International workshop
Livestock, climate change and the environment

Effect of vegetable by-product disposals and animal manure levels on composition and growth of earthworm (*Perionyx excavatus*)

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INTRODUCTION

- ✓Animal production in Vietnam has been quickly developed to meet people demand
- ✓Animal wastes consisted of liquids and solids (manure, urine, slaughter house refuse and so on) discharged 80.49 million tones/year (2008)
- ✓Agronomy production produced large amount vegetables, their by-products, easily decomposed and becomes a serious problem to environment.

- ✓Eachworm has been introduced into VAC, VACB models for vemicomposting and used as feed for chicken and fish
- ✓Eachworm is develop in composted animal manure or mixed with crop by products as rice straw, maize stover
- ✓Vegetable by-product disposals (VBD) can be recycling by combination with composted animal manures and used as feed substrate for earth worm

Aims of the study

-To evaluate potential of composted VBD as feed substrate for earthworm in combination with animal manures

-To determine the effect of substrates on composition and biomass production.

MATERIALS AND METHODS

The study was done at the Departments of Veterinary Medicine and Soil Science for 6 months in Cantho University

Earth worm developed on fresh cow was purchased at an earth worm farm in Tra Noc, Cantho city.

VBD that was vegetative parts left over such as cabbage, inedible leaves, carrots, and turnips and so on, was taken from vegetable markets

Management before making compsot

Vegetable by-product disposals

Pig manure

Prepare feed substrate for earth worm

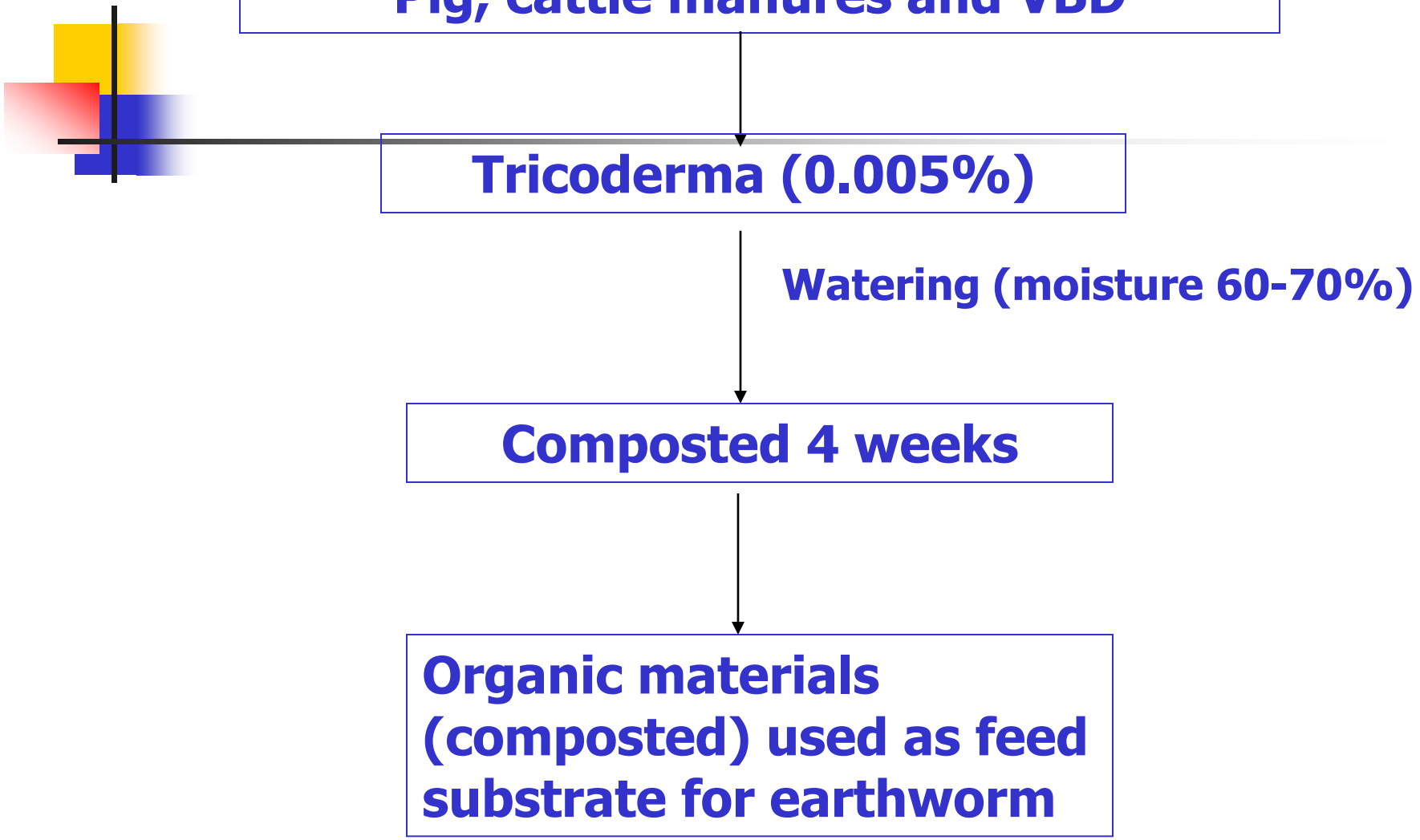


Table 1. Composition of composted animal manures and vegetable disposal

		As % of dry matter						
	DM,%	Ash	OM	CP	EE	NDF	Ca	P
Cattle manure	24.3	44.5	55.5	14.6	1.2	29.3	1.2	1.3
Pig manure	44.0	50.5	49.6	11.4	1.1	27.9	2.8	3.1
VBD	21.2	30.3	69.7	23.2	3.9	38.6	1.9	1.4

DM: dry matter, OM: organic matter, CP: crude protein, EE: ether extract, NDF: neutral detergent fibre; VBD: vegetable by-product disposal

Experimental design

According to a completely randomized design with 5 treatments and three replicates.

Treatment1 (V_{CM}): 70% VBD + 30% cattle manure
Treatment2 (V_{PM}): 70% VBD + 30% pig manure
Treatment3 (V_{ChM}): 70 %VBD + 30% chicken manure
Treatment4 (V_{TM}): 40% VBD+20% cattle manure +20% pig manure +20% chicken manure
Treatment5 (V_{BD}): 100 %VBD

In put
100 g earth worm

+

1 kg feed substrate/10 days

↓

Earthworm Experiment

60-70% moisture

Earthworm after 4 weeks

Measurement

1. Composition of substrate, treatments and earthworm: DM, ash, CP, NDF, Ca, P
2. Biomass production
3. *Coliform* and *Salmonella* using the method of Most Probable Number (APHA, 1998)
4. Isolation and identification of parasitic eggs

Results and discussion

1. The composition of substrate in treatments

Table 2a. Substrate composition of treatments								
	DM, %	As % of dry matter						
		Ash	OM	CP	EE	NDF	Ca	P
V_{CM}	22.1	34.4	65.4	20.6	3.1	35.8	1.7	1.4
V_{PM}	28.1	36.4	63.6	19.6	3.0	35.4	2.2	1.9
V_{BD}	21.2	30.3	69.7	23.2	3.9	38.6	1.9	1.4

2. Nutrient amount of treatments

Table 2b. Amount of nutrients input, g								
	DM	Ash	OM	CP	EE	NDF	Ca	P
V_{CM}	1771	612.7	1158	365.1	54.2	634.8	30.8	24.3
V_{PM}	2243	815.9	1427	440.6	67.9	794.5	49.8	42.4
V_{BD}	1696	514.6	1181	393.3	65.5	655.2	33.6	23.7

(*) Input of substrate: 8000 g/treatment in fresh

Table 3. Effect of treatment on composition of earth worm

	DM, %	As % dry matter						
		Ash	OM	CP	EE	NDF	Ca	P
V_{CM}	22.9	9.6^{ab}	90.4^{ab}	66.6	12.1	3.9^{b}	0.7	1.5^{b}
V_{PM}	23.4	11.1^{b}	88.9^{b}	67.0	12.2	6.1^{a}	0.8	1.9^{a}
V_{BD}	23.5	8.9^{a}	91.1^{a}	68.7	11.8	3.4^{b}	0.9	1.5^{b}
P	0.9	0.04	0.04	0.68	0.88	<0.01	0.5	<0.01
SEM	1.1	0.45	0.45	1.70	0.52	0.33	0.14	0.06

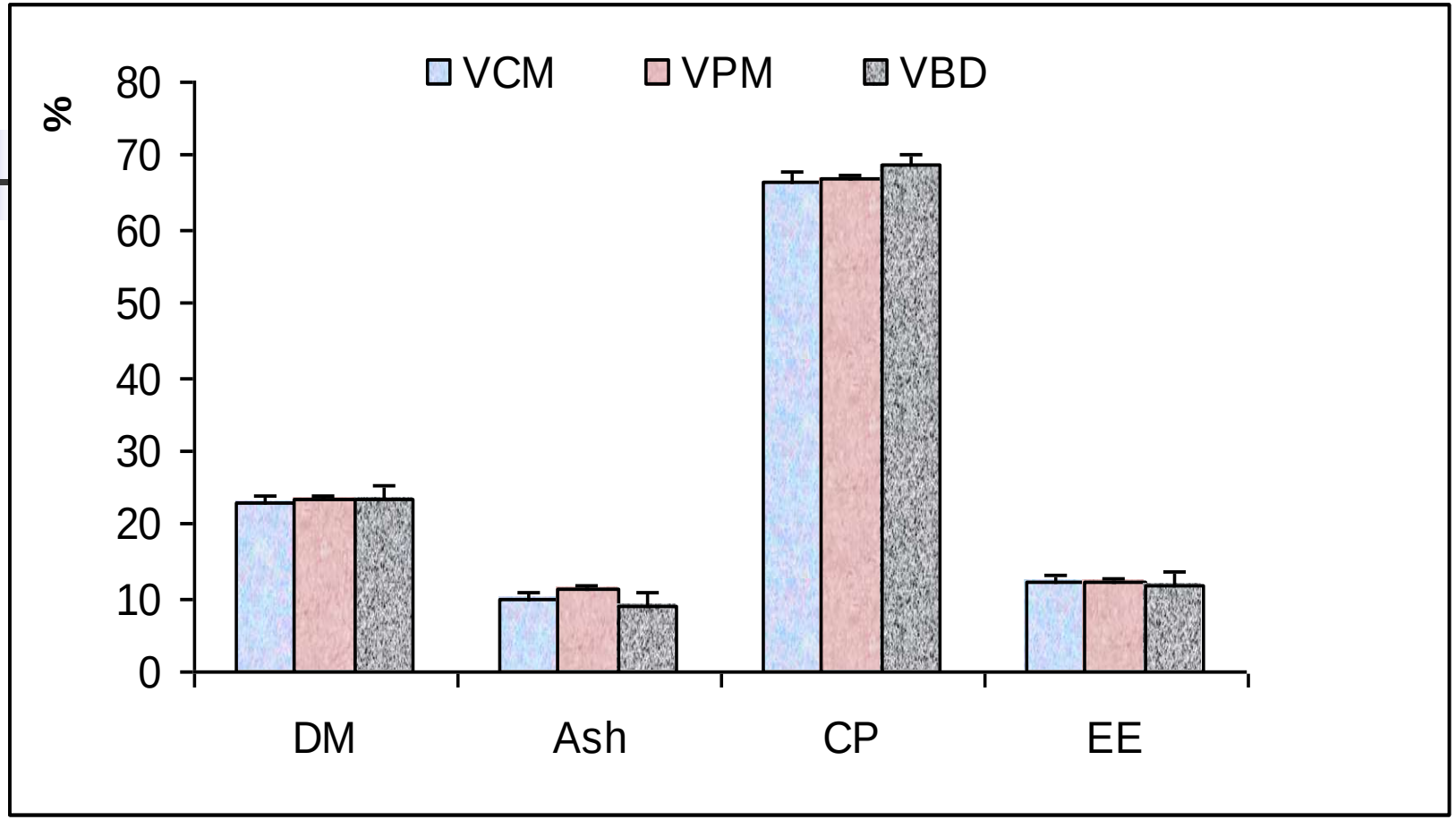


Fig 1. Effect of treatment on composition of earthworm

Effect of treatment on biomass production

	V_{CM}	V_{PM}	V_{BD}	P
In put, g	100	100	1000	
Weight, g/worm				
Initial	0.08	0.08	0.08	
At 30 days. g/worm	0.11	0.12	0.13	0.72
Gain (0- 30 days)	0.03	0.04	0.05	0.72
Final (0-60 days)	0.15	0.23	0.20	
Gain (0- 60 days)	0.07	0.15	0.12	0.17
Biomass production, g				
Total	131.1	132.5	119.6	0.16
Dry	30.0	30.9	28.1	
Organic	27.1	27.5	25.6	
Protein	20.0	20.7	19.3	

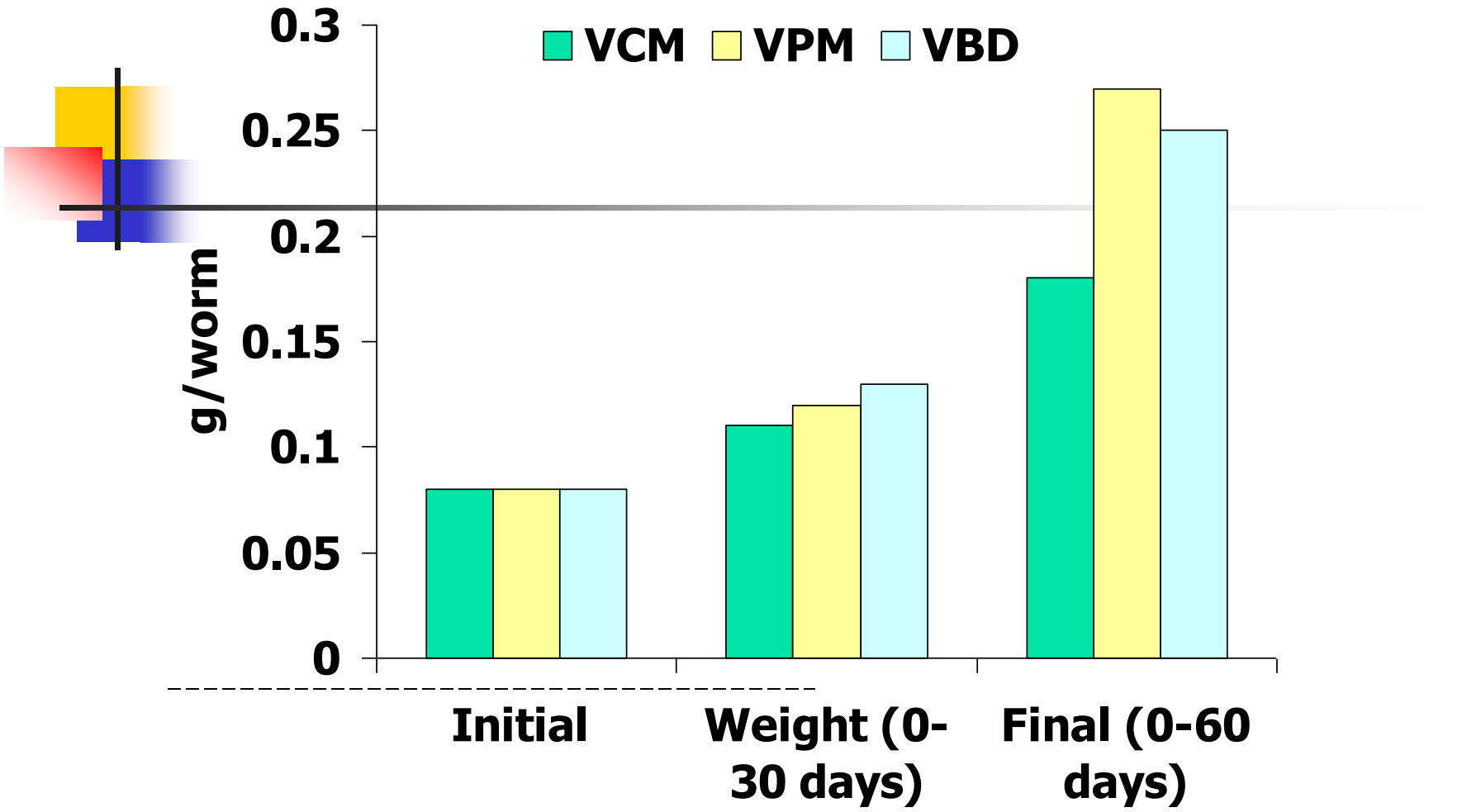


Fig 2. Effect of treatments on earthworm weight

Relation between input and biomass production are shown in the correlation equations:

$Y_1 = 44.6 + 0.00442\ X$; $R^2 = 0.88$; RSD =0.69

$Y_2 = 48.7 + 0.0014\ X$; $R^2 = 0.86$; RSD = 0.34

$Y_3 = 31.8 + 0.00208\ X$ $R^2 = 0.92$; RSD = 0.25

Where:

Y_1, Y_2, Y_3: dry matter, and protein biomass of earth worm (g)

X: dry matter input (g)

Dry matter, organic matter and protein biomass was positive affected by amount of dry matter in put

Pathogens on feed substrate and composts

	Parasites, eggs		Total (MPN/g)	
	Fasiolopsis	*Ascarid*	*Coliform*	*Salmonella*
Compost				
Pig manure	**0**	**0**	**93×10^2**	**< 3**
Cattle manure	**0**	**0**	**7×10^2**	**< 3**
VBD	**0**	**0**	**460×10^2**	**< 3**
Earth worm				
V_{CM}	**0**	**0**	**535×10^2**	**< 3**
V_{PM}	**0**	**0**	**293×10^2**	**< 3**
V_{BD}	**0**	**0**	**377×10^2**	**< 3**

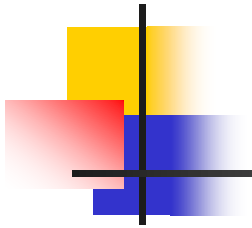
Conclusion

✓Composition of earthowrm was not affected by kind of feed substrates

✓Biomass of dry, organic matter and protein were related to amount of substrate in put.

✓Earth worm harvested from composted VBD and animal manures were high in nutrients and free pathogens, can be used as feeds for other animals.

✓Chicken manure was not feed substrate for chicken.



Thank you for your attention