

UNIVERSITY OF YAOUNDE I

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Nutritive value of *Echinochloa pyramidalis* (Lam.) Hitchc & Chase, a forage plant used for treating faecal sludge and wastewater

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Outline

1. Introduction

- ✓ Background of the study
- ✓ Research question
- ✓ Aims of the study

2. Materials and methods

3. Results and discussion

4. Conclusion & perspectives

Characteristics of developing countries



- 1. Introduction**
2. Materials and methods
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1. Rapid growth rate of urban population;
2. Increasing food demand;
3. Inefficient of water and sanitation provision.

A new paradigm to deal with sanitation in developing countries

1. Introduction
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- Link *sanitation infrastructure* and *cities economic development*
 - ✓ *Encourage reuse of nutrients and water,*
 - ✓ *Couple agricultural system and sanitation technology.*

=> CLOSE THE LOOP

Constructed wetlands (CWs)

1. Introduction
2. Materials and methods
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- **Cost-effective and technically feasible approach for wastewater and sanitation treatment.**

⇒ *Valuable opportunities:*

- **Biomass productions;**
 - ✓ Producing safe forage
- **Recycling wastewater;**



Providing long-term sustainable source of income for covering treatment plant Operation & Maintenance cost.

Echinochloa pyramidalis (Lam.) Hitchc & Chase

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- Forage plant
- Antelope grass
- Aquatic plant
- Poaceae family
- Tropical Africa
- Fast growing rate \Rightarrow long-term absorption and accumulation of nutrients;
- Widely spreading root \Rightarrow good conditions for microbial remediation



Research question and goal

”Does the wetland treatment processes of the faecal sludge have effect on the nutritional quality of *E. pyramidalis*?”

Compositions of faecal sludge similar to those of Sub-Saharan countries like Burkina-Faso, Ghana (Koné *et al.*, 2004): NO_3^- , Cl^- , SO_4^{2-} , Na^+ , Ca^{2+} , Mg^{2+} , K^+ .

Evaluate the effects of wetlands treatment processes on the nutritional potential of the antelope grass as animal feed.

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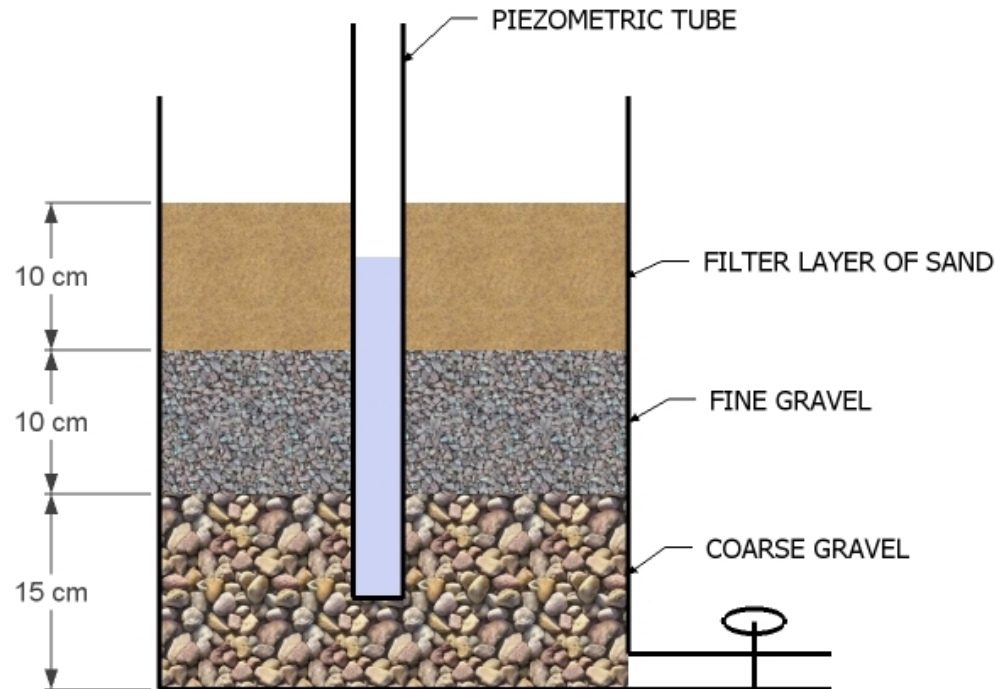
Location of the study sites

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Experimental units

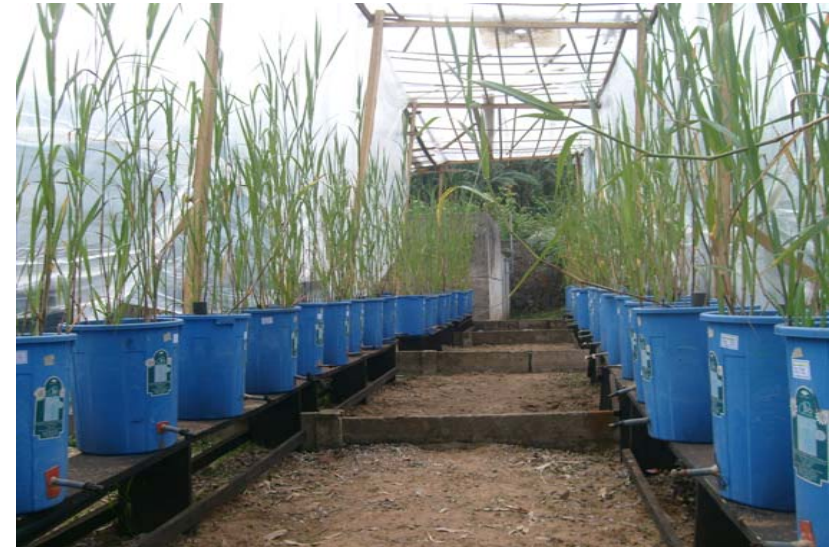
- **Vertical-flow constructed wetlands (VFCW) with a media arrangement adapted from Koottatep et al. (2005)**



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Experimental design & procedure

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Planting



Acclimatization



Wetland treatment processes



Plant sampling

Chemical analyses

▪ Faecal sludge samples:

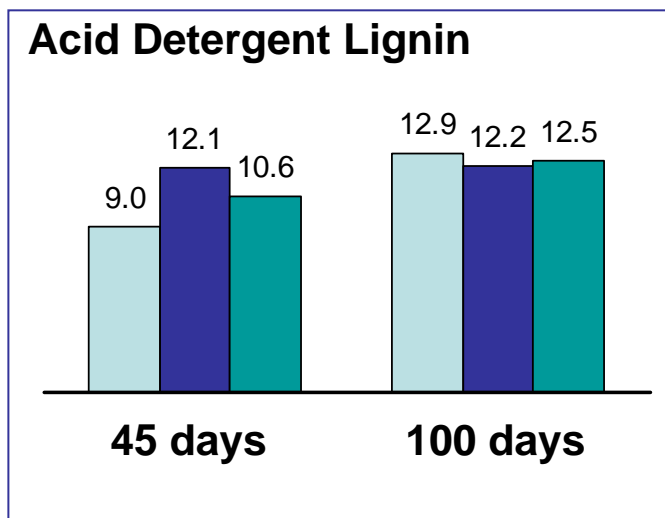
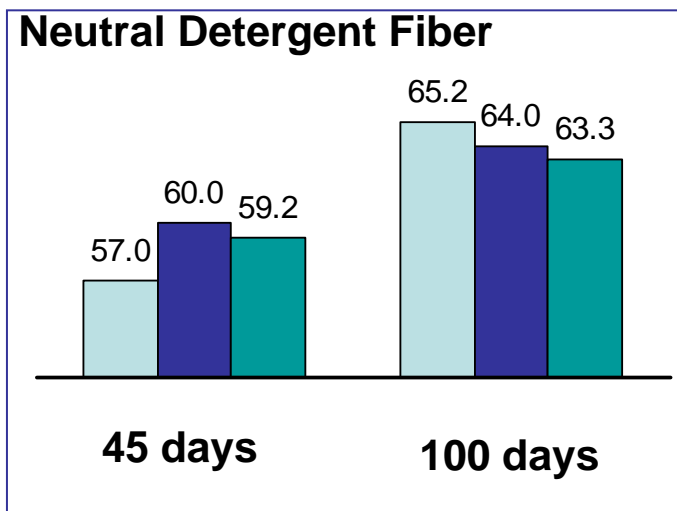
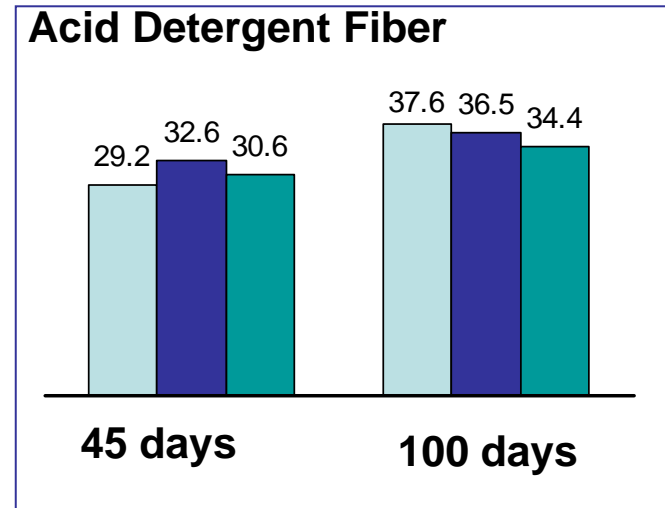
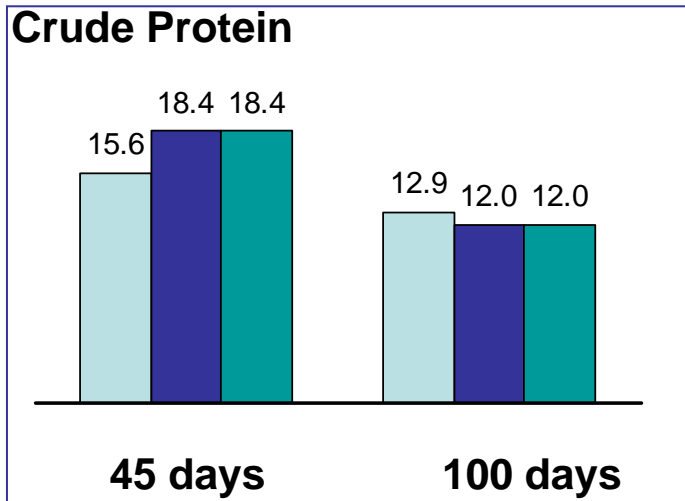
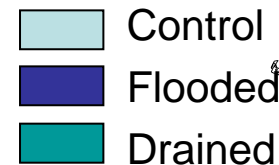
✓ Physico-chemical parameters (pH, EC, NO_3^- , Cl^- , SO_4^{2-} , Na^+ , Ca^{2+} , Mg^{2+} , K^+).

▪ Forage samples:

- ✓ **Total N** determined by Kjeldahl procedure (AOAC, 2000);
- ✓ **Crude Protein (CP)** calculated as $\text{N} \times 6.25$;
- ✓ **Acid Detergent Fiber (ADF)** (AOAC, 2000);
- ✓ **Neutral Detergent Fiber (NDF)** (Van Soest *et al.*, 1991);
- ✓ **sulfuric Acid Detergent Lignin (ADL(sa))** (Van Soest *et al.*, 1991).

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Forage quality (leaf parts)



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Suitability of *E. pyramidalis* for CWs & as forage

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- ✓ Protein content of *E. pyramidalis* improved in the CWs
- ✓ Wetland treatment processes did affect the nutritional quality of *E. pyramidalis*

⇒ *E. pyramidalis* is appropriate for constructed wetlands treatment

⇒ *Constructed wetlands can be adapted to producing high nutritive forage plant !*

Further investigations are needed:

- Evaluation of forage intake and digestibility;
- Hygienic quality and safety;
- Plant management (harvest times, harvest practices).

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THANK YOU FOR YOUR ATTENTION !

