

ALTERNATE WETTING AND DRYING (AWD) IRRIGATION TECHNOLOGY: IMPACT ON THE YIELD OF RICE GROWN WITH PERI-URBAN ANAEROBIC BAFFLED REACTOR (ABR) EFFLUENTS

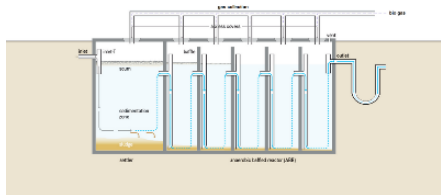
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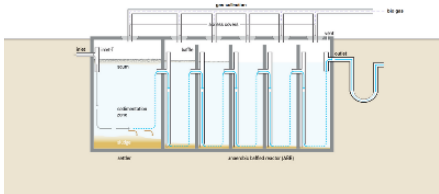
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OUTLINE

1. INTRODUCTION
2. MATERIALS & METHODS
3. RESULTS AND DISCUSSION
4. CONCLUSION

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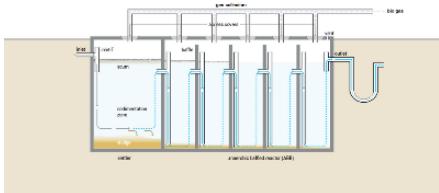
INTRODUCTION



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- Water is a very valuable resource
- Need to preserve and access lower quality water for irrigation
- Urbanization and Population, responsible for increase in volume of wastewater
- The discharge of ABR effluent from DEWATS can cause pollution

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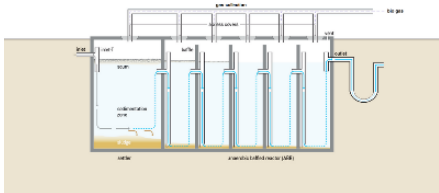
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INTRODUCTION

- Recycling of wastewater; a common practice due to nutrient worth
- The nutrient-rich effluent serves as fertilizer
- UP settlements in developing nations like South Africa needs DEWATS

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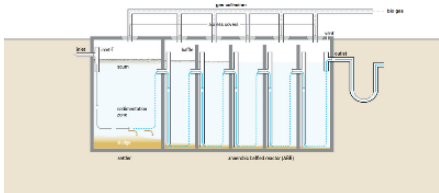
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INTRODUCTION

- Rice, main staple food for majority of the world's populace
- Principal consumer of water.
- SA has one of the highest per capita rice consumption.
- International market is the source of rice consumed in SA
- Level of production in South Africa is not known

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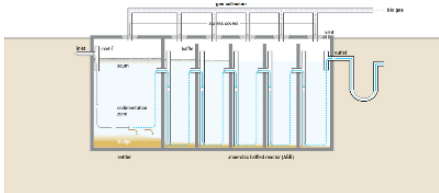
Research Problem

- Need to dispose off the nonstop volume of ABR effluent
- No reported use of ABR effluent with irrigation management techniques in RSA and other parts of the world

Objective

To evaluate the effects of AWDI using ABR effluent on the growth and yield of rice.

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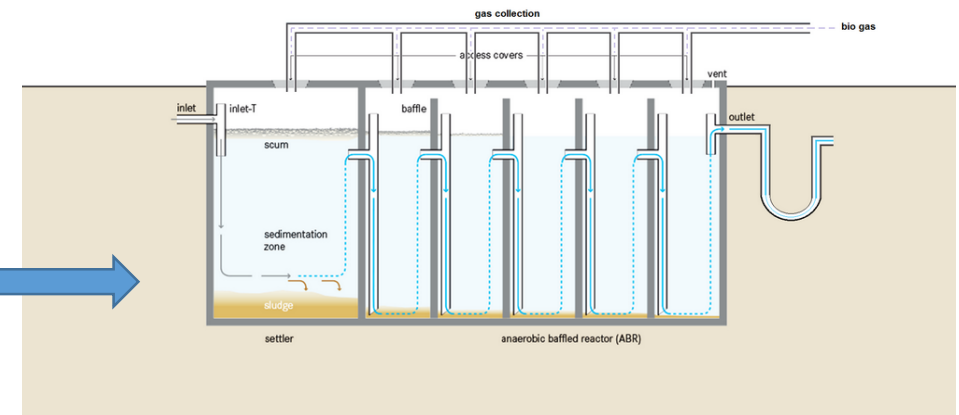


METHOD

STUDY SITE: Newlands east, Durban, RSA, 1000mm rainfall, 20.50C

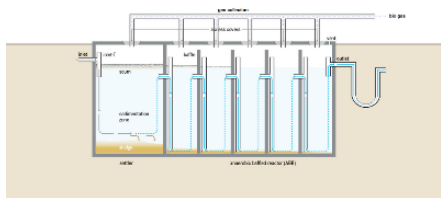


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CROP SELECTION: water, nutrient and need to be cooked before eating

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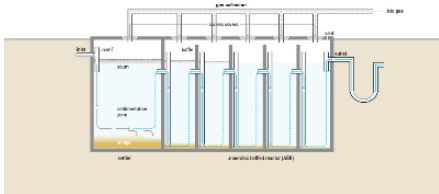


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Plot layout

- Cut-off drains
trenched to
collect field
run-on and off

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METHOD



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METHOD

Plot layout

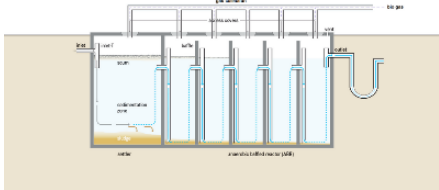
- Bunds are 30 cm wide and 20 cm high.
- Plastic sheeting (250 microns) buried to a depth of 0.6 m
- Tube or observation well (40 by 10 cm) inserted in each plot



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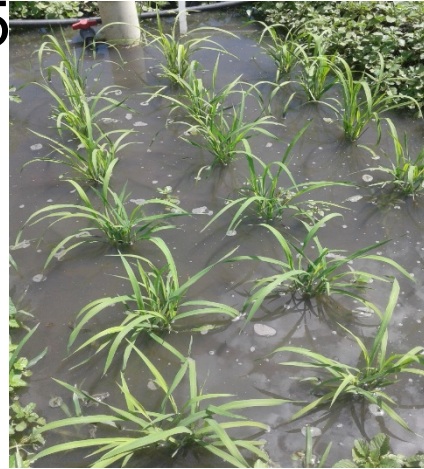
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METHOD

Plot layout & crop establishment

- The spacing was 0.25 m by 0.25 m (SRI)
- Established for 2 weeks with fresh water before transplanting.



CFI

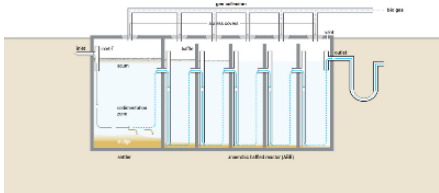


AWD



WWF

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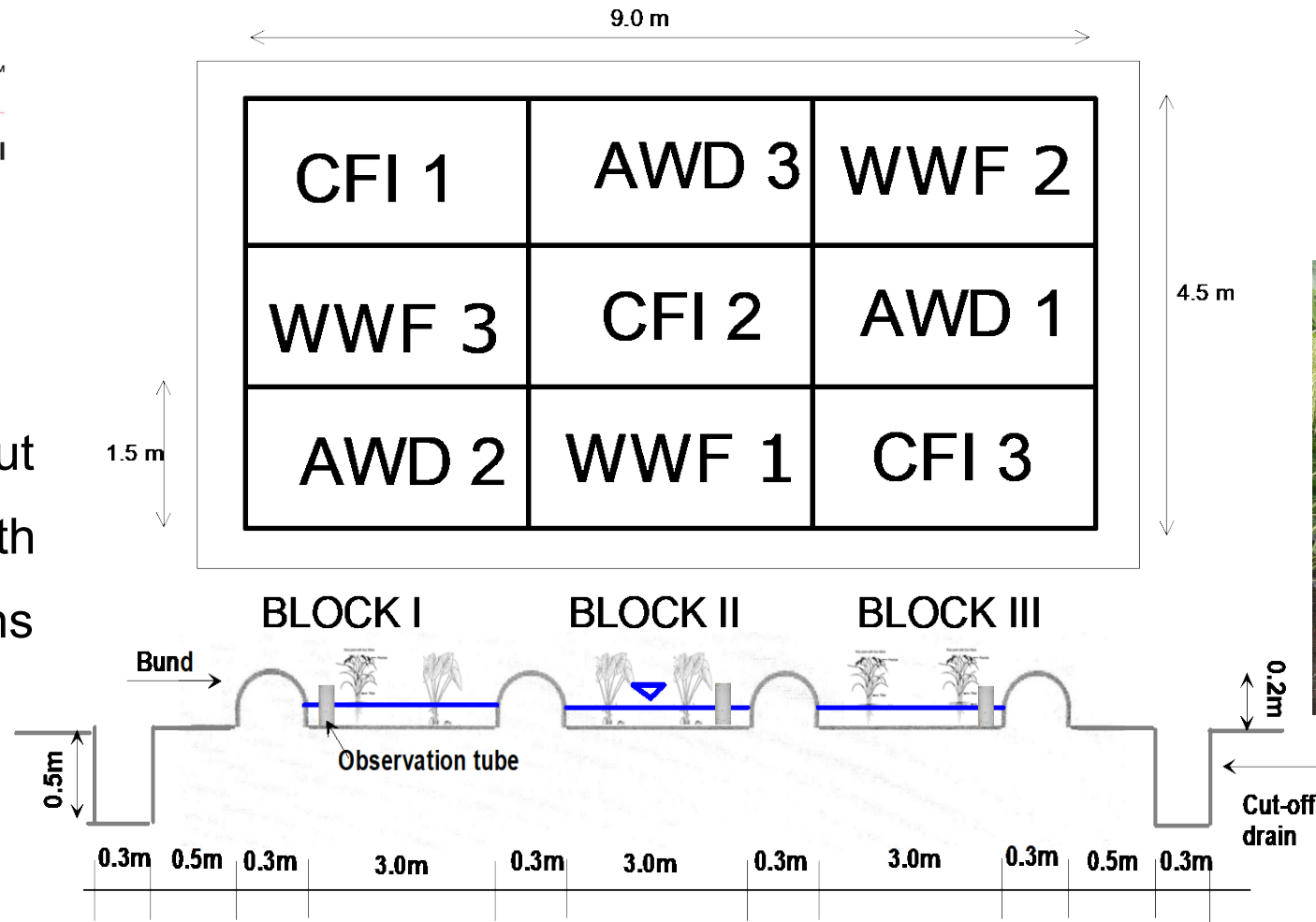
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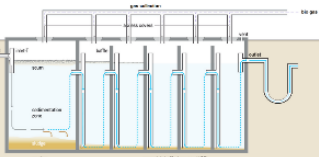
METHOD

EXPTL SETUP

- Trials laid out in RCBD with 3 replications



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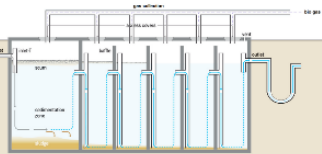


METHOD

DATA COLLECTION & ANALYSIS

- Data collected on 4 plants per plot at 3 replications
- Growth and yield parameters.
 - LAI-2200C Plant Canopy Analyzer for LAI
- ANOVA by GenStat 18th edition
 - Normality test
 - Significant difference at $P \leq 0.05$
 - Duncan's multiple range test for means separation

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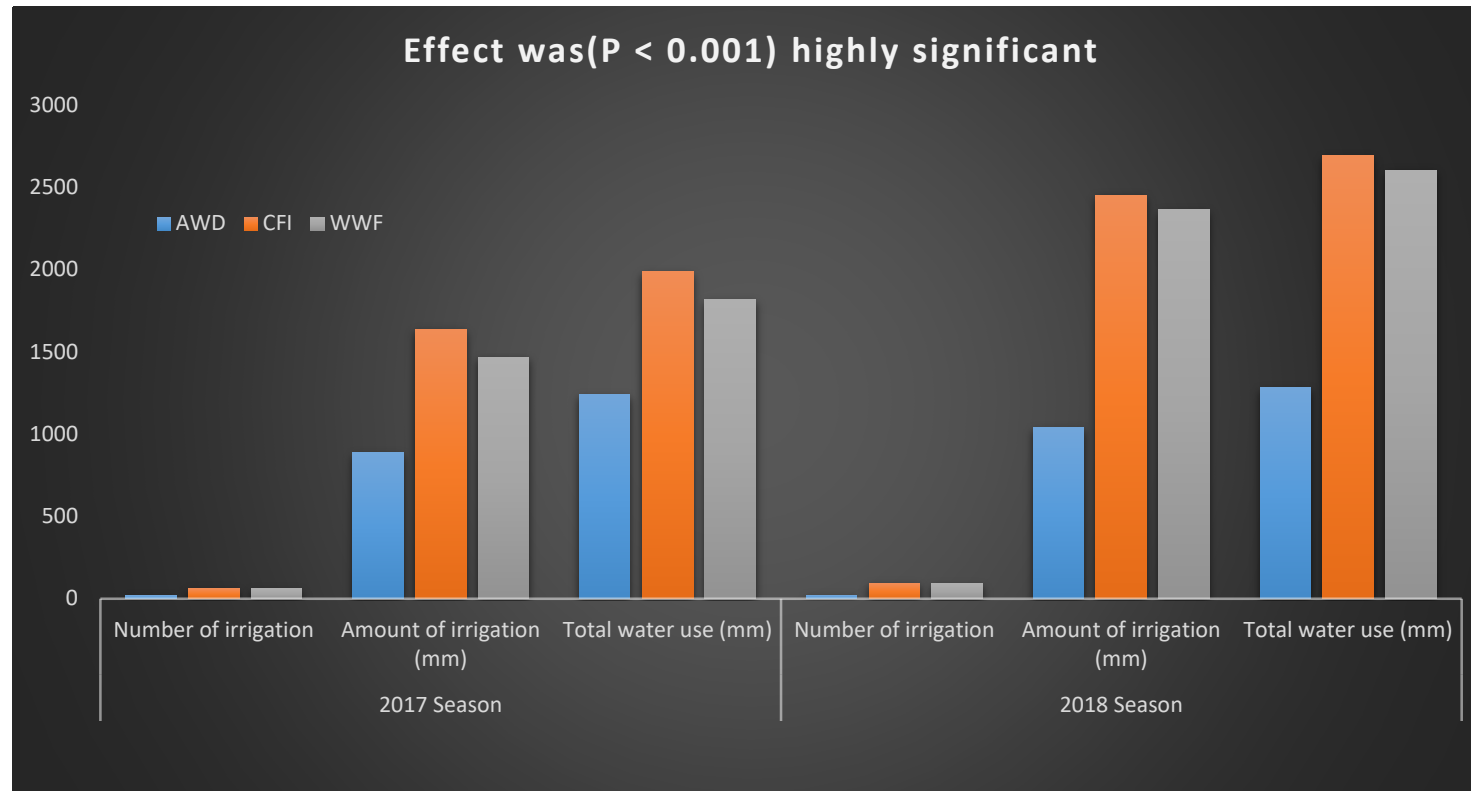
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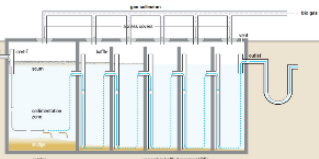
RESULT AND DISCUSSION

Effect on no of irrigation, amount and total water use

The difference was as result of frequent of irrigation according to treatments



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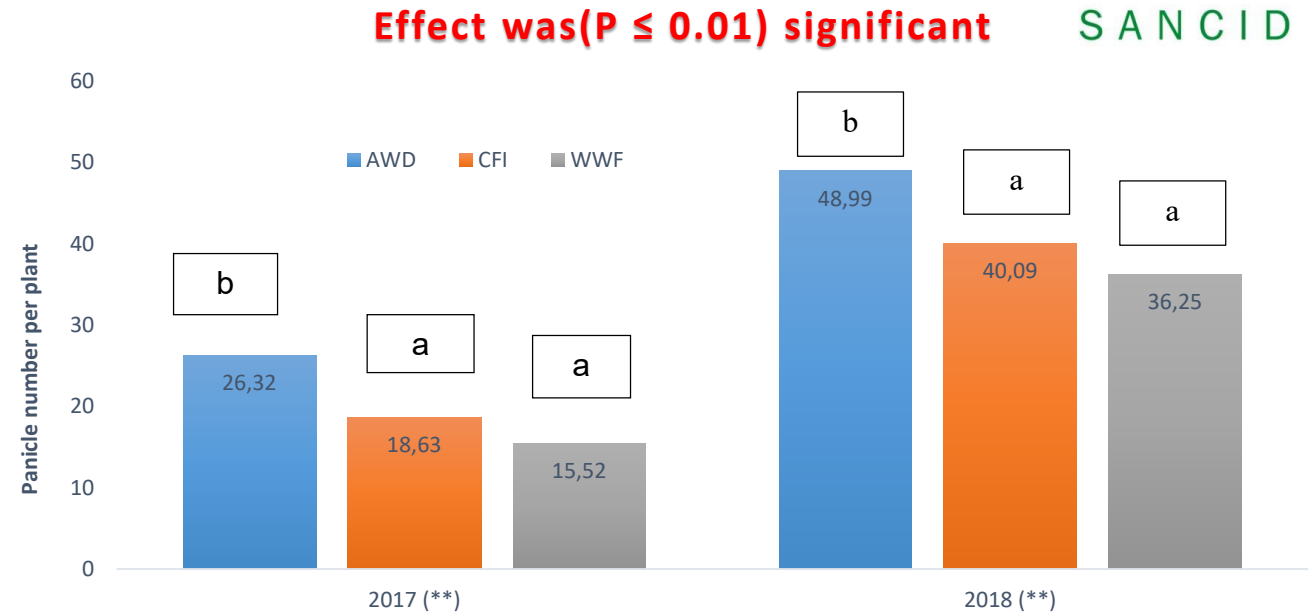
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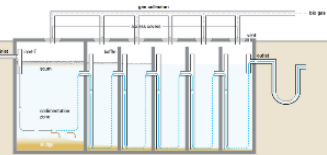
RESULT AND DISCUSSION

Effect on growth parameters

- The effects of irrigation management techniques using ABR were not significant ($P \geq 0.05$) on: Plant height, number of tillers/plant and LAI
- But LAI has max and min value with AWD and CFI (Agreed with [Pascual & Wang \(2016\)](#))



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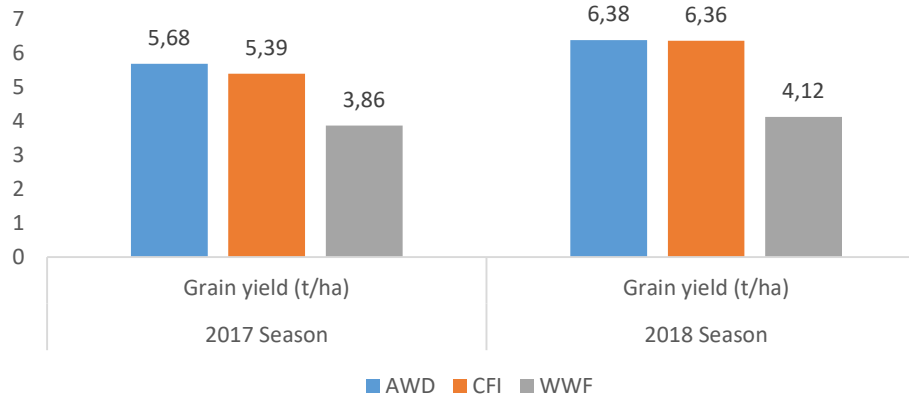


RESULT AND DISCUSSION

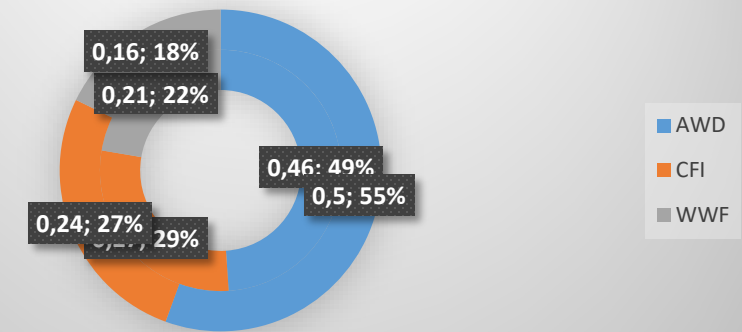
Effect on yield and WP

AWD was higher than CFI but the diff was not significant

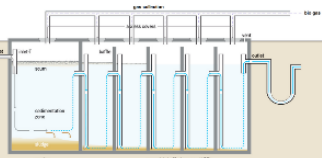
Effects of treatments on the grain yield ($P \leq 0.01$) was significant



Water productivity ($P < 0.001$) significant



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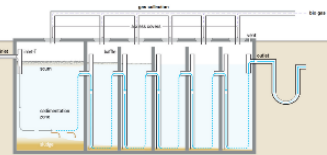


RESULT AND DISCUSSION

Effect on yield and yield components

- Highest grain yields of 5.68 and 6.38 t/ha was obtained in treatment AWD for 2017 & 2018 resp.
- Equivalent to highest WP
- Within the range of the supplier yield data (4.5-6.5), [Oliver et al. \(2008\)](#)-5.86 to 6.86 and [Fonteh et al. \(2013\)](#)-5.7 to 6.5- these are inorganic fertilized cultivation
- Higher than what [Akintayo et al. \(2011\)](#) - 3.2 t/ha reported (same FARO 44)- may be due to effect of ABR effluent

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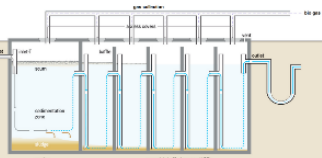
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CONCLUSION

- Rice performed well with AWD treatments
- No significant increase from flooded rice (CFI)
- The yield obtained was as a result of water reuse (ABR effluent) without inorganic fertilizer
- Highest WP was also obtained under AWD treatments, hence,
- Adoption of AWD should be encouraged in rice production.

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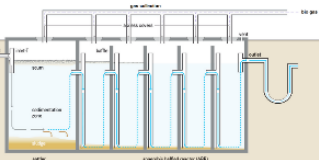
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Recommendation

- Recommended that more household be connected to the sewer
- And increase the volume of ABR effluent for irrigation purposes

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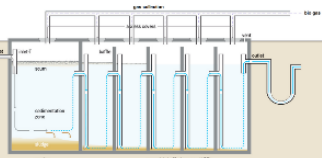
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