UNIVERSITY OF ABOMEY-CALAVI

POLYTECHNIC SCHOOL OF ABOMEY-CALAVI

DEPARTMENT OF HUMAN BIOLOGY

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Communication delivered by:

Victorien Tamègnon DOUGNON,

Lecturer-Researcher at University of Abomey-Calavi

Tel. 00 229 97 73 64 46

Mail. victorien88@hotmail.com

TOPIC

Interest of the anaerobic bio-digestion of chicken manure used for the culture of *Solanum macrocarpon* Linn (Solanaceae) in Benin

Victorien Tamègnon Dougnon, *Honoré Sourou Bankolé, Jacques Tossou Dougnon, Thomas Dadié, Lamine Baba-Moussa, Messanvi Gbeassor, Michel Boko, Patrick Edorh*

Overall Objective

To assess the impact of anaerobic bio-digestion of chicken manure on the hygienic quality of *Solanum macrocarpon*

EXPERIMENTAL STUDY

Anaerobic bio-digestion of chicken manure and microbiological quality of *S. macrocarpon*

SETTINGS

- Study site= Experimental field in Abomey-Calavi

- Study based on the role of chicken manure in the contamination of produced vegetables

MATERIAL

Figure 2. Base of the home made digestor

Figure 3. Lid of the home-made digestor

METHODS (1)

- **Evaluation of the role of chicken manure composting (1)**

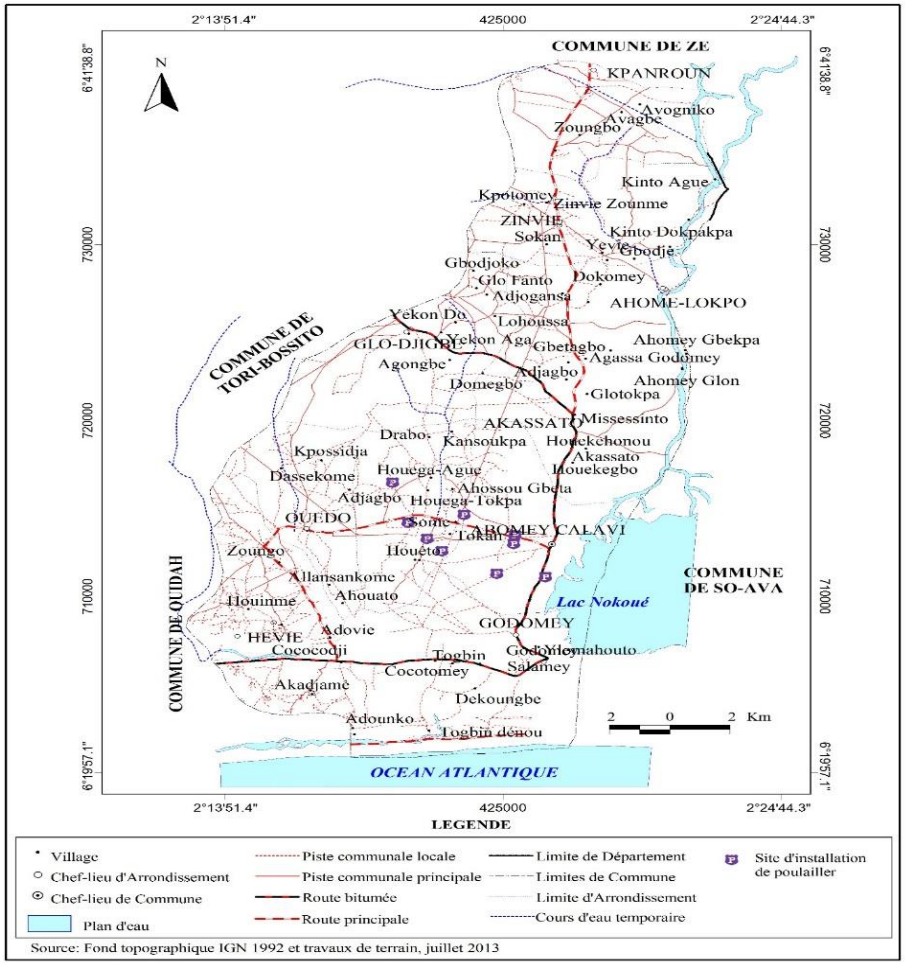

Figure 4. Locations of the visited poultry farms

METHODS (2)

- **Evaluation of the role of chicken manure composting (2)**

Mixture of the contents of manure bags (3 kg/bag) and 5 random samples

5 samples of soil taken at the centre and the edges of the site (3 kg)

Research of aerobic mesophilic bacteria, coagulase + *Staphylococcus, Enterococcus*, thermotolerant coliforms and *Salmonella spp.* (Tété-Bénissan *et al.*, 2012)

METHODS (3)

- **Evaluation of the role of chicken manure composting (3)**

- 30 kg of manure + 60 litres of water + 1 litre of yoghurt in the digestor

- Mixture left in anaerobic cnditions for 3 weeks then dry the sediments under sunlight for 7 days

- Duration of the process: 4 weeks, half of the normal time for chicken manure composting (Znaïdi, 2002)

- Evaluation of the microbiological quality of the sediments

METHODS (4)

Evaluation of the role of chicken manure composting (4)

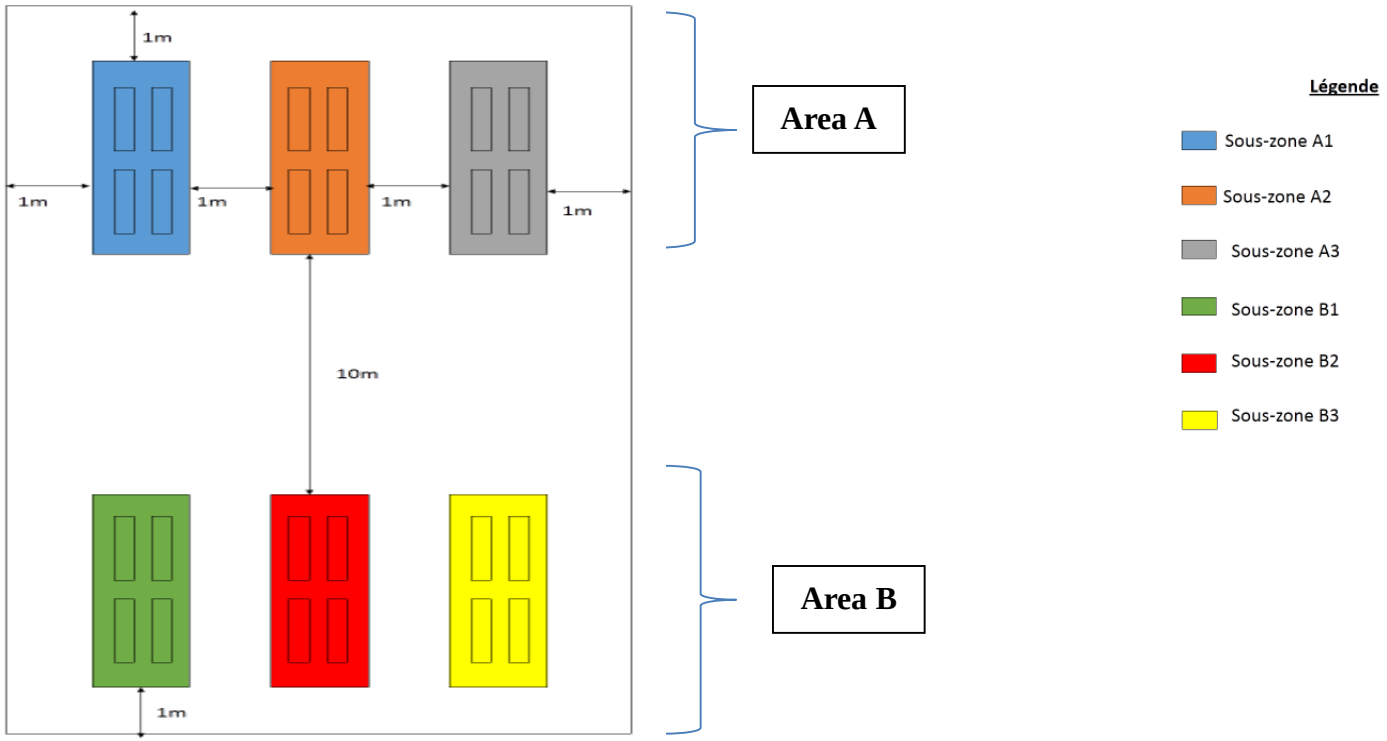

Figure 5. Disposition of the production sites

METHODS (5)

- **Evaluation of the role of chicken manure composting (5)**

Microbiological quality of the leaves of *S. macrocarpon*

Collection of 5 plants of *S. macrocarpon* per area

Research of aerobic mesophilic bacteria, Coagulase+ *Staphylococcus, Enterococcus*, *Salmonella spp* and thermotolerant coliforms including *E.coli* (Tété-Bénissan *et al*., 2012)

Statistical Analysis

Two by two comparaison of the means using the student t test p (T>t) = 0.05	Multiples Comparaisons between results of obtained from the two production zones

FINDINGS

Anaerobic Digestion of chicken manure and microbiological quality of *S. macrocarpon* (1)

Table II : Evolution of the bacterial population after composting

	Bacteria (cfu/g)			
	99%	**99.5%**	**99.8%**	**0.3%**
	Mesophilic germs	Thermotolerant coliforms	*Enterococcus*	coagulase + *Staphylococcus*
Bacteria load of crude chicken droppings	$3x10^{11}$ ± 30150a	$6.5x10^{6}$ ± 1421,38a	$3.54x10^{6}$ ± 3044,73a	10.200 ± 142a
Bacteria load of composted chicken manure	$3x10^{9}$ ± 23520b	34.000 ± 2020b	5.433,33 ± 1500b	10.166,66 ± 230a

Means with the same letters vertically are not significantly different at α = 0.05.

Anaerobic Digestion of chicken manure and microbiological quality of *S. macrocarpon* (2)

Table III : Bacteria load in vegetables based on the type of chicken manure used for the fertilization

Bacteria	Bacteria load in vegetables based on the type of chicken manure used (cfu/g)	
	Leaves produced with non composted manure	Leaves produced with composted manure
Aerobic mesophilic germs **98.8%**	$4.2 \times 10^7 \pm 5348.25a$	$5.13 \times 10^5 \pm 4853.2b$
Thermotolerant coliforms **99.9%**	$5.9 \times 10^5 \pm 10320a$	$855 \pm 26.05b$
E. coli **~ 100%**	$18250 \pm 2543.25a$	$9 \pm 0.34b$
Salmonella	Absence	Absence
Enterococcus **60%**	$1000 \pm 45a$	$400 \pm 32.4b$
coagulase + *Staphylococcus*	Presence	Absence

Means with the same letters are not significantly different at α = 0.05; cfu/g= Colony forming unit per gram

Conclusion (1)

- Development of alternative composting method that takes less time

- Outputs

  - Anaerobic digestion of three weeks followed by an aerobic drying for a week → Reduction of the load of bacterial contamiants in the compost

  - Conservation of the fertilizing properties of the manure

  - Least contaminated vegetables with respect to international standards

Research Unit in Applied Microbiology and Pharmacology of natural substances

- Medical bacteriology (Hygiene, bacteria in infections)
- Food Microbiology (*Salmonella spp*, *Escherichia coli*, other enterobacteria)
- Antibacterial properties of plants extracts (on cocci and bacilli)
- In vivo inoculation of bacteria to animals models
- Toxicity and pharmacological efficiency tests

MANY THANKS TO TWAS-UNESCO

Thank you for your attention !