

Zinc Effects on Growth of *Beta vulgaris* and *Vicia faba* and on Its Content of Some Heavy Metals

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INTRODUCTION

The amount of agricultural land contaminated with heavy metals has increased in Mosul city, Iraq due to industrial activities and the deposition of town wastes. Zinc is an essential element for plants, but excess soil concentrations might be harmful. The heavy metal content of plants depends on many plant and soil related factors (Mengel et al. 2001). This study was carried out to evaluate the effect of Zn on growth and Zn, Cu, Ni and Pb accumulation in edible plant parts.

METHODS

Plants seeds were planted in pots containing 5 kg of air-dried surface soil (silty clay loam) under greenhouse conditions. Four Zn concentrations (0, 60.8, 121.5, 162.7 mg kg⁻¹) were applied as ZnSO₄. Watering with distilled water was accomplished by weighing each pot daily and adding water to obtain the original wet weight at field capacity. At harvest, dry weights of edible parts and Zn, Cu, Ni and Pb accumulation in plant samples were measured.

RESULTS AND DISCUSSION

The dry matter production of both plant species (Table 1) significantly increased with increasing amounts of Zn applied to the soil. This increase might be related to Zn, which is an essential element for plants (Mengel et al. 2001).

Table 1. Effect of Zn on dry matter production.

<u>Zn applied</u> (mg Kg ⁻¹)	<u><i>Beta vulgaris</i> leaves</u> (gm plant ⁻¹)	<u><i>Vicia faba</i> pods</u> (gm plant ⁻¹)
0	7.10	5.52
60.8	7.10	5.60
121.5	7.65	5.76
162.7	8.90	5.79
L.S.D.	0.07	0.08

Increasing the amount of applied Zn decreased the concentrations of Cu, Ni and Pb (Table 2 and 3) in the edible parts of both plants, while Zn concentrations increased.

Table 2. Effect of Zn on Zn and Cu content of edible plant parts.

Zn applied mg kg ⁻¹	Zinc		Copper	
	Bv	Vf	Bv	Vf
0	30.22	31.42	3.52	4.18
60.8	32.60	33.34	2.16	3.31
121.5	36.37	34.89	1.60	2.89
162.7	38.52	36.91	1.22	2.60
L.S.D.	0.122	0.077	0.003	0.371

Bv = Beta vulgaris Vf = Vicia faba

Table 3. Effect of Zn on Ni and Pb content of the edible parts of plants.

Zn applied (mg Kg ⁻¹)	Nickel		Lead	
	Bv	Vf	Bv	Vf
0	1.90	1.92	0.240	0.279
60.8	1.89	1.82	0.210	0.269
121.5	1.86	1.80	0.195	0.253
162.7	1.84	1.79	0.174	0.245
L.S.D.	0.326	0.003	0.003	0.001

CONCLUSIONS

The maximum concentrations of elements were lower than international limits acceptable for human consumption (WHO 1982, 1987).

REFERENCES

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