

# **Potential of composted biodegradable municipal waste in seedlings production**

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# **Introduction**

**The Law on sustainable waste management in the Republic of Croatia (Official Gazette 94/2013) specifies the maximum permissible weight of biodegradable municipal waste that can be disposed annually at the landfills.**

# **Target Reduction**

**Reduction compared to 1997 quantity  
of biodegradable municipal waste:**

**–50% by December 31, 2016**

**–35% by December 31, 2020**

**Includes branches, grass, leaves,  
flowers and weeds, and remains of  
vegetables and fruits**

# **Local government obligations**

**secure a service of separate collection  
of such municipal waste in their area**

- high quality, stable and economically  
efficient way**
- in accordance with the principles of  
sustainable development,  
environmental protection and waste  
management**

# **Disposal methods**

- \* composting**

- \* digestion**

- \* conversion into energy**

**Composting - the easiest and cheapest way ➡ chosen by many of local governments, allowing them to:**

- produce compost which can be placed on the market**
- contribute to the preservation of the environment**

# **Benefits of compost**

- **as an organic soil additive in field**
  - **increases soil fertility,**
  - **reduces the need for fertilizers**
  - **reduces the exploitation of peat**
  - **improves physicochemical properties of the soil**
- **as a substrate ➡ cultivation of seedlings or ➡ production in greenhouses**

**Little information ➡ regarding the  
use as a peat alternative for nursery  
production of horticultural crops ➡  
focused on ornamental potted  
plants, woody shrubs and trees**

**The quality depends on its physical and biological properties ➡ have not been implemented in Croatia until now.**

**The aim of this study was to determine the suitability of composted biodegradable municipal waste in the production of seedlings.**











# **Materials and methods**

- 1. a biodegradable composted municipal waste (BMW),**
- 2. BMW with a foliar nutrition of seedlings using a liquid fertilizer NPK 10:5:4 supplemented with trace elements (BMWT) and**
- 3. commercial substrate Klasmann (CS) as a control.**

# **Chemical analyses of compost**

**In fresh materijal:**

- moisture content by drying at 105 °C**
- organic matter by annealing at 550 °C**
- pH value in the aqueous suspension of compost and water 1:10 w/v and EC in 1:5 w/v**

## **In dry samples:**

- total nitrogen ➡ Kjeldahl method,**
- concentration of total P by spectrophotometric and**
- concentration of total K, Ca and Mg by flame photometry or with AAS.**  
**(from the basic solution of ash),**

# **Micronutrients and heavy metals analysis**

- aqua regia destruction of dry sample**
- AAS for Fe, Mn, Zn, Cu,**
- ICP-OES for Ni, Cr, Cd, Pb and Hg.**

# Phytotoxicity

- germination test with endive (*Cichorium endivia* L.) in containers with 160 holes
- number of germinated seeds ➡ daily
- fertilizing on treatment BMWT ➡ once a week over four weeks



# **Plant growth parameters**

- germination index was calculated**
- 35 days after sowing**
- the above-ground parts of plants were separated from the roots:**
- seedling height (h), leaves height (LH), seedling FM weight per plant (w), FM root weight (RW), number of leaves (n)**

	moisture (%)	OM (%)	pH (1:10)	EC (dS m <sup>-1</sup> )	TKN	TOC	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Ca	Mg
					(%) <sub>dm</sub>					
BMW	36.90	41.22	7.82	1.61	1.98	23.83	0.775	1.180	3.82	0.73

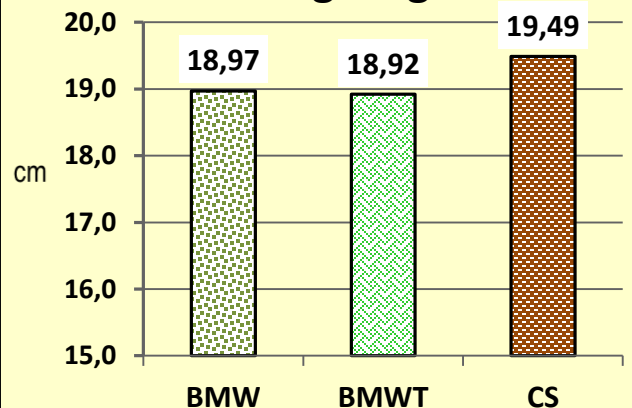
## Chemical properties of composted biodegradable municipal waste

	Fe	Mn	Zn	Cu	Cd	Pb	Ni	Cr	Hg
	(mg kg <sup>-1</sup> )								
<b>BMW</b>	1423	482	113	36.3	1.02	21.33	13	14.9	0.066
<b>LV</b>			200-300	60-100	1-2	100-150	50-60	60-100	1-2

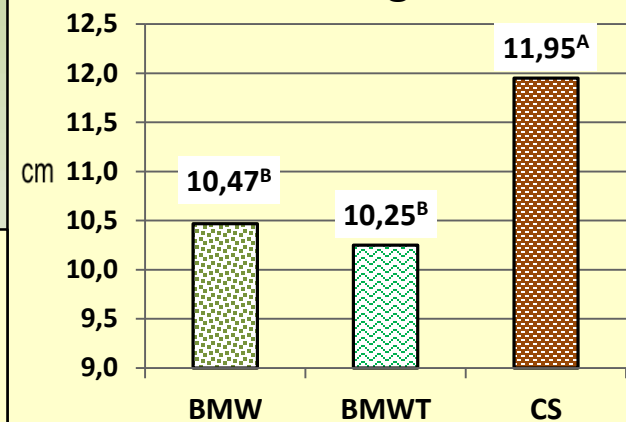
## Total nutrients and trace element contents in composted biodegradable municipal waste

# Morphological properties of the endive seedling 35 days after sowing

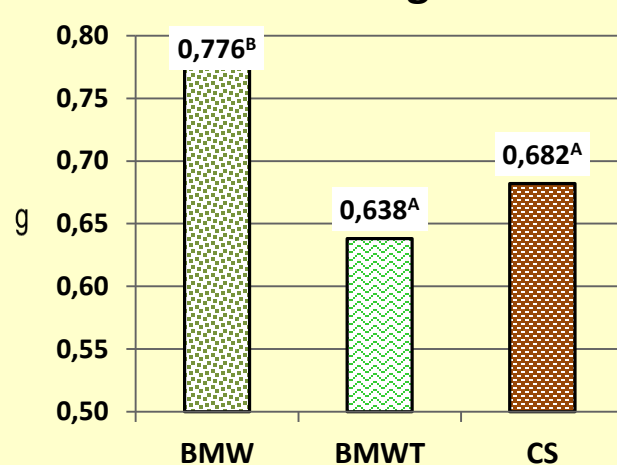
## seedling height



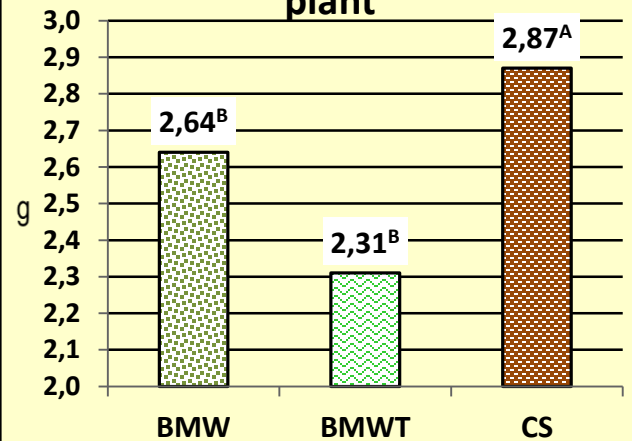
## leaves height



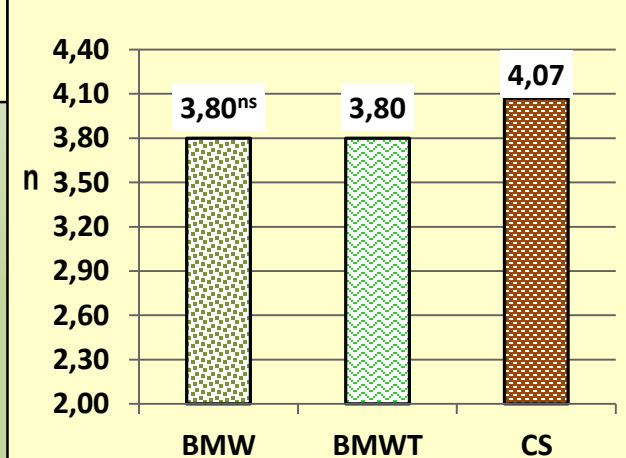
## root FM weight



## seedling FM weight per plant

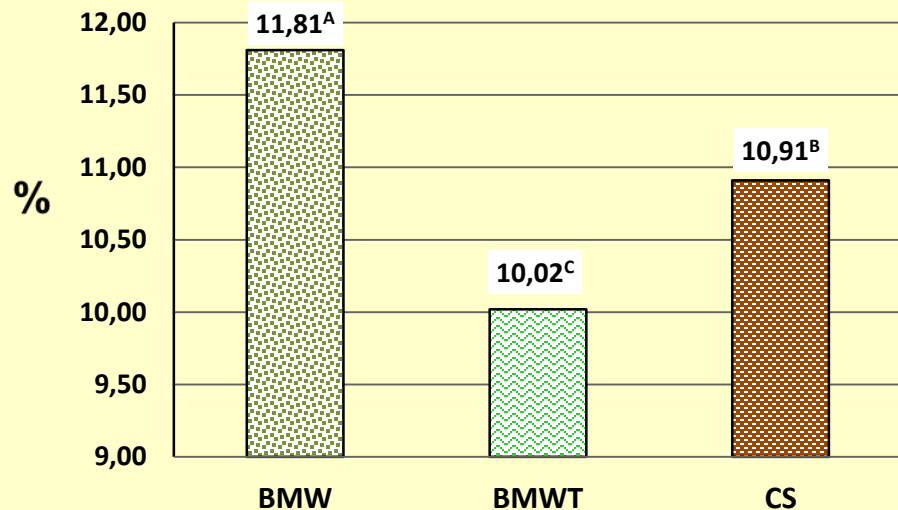


## number of leaves

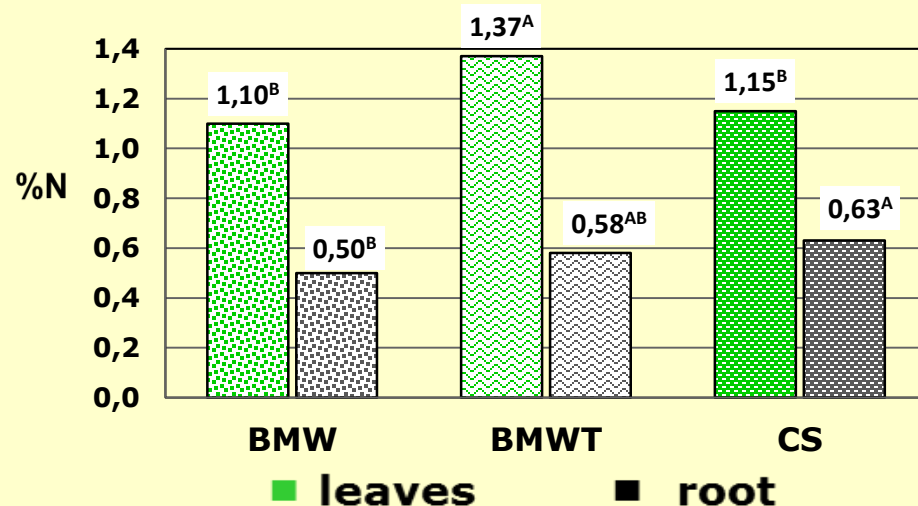


# Chemical properties of the endive seedling 35 days after sowing

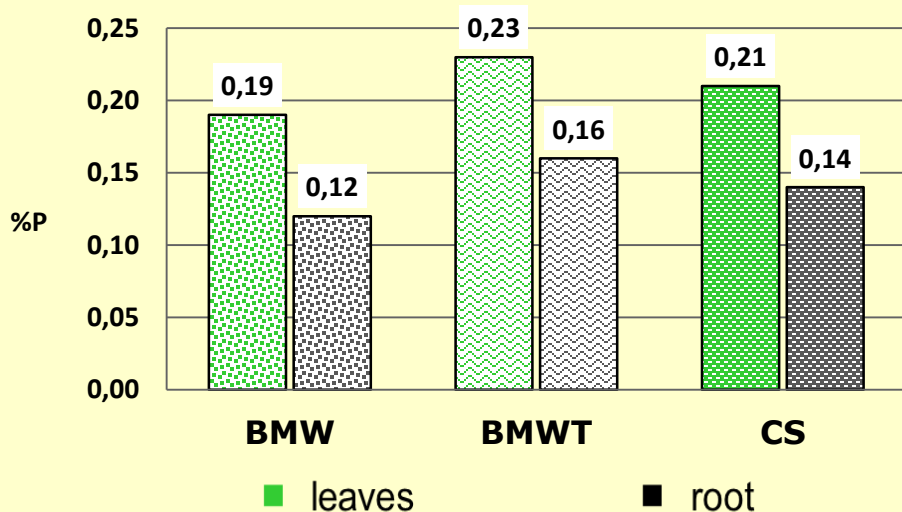
## dry matter seedling with root %



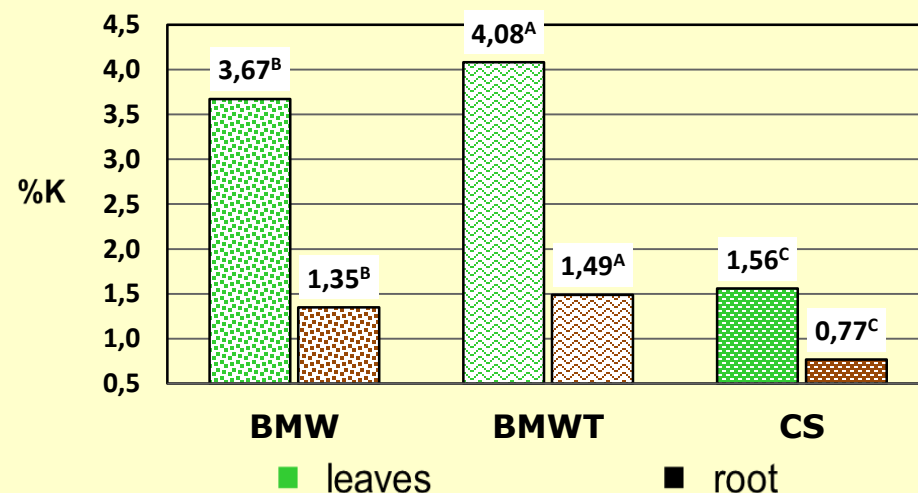
## The nitrogen concentration



## The phosphorus concentration



## The potassium concentration



# **Conclusion**

- compost from biodegradable municipal waste can be used in the production of seedlings**
- there is no inhibitory effects on germination, seedling growth and development of endive as sensitive plant species**

- this compost - production of seedlings of flowers**
- the future research should be directed towards detecting possible sensitivity of this plants.**





**Thank you for  
your attention!**

