

Better Rice Initiative Asia (BRIA) Vietnam: Promotion of Integrated Pest Management in Rice in the provinces Dong Thap, Kien Giang, Hau Giang

Final Report

Project period: 1 June 2015 to 31 December 2017

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Summary

In the Mekong Delta, plant-hopper outbreaks continues to be a major issue and risk in rice production. It is to a large extent due to overuse and poor management of pesticides. This IPM project has been designed to meet this challenge. The aim has been to set up a project that trains farmers and also pesticide retailers in IPM, responsible pesticide use and responsible promotion of products. The project has been implemented from 2015-17 in close collaboration with the Plant Protection Department under the Ministry of Agriculture and Rural Development including the Southern Regional Plant Protection Center, and Departments of Agriculture and Rural Development in the three provinces of Hau Giang, Dong Thap, and Kien Giang.

During the first phase, existing IPM curricula and training material was reviewed in close collaboration with Cuu Long Rice Research Institute. Based on this to new IPM training manuals have been developed, one for farmers and one for retailers, focusing on the current issues and challenges in rice production in the Mekong Delta. To support the training activities, additional booklets and leaflets for farmers have been developed. Training of trainers was organised for 39 technical staff (30 master trainers and 9 substitutes) of the provincial Plant Protection Sub-Departments.

During the second phase, almost 14,000 farmers (15% women) have been trained by the project in the three provinces – 3,000 directly by the master trainers and 11,000 indirectly through farmer to farmer training. Additional training has been financed directly by the provinces and third parties including the private sector leading to more than 17,000 trained farmers in total. This has resulted in a reduction of the use of pesticides with between 33-25%, and a much more appropriate and responsible use of pesticides – with the highest impact on the farmers directly trained by the master trainers. There is little doubt that this will significantly reduce the amount and scale of plant hopper outbreaks in the areas under IPM production. Furthermore, it has resulted in an increased income of between 14-18% – also here with the highest impact on the farmers directly trained.

The training of farmers has been reinforced with IPM training for retailers, where the project far exceeded the expectations by training more than 1,000 retailers as compared with the 300 planned. Also a comprehensive IPM awareness campaign has been implemented in order to reinforce and broaden the impact of the project.

The project has been highly appreciated by the Plant Protection Department for its contribution to reviewing and revising the IPM training materials for rice in general, and particularly for the development of the IPM training manual for retailers as well as the booklets for farmers, which are new innovations. This has been adopted as an official part of the National IPM Program. A robust training system for IPM in rice is now in place that has already been adopted and applied beyond the project.

In conclusion, the project has had a strong contribution towards making rice farming more sustainable in the Mekong Delta by improving farmer's income, and at the same time having a positive effect on the environment as well as the health of farmers and consumers.

1. Introduction

Rice is the most important commodity that supports food security and livelihoods for the majority of the world's poor: the majority of rice growers – approximately 80% - are small holder farmers in poor countries who produce primarily for their own consumption, but also to sell in local markets. The vast majority of rice production and consumption is in Asia, which produces more than 90% of the world's rice. With increasing populations and greater food demand the importance of rice in helping to feed the world will increase and, essentially, higher production is required from less, or at best, static resources.

The Better Rice Initiative Asia (BRIA) project is a public-private partnership aiming to improve the livelihoods of rural rice farmers through the promotion of sustainable rice production and facilitated market access in Southeast Asia, specifically in Thailand, Vietnam, Indonesia, and the Philippines. The Vietnam component of BRIA has organized interested innovators in taking up the dialogue with the rice sector in accelerating the adaptation process toward improved sustainability. The overarching goal has been to raise farm income and farmers interest in future rice production.

In the Mekong Delta, plant-hopper outbreaks continues to be a major issue and risk in rice production. It is to a large extent due to overuse and poor management of pesticides. This IPM project has been designed to meet this challenge. The aim has been to set up a project that trains farmers in IPM (including the responsible use of pesticides and the use of alternatives, including non-neuro-toxic and biological control agents) and also to train pesticide retailers in IPM, responsible pesticide use and responsible promotion of products. In this way the training messages are re-enforced by the local retailers, as well as other local partners (e.g. the extension services and farmer organisations). The project has been implemented in the three provinces of Hau Giang, Dong Thap, and Kien Giang. It has been implemented in synergy with another public-private partnership with Bayer focussing on establishing and strengthening local public-private partnerships within the rice value chain with emphasis on improving rice quality and market access. These projects have been implemented under the umbrella of the GIZ - ASEAN Sustainable Agrifood Systems Program, which also includes a Biological Control Agents (BCA) component.

2. Objectives

The overall objective of the project is: adoption of Integrated Pest Management to prevent plant-hopper outbreaks in rice through demonstration and training of smallholder farmers and training of pesticide retailers.

The specific objectives are:

- Test and recommend a system for training and extension to avoid or manage plant-hopper and, where relevant, other pest outbreaks and for improved rice productivity that is sustainable in the medium to long term, and that can be adapted and replicated in other areas and regions.
- Improve farmer income by prevention of losses, reducing fluctuations in yields and eliminating unnecessary pest control measures.
- Reduce risks for the health of the farmers by safe use and reduction of pesticide applications, less potential environmental pollution due to using pesticides, and less wastage of resources, e.g. water, by reducing the misuse of pesticides and by good farming practices.

3. Achievement of results

Result 1: A tested system of, and recommendations for, training and extension to avoid or manage plant-hopper and, where relevant, other pest outbreaks and for improved rice productivity that is sustainable in the medium to long term and that can be adapted and replicated in other areas and regions.

Achievement: Both IPM training manuals for farmers and retailers have been published on the website of Plant Protection Department for dissemination use throughout the country, and particularly in the Mekong Delta. For the first time an IPM training manual for retailers have been developed and tested, and has now officially been adopted by the National IPM Program. Hardcopies of both manuals have been distributed to the 22 Sub-Plant Protection Departments of South Vietnam. At the provincial level, DARD in Dong Thap and Hau Giang have decided to use the approach and training material for all IPM activities.

Loc Troi JSC have conducted an IPM ToT for 22 of the technical staff organised by Southern Regional Plant Protection Center applying the methodology and training material as an integrated part of the effort to introduce the Sustainable Rice Platform rice standards in Dong Thap and Kien Giang.

An Giang, Hau Giang and Vinh Long provinces have financed and implemented additional ToTs for Master trainers and training on IPM for farmers and retailers based on the positive project results. This is to a large extent a result of SRPPCs efforts to promote the training system.

Result 2: Availability of training materials on rice IPM for farmers and retailers, which are compiled to become suitable in the Viet Nam context.

Achievement: Based on the IPM concepts, practices and experiences of the last two decades, a new training curriculum has been developed for the intense and structured training of rice farmers and

pesticide retailers as well. A group of local experts from the Cuu Long Delta Rice Research Institute (CLRRI) and the Southern Regional Plant Protection Center (SRPPC) has reviewed the existing training materials from the different open sources. Coordinated and guided by an international expert (entomologist) the group developed 12 modules for the training of farmers and 8 modules for the training of retailers in both Vietnamese and English languages. It must be mentioned that this task was performed by all group members with great enthusiasm and commitment.

The modules serve as the content and didactical guidelines for the Master Trainers, who have been selected by the local partner institutions for carrying out the training activities. The modules cover the following topics depending on the characteristics during the planting season:

Table 1: IPM training modules both farmer & retailer.

No.	Modules for Farmer Training
0	Overview: Effective IPM for rice growers in the Mekong Delta
1	Introduction: Rice Eco-Systems
2	Agricultural inputs: Their responsible and economic use
3	Introduction to Integrated Pest Management (IPM): and plant protection measures at the seedling stage
4	How to be an effective rice doctor?
5	Importance of natural enemies: IPM decision making during the tillering stages
6	Understanding pesticides and their labels: A buyer's guide
7	Responsible pesticide use: The maximum tillering stage
8	Pesticide application and spray calibration
9	Decision making during the panicle initiation to flowering stages
10	Pesticide Management
11	Decision making during milky to ripening stages: Avoiding residues
12	Pesticide transport, storage, handling, first aid and conclusions

No.	Modules for Retailer Training
1	Introduction to responsible pesticide use
2	Understanding pesticide products and their labels: Giving the best advice to customers
3	Pesticide application: Equipment and calibration
4	How to be an effective crop doctor?
5	Pesticide Management
6	Transportation and storage of pesticides
7	Maximising the safe use of pesticides and PPE
8	Better pesticide handling, first aid and conclusions

The curriculum has been printed and published in 2 volumes. The Master Trainers have been equipped with a copy, and provincial Sub-PPDs, SRPPC and national PPD have also received a number of volumes

for their purposes. Additionally, based on the individual training modules, illustrated booklets in easy language have been developed as handouts for the training of farmers. These booklets have been distributed to both members of farmer groups and the individual farmers who joined the farmer to farmer training. Finally, the 18,000 booklets have been delivered to farmer at training classes & farmer field days, village meetings and house visits during the public awareness campaign.

Result 3: 3,000 farmers, organized in groups, will directly be trained by weekly farmer field school activities during the paddy seasons and 12,000 farmers will be indirectly trained from these 3000 farmers.

Achievement: Technical staffs from the provincial Sub-PPDs have been selected for their qualification as Master Trainers. In 2015, an IPM Training of Trainers (ToT) was conducted by the Southern Regional Plant Protection Department. Besides the IPM training modules, the master trainers have been trained in skills including participatory approaches and adult training methods, field practices and training management. The participants were 30 master trainers and 9 substitutes (23% female) from Dong Thap, Kien Giang and Hau Giang provinces.

Following, they have trained 3,042 farmers directly (of which 16% were women) organised in 105 farmer groups during 2015-17. In addition, 10,869 farmers have indirectly been trained by the farmers participating in the farmer field schools. This brings the total number of farmers trained by the project up to 13,911, of which 15% are women.

Table 1: The total of farmers trained during 2015-2017 by the project.

	Sub-PPD	Groups	Farmers	Directly trained	Female		Farmer to Farmer	Female		Total Farmers	Female	
2015-2017	Hau Giang	37	30	1,055	197	21%	3,574	603	16%	4,629	800	17%
	Dong Thap	35	30	1,019	86	9%	3,812	507	13%	4,831	593	12%
	Kien Giang	33	30	968	164	19%	3,483	565	16%	4,451	729	16%
	Total	105		3,042	447	16%	10,869	1,675	15%	13,911	2,122	15%

The training has been conducted in 7 districts in each of the three provinces including 49 villages. With an average of 0.7 ha/household this implies that the area under IPM practice is more than 9,700 ha.

Table 2: Area under IPM practice.

Province	Dong Thap	Hau Giang	Kien Giang	Total
Farmer Groups	35	37	33	105
Number of Districts	7	7	7	21
Number of Villages	15	16	18	49
Directly trained farmers	1,019	1,055	968	3,042
Indirectly trained farmers	3,812	3,574	3,483	10,869
Area (ha) (projection)	3,382	3,240	3,116	9,738

Note: Average rice area/household in Mekong Delta: 0.7ha

PPD has with own funds conducted additionally 23 farmer field schools in Dong Thap (6 FFS), Kien Giang (2 FFS), An Giang (9 FFS), and Hau Giang (6 FFS). Loc Troi JSC technical staff have trained 540 farmers using the developed methodology and training material. Furthermore, under the PPP with Bayer and additional 2,665 farmers have also been trained using the methodology and training material, bringing the total number of farmers trained up to more than 17,000.

Result 4: At least 300 pesticide retailers will be trained on IPM rice based on specific training modules.

Achievement: 15 of the master trainers have been selected to participate in a ToT course on IPM for pesticide retailers conducted at SRPPC. The Provincial Sub-PPD have the organised training of retailers based on the following principles:

- Three master trainers facilitate one training class, which consists of 2 training modules per day.
- Training participants are pesticide retailers and their staffs in the area where the IPM farmer classes are organized (e.g. at district level).
- The master trainers use the training modules for retailers provided by the project.
- The training duration is 4 days for delivering 8 training modules.
- Retailer training have been prioritized near IPM farmer training classes.

Retailers have been organised in clubs, and the training has been conducted at the end of each season. In total 1,067 retailers (of which 16% were women) have been trained in IPM – far exceeding the target. This includes 210 new retailers trained by An Giang Sub-PPD and 80 new retailers trained by Hau Giang PPD. IPM certificates have been given to the retailers.

Table 3: Retailer training on IPM from 2016-2017.

	Province	Groups	Retailers	Female	%
2016 - 2017	Hau Giang	5	131	15	12%
	Dong Thap	9	525	98	19%
	Kien Giang	4	121	40	6%
	An Giang	1	210	17	8%
	Hau Giang	1	80	4	5%
			20	1,067	174

Result 5: IPM awareness campaign will be conducted.

Achievement: An important element of the IPM awareness campaign has been to organise farmer field days at the end of each farmer field school in order to demonstrate and disseminate the results and benefits of the IPM practices to the local communities and authorities. After the FFSs, 67 IPM Clubs have been established at the village level where farmers can share experiences and support each other in implementation of IPM. Monthly meetings have been facilitated by the master trainers. In total 1,742 farmers participated in the clubs, of which 14% were women.

The project has organised 4 IPM information days for students at the agricultural university/collages in the provinces. In total more than 380 students participate, of which 35% were female.

Five IPM videos have been produced and a Live IPM Television Program has been broadcasted.

Furthermore, there has frequently been reports and articles from the IPM events in the local mass media. To support the IPM awareness campaign, 18,000 IPM booklets and 1,000 leaflets on action threshold levels have been printed and distributed.

3. Impact

In order to assess the project impacts, two surveys have been conducted in the spring season of 2016 and summer season of 2017. The surveys included 255 farmers directly trained and 235 indirectly trained farmers, in total 490 farmers.

Questionnaires

Type of farmers	Dong Thap	Hau Giang	Kien Giang	Total
Direct	79	90	86	255
Indirect	61	90	84	235
No. result	140	180	170	490

The farmer interviews focused on natural enemies, concept of 3R (resurgence, residues, and resistance), number of sprayings, understating of action threshold levels and pesticide labels, PPE use and the economic return of IPM application in compared to conventional cultivation.

The trained farmers reduced the number of sprayings against the insects and diseases by one third, whereas the indirectly trained farmer reduced the number of sprayings by approximately 25%.

Pesticide application

Description: Average number of pesticide application for each pest in 1 season. It reflects the impacts of IPM training on farmer practice, both direct and indirect farmers.

Pest	Direct		Indirect	
	Before IPM	After IPM	Before IPM	After IPM
Weed	1.5	1.2	1.6	1.4
Golden apple snail	0.9	0.7	1.0	0.9
Roden	0.7	0.6	0.7	0.6
Insects/Mite	3.1	1.3	3.2	2.0
Disease	4.6	3.4	4.5	3.6
Total	9.2	6.2	9.9	7.5

For the beneficial insect recognition, the most common beneficial is spiders. Here 85% of the direct trained farmers recognise them and 81 % of the indirectly trained farmers. There was 27% of the directly trained farmers that recognise up to 5 natural enemy species, while only by 14 % of the indirectly trained farmers. The result has shown that advance training by master trainer and practical methodologies have had high impact on the knowledge of farmers. The popular natural enemies recognised by farmers are listed in the table below:

Natural Enemies Recognition

Name of Natural Enemies (NE)	Direct	Indirect
Lady bug	58%	48%
Mired bug	27%	14%
Water bug	19%	11%
Phaedrus	59%	41%
Parasitic fungus	10%	5%
Spider	85%	81%
Wasps	52%	23%

92% of directly trained farmers understated the concept of action threshold level, while this ratio is 70% for indirectly trained farmers. For the action threshold of Brown Plant Hopper management, 84% of trained farmer understand it, and 66% of the indirectly trained farmer understood. The lowest Action threshold understanding is for leaf folder, where 56% and 24%, respectively of trained and indirectly trained farmer understand it.

Understanding of action threshold

Description of AT	Direct	Indirect
AT concept	92%	70%
AT of BPH	84%	66%
AT of leaf folder	56%	24%
AT of Rice blast	66%	38%

Regarding the use of biological control agents, 42% and 38%, respectively of directly and indirectly trained farmers use them, namely Abamectin and Emmamectin benzoate, polyphenol and Metarhizium fungi. For preventing resurgence, most trained farmer do not apply defoliator insecticide in the first 40 days interval. 63% of trained farmer do not use preventive spaying and 50% of indirectly trained farmers.

Farmer's understanding of the pesticide labels is crucial for correct application. The below table shows the correct understanding of trade name, active ingredient, formulation, colour band, concentration and application.

Understand pesticide label

Information on labels	Direct	Indirect
Trade name	95%	93%
Active ingredient	87%	65%
Concentration	82%	66%

Formulation	74%	56%
Production & expire date	93%	89%
Color band	77%	51%
Cautionary notice	68%	43%
Safety Pictogram	74%	53%
First aid notice	83%	67%
Concentration and application	96%	94%
Target pest	89%	88%
Pre-harvest Interval	96%	94%
Information known (per 12 types)	10	9

For preventing residues, the most important is not to spray pesticides 14 days before harvest. 80% of directly trained farmers and 76% indirectly farmers understand and respect this.

Measures to prevent residues

Measure to reduce residues	Direct	Indirect
No pesticide sprayed 14 days to harvest	80%	76%
Select short PHI chemical	55%	45%
Use correct dosage	69%	64%
Average No. measure used	3.3	2.9

Protective equipment use (PPE) has been an important element of the training. In fact, not all recommendations are being applied by farmers because of the available of these products on the market and farmers' habitats. In addition, the owner of the paddy rice field are usually not spaying, as they mostly hire people for the spaying. However, the hat, long sleeved shirt and cotton mask are commonly applied. Last but not least, although the ratio is low, quiet some farmers use gloves for both mixing and spraying pesticides. PPE regularly used by farmers is shown in the following table:

Protective equipment used

Personal protective equipment	Mixing pesticide		Spraying pesticide	
	Direct	Indirect	Direct	Indirect
1 hat	90%	91%	98%	98%
2 visor	35%	25%	45%	37%
3 apron	8%	5%	23%	10%
4 gloves	49%	32%	50%	29%
5 long sleeved shirt	82%	81%	97%	95%
6 boots	10%	5%	22%	10%
7 Cotton mask	86%	77%	89%	80%

Last but not least, the IPM training has had a positive impact on the farmers' income. The yield and price of paddy remain the same, but input costs have been reduced significantly as compared with conventional farming practices. As a result, the gross margin was increased with 18% for the directly trained farmers and with 14 % for the indirectly trained farmers.

Descriptions	Margin calculation					
	Direct			Indirect		
	Before IPM	After IPM	Changed	Before IPM	After IPM	Changed
Land Preparation	1,347,512	1,338,854	-1%	1,330,996	1,305,843	-2%
Irrigation	731,296	715,304	-2%	732,809	719,241	-2%
Sowing	343,612	334,480	-3%	317,152	314,391	-1%
Weeding	381,303	333,352	-13%	364,803	321,268	-12%
Fertilization, spraying	1,565,967	1,224,103	-22%	1,676,125	1,382,033	-18%
Other labour	916,029	839,565	-8%	822,587	787,952	-4%
Harvest	2,129,641	2,123,761	0%	2,120,754	2,104,715	-1%
Seed	2,251,730	1,742,636	-23%	2,317,824	1,924,705	-17%
Fertilizer	4,062,563	3,459,456	-15%	4,093,589	3,622,723	-12%
Pest Control	3,162,416	2,324,548	-26%	3,247,768	2,673,405	-18%
Total Expense	16,892,069	14,436,058	-15%	17,024,406	15,156,277	-11%
Yield	6,595	6,615	0%	6,511	6,503	0%
Paddy price	5,063	5,120	1%	5,107	5,165	1%
Revenue	33,395,186	33,871,447	1%	33,250,278	33,587,537	1%
Gross margin	16,503,117	19,435,390	18%	16,225,872	18,431,260	14%

4. Conclusion and lessons learned

The project has successfully reached its objectives and achieved significant impact. It has been highly appreciated by the Plant Protection Department of Ministry of Agriculture and Rural Development for its contribution to reviewing and revising the IPM training materials for rice in general, and particularly for the development of the IPM training manual for pesticide retailers as well as the booklets for farmers, which are new innovations. Prior to this project, there has been no IPM training program for retailers, and this has now been adopted as an official part of the National IPM Program. Thus a robust training system for IPM in rice is now in place that has already been adopted and applied beyond this project.

Almost 14,000 farmers (15% women) have been trained by the project in the three provinces of Dong Thap, Kien Giang and Hau Giang, and more than 17,000 including the ones financed directly by the provinces and third parties including the private sector. This has resulted a reduction in the use of pesticides with between 33-25%, and a much more appropriate and responsible use of pesticides among

the farmers trained – with the highest impact on the farmers directly trained by the master trainers. There is little doubt that this will significantly reduce the amount and scale of plant hopper outbreaks in the areas under IPM production. Furthermore, it has resulted in an increased income of between 14-18% among the trained farmers – also here with the highest impact on the farmers directly trained.

The training of farmers has been reinforced with IPM training for retailers, where the project far exceeded the expectations by training more than 1,000 retailers as compared with the 300 planned. Also an IPM awareness campaign has been successfully implemented in order to reinforce and broaden the impact of the project.

In conclusion, the project has had a strong contribution towards making rice farming more sustainable in the Mekong Delta by improving farmer's income, and at the same time having a positive effect on the environment as well as the health of farmers and consumers.