

Enhancing rice field resilience: Pioneering Ecologically-Based Rodent Management in the Senegal River delta

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Introduction

- Agricultural intensification increases the risk of rodent proliferation
- Rodent management: a challenge for food security and public health
- However, conventional rodent control methods are reactive and based on inappropriate use of chemical poisons, which carry environmental and health risks without significant reduction of rodent populations
- Ecologically-Based Rodent Management (EBRM) a realistic alternative, but never tested in Western Africa.

Objectives

- Assess Knowledge, Attitudes and Practices (KAP) of farmers in relation to rodents using Focus Group discussions
- Carry out a pilot experiment in close collaboration with farmers to assess the effectiveness of EBRM practices

Methods

1. KAP surveys

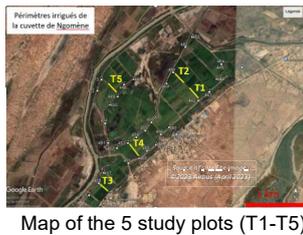


Nov.-Dec. 2021
Focus Group discussions
18 villages
x 10 pers. (5-14 pers.)
/village

2. On-farm experiment

Small-scale field experiment (March-Sept. 2023) to test two EBRM methods: mechanical rodent control & Linear-Trap Barrier System (L-TBS).

- Rodent abundance determined using 4 capture-mark-recapture (CMR) sessions in irrigated rice fields from sowing to harvest
- Evaluation of rodent damage and of rice yields in 3 experimental plots and 2 control plots
- Tested the effectiveness and local socio-economic relevances of the two EBRM methods.



Map of the 5 study plots (T1-T5)



T1-T2: 2 plots with clearing of dykes, installation of fishing nets, flooding of burrows with water and removal of rodents captured in nets



T3: 1 plot with two 150-m long Linear-Trap Barrier System (L-TBS)



T4-T5: 2 control plots



Rodent CMR along the dykes and in rice fields



5 rice plots (T1-T5) * 6 fields/plot * 2 replicates of 10x20 m sub-plots x 10 rice tillers / sub-plot

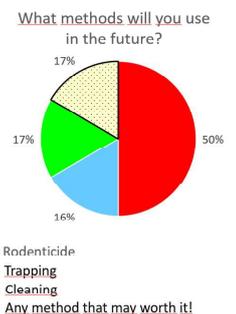
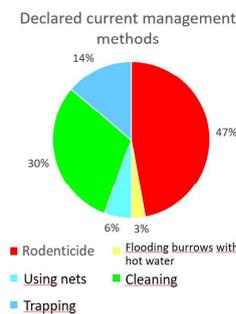
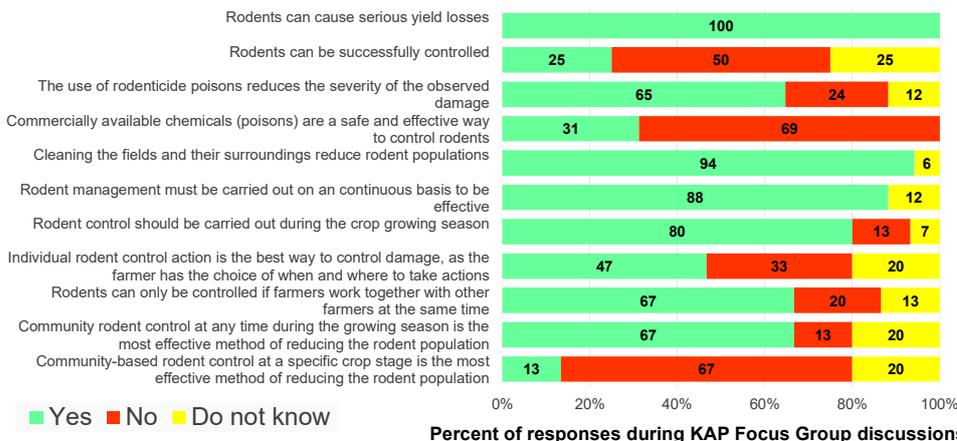


Inspection of rice tillers to estimate yield and damage at the sub-plot level



Estimating yield at the field level

Results and discussion



Current and future rodent management practices declared by farmers in the delta of the River Senegal

1. KAP surveys

- Abandonment of agricultural fields after major crop damage due to a lack of preventive management strategies
- Widespread use of chemicals to control rodents yet available rodenticides are not perceived as safe or effective in reducing the severity of the observed damage
- Rodent control applied at the individual level, though awareness that rodent would be better controlled working simultaneously and as a community
- Rodent control seen as a continuous effort rather than targeting specific seasons / crop stages
- Some farmers ready to try any new methods that would allow them to be resilient.

Conclusion & perspectives

- EBRM as a toolkit: designing effective and sustainable methods that can be adopted by farmers
- Make the environment unfavorable to rodents through sustainable and environmentally friendly management strategies
- Take appropriate collective action at the right time and in the right place
- Train farmers and raise their awareness through scientific and practical workshops.

2. Data analysis of field experiment

Rice has only recently been harvested...



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In sub-Saharan Africa, agricultural intensification programs increase the risk of rodent proliferation in rural habitats. This poses significant challenges to both food security and public health. However, conventional rodent control methods frequently are reactive and based on improper use of chemical poisons, which carry environmental and health risks without significant improvement in terms of reduction of rodent populations. Ecologically-Based Rodent Management (EBRM) has been proposed as a realistic alternative to chemical control. EBRM is based on a good knowledge of rodent biology, as well as on community-based interventions aimed at reducing rodent abundances to economically and healthily acceptable levels over the long term. EBRM has been successfully implemented and evaluated in Southeast Asian agro-ecosystems and has recently shown promises in smaller-scale trials in rural areas of Southern and Eastern Africa. However, to our knowledge, attempts are still lacking in West Africa.

We present results from an original pioneering study that combined (i) Knowledge, Attitude and Practice (KAP) survey conducted among farmers in 18 villages in the delta of River Senegal and (ii) a farmers-scientists joint experiment implemented in rice fields to test two EBRM methods during the hot-dry growing season (March-July 2023). This small-scale pilot experiment focused on assessing the efficacy of two EBRM methods: mechanical rodent control and Linear-Trap Barrier System (L-TBS). Our approach used the capture-mark-recapture (CMR) method to estimate rodent composition and density, as well as crop monitoring to estimate yield and damage at different spatial scales (256 replicated rice tillers, for a total of 30 rice fields) in experimental and control plots. We also aimed to test the effectiveness and local appropriateness of the two EBRM methods.