



Community-Led Ecological Management of Rodents

Everyone is affected by rodents

What's your favorite rat story?

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- 🐭 Why don't rodents come up in the livelihoods assessments, contextual analysis, risk assessments and other participatory surveys we conduct in the field unless prompted by the enumerator?
 - 🐭 Why are rodent problems so rarely reported?
 - 🐭 The answer seems to be that we assume that rodents are an unavoidable part of our lives "*you are never more than one metre from a rodent in a city*".
 - 🐭 Rats are considered too smart to be caught, and even when we kill them numbers do not seem to decline.

Rodent Damage

🐭 **Crop damage:** Indonesia, rice: 17%; Tz, Maize 15-40%; Kenya: 20-30%; RSA: 5-90%.

🐭 **Disease vectors:** 60 diseases. Lassa Fever, leptospirosis (Weil's disease), Toxoplasmosis (*Toxoplasma gondii*), plague (*Yersinia pestis*), protozoans (*Cryptosporidium parvum*, *Giardia* spp.), bacteria (*Listeria monocytogenes*, *Escherichia coli* O157:H7, *Salmonella* spp., and *Mycobacterium paratuberculosis*).

🐭 **Mycotoxins:** Rodents also carry *Aspergillus flavus* spores on their fur.

Table 1. The amount of food that would be gained if proper rodent management were applied, and the number and percentage of undernourished that could benefit from ecologically based rodent management (data derived from FAOSTAT)

Continent	Million t of cereals gained ^a	Number of extra people nourished (millions)	Percentage of undernourished benefiting
Asia	54.32	217.3	39
Latin America	7.84	31.3	60
Africa	5.68	22.7	11
Europe	1.89	7.5	197
Total (world)	69.73	278.8	34

^a All types of cereals, e.g. wheat, rice.

Rodent Damage

- 🐭 Bite sleeping people,
- 🐭 Contaminate food and stored water with urine and droppings,
- 🐭 Damage personal possessions (clothes, shoes, money, books, bednets)
- 🐭 Damage buildings.
- 🐭 “quality of life” challenges from rodents:
- 🐭 sleep disturbed by rodents moving in the house at night and our favourite clothes damaged by rodents.

Rodent Damage



Injuries caused by rat bites in Sierra Leone



**Bedding damaged by rats,
Sierra Leone**



Rodent Basics

- 🐭 The rat's primary survival strategy is a high rate of reproduction.
- 🐭 Female rats (*Rattus rattus*) ovulate every four days, copulate dozens of times a day, have a 28 day reproductive cycle and remain fertile until they die.
- 🐭 Two rats can produce a theoretical population of 15,000 rats in a single year.
- 🐭 When poison or traps thin out a population, rats naturally respond by mating faster until their numbers regenerate.

Rodent Species

- 🐭 In Africa the majority of the rodent species trapped in houses:
- 🐭 **Black Rats** (*Rattus rattus*),
- 🐭 **Norwegian Rats** *Rattus norvegicus*,
- 🐭 **Natal Multimammate Rats** *Mastomys natalensis*
- 🐭 **House Mouse** *Mus musculus*,
- 🐭 Other species may occasionally occur in forest villages but these are mostly non-pest species and do not need to be recorded accurately.

Rodent Species

Black Rat, Roof Rat, gray-bellied rat, white-bellied rat, Alexandrine rat, black rat and ship rat
Rattus rattus



Brown/ harbour/ Norwegian Rat,
Rattus norvegicus



Natal Multimammate Mouse,
Mastomys natalensis



Controlling Rodents

- 🐭 Poisons
- 🐭 Biological control
- 🐭 Traps
- 🐭 Rat Glue
- 🐭 Contraceptive

Norway Rat

Average Length 3/4 inch



Roof Rat

Average Length 1/2 inch



House Mouse

Average Length 1/4 inch



Poisons.

- 🐭 **Acute poisons (fast acting):** (zinc phosphide, Rattex, arsenic trioxide) widely used give obvious results (dead rats) and cheap,
- 🐭 rats are cautious eaters and most will only eat a sub-lethal dose, feel sick and avoid the poison in future.
- 🐭 Many acute poisons are sold illegally (Aldicarb). Acute poisons will also kill cats, poultry and humans.
- 🐭 no antidotes for acute poisons (US 12,000 children per year are accidentally poisoned by rat poison).
- 🐭 **Chronic poisons (slow acting):** Death occurs one to two weeks after ingestion of the lethal dose. no risk of rats becoming bait-shy.
- 🐭 Most chronic poisons are anti-coagulants, like warfarin, for which antidotes are available.
- 🐭 Chronic poisons are cheap.
- 🐭 Chronic poisons can effect predators, particularly birds.

Biological control

- 🐾 **Cats and dogs**
- 🐾 1,000's of years to control rodents
- 🐾 Cats and dogs should create a “zone of fear” for rodents
- 🐾 Cats and dogs are vectors of rabies and must be vaccinated.
- 🐾 Cats are vectors of toxoplasmosis,
- 🐾 **owls, snakes:** owls highly effective in the field but most African communities fear owls and snakes more than they fear rats
- 🐾 **civet cats, jackals, genet cats, honey badgers, mongoose, stoats and some amphibians.** more appropriate for the control of rodents in fields

Traps

- 🐭 traditional live and break-back rat traps,
- 🐭 if the communities have a rodent problem it is likely that these traps are ineffective.
- 🐭 If cheap, good quality, traps are not available in the local market they can be imported from the UK or the USA.
- 🐭 The Romax traps cost £1 each at wholesale prices



Rat Glue

- 🐁 available in most countries.
- 🐁 cheap and safe for humans, domestic pets and livestock
- 🐁 considered inhumane and use is restricted in Europe.
- 🐁 reputational risk with animal welfare groups

Contraceptives

- 🐭 Allowing rodents to mate, but without getting pregnant and populations collapse rapidly and do not rebound.
- 🐭 Research on the use of contraceptives like **ContraPest** (4-*vinylcyclohexene diepoxide* (VCD) to artificially inducing menopause in female rats + *triptolide* as a spermicide), is still experimental but shows promise – watch this space.

Community-Led Rodent Control: Community discussions

- 🐭 What rodents are found in the fields and homes?
- 🐭 Which crops are damaged by rodents? Which parts of the crop are damaged and at which stage of growth does the damage occur? How much do farmers think they loose from rodent damage in the field?
- 🐭 How do farmers control rodents in the field
- 🐭 Which rodent species enter the homes (try to correlate the local names with formal species taxonomy)?
- 🐭 How do they enter homes?
- 🐭 Where do they live in the home and how do they move about the home?
- 🐭 What damage do they do in the home (probe for damage to clothes, shoes, books, mosquito nets, blankets, the structure of the house, stored food, rat bites, electrical wiring, small stock and animal feeds, etc.)? The relative damage levels can be assessed using matrix ranking and/or proportional piling.

Community-Led Rodent Control: Community discussions

- 🐭 How well do communities understand the disease risks from rodents?
- 🐭 How do communities traditionally control rodents.
- 🐭 Do they use traps, poisons, illegal poisons? What do they use as bait?
- 🐭 Does the community eat rodents, which species do they eat and which species are considered inedible/ taboo?
- 🐭 What are the community's attitudes to cats, dogs and other rodent predators? Are cats eaten? Are dogs *haram*? Does the community believe that owls bring bad luck?
- 🐭 What does the community do to deter rodents from entering the village?
- 🐭 Is there anyone in the village who is a professional rat catcher?
- 🐭 How are crops dried and stored?

🐭 work with existing structures as much as: village development committee, a village health committee, a sanitation or borehole committee, community health workers, Care Group Leaders, a women's group, village elders...

Community Rodent Monitors

- 🐭 supervise the trapping and collect records of the number and species of rats caught. Community rodent monitors will need to be literate and numerate. If they are literate and numerate traditional rat catchers should be given priority. The position is not paid, though the rodent monitors could make an income from selling traps. Each monitor will be trained by Concern in species identification and sexing and will receive a basic kit:
- 🐭 Disposable gloves.
- 🐭 Recording sheets
- 🐭 A plastic bowl
- 🐭 Plastic bags
- 🐭 Disinfectant / antiseptic / methylated spirit/ bleach.
- 🐭 Spade for burying dead rodents.
- 🐭 White tiles

Daily recording weight, sex and species of trapped rats



John R Turay, community rat monitor, Rosient.



Dissecting rats to determine # of pregnancies

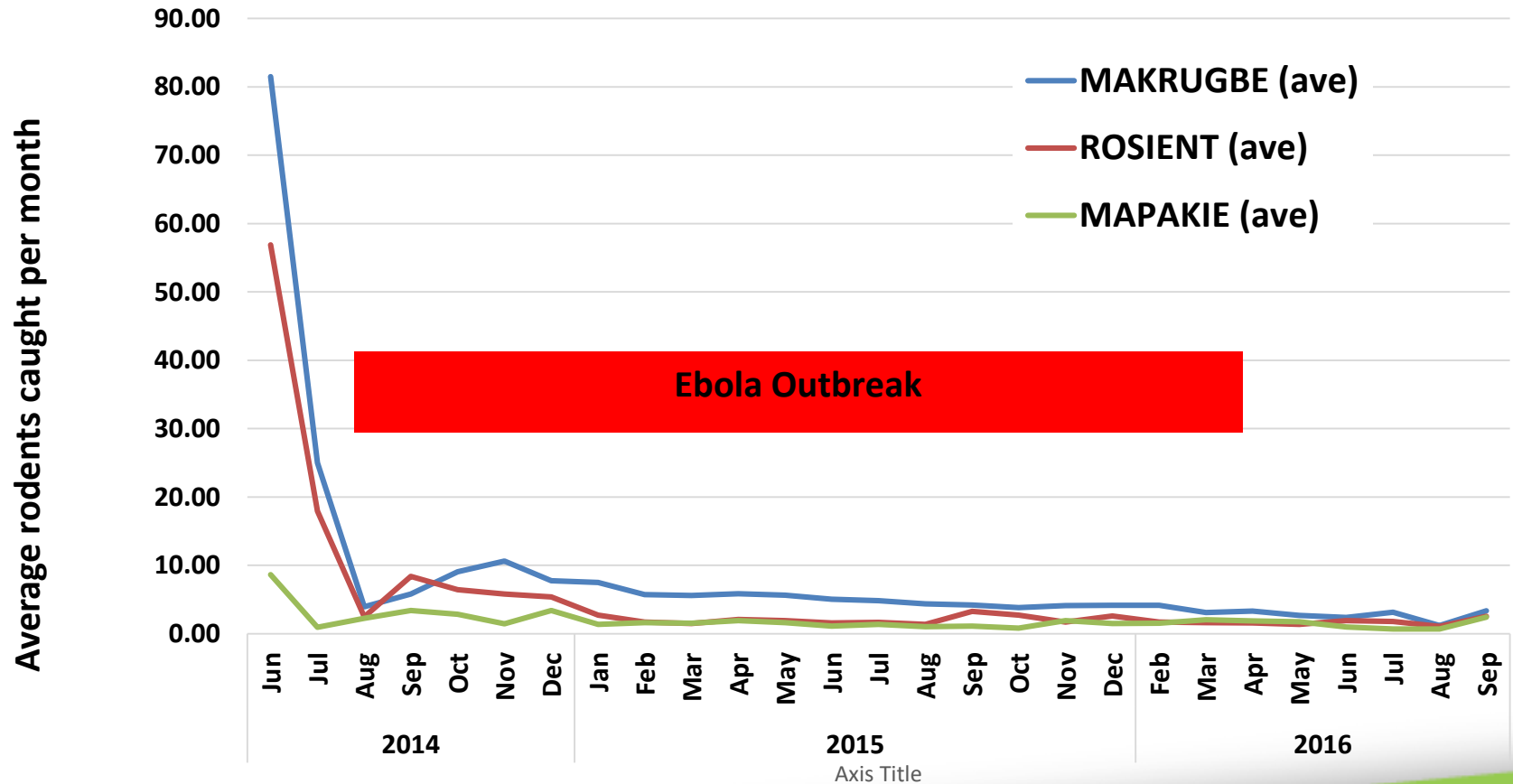


- 🐭 The community must prepare a
- 🐭 **village sanitation plan**
- 🐭 and a
- 🐭 **rodent trapping plan.**

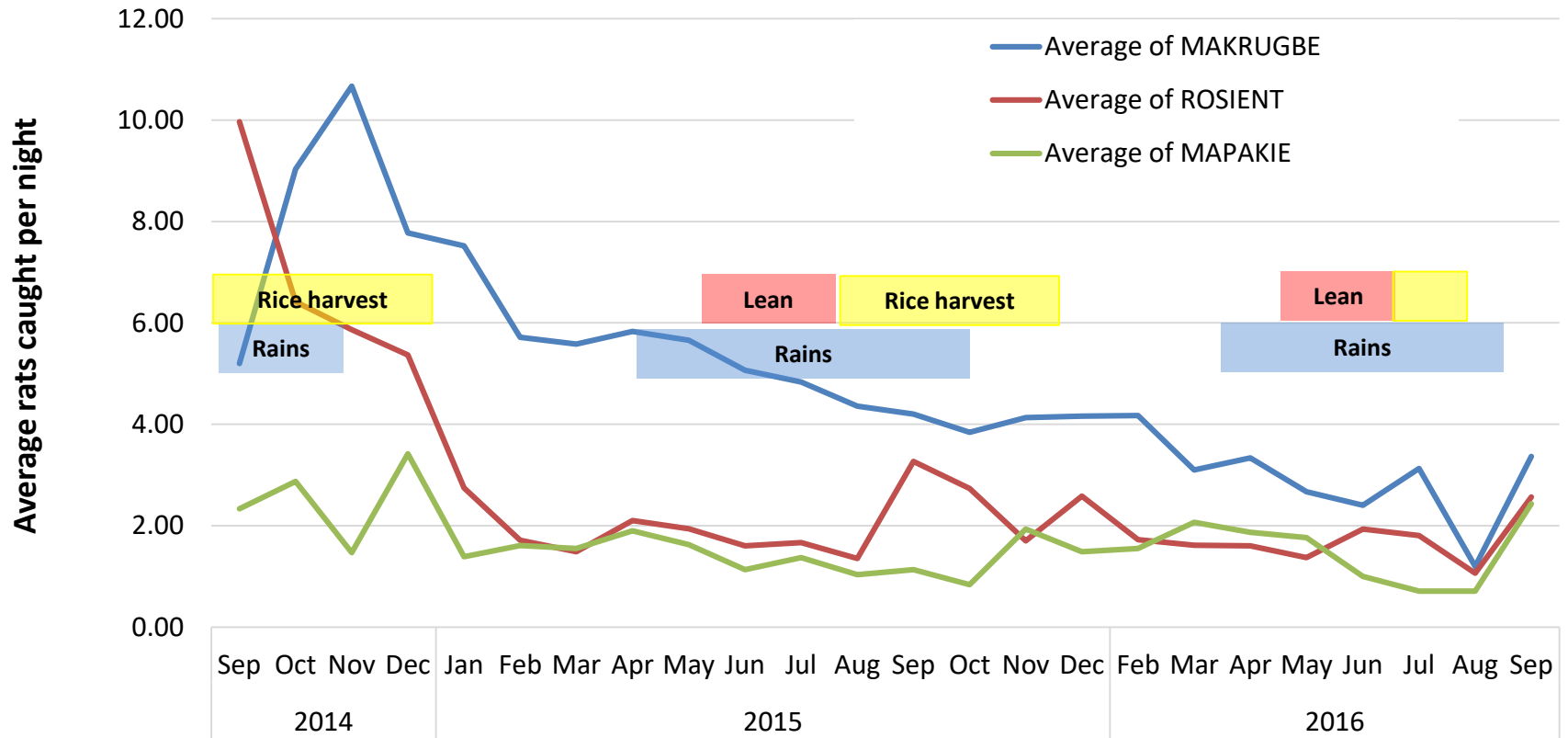
Trapping Plans: High Intensity trapping

- 🐁 The fastest option (**High intensity trapping**) is to provide every household in the village with a good quality break-back rat trap @ €1-2.
- 🐁 The traps should be set every night using any kind of fresh food as bait.
- 🐁 Bait made from fish or a mixture of peanut butter and food grains, banana, mango or any leftover food works well in most countries.
- 🐁 In the morning the dead rats are taken to the Community Rat Monitor for counting.

High Intensity nightly trapping in three communities over the length of the project (June 2014 to August 2016)



High Intensity nightly trapping showing seasonal trends (September 2014 to August 2016)

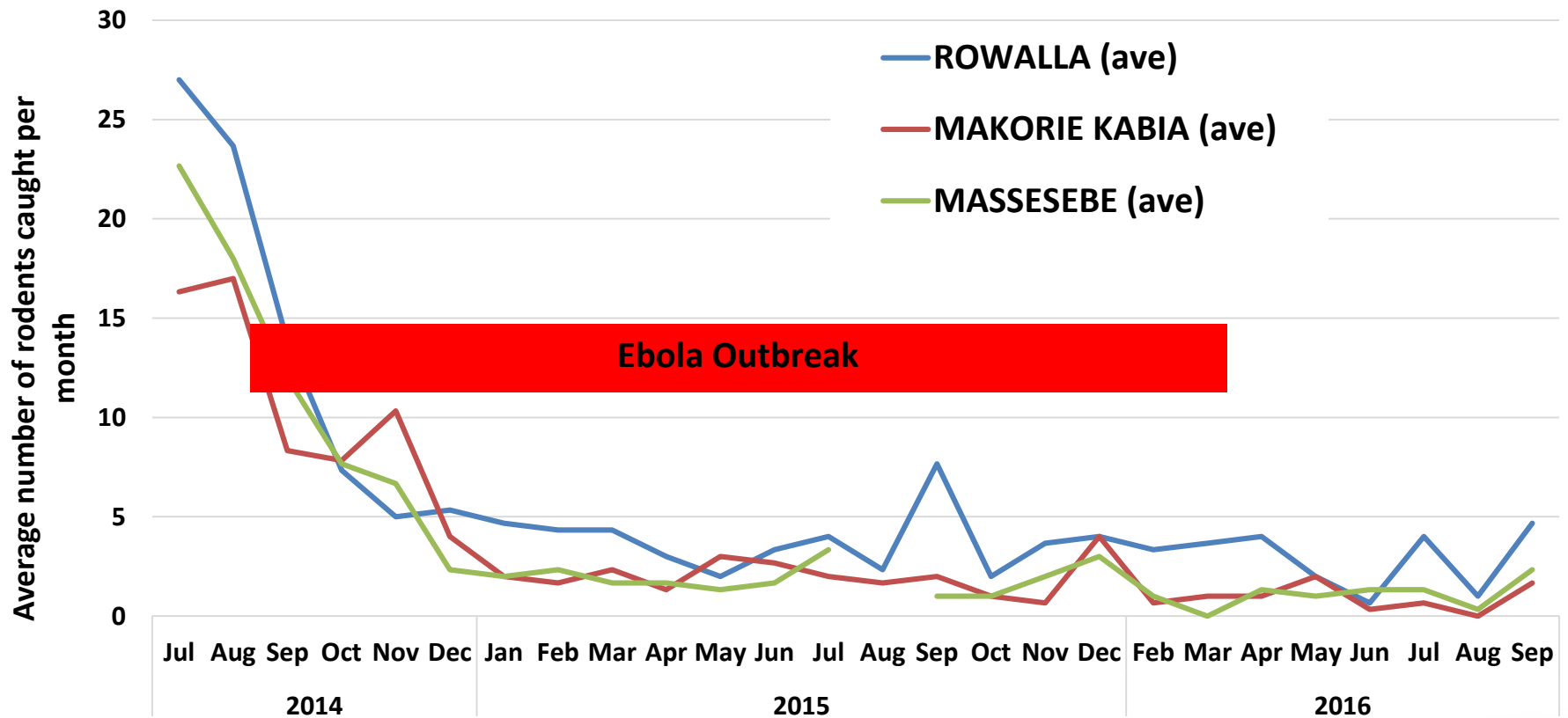


seasonal trends in rodent populations

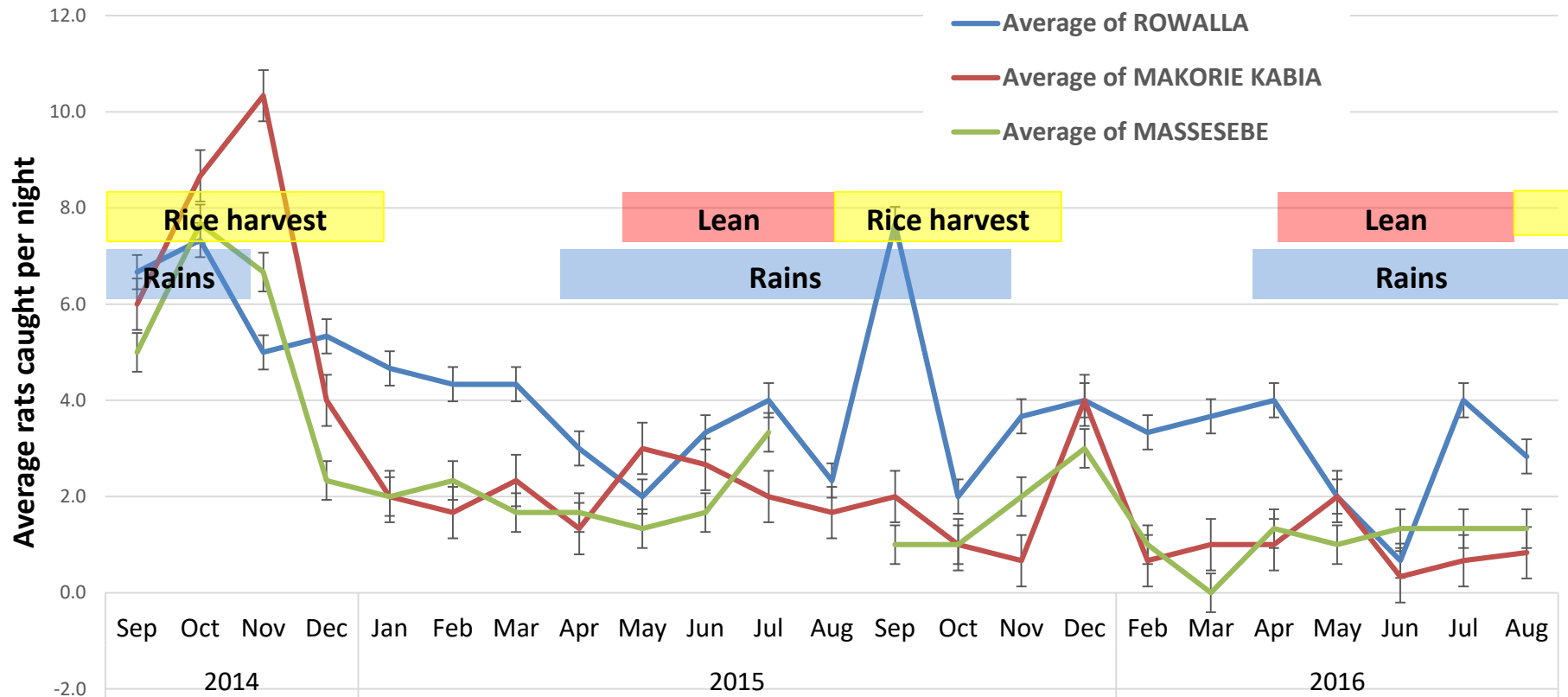
Trapping Plans: Low Intensity trapping

- 🐭 **Low intensity trapping:** ten households in each village trapped rodents for 3 nights each month.
- 🐭 Low intensity trapping controlled the rodent population (figure 10) though it took five or more months to achieve a similar level of control to intensive trapping.
- 🐭 These results suggest a “Herd Immunity” type effect, i.e. not all the households in a community have to be part of the rodent control project for the community to benefit from the project.

Low Intensity monthly trapping in three communities in Sierra Leone, July 2014 to September 2016



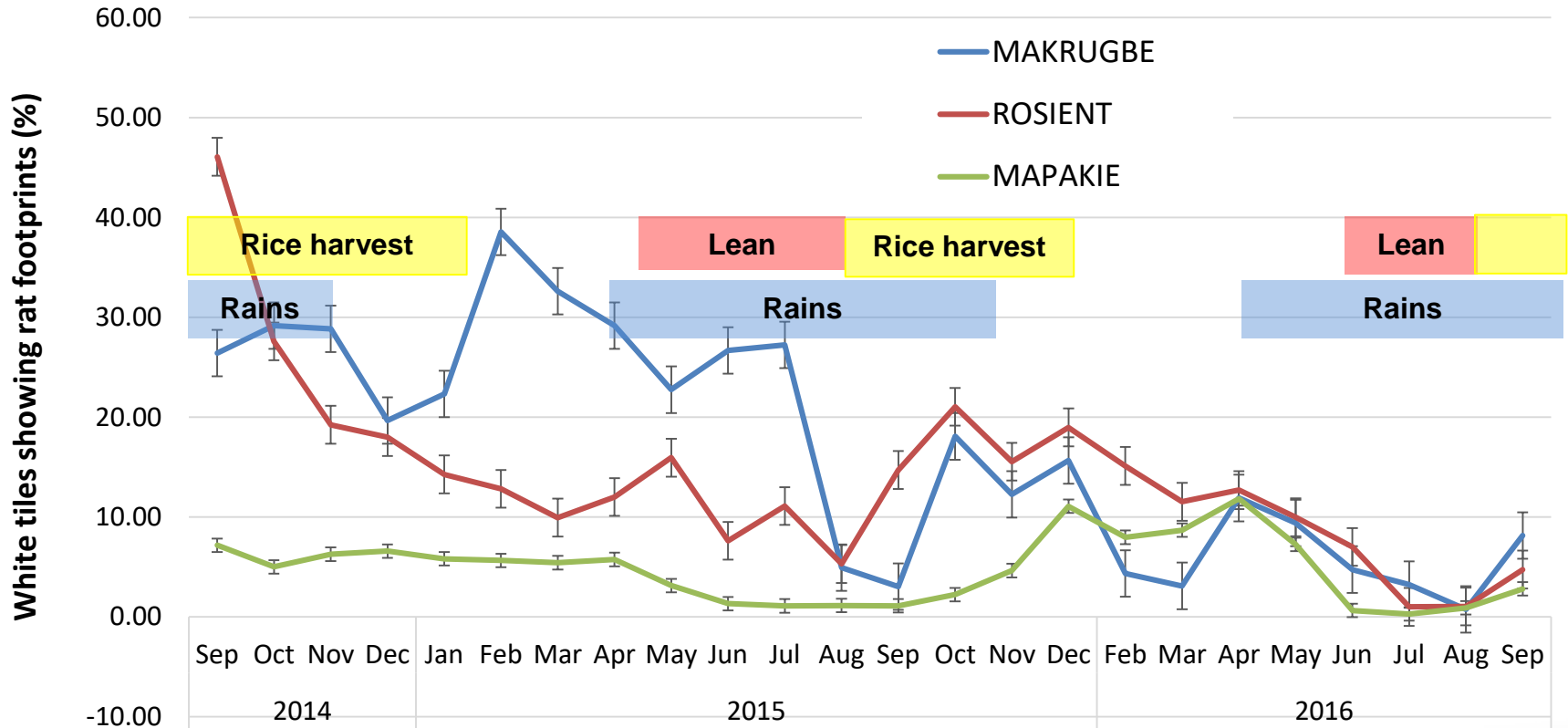
Low intensity monthly trapping intensity showing seasonal trends (September 2014 to August 2016)



How Successful are the traps?

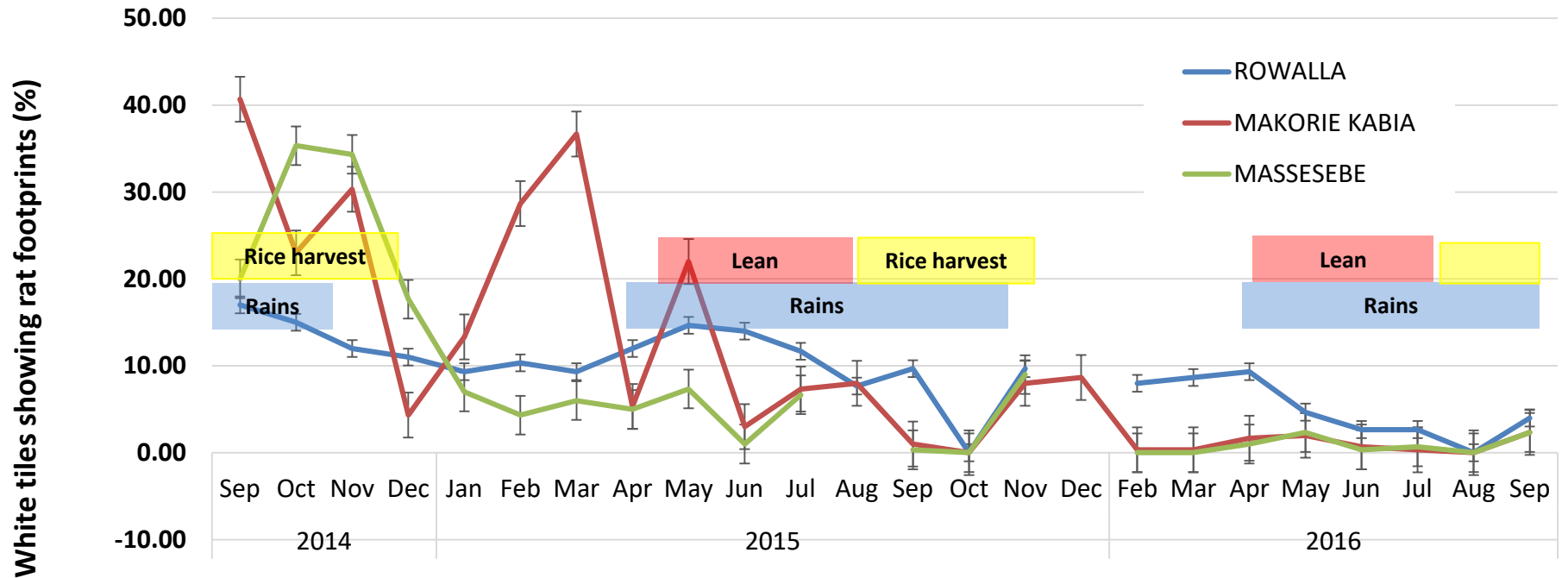
- 🐭 The **big question** is: have rodent populations really declined or have the rodents learned to avoid the traps?
- 🐭 This can be tested by supplying every household with a small (25cm x 25cm) white ceramic (bathroom) tile, which is smoked every day.
- 🐭 The tile is left in the house on a rat route. In the morning any rodent footprints will show up as white marks on the tile.
- 🐭 The tiles can be used to assess simple presence or absence of rodents or the Rodent Monitors can be provided with a grid to help record the % of the tile with rat footprints.
- 🐭 The tiles can also be used to find rat paths and the best places to set the traps.

Monthly averages for the percentage of white tiles showing rat footprints in each in villages with high intensity trapping



% of white tiles showing rat footprints in villages with high intensity trapping

Monthly averages for the percentage of white tiles showing rat footprints with low intensity trapping showing seasonal trends (September 2014 to August 2016)



% of white tiles showing rat footprints in villages with low intensity trapping

Camera traps

- 🐭 Triggered by movement. Photos or video clips under infra-red light.
- 🐭 Provide insights into the behaviour of rodents.
- 🐭 Are rodents avoiding the bait, using unexpected routes?
- 🐭 How do predators like cats hunt rodents?
- 🐭 \$150-400 Bushnell
<https://www.trailcampro.com/collections/bushnell-trail-cameras>,



Crop Storage

- 🐭 Improving crop and food storage is an essential part of rodent control.
- 🐭 woven polypropylene sacks provide no protection from rats (or insects).
- 🐭 Traditional grain drying platforms and storage bins can be made rat-proof by raised the bins on a platform with legs fitted with metal rat guards
- 🐭 Wooden rice storage bins can be rat-proofed by lined with roofing sheet off-cuts.

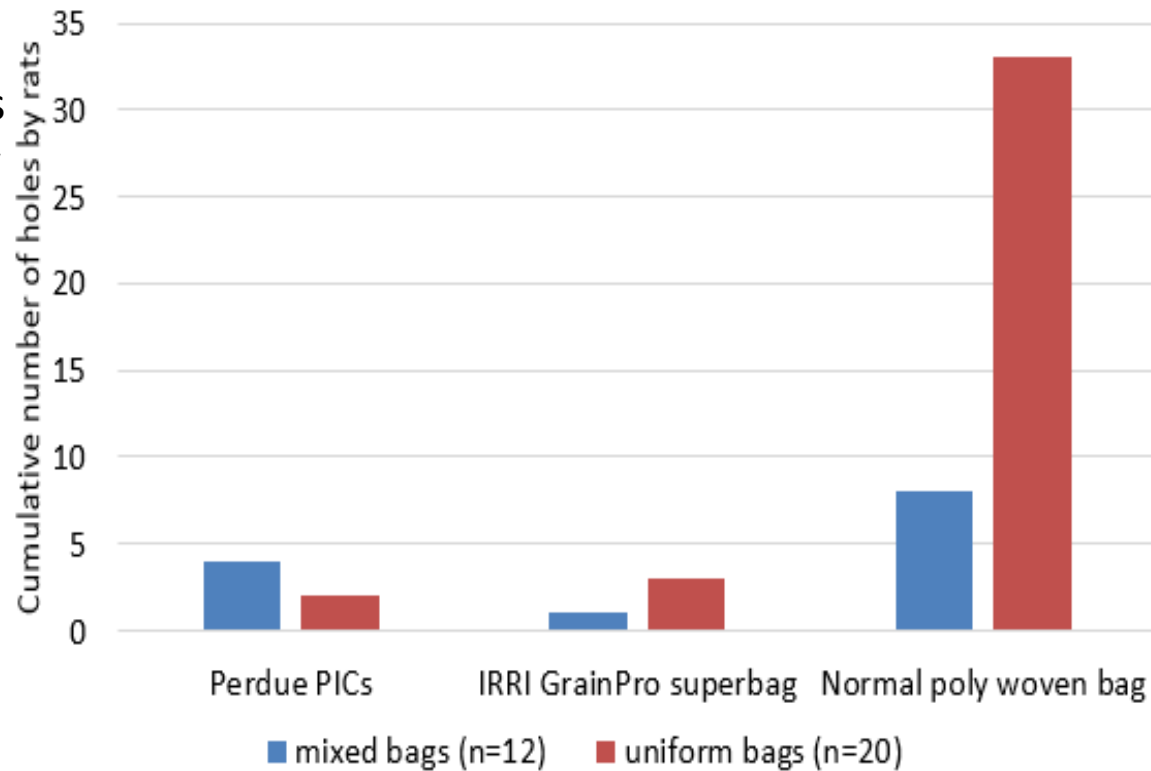
Holes caused by rodents in bags containing maize after four months in storage in Berega village, Central Tanzania



hermetic storage bags.



Though none of these systems is rodent proof (rats can easily chew through the material of the bags), studies from Tanzania show very low levels of rodent damage to hermetic storage bags – presumably because the rodents cannot smell the grain inside.



Video clips on rodent control

Set of video clips for training farmers on rodent control:

<https://youtu.be/sGjL544acCM>

<https://www.youtube.com/watch?v=sGjL544acCM&feature=youtu.be>

<https://www.youtube.com/watch?v=6NT3rhFp6L8>

<https://www.youtube.com/watch?v=uYB3pluS1Fw>

<https://www.youtube.com/watch?v=XyQLCMCVWJY>

<https://www.youtube.com/watch?v=aPVaZuVlvZ4>

These video clips have been compressed (60-80 MB) so that you can download and save the file onto your phone to show farmers in the field.

https://www.dropbox.com/s/8lvkn4onvs0umb2/StopRats_ENGLISH_smartphone.mp4?dl=0

https://www.dropbox.com/s/25uig8mrbrxksgs/StopRats_FRENCH_smartphone.mp4?dl=0

https://www.dropbox.com/s/83j48oevhymhs8f/StopRats_KISWAHILI_smartphone.mp4?dl=0

More information can be found at: <http://projects.nri.org/stoprats/>

[And finally.](#)



Sustainable Technologies to Overcome
Pest Rodents in Africa through Science



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