FROM SOLUTIONS TO ACTIONS

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Combining Drying Beds and Vertical-Flow Constructed Wetlands for Faecal Sludge Dewatering and Leachate Polishing in Cameroon
Developing countries: 90-99% of on-site sanitation facilities (pit toilets and latrines) for excreta disposal

Yaoundé = 1200 m³/week

Douala = 2086 m³/week

(Berteigne, 2012)
INTRODUCTION 2/4

Direct dumping of FS

Land and Environment degradation

Health risk hazards

Drama
INTRODUCTION 3/4

Development of drying beds in West Africa for faecal sludge treatment

Ghana: ISF (Cofie et al., 2005);
Cameroon: planted drying bed at pilot scale;
Senegal: planted drying bed at full scale;

- good solid-liquid separation
- strong plant growth
- >80% removal of contaminants
Problem

Leachate does not meet standards and hence needs further treatment

Objective

Test VFCW at pilot-scale for the polishing of faecal sludge leachate from planted drying beds
METHODOLOGY 1/2

Experimental Lay-out

VFCW pilot-scale treatment plant

VFCW Schematic treatment unit
✓ Assessment of hydraulic loads: 50, 100 and 150 mm/d

✓ Assessment of the effect of feeding frequencies: 1x, 2x and 3x/day at 150 mm/d

✓ Monitoring performances (physico-chemical and bacteriological analysis)
RESULTS 1/4

Organic removal

• On average, 92% removal of COD and BOD$_5$ irrespective of loading rate.
• No significant differences between hydraulic loads (P > 0.05).
• Effluents meet the MINEP requirements for COD (< 200 mg/L) and BOD$_5$ (< 50 mg/L).
Nutrient removal

- Effluent Total Nitrogen exceeding the standards
- Effluent phosphorus concentration complies the standards (< 10 mg/l).
- No significant differences between hydraulic loads or between loading frequencies.
RESULTS 3/4

Removal of faecal coliforms

- Effluent does not comply with guidelines upon single application
- No significant differences between hydraulic loads

Fractionning 150 mm/d into 3x with a resting period of 5 hrs reduces the faecal coliforms below threshold values guidelines for discharge (2000 cfu/100 ml), although still above WHO guidelines (1000 fcu/100 ml).
RESULTS  4/4

Plant Response

Significant increase of Plant density with the increase of hydraulic load

high hydraulic load good for plant production
planted drying beds followed by VFCW is a very promising technology for comprehensive faecal sludge treatment;

The treatment scheme can generate products for end use;

Treatment performance for Nitrogen does not meet guidelines;
CONCLUSION 2/2

✓ Faecal indicator comply with Cameroonian guidelines when managing feeding frequencies;

✓ High Hydraulic Loads preferable when plant production is a major aim of the treatment;

✓ The treatment scheme is cost-effective.

PERSPECTIVES
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