
F.Y.M.				
2.5	4.92 de	1.45 de	0.240	1.82 d
5.0	5.97 de	1.57 cd	0.230	1.88 d
LSD	3.091***	0.129**	N.S	0.210**

\*\* , P < 0.01, N.S., Non-Significant

As regard to variety of organic fertilizers; the highest DMY was obtained with liquid Poultry Manure, DMY obtained with tobacco waste was the second in weight, whereas Farm Yard Manure gave the lowest yield.

In general, N-content of maize crop increased with increasing organic fertilizer rates. While N content of control plants was 1.20%, maximum N content (1.90%) was reached at 7.5 t/da (LPM) rate. Our results are in agreement with the findings of Brohi and Durak (1986), Brohi (1991), and Demirer (1988).

Increasing rates of LPM, TW and FYM generally decreased the P-content of maize crop. This may be due to dilution. This result is close related with the findings of Aydeniz and Brohi (1989).

Maximum K-content (2.95%) was obtained with 7.5 t/da LPM application, when compared to 1.76 % of control plants. Increasing rates of LPM, TW and FYM increased the K-content of maize crop significantly

### Total N,P,K Uptake of Maize Crop:

Residual effect of different rates of liquid poultry manure, tobacco-waste and farm yard manure on the total N,P,K uptake of maize crop is given in Table 3.

Increasing rates of liquid poultry manure, tobacco-waste and farmyard manure increased the total NPK uptake of maize plant. 3501.23 mg/pot maximum average N-uptake and 5434.87 mg/pot maximum average K uptake were obtained with 7.5 t/da rate of LPM., as compared with their control whose N and K uptake 441.18 and 642.55 mg/pot respectively.

The highest average P uptake (501.36 mg/pot) was obtained with 4.5 t/da LPM. No doubt total N,P,K-uptake is depended on the dry matter yield. These data are in agreement with the findings of Özbek et. al. (1984) for soybean and maize, Ünver and Aydeniz (1986), for wheat crop.

**Table 3.**Total N,P,K uptake of maize crop

Manures (t/da)	N (mg/pot)	P (mg/pot)	K (mg/pot)
Control	441.18 h	88.44 e	642.55 f
L.P.M			
1.5	1043.67 f	193.17 bc	1473.35 e
3.0	2771.73 e	440.88 a	4224.50 c
4.5	3351.97 ab	501.36 a	5349.97 ab
6.0	3247.92 b	436.39 a	4662.83 bc
7.5	3501.23 a	423.59 a	5434.87 a
T.W.			
3.0	1782.38 e	290.32 b	2453.27 d
4.0	2048.17 d	298.50 b	2870.68 d
F.Y.M.			
2.5	712.32e	118.21 c	893.02 ef
5.0	933.73 f	137.25 c	1127.07 ef
LSD	178.15**	122.024**	699.993**

\*\* p < 0.01

As a result of the experiment. It can be concluded that liquid poultry manure may be used safely as an organic fertilizer. Liquid pultry manure could create problems for the environment, if they are not used in agricultural practices as an organic fertilizer.

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