

USE OF COMPOSTED MANURE AS SUBSTRATE FOR LETTUCE AND CUCUMBER SEEDLINGS

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INTRODUCTION

- 1. Material that could replace peat in potting medium**
- 2. Peat is a scarce and largely non-renewable natural resource**
- 3. Peat exploitation is now banned in many countries**
- 4. Croatia does not have its own deposits of peat**

The most common composts today are derived from:

- animal manures,**
- municipal waste,**
- yard debris or trimmings,**
- biosolid (sewage sludge).**

This research focuses on composting of manure.

Compost produced from manure is a good substrate or component of substrate.

If it is immature, there may be some disadvantages:

- pH too high,**
- too high content of soluble salts for sensitive plants,**
- nitrogen is immobilized,**
- may be phytotoxic for the seedlings.**

THE AIM OF EXPERIMENT

1. to determine the suitability of different composted manures in the production of lettuce and cucumber seedlings
2. bioassays to determine the specificity of the reaction of lettuce and cucumber on maturity and properties of compost

MATERIAL AND METHODS

Compost material was five types of manure from farms in north-western part of Croatia:

1. fresh cattle (FCM),
2. semi-mature cattle (SCM),
3. horse (HM),
4. swine (SM) and
5. poultry manure (PM).

Way of composting:

- In stacks (piles)
(2x2x1 m)
- By manual mixing,
once of week

Experiment duration

- Active phase:
90 days
- Maturing phase:
6 months



Growing medium:

- mix of composted manures and white peat in a ratio of 1:1 (v/v)

Containers were filled in four replications

Germination test on plates:

- lettuce (*Lettuca sativa* L.)
- cucumber (*Cucumis sativus* L.)

Plant growth parameters were measured 35 days after sowing, when the transplants reached the commercial transplanting size.

The following measurements were performed on transplants:

- seedling height,**
- dry weight per plant,**
- leaf area.**

RESULTS

Physical properties: bulk density (ρ), pore space (PS), free airspace (FAS), water-holding capacity (WHC)

substrate	ρ (g·cm ⁻³)	PS (%)	FAS (%)	WHC (%)
FCM	0,162 a	61,76 a	22,10 a	39,65 b
SCM	0,191 a	60,30 a	21,85 a	38,45 b
HM	0,234 b	57,13 a	26,77 b	30,13 a
SM	0,190 a	66,18 b	34,69 c	31,48 ab
PM	0,231 b	71,01 b	39,89 d	31,12 a

Chemical properties: total N, P, K, Ca and Mg

substrate	N (g·kg ⁻¹)	P (g·kg ⁻¹)	K (g·kg ⁻¹)	Ca (mg·kg ⁻¹)	Mg (mg·kg ⁻¹)
FCM	13,68 b	13,30 b	7,63 c	162,5 ab	255,6 c
SCM	10,72 a	10,66 a	6,03 b	156,5 a	251,4 c
HM	14,57 b	10,77 a	9,50 d	227,3 c	329,7 d
SM	18,57 c	42,06 d	1,37 a	648,4 d	195,9 b
PM	27,32 d	20,34 c	5,73 b	175,0 b	107,1 a

Chemical properties: concentration of microelements and toxic elements

substrate	Zn	Cu	Pb	Cr	Cd
	(mg·kg ⁻¹)				
FCM	294.5 b	56.3 b	4.25 ab	27.40 b	0.42 b
SCM	308.0 b	56.0 b	7.27 b	39.55 c	0.56 b
HM	94.3 a	23.7 a	13.83 c	40.93 c	0.28 a
SM	697.6 c	111.3 c	6.88 b	54.83 d	1,18 c
PM	349.4 b	64.0 b	1.86 a	14.50 a	0.60 b
LV*	200-300	60-100	100-150	60-100	1-2

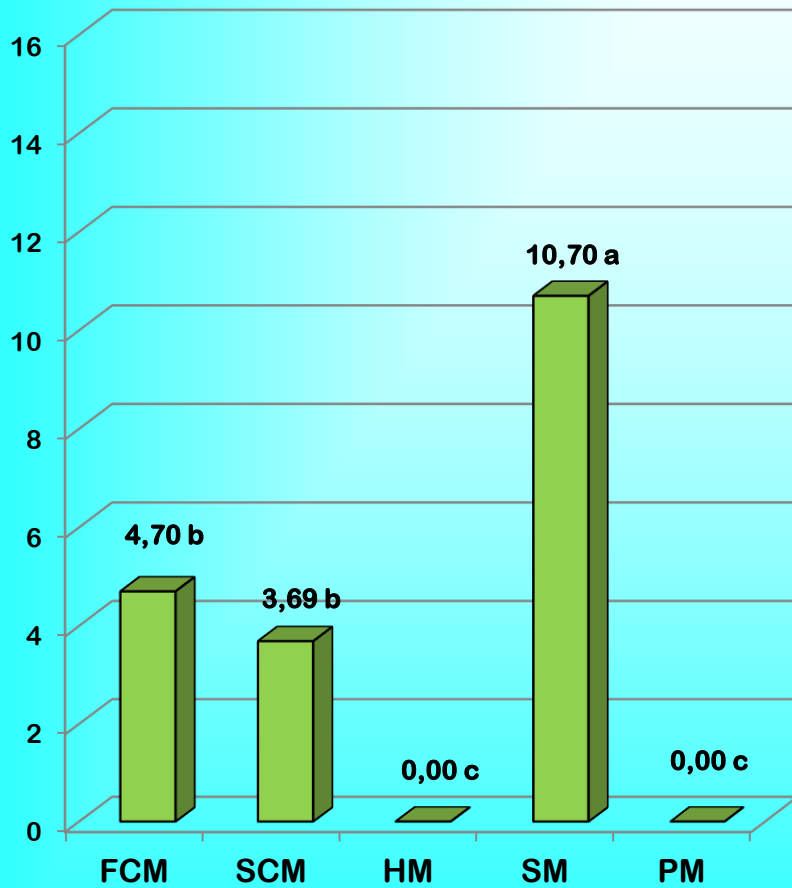
* The limit values for composts as used of substrate for seedlings

Chemical properties: pH and electrical conductivity (EC) in composts and substrates

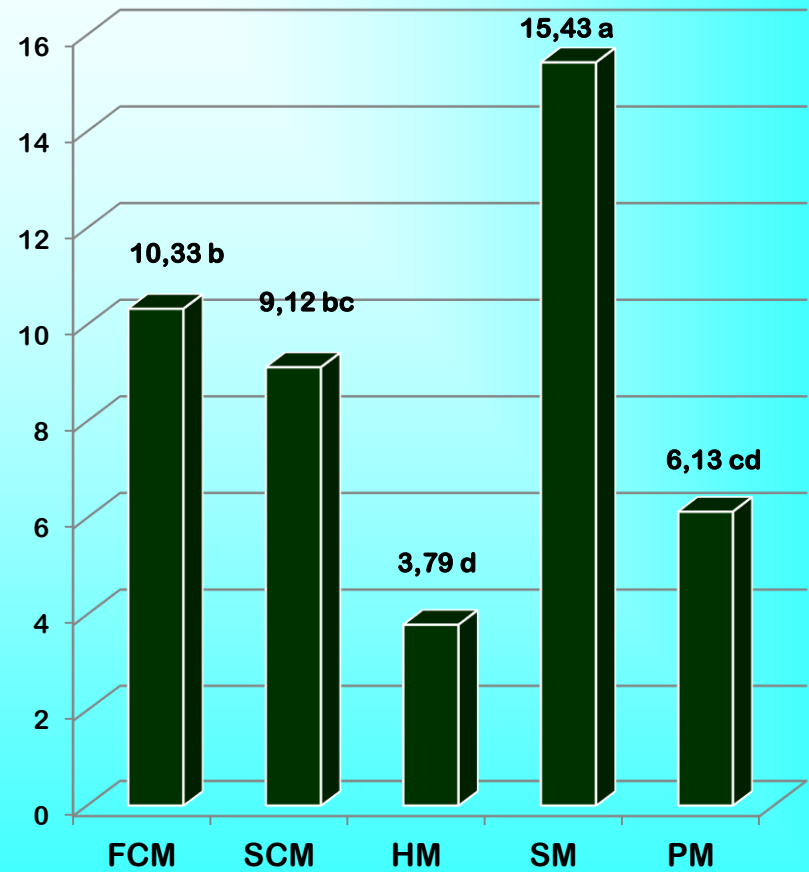
substrate	pH		EC (dS/m)	
	compost	compost:peat (1:1)	compost	compost:peat (1:1)
FCM	9,16 bc	8,32 a	4,79 c	3,01 c
SCM	9,26 bc	7,68 b	4,06 b	3,42 c
HM	9,48 c	7,71 a	6,88 d	5,05 b
SM	7,73 a	6,13 c	3,04 a	2,27 d
PM	8,81 b	8,47 a	9,74 e	5,87 a

Seedling height

lettuce

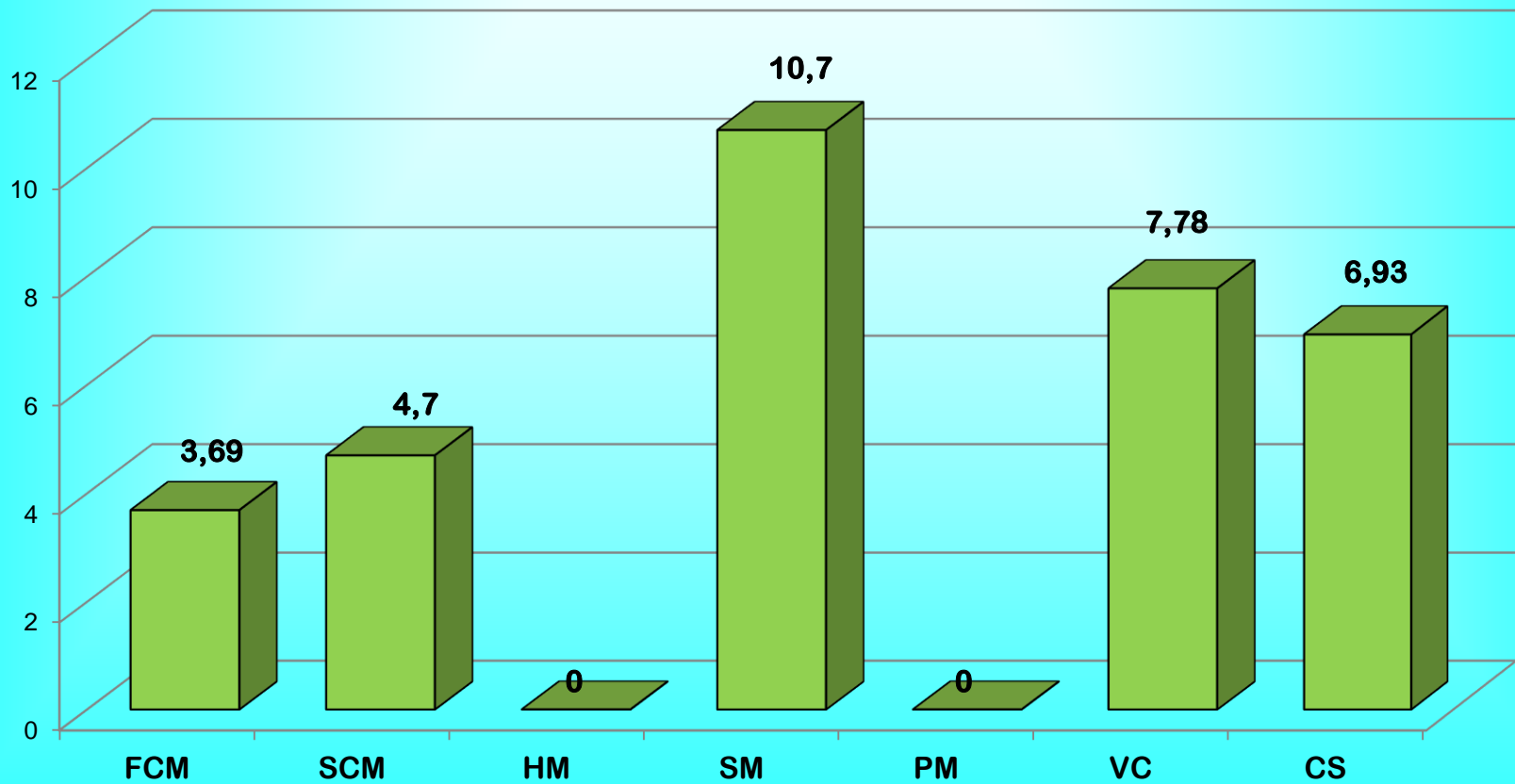


cucumber

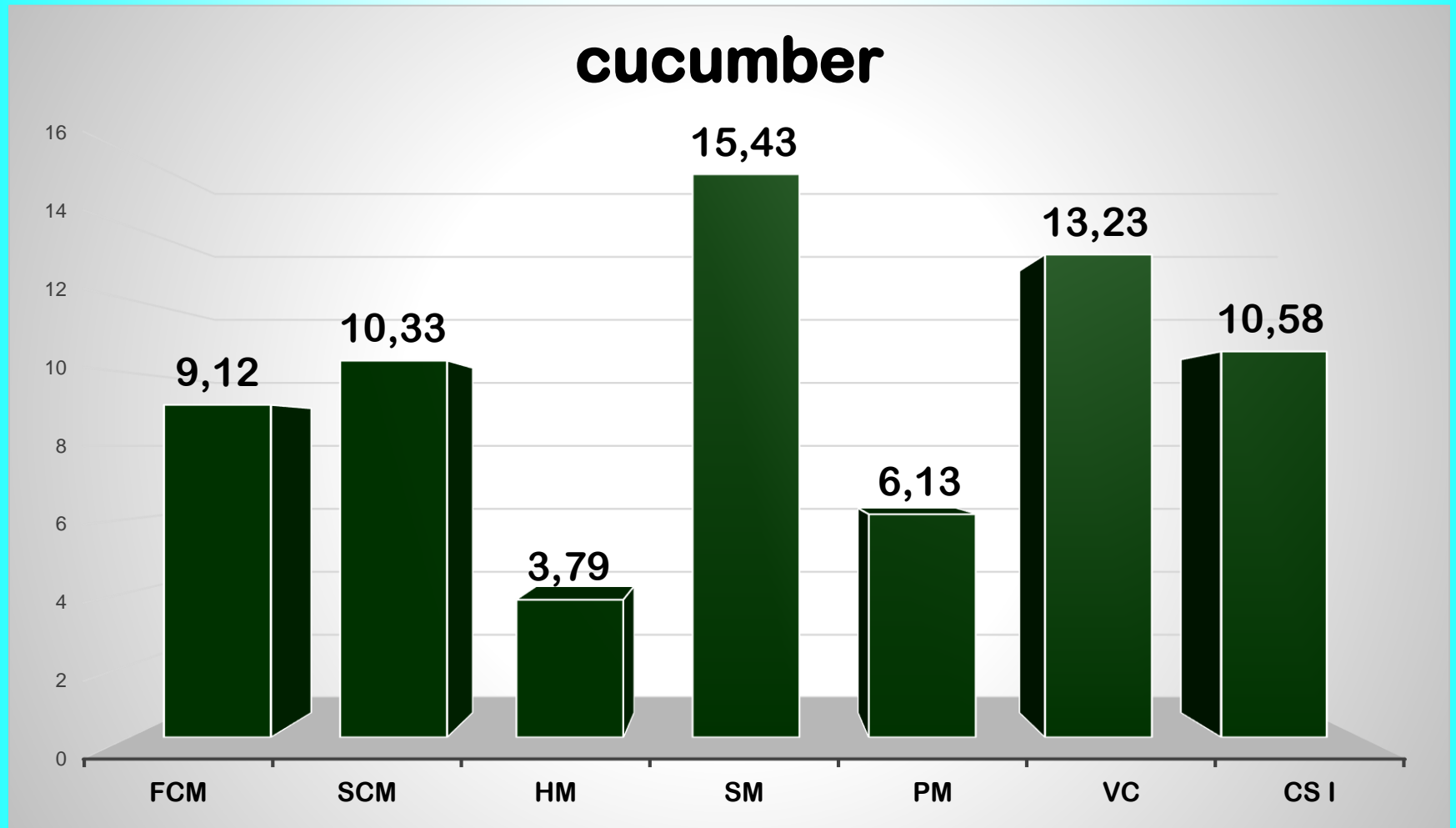


Seedling height

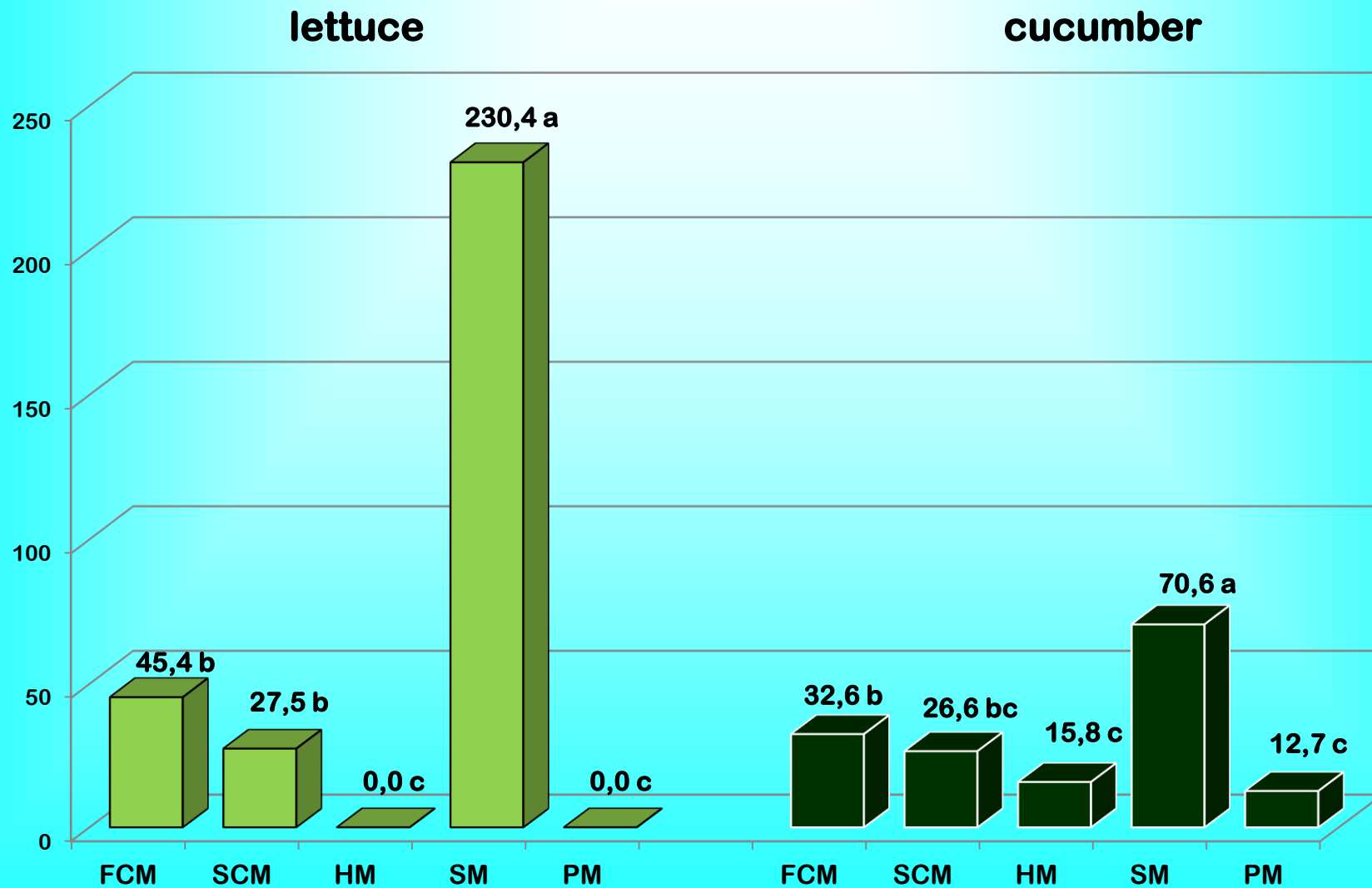
lettuce



Seedling height



Leaf area



CONCLUSIONS

- 1. Compost produced from swine manure is suitable for the production of seedlings of both species, less sensitive and very sensitive. But it has too high concentration of Cu and Zn.**
- 2. Compost from cattle manure can also be used as a substitute for one share of peat.**
- 3. Composts from horse and poultry manure are not suitable.**

CONCLUSIONS

Different sensitivity of cucumber (most tolerant) and lettuce (most sensitive) suggests:

- both should be also used in bioassays!

**THANK YOU FOR
YOUR ATTENTION!**