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Research Article

INVESTIGATION OF DIFFERENT RATES OF ORGANIC FERTILIZERS ON THE YIELD OF ALFALFA

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ABSTRACT
The present study was carried out to studying the effect of different levels of organic fertilizers (cow manure) on yield of alfalfa. For this purpose, a pot experiment with complete randomized block design in the form of a factorial experiment was carried out on a single soil sample with plant of *Medicago sativa* (alfalfa), two levels of cow manure (zero and 100 tons per hectare), and with eight repetitions during the farming year 2005-2006. Plant was harvested at the height of 20 cm in three turns. The harvested plant samples were dried in the oven and their yield was measured. According to the results obtained by comparing the means (base on LSD test), the effect of cow manure different levels on plant yield was significant in all three harvests ($P_r \leq 0.01$). Yield of the plant during the first harvest of 3.2 g per pot, respectively, to 4.2 and 5.4 g per pot showed a significant increase in the second and third harvest. Because, its application is recommended up to the mentioned limit of the studied soils.

Keywords: *Yield Indicators, Cow Manure, Medicago Sativa (alfalfa)*

INTRODUCTION
Manure is a valuable and renewable resource that can be used as a fertilizer in crop production. However, in many cases it is applied to crops as a method of waste disposal. Application without regard to plant nutrient uptake can lead to nutrient loading of the soil and environmental Contamination. Manure application to alfalfa is rarely recommended because the plant does not need nitrogen. Alfalfa symbiotic relationship with rhizobium bacteria allows nitrogen fixation from the atmosphere. Meeting alfalfa phosphorous and potassium needs with manure may provide nitrogen that is not needed and could be an environmental threat because the excess nitrogen can leach into groundwater. If surface waters are to be protected, nutrient loadings should be based on phosphorous. On the other hand, if groundwater is to be protected, nutrient loadings should be based on nitrogen (Kiely, 1997). Organic material is used to prevent or improve the negative stresses effects in plants and yield decreasing. It is material to decrease soil salinity. It is one the best used fertilizers (Hassanpanah, 2012). Organic materials particularly farmyard manure and green manures have traditionally been used by rice farmers in pre-industrial age. But with the present day high yielding cultivars, which have higher nutrient requirements, the use of inorganic fertilizers has increased considerably leading to decline in the use of organic materials (Carter and Gregorich, 2006) The impact of increased fertilizer use on crop production has been large, but ever increasing cost of energy is an important constraint for increased use of inorganic fertilizer (Barker *et al*., 1985). Use of organic matter to meet the nutrient requirement of crops would be an inevitable practice in years to come, particularly for resource poor farmers. Furthermore, ecological and environment concerns over the increased and indiscriminate use of inorganic fertilizers have made research on use of organic materials as a source of nutrients very necessary (Giller and Cadisch, 1995; Ayoub, 1999)

MATERIALS AND METHODS
In order to investigate different levels of cow manure on yield of alfalfa, a pot experiment with complete randomized block design in the form of a factorial experiment was carried out on a single soil sample, two levels of cow manure (zero and 100 tons per hectare) and with eight repetitions during the farming

year 2005-2006. The soil sample was taken from four spots of the farm in depth of zero to 30 cm, and the compound sample was provided after mixing the samples. Some of the physical and chemical characteristics of the taken soil sample were measured according to standard methods (Carter and Gregorich, 2006). Their results are shown in Table 1.

Table 1: Some physical and chemical properties of soil

SO4 meq.l^{-1}	CaCO3 %	N_t g kg^{-1}	O.C g kg^{-1}	EC_e dS m^{-1}	pH	Soil texture	Index
0.04	32.75	0.8	1.6	2.4	6.08	SiCL	Soil sample

After being air-dried the taken soil samples was passed through a 2 mm- sieve. 360 kg of the soil was divided into two equal parts and half of it was loaded with an amount of cow manure equivalent to 100 tons per hectare and it was thoroughly mixed. Also 55 ppm of ammonium phosphate was added to all samples. The prepared soils were moved to 60 pots (30 pots with cow manure and 30 other pots without cow manure) with capacity of 6 kilograms (Some of the characteristics of cow manure sample was measured according to standard methods (Carter and Gregorich, 2006). whose results are showed in Table 2). Then seeds of alfalfa equivalent to 40 kg per hectare were planted in depth of 3 cm and were irrigated immediately. The pots were transferred to the green house. Next irrigations were daily up to appearance of sprouts, then and during the growing phase they were irrigated every 4 days. Urea fertilizer was added to the pots during two steps; 22 mili ppm at the time of germination and growing multiple leaves and 33 ppm when the vegetation was complete. The pots were regularly visited and they were irrigated and pesticides were used if necessary. Generally plants were harvested in three turns. The first harvest was when the plant approached the height of approximately 20 cm. Next harvests were done when the plant reached the height of 20 cm. In each harvest, the Shoots dry weights of the plant were taken from 2 cm height from the soil surface. After getting prepared, the plant samples were moved to paper envelopes and they were dried and weighted in a ventilating oven for 72 hours at 65 ºC. Data obtained from each treatment were transferred to excel sheets. The diagrams were plotted using this software. Statistical analysis on data obtained from each treatment was done applying SAS software and Fisher LSD test at level 0f 5%.

Table 2: Some characteristics of cow manure sample

K %	P %	N_t g kg^{-1}	O.C g kg^{-1}	EC_e dS m^{-1}	pH	Index
0. 4	0.09	1.3	24.9	17	8.6	Cow manure sample

RESULTS AND DISCUSSION

The comparison of yield mean of alfalfa under the influence of different levels of cow manure in Table 3 and during the third harvest is shown Figure 1. As shown in table (1), with increasing the levels of cow manure treatment, the Shoots dry weights in alfalfa increased in three harvests ($p_r \leq 0.05$). The third harvest yield in plant was more than the second harvest, and the second's was more than the first's (Figure 1). There is an increasing trend in plant yield from the first harvest to the third one (Figure 1). The reason can be due to the organic material existing in cow manure. Because improving physical properties of the soil the organic material elevates the soil's cationic exchange, storing capacity, soil's water preservation, and action of microorganisms and in turn leads to higher nutrients' release. Hence in treatments where organic material was used, plants had an improved growth and a higher yield. Other researchers, in their surveys, confirmed the effect of organic material on plants' growth and yield. Lopoy

et al., (1998) and Park *et al.,* (1990) reported that adding cow manure to the soil results in meaningful increase in yield and nitrogen intake by corn in comparison to control treatment.

Table 3: Effect of cow manure rates on alfalfa yield (g per pot)

The amount of cow manure (Mg.ha^{-1})	**Mean of square (yield)**
0	3.06^{b}
100	3.86^{a}

(Bars within a manure class having the same letter are not different at P = 0.05).

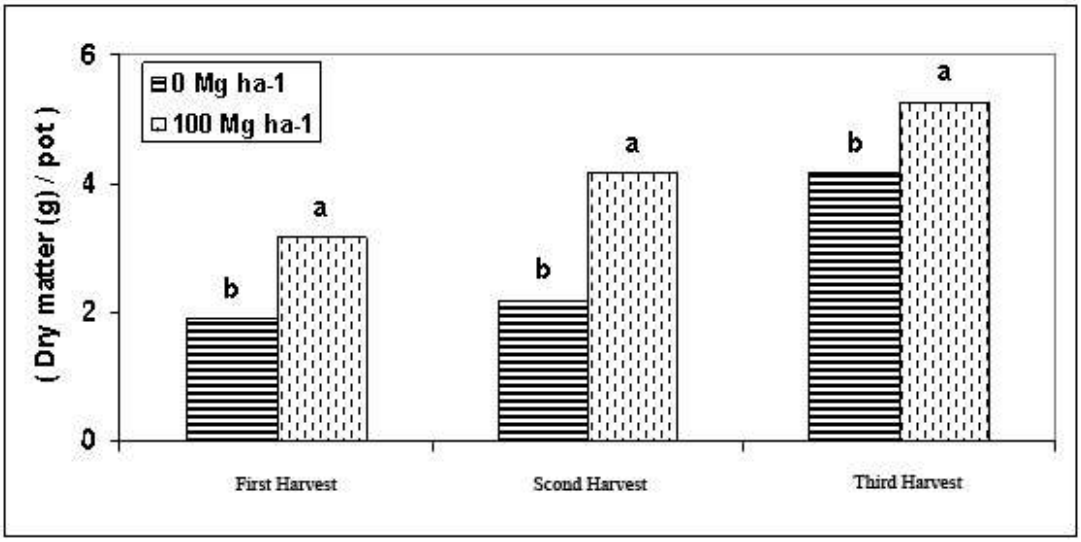

Figure 1: Mean comparison of the different cow manure rates on the yield at different harvest. (Bars within a manure class having the same letter are not different at P = 0.05)

Hojjati *et al.,* (2004) and Lotfi *et al.,* (2003) showed that an elevation in cow manure significantly increased corn yield during a treatment in which cow manure was received in amount of 100 mega grams per hectare in 4 turns.

Conclusion

1) Cow manure application significantly improved yield in alfalfa and ($p_r \leq 0.05$).
2) During plant second and third, their yield showed a significant increase.
3) The application of 100 ton per hectare cow manure in the form of did not lead to reduced yield in plants. Hence its usage up to the mentioned amount is recommended in soils under study.

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