Ecological and biological rodent control

PRELIMINARY RESULTS ON DEVELOPING A BIO-RODENTICIDE AND INTEGRATING EBRM

Total (world)

(Excluding United States, Canada and Australia)

69 Million of of cereals gained (all types, e.g. wheat, rice.)

278.8 Million of extra people nourished

34% of undernourished benefiting

	Million t of cereals gained	Million of extra nourished people	% of undernourished benefiting
Asia	53.32	217.3	39
Latin America	7.84	31.3	60
Africa	5.68	22.7	11
Europe	1.89	7.5	-

Source: Meerburg et al (2008). Data derived from FAOSTAT

Wereda	Watershed	Damage % in 2018/19
Farta	Jamarda	20
	Seharna	25
	Berie Mesk	50
	Fafuatie	25
	Ayk wuha	30
	Alekt wenz	30
	Zanti	40
Guna Begiemider	Meher	25
	Chimchimit	20
	Wonbi	45
	Ata	25
	Golye	30
	Anba wenz	50
Average		**30**

Example for Amhara, Ethiopia

An estimated 9-44% of pre-harvest yield loss in annual production to wheat and barley crops (Meheretu et al., 2010)

- Looking at malt barley, food barley and wheat combined, a **15% production loss** due to rodents, represents a **105-230 euro per ha** monetary devaluation of produce.
- Given 1.75ha average land size → average loss of **184-403 euro per farmer.**
- For wheat average yield e.g. of 2700 kg/ha, considering 15% increase, this means **405 kg/ha increase**, raising net production to 3105 kg/ha.

➢ This is a substantial contribution to food security at national level and at farming household level.

The impact

Improve primary crop production and quality

Improve health of food crops and households (reduce rodent vectored diseases)

Ensure sustainable use of resources

Create business opportunities

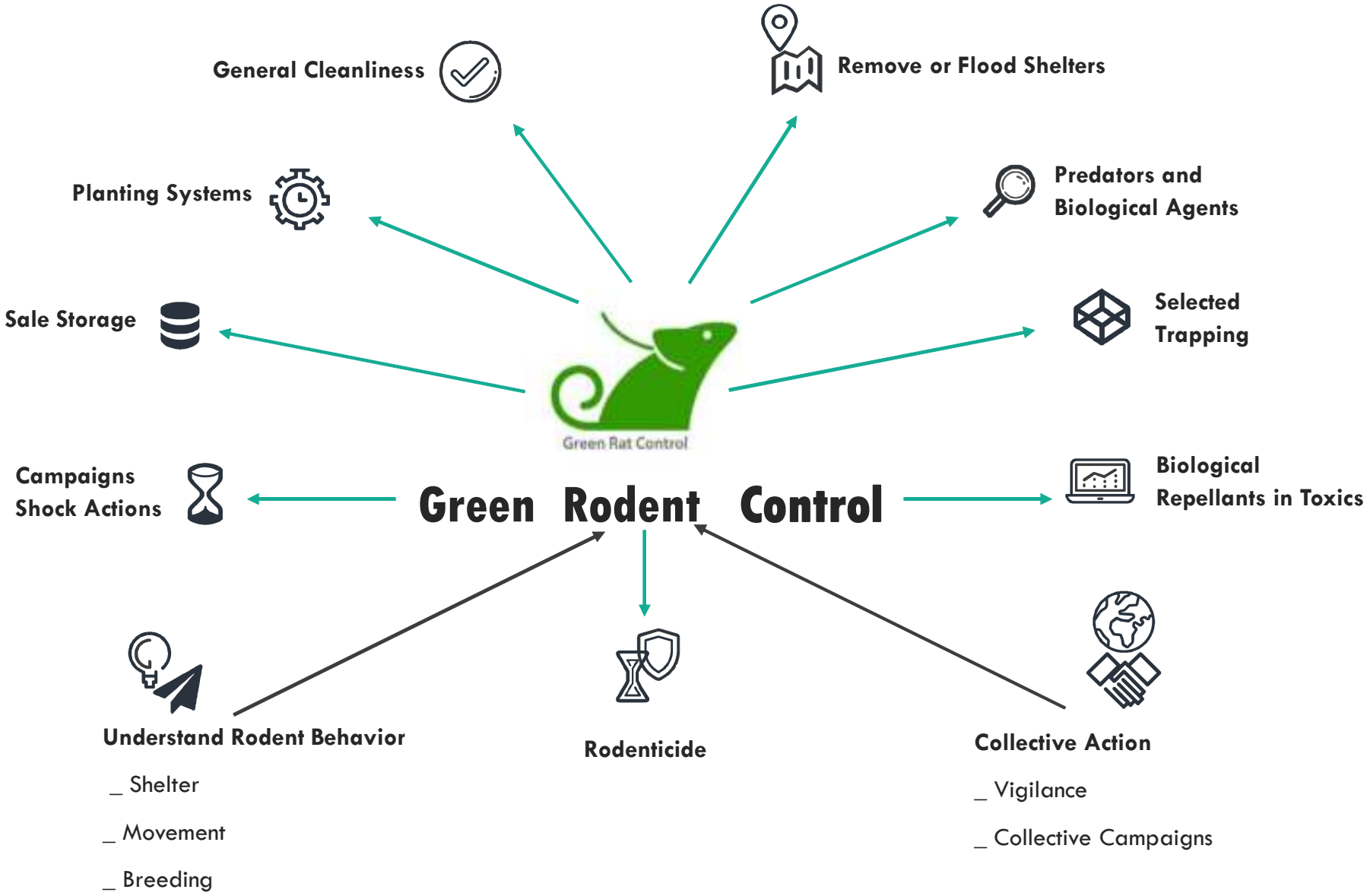
Urgency for bio-based rodent control

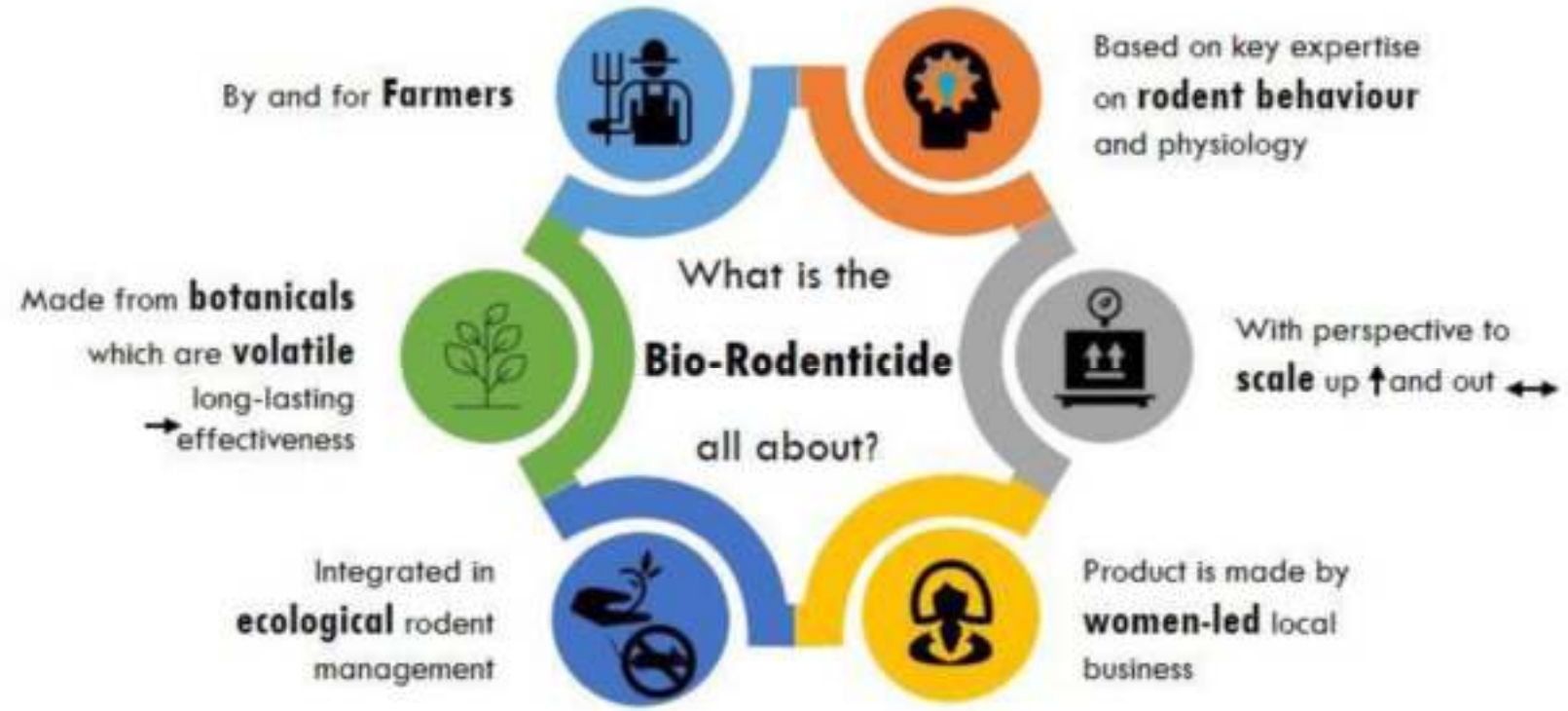
WATER CONSERVATION MEASURES → RAT ABUNDANCE

INDIVIDUAL MANAGEMENT = INSUFFICIENT

EXISTING CHEMICALS NO LONGER EFFECTIVE

LACK OF NEW PRODUCT DEVELOPMENT


General Cleanliness
Remove or Flood Shelters
Planting Systems
Predators and
Biological Agents
Sale Storage
Selected
Trapping
Green Rat Control
Campaigns
Shock Actions
Green Rodent Control
Biological
Repellants in Toxics
Understand Rodent Behavior
_ Shelter
_ Movement
_ Breeding
Rodenticide
Collective Action
_ Vigilance
_ Collective Campaigns



The alternative – a Bio-Rodenticide

Development pathway

FIELD TRIALS

LAB TRIALS

SOCIAL BUSINESS MODEL

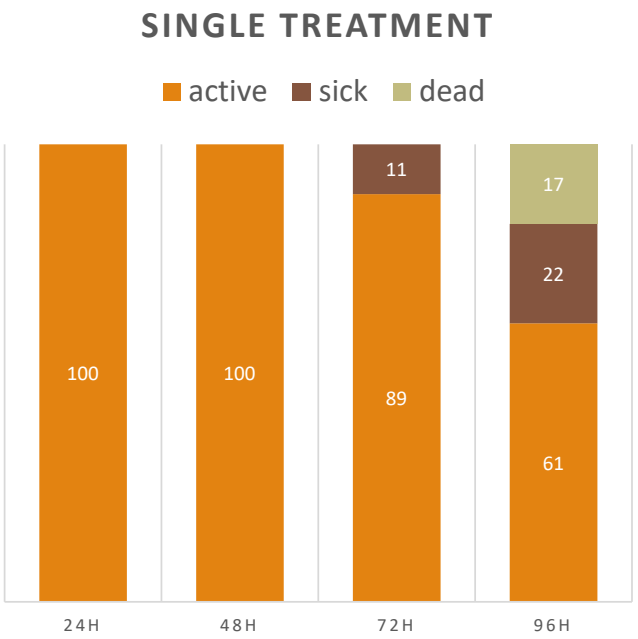
PATENTING

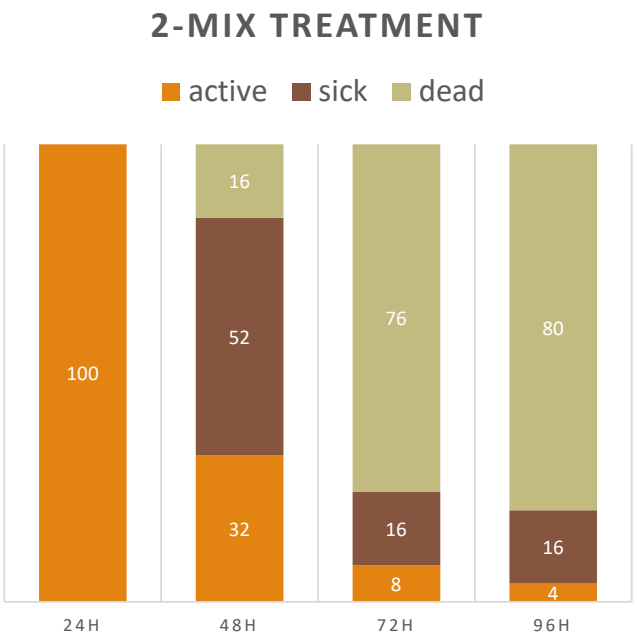
OFF-THE-SHELF PRODUCT

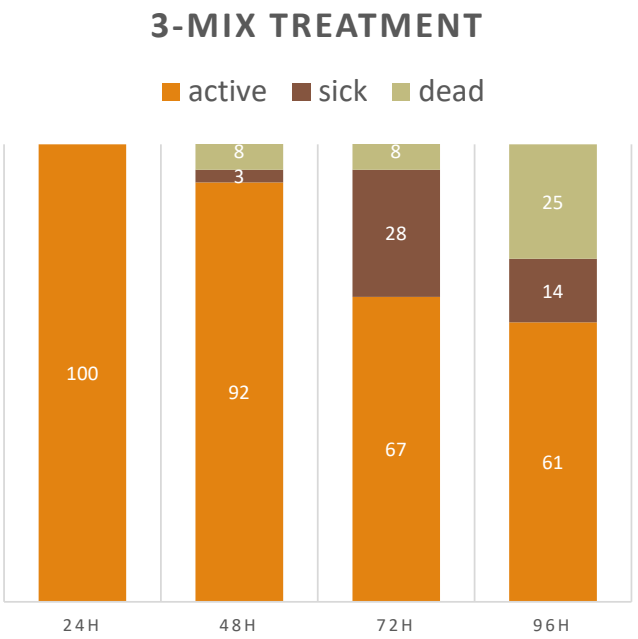
Field findings

- Presence of 3 pest species confirmed (Mastomys a., Arvicanthis a. and Rattus Rattus)
- 75-80% cases of rats eating the treatments
- Dead rats observed – died from sickness
- Treatments did not kill instantaneously
- Rats are cautious in approaching the treatments
- Treatments become less attractive over time

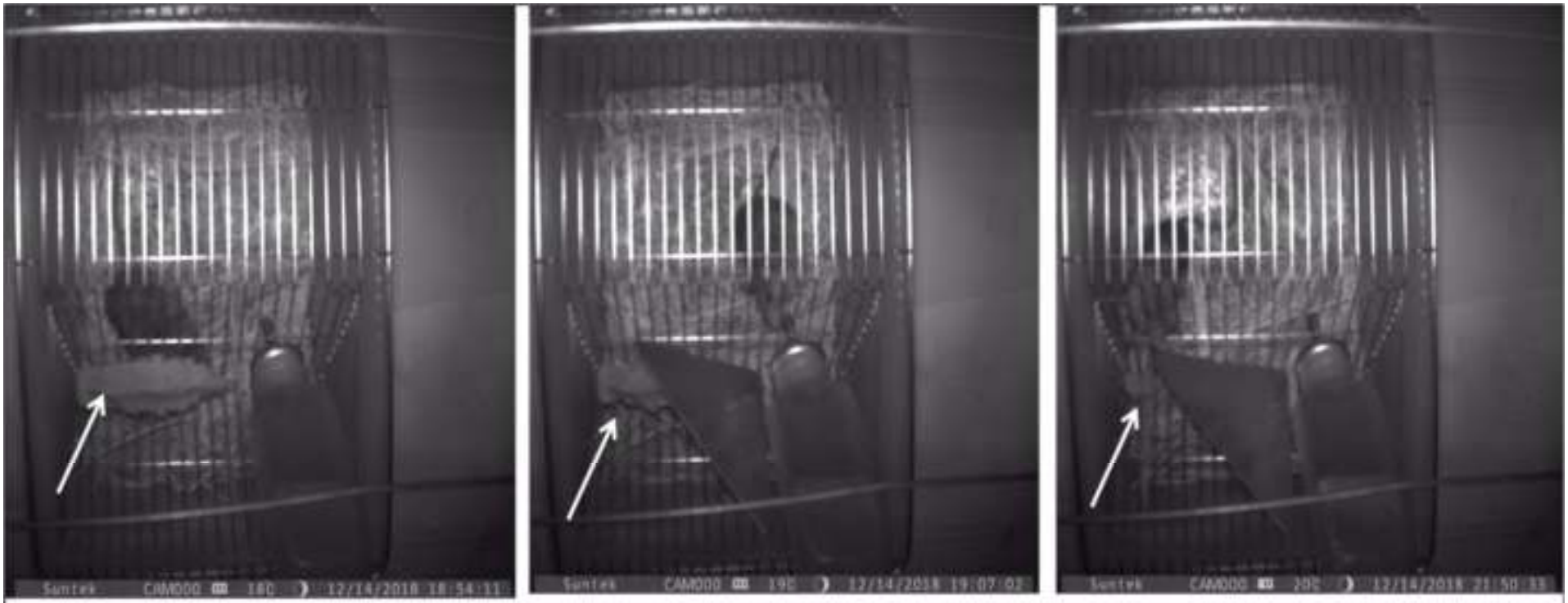
Lab findings







- 90-100% of rats was eating the treatments
- Synergy of 2 botanicals in one treatment has highest lethal potency
- Effect on rats goes beyond the differences of rat species



Time series feeding activity of *M. awashensis* rat on [redacted] juice/fresh. Cage # 11, camera # 8.

Further testing bio-rodenticide

- Testing rat physiology
- Investigate possible association of rats to the treatment
- Investigate most desired effect + timing of the effect
- Determine lethal dose
- Determine active ingredients in botanicals

- Support setting up of local business:
  - Nurseries
  - Rodent control promotors selling/ preparing bio-rodenticide and other products (hermetic bags, traps)
- Combine with EBRM campaigns

PRACTICAL GUIDELINE

Effectively Controlling Rats with Ecological Methods

EBRM Campaign

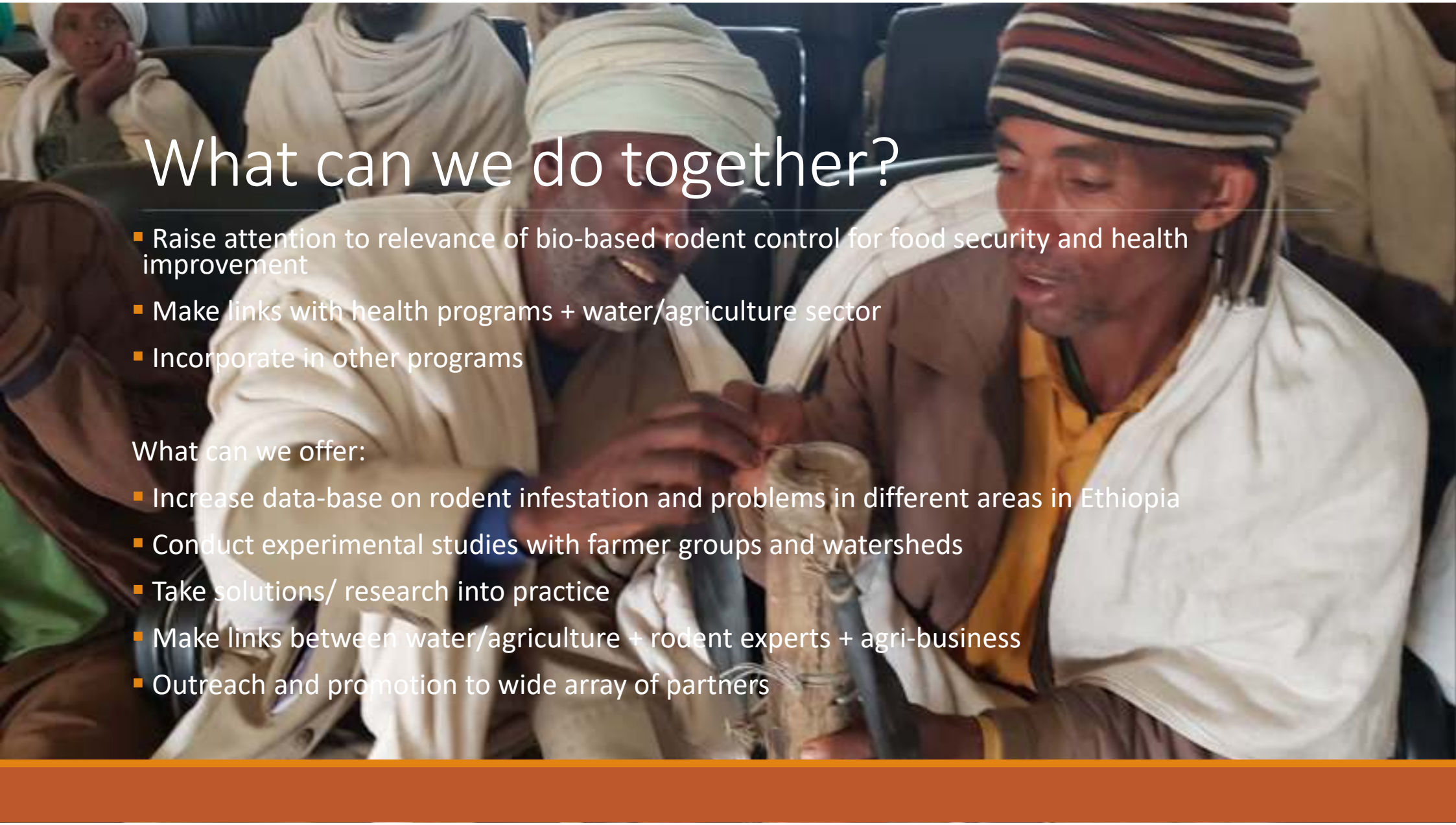
- By the Amhara Bureau of Agriculture
- Working with watershed committees in 16 highly affected watersheds
- Two day training
- Range of measures: agronomic measures, destroy habitats, block movement, better storage, predators, trapping, etc.
- Monitoring
- Horizontal learning (exchange, awards)

Name of watershed	Measures for rat control					
	Controlling the environment in the agricultural fields					
	Destroy rat habitats by flooding, burning or ploughing the land where they take shelter			Keep an open strip of land next to the stone bund		
	Plan	Achievement	%	Plan	Achievement	%
Ata/Tebasit	55	13	23	6	3	57
Chimchimit	15	13	87	7	6	86
Golye	107	25	23	22	18	84
Meher	100	106	106	150	55	37
Wonbi	30	22	73	5	6	110
Berie mesk	61	7	11	15	3	22
Fafuat	66	5	7	20	13	65
Jarmeda	75	8	11	98	35	36
Zanti	75	25	33	18	12	67
Alekt wenz	50	50	100	2	2	67
Seharna	52	46	88	75	23	31
Ayk wuha	33	70	214	41	15	37
Region	**719**	**389**	**54**	**458**	**191**	**42**

EBRM first results

Wereda	Name of watershed	Rats Killed in Total		
		In and around home	Outside home	Total
Guna Begie mider	Ata Tebasut	92	243	335
	Chimchimit	510	390	900
	Golye	193	351	544
	Meher	610	820	1430
	Wonbi	550	600	1150
Farta	Berie mesk	465	1250	1715
	Fafuat	1550	540	2090
	Jarmeda	488	700	1188
	Zanti		500	500
	Alekt wenz	140	130	270
	Seharna	102	1271	1373
	Ayk wuha	1950	1840	3790
Region		**6650**	**8635**	**15285**

- Positive attitude by farmers
- Farmers need to be fully aware of collective action and the methods to do so
- More insight in rat movements in different seasons
- Peer to peer review and awarding to boost and credit farmers
- Demonstration of trap barrier system
- Local provision of hermetic bags



What can we do together?

- Raise attention to relevance of bio-based rodent control for food security and health improvement
- Make links with health programs + water/agriculture sector
- Incorporate in other programs

What can we offer:

- Increase data-base on rodent infestation and problems in different areas in Ethiopia
- Conduct experimental studies with farmer groups and watersheds
- Take solutions/ research into practice
- Make links between water/agriculture + rodent experts + agri-business
- Outreach and promotion to wide array of partners