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Fresh weight and yield of lettuce as affected by organic manure and bio-fertilizers

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Summary: A field experiment was conducted to study the effect of cattle manure and chicken manure with or without bio-fertilizer or NPK. Obtained data revealed that the best treatment was the cattle manure + bio-fertilizer followed by chicken manure + NPK. Increase of yield and yield components due to the organic manure + bio-fertilizer can be attributed to nutrient availability increase under such conditions.

Key words: *Lettuce, organic manure, bio-fertilizer, NPK, leaf area, fresh wieght, yield*

Introduction

Egyptian lands are suffering from insufficient organic matter contents as well as macro and micro nutrients. Application of suitable amounts of organic manure and bio-fertilizers might be successful tool for improving the physical and chemical condition of the soil (Hanafy Ahmed et al 2002), which in turn could induce simulative effect on plant growth and productivity (Premuzic et al 2004). Aim of this research work was to study the effect of cattle manure, chicken manure as well as bio-fertilizers on growth characteristics and yield of lettuce grown under field conditions compared to NPK fertilizers.

Material and methods

Place of Experiment: Faculty of Agriculture, Cairo University, Egypt.

Cultivar: Romaine Lettuce (Lactuca sativa L. var. longifolia).

No. of replicates: 3

Sowing date: October, 3rd 2002. Plants were transplanted to the field (Table 1) on November, 1st 2002.

Harvest: February, 1st 2003.

Treatments:

1.Control – ***cattle manure*** (50 t.ha^{-1}, Table 2).

2.Control – ***chicken manure*** (25 t.ha^{-1}, Table 2).

3.Cattle + Bio-fertilizer*.

4. Chicken manure + Bio-fertilizer*.

5.Cattle + NPK fertilizers**.

6.Cattle + NPK fertilizers**.

*Bio-fertilizer (Nitroben)

** NPK fertilizers (180 kg ammonium sulphate + 120 kg super phosphate + 120 kg potassium sulphate/ha).

Table 1. Physical and chemical properties of the soil season 2002

Physical properties:		Available nutrients:	
Clay (%)	22,9	N (%)	1,15
Silt (%)	36,2	P (%)	0,44
Fine sand (%)	37,1	K (%)	1,25
Coarse sand (%)	3,8	Fe (mg.kg^{-1})	40,16
Soil texture	Clay loam	Zn (mg.kg^{-1})	28,90
EC (mmohs.cm^{-1})	3,3	Mn (mg.kg^{-1})	30,54
pH	8,5	Cu (mg.kg^{-1})	15,65
Organic matter (%)	1,11		

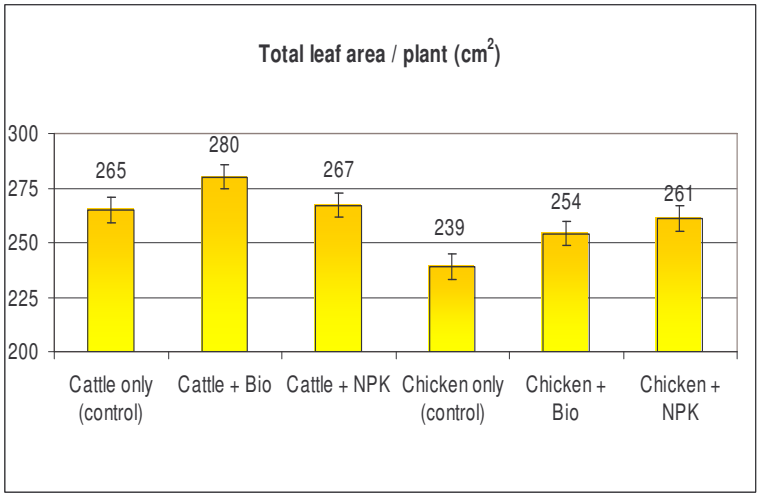
Table 2. Manure analysis season 2

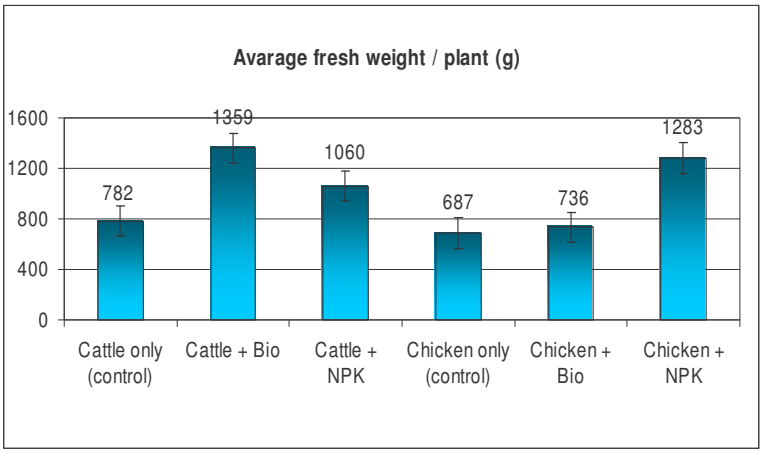
Nutrients	Chicken manure	Cattle manure
N (%)	3	1,66
P (%)	1,5	0,78
K (%)	2,6	3,55
Fe (mg.kg^{-1})	1300	3690
Mn (mg.kg^{-1})	825	117
Zn (mg.kg^{-1})	520	40
Cu (mg.kg^{-1})	46	7

Results

Fig. 1 showed that cattle manure + bio-fertilizer was the best treatment, followed y chicken manure + NPK. Cattle manure + bio fertilizer increased total leaf area, FW and yield by 5 % , 96 % and 80 %, respectively while chicken manure + NPK increased the same parameters by 9 %, 89 % and 76 %, respectively compared to control. These results were confirmed in Fig. 2 which declared significant increase in lettuce total yield among treatments.

Fig 1. LA, FW and yield of lettuce as affected by different fertilization treatments





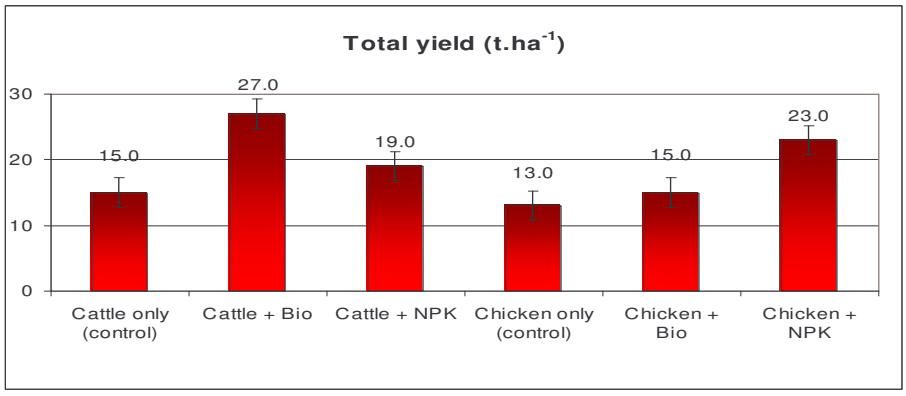
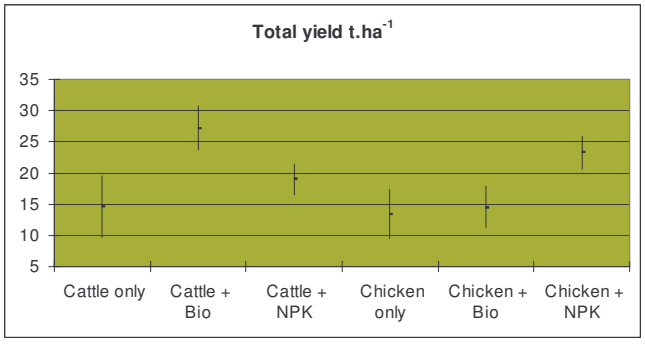


Fig 2. Statistical analysis of lettuce yield season 2002



Conclusion

Increases of leaf area and fresh weigh due to cattle manure + bio-fertilizers can be attributed to the good equilibrium of nutrients and water in the root medium. Moreover, in the presence of microorganisms of the bio-fertilizer, availability of nutrients was higher. Organic acids of the chicken manure acted as growth inhibitors for the microorganisms of the bio-fertilizers. Application of NPK to both manures increased yield than control. This might be related to the increase of available nutrient in soil caused by NPK treatment. But, this yield increase was higher with chicken manure than with cattle manure as a result of higher N level in chicken manure comparing cattle manure.

References

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