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REDUCING FOOD LOSS AND IMPROVING AGRICULTURAL ECOLOGY BASED ON PEST RODENT MANAGEMENT IN GUIZHOU

December 2019

SDGs:	1 No Poverty; 2 Zero Hunger; 3 Good Health and Well-Being; 5 Gender Equality
Countries:	People's Republic of China
Project Code:	TCP/CPR/3608
FAO Contribution:	USD 200 000
Duration:	1 March 2018 – 31 August 2019
Contact Info:	FAO Representation in China FAO-CN@fao.org

Implementing Partner

Ministry of Agriculture and Rural Affairs.

Beneficiaries

Farmers in project areas, government, civil society and private sector researchers, subject matter specialists, extension officers/technicians and community facilitators/mobilizers from Yuqing and Sandu Counties.

Country Programming Framework (CPF) Outputs

CPF (2016-2020) Priority area 1: Fostering sustainable and climate resilient agricultural development.
CPF (2016-2020) Priority Area 3. Promoting a one-health approach for improved Public Health.

Background

In recent years, Yuqing County and Sandu County in Guizhou Province have experienced heavy pest rodent damage, leading to severe crop production losses and restricting the development of local agriculture. The occurrence of rat-borne diseases also directly threatens human health. In Yuqing and Sandu Counties, 120 000 people live in poverty in mountainous areas and the presence of pest rodents, combined with low agricultural production, severely impedes poverty reduction.

A long-term management strategy to reduce food loss and protect agricultural ecology by improved pest rodent management is a high priority for the province, not only to protect the livelihoods of poor ethnic minority farmers but also to safeguard agricultural ecology and biodiversity in the area. The aim of the project was to reduce food loss, improve crop production and the livelihoods of farmers, and achieve a more prosperous and sustainable rural economy in the poverty-stricken mountainous areas in Yuqing County and Sandu County in Guizhou Province by introducing improved environmental-friendly rodent management technologies and practices.

Impact

The project has increased resilience to rodent risks through the introduction of improved pest rodent management technology and provision of training. Thanks to the activities of the project, food security has been enhanced and the livelihoods of local farming communities in poverty-stricken mountainous areas in Yuqing County and Sandu County in Guizhou Province have been improved.

Achievement of Results

The presence of rodent pests in the two project counties was monitored for 24 months. Following this, a rodent control technology system was introduced, demonstration sites were established and operational instructions were formulated. Training of trainers (TOT) in pest rodent control and prevention technologies and practices was provided for 30 extension technicians, including ten women, and 15 farmer field schools (FFSs) were organized. A total of 451 farmers, including 286 women, graduated from FFSs with increased knowledge and skills for green rodent management technologies, including the Trap Barrier System (TBS), rodent control technology, poison bait station technology and biological control technology.

The project produced a manual on Integrated Rodent Management Technologies and Operational Guidelines on Green Rodent Prevention and Control in Guizhou Province. These were distributed by TOT graduates to around 20 000 farmers in neighbouring farming communities in 14 counties. Improved rodent control and prevention technologies and practices were also broadcast on radio, television and through cell networks.

A long-term technological strategy to reduce food loss and protect agricultural ecology by improved pest rodent management in rural areas of Guizhou Province was discussed and the Technical Guidelines on Reducing Food Loss and Improving Agricultural Ecology Based on Pest Rodent Management in Guizhou was released in July 2019.

Implementation of work plan

All planned activities were carried out on time and within the original budget. The project was implemented by the Plant Protection and Quarantine Station of Guizhou Province and Guizhou Province Farmland Pest Rodent Research Collaboration Group, under the supervision of the Ministry of Agriculture and Rural Affairs. In consultation with all stakeholders, the project work plan was revised at the inception workshop and activities were undertaken in accordance with the revised work plan. National project consultants provided technical and programme development support, which contributed to mitigating such envisaged risks as a lack of dedicated provincial and local county management, and ineffective or unavailable technologies.

Follow-up for government attention

It is recommended that the TOT and FFSs introduced under the project be further developed, with government funding, to train more extension staff and farmers. Education and advocacy activities for the adoption of the new rodent management knowledge and technologies should be extended to more farmers. Finally, a regular and long-term technology system for rodent management should be fostered in the rural areas of Guizhou Province.

Sustainability

1. Capacity development

After the completion of the project, the project results will be extended through collaboration between Guizhou Farmland Rodent Control Network and TOT trainees, while FFS methodologies will continue to be used to extend the improved pest rodent control technical system. This will ensure the long-term effect of the project results. From an institutional point of view, linkages have been strengthened among the National Agro-tech Extension and Service Centre, the Ministry of Agriculture and Rural Affairs, China Agriculture University, Chinese Academy of Sciences, Sichuan university, Guizhou Provincial Plant Protection Station and Guizhou Farmland Rodent Control Network. This will also contribute to the sustainability of the project results.

2. Gender equality

Concrete measures were taken to incorporate gender equality in the implementation of project activities. Priority was given to women when selecting participants for all project activities; the percentages of women participants were 33.3 percent, 63.41 percent, 60.5 percent and 56.67 percent in, respectively, TOT, FFSs, educational and advocacy activities, and the Field Day.

3. Environmental sustainability

Environmental and ecological protection as well as biodiversity were taken into full consideration in rodent control. Green and ecological rodent control methods were promoted under the project. These new technologies greatly reduced the use of chemical rodenticides, improving agricultural ecology safety and avoiding pollution to the environment.

4. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

The integrated rodent control technologies and methods introduced by the project have reduced food loss, improved crop production and the livelihoods of farmers, and contributed to a more prosperous and sustainable rural economy. Farmers' awareness of, and capacity for, pest rodent management have been significantly improved, along with the awareness and capacity of local stakeholders to protect agricultural, ecological and environmental safety using new technologies.

5. Technological sustainability

The sustainable rodent control technologies and methods introduced by the project are suitable for both farmlands and farmhouses in Guizhou Province. TBS technology, for example, could effectively reduce rodent density by 82.41 percent. These technologies have been well accepted by the farmers and will be further extended in the future.

6. Economic sustainability

The International Cooperation Department of the Ministry of Agriculture and Rural Affairs provided CNY 300 000 and Guizhou Province Agricultural Commission another CNY 200 000 as counterpart funding to support project implementation. After the end of the project, Guizhou Provincial Rodent Control Network will continue to mobilize resources to extend the technologies developed by the project, while the training manuals and leaflets on integrated rodent control methods will continue to be distributed free of charge to local farmers. Finally, the bait station rodent control technology developed by the project has a low cost (4 yuan per mu) and offers good control with a decrease of more than 80 percent in rodent population density.

Documents and outreach products

- Project inception workshop report. March 2018. 16 pp.
- Report on training of trainers. June 2018. 13 pp, excluding annexes.
- Report on farmer field schools. October 2018. 17 pp, excluding annexes.
- Report on Field Day, educational and advocacy activities and cross-visit. July 2019. 5 pp.
- Baseline and impact assessment report. August 2019. 11 pp.
- Report on project final review workshop. August 2019. 10 pp.
- Manual on Integrated Rodent Management Technologies (in Chinese).
- Information note on Operational Guidelines on Green Rodent Prevention and Control in Guizhou Province (in Chinese).
- Technical Guidelines on Reducing Food Loss and Improving Agricultural Ecology Based on Pest Rodent Management in Guizhou (in Chinese).

- Manual on Integrated Rodent Management Technologies (in Chinese).
- Information note on Operational Guidelines on Green Rodent Prevention and Control in Guizhou Province (in Chinese).
- Technical Guidelines on Reducing Food Loss and Improving Agricultural Ecology Based on Pest Rodent Management in Guizhou (in Chinese).

Achievement of results - Logical framework

Expected Impact	Increased resilience to rodent risks, enhanced food security and improved livelihoods of local farming communities in poverty-stricken mountainous area in Yuqing County and Sandu County in Guizhou Province	
Outcome	Reduced food loss and improved agricultural ecology with the introduction of a set of improved environmentally friendly rodent management technologies and practices, coupled with increased awareness and capacities of local farmers, agricultural technology extension staff and policy-makers in designing, implementing and extending the introduced rodent control technologies and practices to most farmers in Guizhou Province	
	Indicator	– Reduced rodent density in rural areas. – Reduced damage loss rate by rodents on major crops. – Economically and ecologically sustainable crop production.
	Baseline	– The average density of field rodents for one year pre- and post-implementation of the project, respectively. – The average damage loss rate caused by rodents for one year pre- and post-implementation of the project, respectively. – Crop production has become uneconomical in these two counties because of food loss caused by pest rodents.
	End Target	– Reduction and control of pest rodents. – Minimized food loss caused by pest rodents. – Increased farmers' income, and improved food safety and ecology sustainability.
	Comments and follow-up action to be taken	– Thirty extension staff, including ten women, graduated from season-long TOT on pest rodent control and prevention technologies and practices. – Fifteen FFSs established and training provided to 451 farmers, including 286 women, in six counties of Guizhou Province. – TBS rodent control technology, poison bait station technology and biological control technology integrated into a set of rodent control technology systems in rural areas for pest rodent management. A total of 9 000 mu (about 150 ha) of farmland established for demonstration of TBS technologies and 44 300 mu (about 2 953 ha) for demonstration of refined poison bait technologies. – Rodent density in the fields decreased from 6.65% to 1.17% on average in the two pilot counties. Use of chemical rodenticides reduced by 39.05%. Follow-up actions to be taken: – Further develop TOT and FFS to train more extension staff and farmers with funding from government budget. – Further extend educational and advocacy activities to farmers for the adoption of the developed rodent management knowledge and technologies. – Foster a regular and long-term technology system on rodent management in the rural areas of Guizhou Province.

Output 1	Rat monitoring and forecast, and baseline survey of farmers' food loss and technology needs		
	Indicators	Target	Achieved
	Regular monitoring on pest rodent and food loss.		Yes
Baseline	0		
Comments	Pest rodents were monitored and reported for 24 months/times in the two project counties in 2018.		

Activity 1.1	Establish pest rodent monitoring site in Yuqing County and Sandu County to collect data and specimens of rats in residential areas, paddy fields and dry land areas monthly. Understand species, distribution and regularity of outbreak of pest rodent in these two sites. Establish pest rodent monitoring and forecast report system and database	
	Achieved	Yes
	Comments	24-month monitoring was conducted on pest rodents in 2018 in Yuqing and Sandu Counties.
Activity 1.2	Conduct baseline survey to collect data on previous rodent situation, food loss, crop yield, farmers' income, deratization technology needs, and other related technological and socio-economic information	
	Achieved	Yes
	Comments	Baseline survey was conducted to collect data on previous rodent community situation, rodent damage and rodent management technology needs. Face-to-face interviews were conducted with 60 local farmers, collecting information about rodent occurrence in the house and cropland, storage food loss caused by rodents, crop yield, farmers' income, rodent management technology needs, and other related technological and socio-economic information. Impact assessment was conducted at the end of the project to compare the results.
Activity 1.3	Organize inception workshop to develop and update work plan for extension, communication and implementation. Give suggestions on pest rodent management based on local situation	
	Achieved	Yes
	Comments	The inception workshop was conducted in Yuqing County, Guizhou Province, on 30-31 May 2018 and attended by 52 representatives of all concerned stakeholders. A project implementation plan was discussed and agreed among project stakeholders.

<table>
<tr><td rowspan="3">Output 2</td><td colspan="3">Improved poison bait technology and TBS technology for pest rodent control, established demonstration villages and fields, and formulated operational instructions</td></tr>
<tr><td>Indicators</td><td>Target</td><td>Achieved</td></tr>
<tr><td>– A set of improved pest rodent management technologies.
– Field demonstrations planned and implemented to test and verify improved technologies and practices.</td><td></td><td>Yes</td></tr>
<tr><td>Baseline</td><td colspan="3"></td></tr>
<tr><td>Comments</td><td colspan="3">The project integrated TBS rodent control technology, poison bait station technology and biological control technology into a set of rodent control technology systems in rural areas for pest rodent management.</td></tr>
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<tr><td rowspan="3">Activity 2.1</td><td colspan="2">Identify and development suitable poison bait technology and TBS deratization technology for pest rodent control for both Yuqing County and Sandu County based on their differentiated local needs and conditions</td></tr>
<tr><td>Achieved</td><td>Yes</td></tr>
<tr><td>Comments</td><td>Refined poison bait stations were made for rodent control in farmland and farmhouses.
R-shaped TBS with 20×10 m metal fences and 12 traps and L-shaped TBS with 60 m metal fences and 12 traps were selected for rodent control in farmland in Yuqing County and Sandu County.</td></tr>
<tr><td rowspan="3">Activity 2.2</td><td colspan="2">Select suitable sites, prepare infrastructure, and establish demonstration villages in both Yuqing County and Sandu County to demonstrate improved poison bait technology and TBS deratization technology</td></tr>
<tr><td>Achieved</td><td>Yes</td></tr>
<tr><td>Comments</td><td>An area of 9 000 mu (approximately 150 ha) of farmland was established for demonstration of TBS technologies and 44 300 mu (around 2 953 ha) for demonstration of refined poison bait technologies. Monitoring results indicate that rat density decreased from 6.65% to 1.17%.
The application of integrated rodent control technologies during the project period not only increased the efficiency of rodent management, but also successfully reduced the use of chemical rodenticides by 39.05%. As a result, food loss in local farming communities was reduced and the local agricultural ecological environment was improved.</td></tr>
<tr><td rowspan="3">Activity 2.3</td><td colspan="2">Formulate poison bait technology and TBS deratization technology operational instruction in mountainous area for safe, environmentally friendly and effective pest rodent management</td></tr>
<tr><td>Achieved</td><td>Yes</td></tr>
<tr><td>Comments</td><td>Operational instruction manual on integrative rodent management and information notes on sustainable rodent control methods in Guizhou agricultural area were compiled.</td></tr>
<tr><td rowspan="3">Activity 2.4</td><td colspan="2">Conduct international study tour to learn successful experiences of pest rodent control, food loss reduction and ecological protection</td></tr>
<tr><td>Achieved</td><td>Yes</td></tr>
<tr><td>Comments</td><td>A group of five members, including policy-makers and agricultural technicians, visited local farms in South Africa and Kenya to learn about and exchange knowledge on the topics of pest rodent control, food loss reduction and ecological protection. A relevant network was built and potential cooperation was discussed.</td></tr>
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Output 3	Training of trainers for 30 extension staff on pest rodent control and prevention technologies and practices		
	Indicators	Target	Achieved
	30 agricultural extension staff members trained at county and township levels.		Yes
Baseline	0		
Comments	Season-long TOT was conducted from April to June 2018 for extension technicians. Test scores showed a significant increase in participants' knowledge.		

Activity 3.1	Develop training courses for TOT and conduct trial training, highlighting agro-ecological system analysis (AESA)	
	Achieved	Yes
	Comments	Training curricula were developed for TOT, aimed at raising awareness and capacities of local farmers, agricultural technology extension staff and policy-makers in designing, implementing and extending improved rodent control technologies and practices. The training covered rat identification and monitoring, rat ecology and integrated management, AESA and FFS facilitation skills.
Activity 3.2	Conduct season-long TOT for 30 extension staff on improved pest rodent control and prevention technologies and practices	
	Achieved	Yes
	Comments	Season-long TOT was conducted from April to June 2018 for 30 extension technicians, including ten women. Three sessions of training were organized for a total of 22 days.
Activity 3.3	Conduct review of the training programmes	
	Achieved	Yes
	Comments	Thirty participants took part in each session of the training. Tests were undertaken before and after training. Test scores showed that participants' knowledge increased from 51 before training to 87 after training, indicating significant improvement. Qualitative reflection and evaluations were also conducted after training. Trainees demonstrated clear improvement not only in technical skills but also in presentation and communication skills critical to organizing FFSs.

Output 4	Farmers' training, directly by FFS, and farmers' exposure, indirectly by visit to demonstrated field practices		
	Indicators	Target	Achieved
	– Training curricula developed. – 15 FFSs held. – 450 farmers participated in FFSs.	Improved awareness and skills of rodent management in farmhouses and farmlands.	Yes
Baseline			
Comments	From April to October 2018, 15 FFSs were organized. Five sessions of training were conducted for each FFS. FFS graduates showed increased knowledge and skills in green rodent management technologies.		
Activity 4.1	Develop training plans for Yuqing County and Sandu County and FFS training manual on improved pest rodent control and prevention technologies and practices for food loss reduction and agricultural ecology protection, and mainstreaming AESA practices		
	Achieved	Yes	
	Comments	The FFS curriculum was developed by national consultants and TOT graduates based on training needs identified alongside the baseline survey.	
Activity 4.2	Organize 15 FFSs involving 450 farmers		
	Achieved	Yes	
	Comments	A total of 451 farmers, including 286 women, was identified for FFS training, which focused on awareness of rodent management, improved pest rodent control and prevention technologies and practices for food loss reduction and agricultural ecology protection, and mainstreaming AESA practices. Test scores test increased from 75.40 before training to 93.36 after training.	
Activity 4.3	Conduct awareness campaign and educational activities by holding Field Day activity, inviting 150-200 farmers to observe results and share experiences		
	Achieved	Yes	
	Comments	A total of 150 participants took part in the Field Day on 17 May 2019, including TOT graduates, FFS graduates, technicians, government officials and farmers from neighbouring communities. Exhibited at the Field Day were the improved pest rodent management technology and sustainable rodent control methods, including various TBSs, poison bait stations, and traps.	

Output 5	Resource materials on improved rodent control and prevention technologies and practices incorporating operational instruction developed to reach at least 20 000 farmers		
	Indicators	Target	Achieved
	– Brochures, leaflets, videos, manuals and other training materials and technical reports prepared, published and disseminated. – Full participation of all stakeholders in preparation, review and finalization of content and format of resource materials.		Yes
Baseline	0		
Comments	Manuals on Integrated Rodent Management Technologies and information notes named Operational Guidelines on Green Rodent Prevention and Control in Guizhou Province prepared and distributed by TOT graduates to farmers in 14 counties in Guizhou. Improved rodent control and prevention technologies and practices were broadcast through radio, television or cell networks.		
Activity 5.1	Prepare training curricula and resource materials on rodent control and prevention technologies and practices incorporating operational instructions		
	Achieved	Yes	
	Comments	The Manual on Integrated Rodent Management Technologies and the information note on Operational Guidelines on Green Rodent Prevention and Control in Guizhou Province were compiled with the support of the national consultants. Both the manual and information note included concise information and detailed illustrations of green rodent management technologies that could be easily understood and operated by local farmers.	
Activity 5.2	Produce materials for communication of knowledge and information – pamphlets, posters, training videos and programmes for telecast through radio, television or cell networks		
	Achieved	Yes	
	Comments	A total of 10 000 copies of manuals on Integrated Rodent Management Technologies and 20 000 copies of information notes named Operational Guidelines on Green Rodent Prevention and Control in Guizhou Province prepared and distributed by TOT graduates to around 20 000 farmers in neighbouring farming communities in 14 counties in Guizhou. The distribution activities were organized in the forms of small meetings, on the occasion of local markets and through door-to-door visits to households Improved rodent control and prevention technologies and practices were broadcasted through radio, television or cell networks.	
Output 6	Long-term management strategy on food loss reduction and agricultural ecology protection by improved pest rodent management		
	Indicators	Target	Achieved
	Provincial and county-level plan for long-term management strategies		Yes
Baseline			
Comments	An expert consultation forum on rodent management in Guizhou Province was held. Based on project results, a long-term technological strategy on food loss reduction and agricultural ecology protection by improved pest rodent management in the rural areas of Guizhou Province was discussed. The Technical Guidelines on Reducing Food Loss and Improving Agricultural Ecology based on Pest Rodent Management in Guizhou were released in July 2019.		
Activity 6.1	Organize county level expert consultation seminar		
	Achieved	Yes	
	Comments	On 26-28 June 2019, an expert consultation forum on rodent management in Guizhou Province was held in Yuqing County.	

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Business Development and Resource Mobilization Division (PSR)

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