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EFFECT OF DIGESTATES AND MANURES APPLICATION ON KOHLRABI YIELD AND QUALITY

Dragan Kovačević[a], Maja Manojlović[a] Ranko Čabilovski[a], Klara Petković[a], Zoran Ilić[b], Abu Baker Brayek[a], Mirna Štrbac[a], Mirjana Trninić[a]

[a]University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića 8, 21000 Novi Sad, Serbia

[b]University of Priština-Kosovska Mitrovica, Faculty of Agriculture, Kopaonička bb, 38219 Lešak, Serbia

INTRODUCTION: The national action plan for the use of renewable energy sources in Serbia aims to reach much more electricity from alternative sources. Increasing the number of biogas plants will increase the amount of by-products (digestate) obtained, therefore, it is necessary to find their application. The aim of this study was to investigate the effect of digestate application (solid and liquid) on the kohlrabi yield and some quality parameters and compare it with the effect of manure (solid and liquid) and mineral fertilizers application.

MATERIALS AND METHODS: The experiment was conducted in 2019 on the field used for vegetable production in the vicinity of Novi Sad, Serbia. The experiment was set up as a **randomized block design** with three replications, with an individual plot of **1.75 m long and 1.20 m wide**. Each plot consisted of 32 kohlrabi plants (***Brassica oleracea* var. *gongylodes***). All fertilizers were incorporated into the soil (0-30 cm) 10 days before kohlrabi planting, in the amount which brings **100 kg of N per ha** to the soil.

The **treatments** chosen to assess the analyzed parameters were:

Ø - control;
SD - solid digestate;
LD - liquid digestate;
SM - solid manure;
LM - liquid manure;
NPK - mineral fertilizers

(100 kg N ha^{-1} as ammonium nitrate, 80 kg P_2O_5 as superphosphate and 100 kg K_2O as potassium chloride).

- The contents of **Fe** and **Zn** were determined by AAS method (wet digestion, HNO_3 and $HClO_4$ mixture).
- The vitamin C content was estimated by using 2,4 dinitrophenylhydrazine reagent, and reading was done using spectrophotometer 540 nm (Kumar and Tata, 2009).

RESULTS:

Table 1. Basic chemical soil properties at the experimental site

Depth (cm)	pH in KCl	pH in H_2O	$CaCO_3$ (%)	Total C (%)	Total N (%)	P_2O_5 (mg 100 g^{-1})	K_2O (mg 100 g^{-1})
0–30	7.16	7.83	2.95	1.04	0.09	17.5	21.1

Table 2. Chemical composition of digestates and manures used in the field experiment

Chemical properties	SD	LD	SM	LM
Dry mater (%)	28.85	6.98	37.56	-
pH (in H_2O)	8.48	7.48	8.82	6.72
Total N (%)	1.65	0.61	1.90	0.35
Total C (%)	42.23	2.62	38.34	5.79
C/N	25.59	4.30	20.18	16.54
Total P_2O_5 (%)	0.94	0.22	0.95	0.12
Total K_2O (%)	1.28	0.36	1.49	0.19

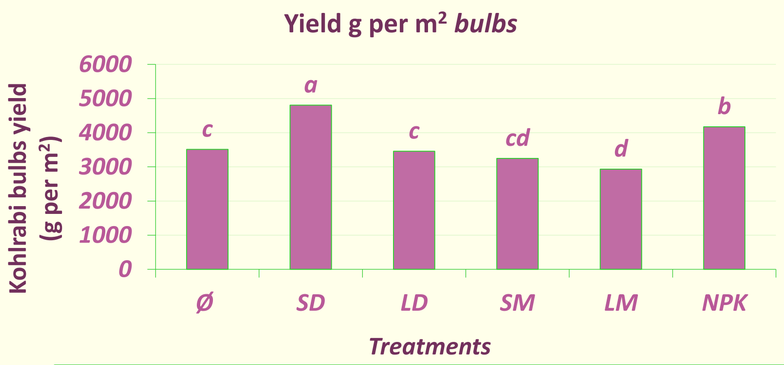

Fig. 1. **Kohlrabi bulbs yield (g/m²) as a result of digestates, manures and mineral fertilizers application**

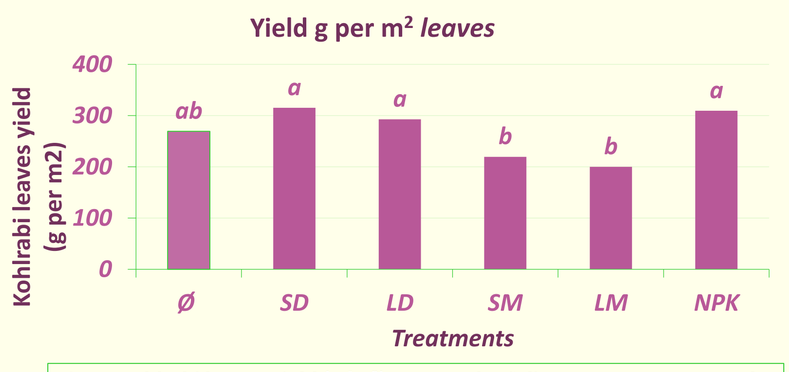

Fig. 2. **Kohlrabi leaves yield (g/m²) as a result of digestates, manures and mineral fertilizers application**

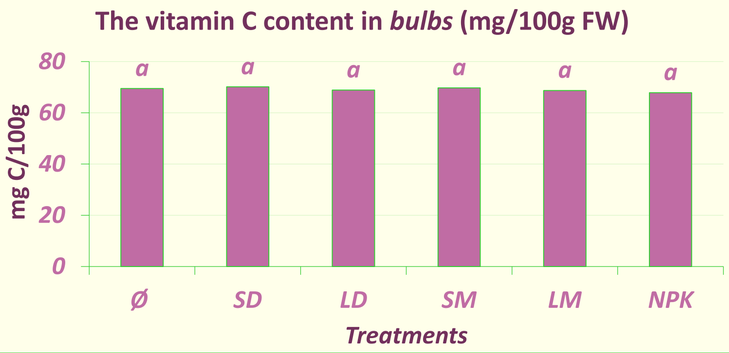

Fig. 3. **The vitamin C content (mg/100g Fresh weight) in kohlrabi bulbs as a result of digestates, manures and mineral fertilizers application**

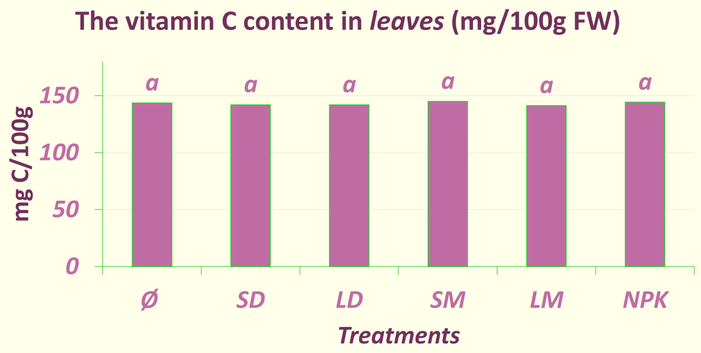

Fig. 4. **The vitamin C content (mg/100g Fresh weight) in kohlrabi leaves as a result of digestates, manures and mineral fertilizers application**

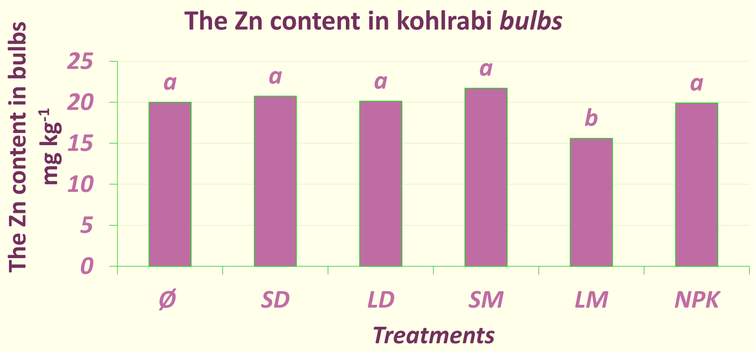

Fig. 5. **The Zn content (mg/kg) in kohlrabi bulbs as a result of digestates, manures and mineral fertilizers application**

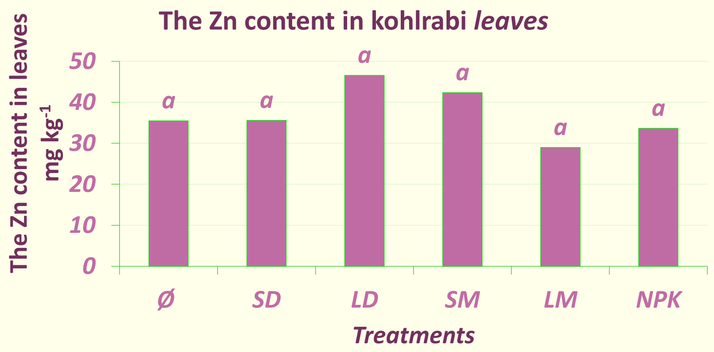

Fig. 6. **The Zn content (mg/kg) in kohlrabi leaves as a result of digestates, manures and mineral fertilizers application**

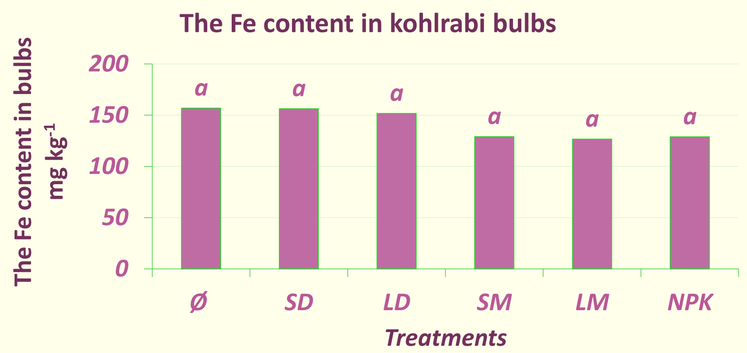

Fig. 7. **The Fe content (mg/kg) in kohlrabi bulbs as a result of digestates, manures and mineral fertilizers application**

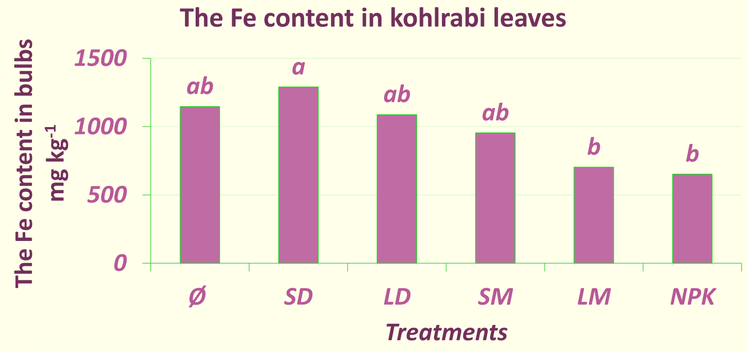

Fig. 8. **The Fe content (mg/kg) in kohlrabi leaves as a result of digestates, manures and mineral fertilizers application**

CONCLUSIONS:

- The kohlrabi yield was significantly higher with solid digestate application and it was decreasing in order SD > NPK > Ø > LD > SM > LM.
- It can be concluded that the application of digestate has a positive effect on increasing the yield of kohlrabi knobs while maintaining their quality in terms of Fe, Zn and vitamin C contents.

*Corresponding author: dragan.kovacevic@polj.uns.ac.rs