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International Agricultural Research

Final report

Small research and development activity

SRA

Scoping study to identify research and implementation issues related to management of the Brown Planthopper/virus problem in rice in Vietnam.

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prepared by
K. L. Heong
Senior Scientist, International Rice Research Institute, Philippines
M.M. Escalada
Professor, Visayas State University, Philippines

co-authors/ contributors/ collaborators
Nguyen Huu Huan
Deputy Director General, Plant Protection Department, Vietnam.
Ho Van Chien
Director, Southern Plant Protection Centre, Long Dinh, Vietnam
Il Ryong Choi,
Virologist, International Rice Research Institute, Philippines.
Yolanda Chen
Entomologist, International Rice Research Institute, Philippines
Roger Cabunagan
Virologist, International Rice Research Institute, Philippines.

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GPO Box 1571
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Australia

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1 Acknowledgment

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Ms J. Ferrater, IRRI, who conducted the insect characterization using micro satellite markers.

2 Executive summary

In 2005 and 2006, rice production in Vietnam was threatened by the planthopper pests and the virus diseases they carry. The sudden outbreaks caused a loss of about 700,000 tons of paddy and it prompted the Government to halt exports. The Short Research Activity project was developed to review the problems and scope for opportunities to develop sustainable management strategies. The scoping team reviewed documents, both published and unpublished, performed field visits, collected samples, interviewed farmers and experts in policymaking, research and extension. In the final consultation workshop, a series of research and implementation opportunities were identified.

The scoping team used an analytical framework to analyze factors that caused the pest outbreaks. Weather and socioeconomic factors were the main driving variables. There had been slight elevation in temperatures but were inconsistent. The increase in abnormally strong winds might have contributed to the rapid spread, but there is need for a more thorough analysis using meteorological models and local data. Over the last 3 years there has been an increasing trend in domestic rice prices and growing of aromatic varieties like "Jasmine". These might have influenced farmers' increasing use of insecticides, which had disrupted the biological control ecosystem services. The increase in pest tolerance to insecticides such as fipronil and imidacloprid is another sign of high insecticide use. Using five microsatellite markers, the scoping team found little genetic variability between pest populations in the north, central, and south, which implies that planthopper populations move freely between geographic regions and could be the main cause of the rapid spread of the virus disease. Although BPH (brown planthopper) populations on the weed *Leersia hexandra* were genetically distinct, BPH populations on cultivated and wild rice could not be genetically differentiated, suggesting considerable planthopper movement between rice species. Wild rice could be the harbour of the viral diseases. The genetic data predicts that the incidence of virus-carrying planthoppers would be the same in cultivated and wild rice fields. While this pilot study provided an overview of planthopper genetic structure, the geographic coverage of our sampling was insufficient to make general conclusions about the movement of BPH throughout Vietnam. Further monitoring of planthopper genetic variability using several of our newly developed microsatellites will be useful in characterizing planthopper movement between different geographic regions. Leaf samples collected from southern, central, and northern Vietnam and near the Vietnam border in Cambodia showed the presence of three main viruses, Rice Ragged Stunt (RRSV), Rice Grassy Stunt (RGSS) and Rice Tungro Spherical Virus (RTSV). Depending on the combination and the timing of the infections, plants exhibit a wide range of symptoms, collectively referred to as "yellowing syndrome", from mixed infections. RRSV was detected in all areas. Near Hanoi, the leaf samples were possibly

from hybrid rice which implies that the white back planthopper (WBPH) might be a new vector. Further research will be needed to determine virus-plant and virus-vector relationships between WBPH and hybrid rice. The Plant Protection Department developed the “escape strategy” as an interim technique to prevent the spread of the planthoppers and virus diseases. This is based on observing light trap catches to synchronize seeding times in order to avoid disease transmissions and using prophylactic pesticide applications. The strategy has apparently worked. However, the reliability of the light trap is a concern and the strategy also lacks scientific evaluation. There is, thus, a need for research to evaluate and develop a more robustness improvement. Some scientists on the other hand are advocating the use of prophylactic insecticide seed treatments to prevent disease transmission by immigrating insects. Since disease transmission period is very short, successful transmission might have occurred before the insect is killed by the insecticide. Besides the planthoppers have developed high tolerance to the insecticides, imidacloprid (>50 folds) and friponil (> 4 folds), respectively.

Interviews with farmers, extension, research and policy personnel showed that the central and provincial governments distributed 2 million guidebooks, 2.5 million leaflets, > 2,000 posters, 1,000 television broadcasts and organized 9,219 one-day training courses covering 404,938 farmers to combat the BPH/virus problem. With pesticide industry’s support, the Plant Protection Departments also organized 13 large-scale demonstration fields on the escape strategy covering 872.6 ha and involving 1,425 farmers.

The government budget allocated for BPH/virus control in 2006 was VND 105,758.50 million (US$ 6.6 million). Of this 55 % was used for pesticide purchase and distribution and 38 % for destroying infected fields and subsidizing farmers. Only 7% was spent on extension and training activities. Using decision analysis the team identified differences in concerns and information needs of various stakeholders that contributed to the variety of decisions in handling the crisis. Policymakers were focusing on ensuring food security and political stability and thus, released emergency funds. Chemical industries were focused on increasing sales through using more pesticides for the emergency. Extension needed a rapid means to contain the problem, while research needed to develop scientifically proven techniques. Farmers’ main concerns were preventing loss but they lacked sufficient information. The Mekong Delta farmers who had greater access to information through mass media than counterparts in Central Vietnam had clearly more knowledge on pest and virus management. Thus, a greater effort for communication and training of farmers on using the “escape strategy” would have greater benefits and is more sustainable than distributing pesticides.

A one day consultation workshop of 70 participants from research, extension, policy making and mass media from Vietnam, Cambodia, Philippines, Indonesia, Korea and FAO was held to develop plans for next steps. Using SWOT analysis, the following next steps were developed:

1. The “Escape Strategy” lacks robustness and more research efforts to improve knowledge of the ecological bases and monitoring methods and decision protocols are needed.
2. Planthopper outbreaks are due to sudden abnormal explosive increases in populations. An analytical framework has been developed and there is now a need to develop a research program to validate the cause-effect relationships between various factors.
3. Biological control services are foundation to sustainable pest management. There is a need to develop a research program to assess these ecosystem services, develop strategies to enhance, and sustain them through cultural practices, like increasing habitat biodiversity.
4. Insecticide resistance to recently introduced insecticides seems to have appeared in some areas. There is a need to establish an insecticide resistance monitoring network and to use standard protocols.

5. The increasing importance of the white back planthopper (WBPH), especially in the north, due to the growing of popular hybrid rice varieties, raised the need to conduct research to understand ecological and vector-virus relationship.
6. The causal viral agents of "yellowing syndrome" need to be further characterized. A simple diagnostic kit needs to be developed for use in research and extension.
7. Further understanding of the genetic variability of the pest using microsatellite markers needs to be investigated.
8. Vietnam has a well staffed and widely distributed plant protection network. In addition, farmers have wide access to mass media. There is a need to develop a strategic communication plan to maximize rapid dissemination of essential and accurate information that will promote sustainable practices which will reduce vulnerability to pest outbreaks.

3 Introduction

In Vietnam, rice is a major food crop for home food security as well as exports. Production has increased by 60% between 1990 and 2000 or about 5% growth per annum. In 1995, 2 million t of rice were exported and this increased to 4.5 million t in 1999, making Vietnam the second largest rice exporter in the world market. The two delta areas, Red River Delta (RRD) in the north and the Mekong River Delta (MRD) in the south account for 67% of rice lands and 72% of production. With limited rice land expansion, production growth was mainly from yield increases (3% p.a.) and cropping intensity (2% p.a.). In the near term, Vietnam is likely to maintain rice land at 4 m ha and produce to export between 2 to 4 million t of rice per annum, with adequate management and protection of losses due to pests and diseases.

Pests and diseases remain important biotic constraints to rice production. With inadequate knowledge, rice farmers usually resort to using pesticides which are hazardous to human health, to the environment, and also create secondary pest problems. Planthoppers are such pests, normally kept in check by naturally-occurring biological control agents. Studies have shown that unnecessary insecticide sprays, applied especially in the early crop stages to control leaf feeding insects, often disrupt natural balance favouring the development of the hoppers. In large populations, the BPH can completely destroy crops, a symptom called "hopper burn". In addition, the BPH is a vector of two persistent virus diseases, the grassy stunt and the ragged stunt viruses. Plants infected by these viruses result in no yield.

In 2005, the BPH, which had remained in low densities since the 1980s, caused a series of outbreaks in Vietnam, China, Korea, and Japan. The biggest damages were from China, where 7.5 million ha in several provinces were infested resulting in a loss of 2.8 million t of paddy. In Vietnam, in addition to BPH damages, crops were severely damaged by viral infections transmitted by BPH. In 2006, the agricultural ministry reported a loss of 700,000 t rice, which prompted the government to restrict exports for fear of domestic shortages. In desperate attempts to control the virus spread but with lack of research information, the government started encouraging farmers to spray insecticides and distributed insecticides that can have undesirable environmental, economic and social consequences.

Vietnam's rice ecosystem has a rich habitat biodiversity that can conserve natural biological control activities. At the same time some of the flora might be alternate hosts to the viruses, although the vector BPH is primarily monophagous to rice. Such alternate virus hosts need to be identified to develop effective management strategies. In the last 15 years, rice farmers' insecticide use has steadily reduced from about 3.5 to 1.0 spray per season as a result of intensive media campaigns, including radio and training programs implemented by the government. The recent BPH/virus problems have negated the good results obtained in IPM (integrated pest management) by the increase in unnecessary pesticide use, which can also pollute the environment, compromise farmers' health and biological control activities in rice ecosystems, and bring about increased BPH problems and virus spread.

BPH outbreaks are attributed to the lack of "system resistance" and thus making the crop vulnerable to slight changes in climate and cropping shifts. The outbreak in northern China was also attributed to the slight increase in summer temperatures of 2 ^{o}C in 2005 and abnormal number of south -west typhoons. Similar post-ante analyses of Vietnam's BPH/virus problem may provide important information for developing management options.

The potential for spread of the virus source towards the north and west is extremely high since the insect vector BPH is capable of long distance migrations. The nymphs can molt into two adult forms, long and short winged. The long winged forms are capable of flight and can remain airborne for several weeks before landing. They are carried by wind and can be displaced a long distance from the place of origin. Thus, viruliferous hoppers can potentially spread the virus hundreds of kilometers down wind into several Greater Mekong Subregion (GMS) countries, like Cambodia, Laos, Thailand, and China. Information related to this potential spread will be extremely useful not only for managing the virus problem in Vietnam but in the GMS as well.

3.1 Communication and dissemination activities

The project had several communication and dissemination activities:

Commencement workshop 30-31 May 2007 – Report attached. Appendix #1
Also available http://bulletin.irri.cgiar.org/bulletin/2007.22/default.asp

M. M. Escalada, Ho Van Chien, Tran Thanh Tung and Le Quoc Cuong.
Focus Group Discussion with farmers. Report attached. Appendix #2

I.R Choi. Trip Report to Vietnam. Report attached. Appendix #3

I.R. Choi. Trip Report to Cambodia. Report attached. Appendix #4

Final consultation workshop 8 January 2008. Program attached. Appendix #5
Report attached Appendix # 6 and also available in
http://bulletin.irri.cgiar.org/bulletin/2008.02/default.asp ;
http://english.vietnamnet.vn/tech/2008/01/763441/
http://www.seedquest.com/News/releases/2008/january/21482.htm

CD publication of papers and summaries, the PowerPoint presentations and SWOT analysis of the final consultation workshop. The materials presented at the workshop are being compiled, synthesized, translated and processed for CD printing.

3.2 Farmer-level, community, or policy impacts (economic, social and/or environmental)

The SRA project identified some gaps and opportunities to strengthen research and implementation of sustainable management of the BPH/virus problem, which was endorsed by the vice minister and director general of the Plant Protection Department.

The next step is to use the initial results of the SWOT analysis to conduct a more thorough (probably 1 whole day) SWOT analysis to develop details. The result of the second SWOT will be used to develop a full proposal for donor funding.

The interim “escape” technique developed by the local extension has potential and the government has adopted it for full scale implementation. The main concern is about its reliability. There is immediate need for research to perform a reliability analysis and conduct research to improve the technique. Without this research support, the adoption of the “escape” technique will lack credibility and reliability, and might eventually suffer discontinuance. A full research proposal will certainly contribute towards sustaining the adoption of this SRA’s initial outputs. This finding had raised questions on the popularly prompted “escape” technique which might have immediate negative impact on government’s implementation plans.

3.3 Training and capacity-building

The project conducted several capacity building activities as follows:

3 Days Training on Diagnosis of RRSV and RGSV by ELISA. October 10-12, 2006, in Southern Plant Protection Center, Tien Giang. Cofinanced by IRRI and PPD.

16 Staff from Post Entry Quarantine Center in Cantho City, Ho Chi Minh City and from Southern Plant Protection Center. Cofinanced by IRRI and PPD.

One week training of 4 PPD, South Vietnam staff on RT-PCR. May 6-13, 2007, Virology Laboratory, IRRI. Cofinanced IRRI and PPD

Training in insect toxicology techniques and data analysis at IRRI. October 29 – Nov 2, 2008. 4 participants from PPD Ho Chi Minh City and Hanoi. Cofunded by PPD and IRRI.

3.4 Intellectual property

All materials produced are considered global public goods and are freely available.

4 Relationship to other activities

The SRA has directly influenced IRRI’s research on this subject. Because of the seriousness of the problem, IRRI has initiated 3 small activities to address the problem:

(1). Monitoring of insecticide resistance
(2). Assessing loss in biological control services and
(3) Etiology of the ragged stunt and grassy stunt virus diseases.

In addition, IRRI will host an International Planthopper Conference in June 2008 to bring about a broader scientific discussion that will include experiences from Vietnam and other countries. IRRI will also engage Dr K. Sogawa, a well known planthopper specialist as consultant to prepare a review of the white back planthopper (WBPH) and further advise us on research matters, particularly on the emerging problem in the WBPH.

In the longer term, IRRI will lead in the development of a full project proposal that will address scientific gaps in a wider geographic region to include Vietnam, Indonesia, Cambodia, Laos, Malaysia, and the Philippines.

5 Budget

About 35%, 27% and 23% of the budget were spent on personnel, travel, and consumables, respectively in both IRRI and in Vietnam. Thirty-four percent (34%) of the total budget was spent in Vietnam. About 10% in travel costs was spent in bringing non-Vietnamese participants to the workshop and about 4% committed for publication and follow up activities. In addition, about A$25,000 matching funds in travel costs of IRRI scientists and hosting of Vietnamese trainees at IRRI have been provided by IRRI funds.

Budget in Aus $

IRRI	Approved	Expenditure
Personnel	30553	33350
Supplies & Services	923	715
Travel	20858	22378
Workshop	14579	11629
Publications	4718	4295
Sub total	**71631**	**72367**
Vietnam		
Personnel	5500	5590
Supplies & Services	19469	25032
Travel	13400	7011
Sub total	**38369**	**37633**
TOTAL	**110000**	**110000**

6 Conclusions and recommendations

Pest and disease outbreaks are caused by multiple factors and driving forces. The SRA developed a framework to structure these factors. There are two main groups of driving forces—weather and socio economic variables.

Recommendation # 1: This analysis should be taken further and substantiated with data and experimentation as needed to further refine the cause-effect relationships that will help in developing sustainable management strategies.

Plant Protection Department is prompting the use of the “escape strategy” to avoid virus transmission and excessive use of prophylactic insecticides. However, this strategy may have some inadequacies and lack robust scientific scrutiny.

Recommendation #2: Further ecological research and evaluations of the escape strategy should be conducted to develop a more robust and sustainable system of management of the planthoppers and virus diseases.

The SRA identified 3 main viruses in rice crops. There are wide ranges in symptoms and their effects on the rice crop which seem to depend on time of inoculation and interactions. There is acute lack of knowledge in this area, especially symptomology of mixed infections and vector-virus relationships. In addition, there is need for a diagnostic kit for accurate field diagnoses.

Recommendation # 2: Further research on the epidemiology of the virus, vector-virus and virus-plant relationships is urgently needed. Research that will lead to the development of a practical diagnostic kit should be initiated.

The spread of the virus depends on availability of alternate hosts and movement patterns of the vector. IRRI has developed micro satellite markers that can be used to characterize hopper populations which can be used to study changes in population structures.

Recommendation #3: A monitoring scheme of planthopper genetic variability using the newly developed microsatellites to characterize planthopper movement between different geographic regions should be developed.

The rapid development of insecticide resistance to two new insecticides, imidacloprid and fipronil, is a concern. There is need to develop an insecticide resistance monitoring scheme that uses standard toxicological, technical, and statistical methods.

Recommendations #4: An insecticide resistance scheme should be developed, with appropriate capacity building, equipment, and analytical tools to monitor the development of resistance. This monitoring should be part of the Plant Protection Department activities.

Gaps between what farmers know and what they need to know to manage pests and diseases remain high. Misperceptions often lead to excessive pesticide use. In order for research to benefit farmers, an effective sustainable communication system is necessary.

Recommendations #5: There is a need for a communication system that will simplify technical information for farmer use and able to rapidly reach the masses. Research should explore the use and adaptation of existing mass communication systems to carry information farmers need to bridge the knowledge gaps.

From a SWOT analysis, some ideas and opportunities in research to refine technologies and strategies for implementation to promote uptake and impact were developed (see Item 2 SUMMARY above).

Recommendation # 7: There is an immediate need to conduct a facilitated SWOT analysis involving broader participation to refine this list. New donor support will be needed to broaden these ideas and develop these into a full research and implementation proposal for the next ACIAR (2008) call for proposal. This full proposal will focus on a broader set of countries, possibly Cambodia, Laos, Thailand, Indonesia, and the Philippines, further understanding of farmers' perceptions, plant-vector-virus relationships, diagnosing techniques, ecology of the WBPH and its vector abilities, development of scaling up strategies, and organising policy dialogues to facilitate change. Since managing pest and disease outbreaks require landscape level strategies, this proposal will focus on developing new approaches using ecological engineering (Gurr et al 2004) principles and testing them.

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8 Appendices

8.1 Appendix # 1: Commencement workshop 30-31 May 2007

8.2 Appendix #2: M. M. Escalada, Ho Van Chien, Tran Thanh Tung and Le Quoc Cuong. Focus Group Discussion with farmers.

8.3 Appendix #3: I.R Choi. Trip Report to Vietnam.

8.4 Appendix # 4: I.R. Choi. Trip Report to Cambodia.

8.5 Appendix #5: Program of Final consultation workshop 8 January 2008.

8.6 Appendix # 6: Report of the Final Consultation Workshop

Appendix 1`

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Bulletin **4-8 June No. 2007.22**

Vietnamese and IRRI scientists begin looking for solutions to the rice virus disease problem in the Mekong Delta

In the last two years, rice production in Vietnam, particularly in the Mekong Delta, suffered a major setback when outbreaks of virus diseases carried by the brown planthopper (BPH) caused a loss of about 400,000 tons (or 1.1 % of Vietnam's total). Vietnam's rice exports were threatened and the infestations prompted officials and farmers to spray insecticides in excess in attempts to curb the spread of the viral infections, which, in turn, escalated to a high usage of insecticides. There is also an imminent danger of the virus problem spreading north and west from the current epicenter in the Mekong Delta, which might affect rice production in Cambodia, Laos, and central and northern Vietnam. The virus has been reported in Cambodia and in Nha Trang, about 400 km north of the Delta. During this time, extensive outbreaks of BPH were also reported in China, Korea, and Japan, causing yield losses of more than 3 million tons of rice.

To focus on identifying research and implementation issues related to management of the BPH/virus problem, the Australian Centre for International Agricultural Research (ACIAR) is providing funds to Vietnamese and IRRI scientists to undertake an 8-month project that will review literature, historical data, and reports, and collect preliminary data to scope for research and implementation issues, provide some understanding of the vector-virus relationships, vector migrations, and vector variability, and explore farmers' and extension's perceptions of viral diseases and their management. This information is needed for the development of an integrated management of the BPH/virus problem to prevent its spread and to develop communication management strategies to help farmers adapt.

The research team met at the Plant Protection Department (PPD) office in Ho Chi Minh City on 30-31 May to develop detailed work plans. After the intensive scoping study, a workshop will be organized in early 2008 to report and advise on potential next steps in research and implementation to manage the problem. The materials gathered in the study will also be used to develop a full research proposal on the management of BPH and the viruses.

The photo above shows the research team, composed of (L-R) Mr. N.P. Dung (Angiang University), Dr. Nguyen Huu Huan (vice director general of PPD), Dr. Yolanda Chen (entomologist, IRRI), Dr. K.L. Heong (project leader, IRRI), Mr. H.V. Chien (director of the Southern Plant Protection Center, SPPC)), Dr I.R. Choi (virologist, IRRI), Dr. P.V. Du (plant pathologist, Cuulong Rice Research Institute, CLRRI), Mr. T.H. Anh (virologist, Plant Protection Research Institute, Hanoi), Dr. M.M. Escalada (communication specialist, Visayas State University), Mr. T.T. Tung (PPD), and Mr. L.V. Thiet (vice director of SPPC).

Appendix 2

SRA CP/2007/211

Scoping study to identify research and implementation issues related to management of the Brown Planthopper/virus problem in rice in Vietnam.

BPH/Virus Management
FGD with Farmers

M. M. Escalada, Ho Van Chien, Tran Thanh Tung and Le Quoc Cuong

The rice virus problem in the Mekong Delta

In the last two years, rice production in the Mekong Delta, was vastly affected by outbreaks of virus diseases carried by the brown planthopper (BPH) which caused a loss of about 400,000 tons (or 1.1 percent of Vietnam's total production). Vietnam's rice exports were threatened and the infestations prompted officials and farmers to spray insecticides in excess in attempts to control the spread of the viral diseases, which, consequently led to a high usage of insecticides. Such practices can disrupt ecological balance and in turn favor BPH development rates. Also looming in the horizon is the possibility of the virus problem spreading north and west from the Mekong Delta, which might affect rice production in Cambodia, Laos, and central and northern Vietnam.

To focus on identifying research and implementation issues related to management of the BPH/virus problem, an 8-month project has been supported by the Australian Centre for International Agricultural Research (ACIAR) to enable Vietnamese and IRRI scientists to review literature, historical data, and reports, and collect preliminary data to scope for research and implementation issues, provide some understanding of the vector-virus relationships, vector migrations, and vector variability, and explore farmers' and extension's perceptions of viral diseases and their management. This information is needed to develop an integrated management strategy for the BPH/virus problem to prevent its spread as well as communication strategies to help farmers adapt and enable the Plant Protection Department to scale up the dissemination of these strategies.

Field visits and a series of focus group discussions (FGD) with rice farmers in Tien Giang, Long An, and Vinh Long provinces are part of the scoping study to explore farmer perceptions of viral diseases and their management.

FGD Details

Date	Location	No. of farmer-participants
23 July 2007	Tan Binh Thanh village, Cho Gao District, Tien Giang province	15
24 July 2007	My An village, Thu Thua District, Long An province	17

25 July 2007	Long An village, Long Ho District, Vinh Long province	21

1. Rice varieties planted

Tan Binh Thanh village – IR4625 (sticky rice); most important pest problem this season is sheath blight but last season the dominant problem was the virus.

My An village - IR4625 (sticky rice), 99% of the farmers plant sticky rice, 1% grow jasmine; no virus problem this season.

Long An village – Tai Nguyen, OM214, IR50404 and OM2517.

2. Historical profile – when and where BPH/virus problem was first detected

The brown planthopper/virus problem was first detected in Tan Binh Thanh Village, Cho Gao District in 1978 but it reappeared in 2005, infecting 3 to 4% of the rice fields in the area. In 2006, the virus incidence increased sharply, spreading to almost the entire village.

In My An village, the ragged stunt virus was first seen 10 years ago but it was only 3 years back when the yellow stunt virus was detected. In the 2006 summer-autumn crop, virus disease incidence occurred in 50% of farmers' fields.

The virus first appeared 10 years ago in Long An village but it came back when farmers started planting three (3) crops a year. Farmers believed that their intensive cultivation gave rise to the BPH population.

3. Farmers' perceptions of causes of virus problem

Where the virus came from

Farmers in Tan Binh Thanh village, Cho Gao District, said that the virus was carried by the BPH blown in by the wind from other locations. They could not tell where the virus originated. Farmers noted that although there was BPH before, it did not carry the virus.

My An village farmers noted that the virus was brought by BPH from other locations. A Vietnamese expert, they added, had reported in a conference that the virus came from Tan Tru district and it spread to the entire Long An province.

Virus transmission time and information source

If the BPH carrying virus comes to the field, most farmers in the focus group from Tan Binh Thanh village thought that it may take one hour for it to transmit the disease. They expressed that they learned this from training, radio and television.

Likewise, those farmers from My An village believed that it takes one hour after BPH attack for the virus to be transmitted, This information, they said, came from the Plant Protection Department (PPD). However, farmers also offered their own observations of virus transmission times which ranged from right after the BPH sucking the plant to one day.

Long An farmers stated that they learned from the television, newspaper and neighboring farmers that it takes less than one hour for BPH to transmit the virus.

If the field is sprayed with insecticide and an insect carrying virus arrives, can the virus be transmitted before the insect dies?

Asked if a virus can be transmitted before the BPH dies in a field sprayed with insecticide, farmers in Tan Binh Thanh village replied that the hopper can transmit the disease before it dies.

In My An village, almost all farmers noted that the virus can be transmitted before the insect dies. One farmer said the insect would not transmit the disease because the field had already been sprayed with insecticides such as Bassa (fenobucarb, Butyl 10 WP and Applaud (buprofezin).

Vinh Long farmers believed that the virus can be transmitted before the BPH dies and the insecticide spray is meant to control the BPH. Farmers spray the young rice plants with buprofezin while plants at a later crop stages are treated with fenobucarb. If a few plants are infected, the virus will not spread if there is no BPH. Farmers said that the BPH attacks young plants and the virus is spread to other plants. Sometimes, it is hard to determine transmission time because the attacked plant often does not show immediate symptoms.

Symptoms of a diseased plant

Tan Binh Thanh village farmers gave the different symptoms of two rice diseases. Farmers described these symptoms of ragged stunt: the rice plant gets stunted, turns yellow, and die while in grassy stunt, the leaves are twisted and the plant does not flower nor recover. All sick plants die.

Likewise, farmers in My An village described these symptoms of a diseased plant: it gets stunted, the leaves turn yellow, and the sheath develop black spots.

Vinh Long farmers listed these symptoms of grassy stunt: stunted growth, leaves turned yellow, rice leaves are open compared to other yellowing disease.

Leaving the sick plant in the rice field

Farmers in Tan Binh Thanh village suggested that diseased plants be removed and destroyed. If the disease incidence is low, farmers remove the diseased plant but if the infection was widespread, they applied Bassa (fenobucarb), plowed the field, and applied herbicide. According to farmers, the disease will spread if the sick plant is left in the rice field. If the infected plant dies, the brown planthopper will have no food to eat and will move to the next plant.

Farmers in My An village expressed that diseased plants can not recover but if a rice plant is infected with virus disease but there is no BPH, it means that the virus has not spread. If disease incidence is low, farmers stated that they removed the diseased plant only but if the entire field had high virus incidence, they applied chemicals and plowed the field. Farmers were worried about the disease so they applied seed treatment but they found that it did not work if they had not followed the “escape” strategy.

Vinh Long farmers thought that diseased plants cannot recover and will eventually die. They specified that in one hill, if one tiller is attacked by BPH, this tiller will have the disease and not the others. Sick plants, they said, should be removed from the field and buried to stop the source of the virus. Farmers recalled applying integrated pest management (IPM) 5 years ago but in the last 2 years, they increased their number of sprays of buprofezin, especially in the last winter-spring crop because they are so worried about the virus.

4. Extent of damage to rice crop

The virus problem has hit Tan Binh Thanh village for the past eight (8) cropping seasons. Before the virus problem, farmers' rice yields used to range from 7 to 7.5 t/ha. At the worst virus infection, farmers estimated that the damage could be as much as 100% of the rice crop.

My An village farmers noted that if 10% of the field is infected with virus disease, it could lead to 10% yield loss. Compared to blast and sheath blight, farmers observed that the virus disease caused the biggest yield loss.

5. Virus control strategies introduced to farmers

Tan Binh Thanh farmers enumerated seven (7) virus control strategies introduced to them by the Plant Protection Department staff, namely: 1) escape strategy, 2) use good seed and variety, 3) good land preparation, 4) balanced fertilizer – don't use excessive nitrogen, 5) reduce seeding rate by using the drum seeder, 6) proper pesticide use by applying the correct pesticide dosage and timing, and 7) check the field regularly.

In My An village, farmers specified the following virus control strategies introduced to them by PPD: 1) "escape strategy", 2) regular field checking, 3) reduce seeding rate, 4) use balanced fertilizer – don't use excessive nitrogen, and 5) follow PPD recommendation not to use insecticides within 40 days after seeding (DAS) to protect the natural enemies. When farmers observe BPH on their rice crop, they quickly inform the local extension technician to decide whether or not to spray insecticides.

Vinh Long farmers, likewise, spelled out five control strategies that had been introduced to them by PPD: 1) "escape strategy", 2) field sanitation, 3) use of resistant varieties, 4) balanced fertilization – no excess N fertilizer, and 5) water management.

The "escape strategy" – what it is and how it works

As described by farmers, the "escape strategy" involves sowing the rice seeds at the time when the BPH migrates to the field when food is not available and they die. Farmers note the 25 to 27-day life cycle of the BPH to time their planting to avoid pest attack on their rice crop. Determining when to sow the rice seeds is based on light trap data. In a village, a farmer takes care of checking the light trap every morning and records the number of BPH. The light trap data are presented to the sub-PPD technician who decides when to plant. In other districts, the plant protection station decides and advises the farmers when to plan. The rule is to plant three (3) days after the peak, which, on average, is 1,000 BPH/night.

6. Farmer perceptions of control strategies introduced

Asked which virus control strategy is the most effective, farmers in Tan Binh Thanh village specified the "escape strategy". Farmers attested that escape strategy, when combined with reduced seeding rate, can contribute 50% of the success of virus control. Control strategies were learned from training on integrated pest management (IPM), farmer field schools, TV and radio. Pesticide companies, reportedly, provided technical advice on how to control the virus but the emphasis was chemical control for BPH. While chemical companies recognized the value of "escape strategy", they stressed to farmers what pesticides to use for BPH control.

Of the control strategies introduced, My An village farmers considered the "escape strategy" or synchronized planting to be the most effective.

7. Extension materials received and training events attended

Tan Binh Thanh farmers reported that they received a leaflet on BPH/virus disease management and also watched a television program, "Farmer Bridge" which discussed control strategies for the virus disease, namely, cultural practices as the first option and chemical use as a second option. The TV program provided a direct telephone line to which farmers could phone in their questions. Farmers thought that the provision of a hot line was quite effective as they got an instant response to their questions. All farmers in the village also attended training organized by the district-level offices of the Plant Protection Department (PPD). The training focused on the use of the "escape strategy" which required the use of light trap data to determine the best time to sow the rice seeds. Farmers reported that the district had 14 light traps, with each light trap maintained by one farmer.

For virus management advice, My An village, farmers were exposed to a combination of mass media and interpersonal channels. While they listened to the Voice of Ho Chi Minh City and watched TV Vinh Long, they also had direct contact with the sub-PPD staff who often visited them. Farmer training was also organized by extension and the sub-PPD early in the season, which covered these topics: planting calendar, pest and disease management and *Ba Giam, Ba Tang* (Three Reductions, Three Gains) recommendations.

Working with the FAO technical cooperation project (TCP), PPD also organized a demonstration crop with these elements: escape strategy, reduced pesticide use, and community action in synchronized planting. This demo plot, together with the printed materials, radio and TV programs helped to raise farmers' awareness on crop damage from virus disease. The project also organized farmers' field trips and field days to make farmers realize the benefits of the escape strategy. Managed by farmers, the demo crop covers a total area of 46.5 ha comprising 50 farm-households. Rewards given to demo crop participants include training, meals, field trip and farmer exchange visit to Dong Thap province.

Appendix 3.

TRIP REPORT

Survey of Rice Virus Diseases in Vietnam
July 29-August 8, 2007

Rogelio C Cabunagan (PBGB)
Alberto Naredo (CESD)
Il-Ryong Choi (PBGB)

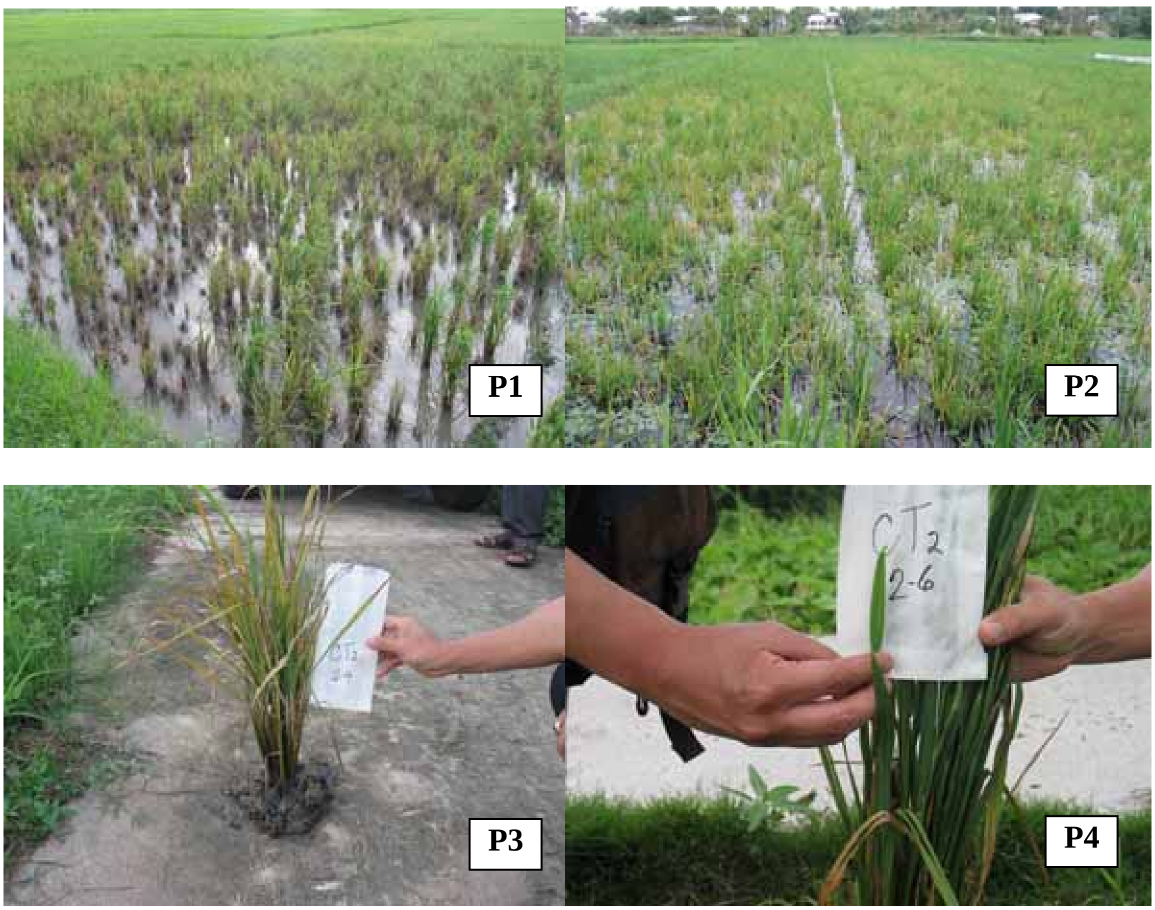
Background: A survey for the distribution of rice viruses in Vietnam was conducted as an activity under the project CP/2007/211 "Scoping study to review and document transmission, epidemiology and spread of the virus disease transmitted by brown planthopper in Vietnam" funded by ACIAR (Australia). Rice leaves potentially infected with viruses and brown planthoppers (BPH) were collected in rice fields of the following places:

Part of Vietnam	Province	District	Date of Survey
South	Ho Chi Minh City	Binh Chanh	July 30, 2007
	Long An	Binh Hanh	July 30, 2007
		Tan An	July 30, 2007
		Chau Tan	July 30, 2007
		Tan Vu	July 30, 2007
	Tien Giang	Caibe	July 31, 2007
		Cai Lay	July 31, 2007
	Can Tho	Omon	July 31, 2007
	Vinh Long	Binh Minh	August 1, 2007
		Tam Binh	August 1, 2007
Central	Quang Nam	Duy Xuyen	August 2, 2007
		Thanh Binh	August 2, 2007
	Quang Ngai	Son Tinh	August 3, 2007
		Binh Son	August 3, 2007
		Tu Nghia	August 4, 2007
North	Ninh Binh	Nho Quan	August 6, 2007
		Yen Mo	August 6, 2007
	Hai Phong	An Lao	August 7, 2007
		Tien Lang	August 7, 2007

In each of the provinces/districts we discussed with researchers and extension officers (Appendix 1) about the pests and diseases problem in their area. Most of extension officers we met told us that they had BPH problem in 2006.

General Observations

South Vietnam. Observed fields suspected to be affected by rice grassy stunt (RGSV) and rice ragged stunt (RRSV) viruses. Plants with leaf yellowing/bronzing, and those with typical symptoms of RGSV infection (profuse tillering and stunting) were observed. Plants exhibiting symptoms of RRSV infection such as the ragged/serrated leaves and twisting of the leaf tip were also observed in Tien Giang Province. The incidence of plants with the yellowing symptoms was not as high as that observed in 2006 when we visited the area. In Cuu Long Rice Research Institute (CLRRI), RGSV and RRSV collected in affected rice fields of Mekong Delta region from 2005 to 2006 were being maintained in the experimental plots and the greenhouse (P1 to P4).



Central Vietnam. Despite of the high BPH population (P5) for the past two seasons in the rice areas of Quang Nam and Quang Ngai provinces, plants exhibiting symptoms of typical RGSV and RRSV infection, which were frequently observed in Mekong Delta region, were not found in Central Vietnam. Instead, plants showing yellowing and stunting much similar to symptoms of rice tungro disease (P6 and P7) were observed in some fields, although the incidence was not high.

P5

Current status of rice virus diseases in Vietnam

Leaf and BPH samples collected in Vietnam during the trip were tested by enzyme-linked immunosorbent assay (ELISA) for the presence of viruses (table in the following page). The results can be summarized as:

1. Examination of leaf samples collected in the southern region showed that plants with yellowing symptoms were predominantly infected with RGSV, but not RRSV. During the height of virus disease outbreak in 2006, double infection of RGSV and RRSV were frequently detected from plants with yellowing symptoms collected in Mekon delta area. However, the double infection was rarely observed in the samples collected this year, except in those collected from the plants maintained in the fields and the greenhouse of CLRRI.
2. RRSV, but no tungro viruses were detected from the leaf samples of plants with tungro-like symptoms found in the central and the northern regions.
3. We were able to collect about 200 BPH in Tien Giang and Vinh Long provinces. Examination of BPH samples by ELISA revealed that about 60% BPH from Tien Giang and 30% of BPH from Vinh Long were carrying RGSV. No RRSV were detected from BPH collected in the two southern provinces. We also tested BPH collected in the central and the northern regions, but we were not able to detect any viruses in BPH from those regions. (In 2006, 66% and 40% of BPH collected in several sites of Mekong delta area were found carrying RGSV and RRSV, respectively).

Viruses detected from leaf samples collected in Vietnam from July to August, 2007.

Samples collected at:	Part of Vietnam	Number of samples infected with / number of samples collected				
		RGSV	RRSV	RGSV+RRSV	RTBV	RTSV
HCM City	South	2/4	0/4	0/4	0/4	0/4
Long An	South	10/12	0/12	0/12	0/12	0/12
Tien Giang	South	17/20	3/20	0/20	0/20	0/20
Can Tho	South	16/16	9/16	9/16	0/16	0/16
Vinh Long	South	15/18	1/18	1/18	0/18	0/18
Quang Nam	Central	0/11	2/11	0/11	0/11	0/11
Quang Ngai	Central	0/22	0/22	0/22	0/22	0/22
Ninh Binh	North	0/9	0/9	0/9	0/9	0/9
Hai Phong	North	0/7	0/7	0/7	0/7	0/7
Ha Giang	North	0/2	2/2	0/2	0/2	0/2
Bac Ninh	North	0/2	1/2	0/2	0/2	0/2
Hung Yen	North	0/13	5/13	0/13	0/13	0/13
Bac Giang	North	0/6	3/6	0/6	0/6	0/6
Thai Binh	North	0/4	0/4	0/4	0/4	0/4
Ha Tay	North	0/9	0/9	0/9	0/9	0/9


P6


P7

North Vietnam. Similarly in North Vietnam plants that exhibit symptoms of virus diseases prevalent in South Vietnam were not found. However, plants suspected to be infected with rice tungro disease (P8 and P9) were observed. High population of BPH was also a problem in some rice areas we visited. Infestation of stemborer was high as shown by presence of deadhearts (P10). Some of the rat damage appeared to cause yellowing of plants (P11).


P8


P9


P10


P11

Appendix 4

TRIP REPORT

Survey of Rice Virus Diseases in Cambodia
August 20 - 25, 2007

Il-Ryong Choi (PBGB)

Background: Dr. Vincent Lanoiselet (Charles Sturt University, Australia) has been conducting a capacity-building project for rice disease research in Cambodia. He participated in the blast workshop held in IRRI, 2006. He asked for our help in identifying suspected virus diseases observed in Cambodia.

Places visited: We were accompanied by Dr. Ny Vuthy of CARDI, and traveled four provinces adjacent to Vietnam (figure below) to observe the status of rice virus diseases, and collected leaf samples of rice plants suspected to be affected by viruses.

Province	Date of Survey
Kampong Cham	August 24, 2007
Prey Veng	August 23, 2007
Svey Rieng	August 22, 2007
Takeo	August 21, 2007

August 21, 2007

- Met Dr. Preap Visarto, Head of Plant Protection Division, CARDI. He said that 1) in 2006 they had a serious problem with brown plant hoppers (BPH) in several provinces near the Cambodia/Vietnam border, 2) a number of rice plants which appeared to be affected by rice grassy stunt (RGSV) and rice ragged stunt viruses (RRSV) were also observed in those provinces then, 3) community efforts are being made to reduce the BPH population by physical (e.g., removal of BPH by mosquito nets) and chemical (e.g., broadcasting of sands soaked with diesel oil) methods, and 4) their BPH-resistant varieties seemed not to be effective to control BPH in fields.
- Visited Golden Seed Company (P1) in Takeo province. The company produced the seeds of popular rice varieties such as IR66, but the production in 2006 was severely

Appendix 1: Persons met during the survey of rice virus disease in Vietnam (July 29 to August 8, 2007).

Plant Protection Department, Ho Chi Minh City

- Dr. Nguyen Huu Huan, Deputy Director General, PPD HCM
- Mr. Nguyen Huu Dat, Director, Post Entry Quarantine Center II
- Mr. Nguyen Danh Van, Vice Director, Post Entry Quarantine Center II

Southern Regional Plant Protection Center, Tien Giang

- Mr. Ho Van Chien, Director
- Mr. Lee Quuc Coung

Plant Protection Sub-Department, Caibe District, Tien Giang.

- Mr. Nguyen Van Hai
- Vo Thanh Hung
- Phan Ba Hung

Cuu Long Delta Rice Research Institute, Omon, Can Tho, South Vietnam

- Dr Pham Van Du, Head and Plant Pathologist
- Dr Loung Minh Chau, Entomologist
- Mr Hoang Dinh Dinh, Pathologist, ATTC

Plant Protection Sub-Department, Vinh Long, South Vietnam

- Mr Nguyen Van Liem

Plant Protection Sub-Department, Quang Nam, Central Vietnam

- Mr Tran Hong, Director Quang Nam PPSD
- Mr Nguyen Dinh, Chief Technical Division, Quang Nam PPSD
- Mr Vo Duy Anh, Director PPS, Thanh Binh District

Plant Protection Sub-Department, Quang Ngai, Central Vietnam

- Mr Vo Duy Loan, Director Quang Ngai PPSD
- Mr Truong Dinh Dau, Director PPS, Son Tinh District
- Mr Nguyen Hoa, Director PPS, Binh Son District

Central Region Plant Protection Center, Quang Ngai, Central Vietnam

- Mr Nguyen Van Ha, Director
- Mr Phan Dinh Dung

Plant Protection Sub-Department, Ninh Binh, North Vietnam

- Mr Pham Van Nang, Director, Ninh Binh PPSD
- Mr Vu Chac Hieu, Vice Director, Ninh Binh PPSD

Plant Protection Sub-Department, Hai Phong, North Vietnam

- Mr Le Viet Cuong, Director, Hai Phong PPSD
- Mr Nguyen Xuan Binh, Vice Director, Hai Phong PPSD
- Mr Vu Danh Ca, Vice Director, Hai Phong PPSD
- Ms Nguyen Hong Thuy, Chief Technical Division, Hai Phong PPSD

Northern Region Plant Protection Center, Hung Yen, North Vietnam

- Mr Tran Nguyet Tam, Director
- Mr Bui Xuan Phong

Plant Protection Department, Hanoi

- Dr Dau Quac Tru, Vice Director, PPD Hanoi
- Ms Tran Thi Xuyen
- Ms Ngo Thi Thuang Dung

Plant Protection Research Institute, Hanoi

- Dr Ngo Vinh Vien, Acting Director
- Mr Nguyen Tuan Anh

damaged by BPH and virus diseases (possibly RGSV). We visited the rice fields of the company, and found some plants with symptoms of leaf yellowing/bronzing and stunting (P2). However, BPH population in the area seemed to be low.


P1

P2

August 22, 2007

- Met Mr. Tahch Ratana, Directror of Provincial Department of Agriculture (PDA) of Svey Rieng. According to him, 1) they had serious problems with BPH since 2006 – about 16,000 ha of rice fields were affected by BPH in 2006, 2) they are focusing on the removal of BPH using mosquito nets (picture below). So far more than 40,000 farmers participated in forums for BPH control, and more than 9 tons of BPH were collected in the area, and 3) PDA once offered an incentive to farmers for catching/collecting BPH (500 Riel for kilogram of BPH, 1USD = 4,000 Riel).


Picture provided by PDA-Svey Rieng

• Traveled through Svey Rieng province. However, rice plants were just harvested or in transplanting stage in most fields, and could not find plants with distinctive symptoms of virus infections. Also visited the local branch of Golden Seed Company. They said that they stopped growing rice since the last season due to suspected virus diseases causing yellowing.

August 23, 2007

• Traveled Prey Veng province. Met the director of PDA-Prey Veng, who told us that about 20 to 30% of rice plants were affected by suspected virus diseases in last year. We could find a few fields with rice plants exhibiting yellowing/bronzing leaves in the province, although the incidence seemed to be low.

• The level of BPH in the area appeared to be very high. We saw a huge number of BPH were attracted to any lights outside at night (P3).


P3


P4

August 24, 2007

• Traveled Kampong Cham province. In the morning we met local extension officers, who were going to hold a farmers' forum on BPH management in the area. We visited several sites, and found some plants with yellowing symptoms. Symptoms of some plants looked very similar to those of tungro disease (P4). Usually we found 3 to 4 BPH per plants in those sites.

Results of serological test for virus infection in the samples collected in Cambodia

• Leaf samples collected in Cambodia were tested by enzyme-liked immunosorbent assay for virus infections (table in the following page). Only RGSV were detected from some of leaf samples we collected. Some of the plants showing symptoms much similar to those of tungro disease were also found infected with RGSV, not with tungro viruses.

Sampling date	Province		Number of plants infefcted with / number of plants examined			
			RGSV	RRSV	RTSV	RTBV
8/21/2007	Takeo	Farm 1	5/9	0/9	0/9	0/9
8/23/2007	Prey Veng	Farm 1	4/10	0/10	0/10	0/10
		Farm 2	0/10	0/10	0/10	0/10
8/24/2007	Kampong Cham	Farm 1	6/8	0/8	0/8	0/8
		Farm 2	1/6	0/6	0/6	0/6
		Farm 3	2/8	0/8	0/8	0/8

CP/2007/211

Scoping study to identify research and implementation issues related to management of the brown planthopper/virus problem in rice in Vietnam

Final Consultation Workshop

8 January 2008
New World Hotel
Ho Chi Minh City, Vietnam

Australian Government
Australian Centre for International Agricultural Research

Appendix 5

Introduction

In 2005/06, rice production in Vietnam particularly in the Mekong Delta suffered a major setback when outbreaks of the brown planthopper (BPH) caused a loss of ~ 400,000 tons (or 1.1 % of Vietnam's total). In Vietnam BPH infestation threatened rice exports and also prompted farmers to spray insecticides indiscriminately and excessively in attempts to curb the spread of viral infections and this escalated in a high usage of insecticides. There is also the imminent danger of the BPH/virus problem spreading north and west from the current epicentre in the Mekong Delta that will affect rice production in Cambodia, Laos, Central and Northern Vietnam and China. In 2005 extensive outbreaks of BPH also occurred in China, Korea, Japan and Vietnam bringing about yield losses of more than 3 million tons. BPH was first detected on rice in Asia in the 1970s but in recent years little research had been carried out on BPH as a vector of viral diseases.

Vietnam's rice ecosystem has a rich habitat biodiversity that can conserve natural biological control services. At the same time, some of the flora might be alternate hosts to the viruses, although the vector, BPH is primarily monophagous to rice. In the last 15 years, rice farmer's insecticide use has steadily declined from about 3.5 to 1.0 spray/season as a result of intensive media campaigns, radio and training programs implemented by the government. The recent BPH/virus problems have negated the good results obtained in IPM by the increase in unnecessary pesticide use, which compromise farmers' health and biological control activities in rice ecosystems and bring about increased BPH problems and virus spread.

BPH outbreaks may be attributed to the lack of "system resistance" and breakdown in ecosystem services, thus making the crop vulnerable to shifts in climate and cropping patterns. The outbreak in northern China in 2005 had been attributed to the slight increase in summer temperatures of 2 ^{o}C and abnormal number of south -west typhoons. Similar post-ante analyses of Vietnam's BPH/virus problem may provide important information for developing management options.

In May 2007, the Australian Agency for International Agricultural Research (ACIAR)[1] supported a small research activity (SRA) focused at helping the Ministry of Agriculture and Rural Development of Vietnam identify research and implementation issues related to management of the BPH/virus problem. The SRA focused on the following activities:

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[1]Special thanks to Dr. T.K. Lim, program manager, who facilitated the SRA.

1. Analyses and review of literature, information, monitoring data, results of pilot projects and field trials conducted and documents available from the Ministry of Agriculture Vietnam.
2. Review of occurrence and variability of virus diseases (Rice Yellow Syndrome) transmitted by BPH in whole of Vietnam.
3. Review of BPH population variability, identify migratory patterns for developing a monitoring scheme and scoping for natural biological control possibilities.
4. Conducting focus group discussions to identify major perception constraints to the viral diseases and their management and scope for opportunities for communication to farmers.
5. To advise next steps for the Ministry of Agriculture to implement research and implementation strategies to manage the pest in a workshop.

The purpose of this workshop is thus to report on the scoping studies, share information, discuss next steps in research and implementation of management strategies.

Program

8 January 2008 (Tuesday)

0800	Registration	Secretariat
0830	Opening session	
	Introductions	K.L. Heong
	Welcome address	Vice Minister Dr Bui Ba Bong

Session I: Ecology of planthoppers and viruses

Chair*: M.M. Escalada*

0900	Are brown planthopper outbreaks due to deteriorated ecosystem services in rice fields?	K.L. Heong
0920	The effects of nitrogen on planthopper fitness	Z. Lu
0940	Review of trends and circumstances that might have contributed to outbreaks in the Mekong	K.L. Heong H.V. Chien N.H. Huan
1000	Coffee/ picture taking	
1020	BPH/virus problems in Cambodia	Pol Chanty
1040	BPH population variability and migratory patterns	Y. Chen J. Ferrater
1100	BPH management in the Mekong	N.V. Huynh
1120	Occurrence and variability of virus diseases (Rice Yellow Syndrome) transmitted by BPH in Vietnam.	I.R. Choi R. Cabunagan
1140	BPH/virus problems in Indonesia	Suprihanto
1200	Lunch	

Session II: **Planthopper and virus management**

Chair: K.L. Heong

1300	BPH and virus problems and management	N.V. Vien
1320	Management of virus disease in Vietnam	P.V. Du
1340	Major perception constraints to viral diseases and their management.	M.M. Escalada T.T. Tung
1400	Implementing the "escape" strategy to manage BPH and virus infections	N.H. Huan H.V. Chien
1420	Managing BPH in Korea	Y.H. Song

Session III: Workshop – Brainstorming for next steps

1440	Next steps in formulating R and D for BPH/virus problem	K.L. Heong
	Breakout into 2 groups for discussions *Research needs and issues* *Implementation needs and issues*	
1630	Presentation of recommendations/plans	
1700	Closing remarks	Dr. Nguyen Van Bo
1830	Workshop dinner	

Participants

Cambodia

Pol Chanty	Cambodia Agricultural Research and Development, Phnom Penh, Cambodia

China

Dr. Zhong Xian Lu	Deputy Director, Plant Protection Institute, Zhejiang Academy of Agricultural Sciences Hangzhou, PR China

Indonesia

Dr. Suprihanto	Indonesian Center for Rice Research Sukamandi, West Java, Indonesia

Korea

Dr. Yoohan Song	Gyeongsang National University, Chinju, Korea

Philippines

Dr. M.M. Escalada	Visayas State University, Baybay, Leyte

Vietnam

Dr. Bui Ba Bong	Vice Minister of Agriculture and Rural Development, Hanoi, Vietnam
Dr. Nguyen Van Bo	President, Vietnam Academy of Agricultural Sciences, Hanoi, Vietnam
Mr. Nguyen Quang Minh	DG Plant Protection Department, Hanoi
Mr. Le Mau Toan	Vice DG Plant Protection Department, Hanoi
Dr. Bui Si Doanh	Vice DG Plant Protection Department, Hanoi
Mr. Nguyen Huu Huan	Vice DG Plant Protection Department, Ho Chi Minh City
Mr. Ngo Tien Dung	Head of Plant Protection Division, PPD, Hanoi
Mr. Hoang Van Thong	Head of Planning Division, PPD, Hanoi
Representative	Department of Science & Technology, MARD, Hanoi, Vietnam
Dr. Ngo Vinh Vien	DG National Institute of Plant Protection, Hanoi
Dr. Nguyen Nhu Cuong	Entomologist, National Institute of Plant Protection, (NIPP) Hanoi
Dr. Ta Hoang Anh	Virologist, NIPP, Hanoi
Dr. Nguyen Van Tuat	DG National Institute for Food Crops, Hanoi
Dr. Nguyen Van Huynh	Professor, entomologist, Can Tho University, Can Tho
Dr. Pham Van Kim	Professor, pathologist, Can Tho University, Can Tho

Mr. Ho Van Chien	Director, Southern Plant Protection Center (SPPC), Long Dinh, Tien Giang
Mr. Le Van Thiet	Deputy Director SPPC, Tien Giang
Mr. Le Quoc Cuong	Deputy Director SPPC, Tien Giang
Dr. Pham Van Du	Deputy DG, Department of Crop Production, Ho Chi Minh City
Mr. Nguyen Van Hoa	Deputy DG, Department of Crop Production, Ho Chi Minh City
Dr. Duong Van Chin	Deputy Director, Cuu Long Rice Research Institute (CLRRI), O Mon, Can Tho
Dr. Luong Minh Chau	Entomologist, CLRRI, O Mon, Can Tho
Dr. Mai Thanh Phung	National Center for Extension, HCM City
Dr. Vo Tong Xuan	Former Rector, An Giang University
Dr. Nguyen Tho	Consultant
Dr. Vu Trieu Man	Professor, virologist, University of Agriculture, Hanoi
Dr. Bui Chi Buu	DG, Institute for Agricultural Science, Ho Chi Minh City
Mr. La Pham Lan	Researcher, Institute for Agricultural Science, Ho Chi Minh City
Dr. Tran Tan Viet	Lecturer, Nong Lam University, HCM City
Provincial Directors of Agriculture	Ho Chi Minh City, Long An, Tien Giang, Dong Thap, Vinh Long, Tra Vinh, Can Tho, An Giang, Hau Giang, Soc Trang, Kien Giang
Provincial Directors of Protection Protection	Ho Chi Minh City, Long An, Tien Giang, Dong Thap, Vinh Long, Tra Vinh, Can Tho, An Giang, Hau Giang, Soc Trang, Kien Giang

FAO

Dr. A. Speedy	FAO Vietnam, Hanoi

ACIAR

Mr. Geoff Morris	ACIAR Country Manager, Vietnam, Hanoi

IRRI

Dr. I. L. Choi	Plant Breeding, Genetics and Biotechnology Division, IRRI
Dr. R. Cabunagan	Plant Breeding, Genetics and Biotechnology Division, IRRI
Ms. J. Ferrater	Crop and Environmental Sciences Division, IRRI
Dr. K.L. Heong	Crop and Environmental Sciences Division, IRRI

Appendix 6

IRRI
INTERNATIONAL RICE RESEARCH INSTITUTE
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Bulletin

14-18 **January No. 2008.02**

http://bulletin.irri.cgiar.org/bulletin/2008.02/default.asp

Also visit: http://english.vietnamnet.vn/tech/2008/01/763441/

Scientists develop plans toward sustainable management of brown planthopper and virus diseases in Vietnam

In the past 2 years, Vietnam's rice production suffered losses of about 0.7 million tons from damage caused by brown planthoppers (BPH) and virus diseases.

On 8 January in Ho Chi Minh City, Vice Minister Dr. Bui Ba Bong emphasized the importance of developing research and implementation strategies that are environmentally sustainable during the *Final Consultation Workshop* of a scoping project sponsored by the Australian Centre for International Agricultural Research (ACIAR) and IRRI. The project was designed to review the factors that had contributed to the sudden outbreaks of BPH and virus diseases, management strategies that were adopted, and their implications. The goal was to develop research and extension opportunities for sustainable management of the problems.

The photo shows workshop guests (front row, L-R) Andrew Speedy (FAO representative, Vietnam), Monina Escalada, K.L. Heong, Dr. Bui Ba Bong (vice minister for agriculture, Vietnam), Nguyen Huu Huan (vice director general, Plant Protection Department, PPD, Vietnam), Prof. Vu Trieu Man (Hanoi Agricultural University), Huynh Thanh Binh (director of Plant Protection Sub-Department (PPSD) Soc Trang), Do Duc Hoang (vice director of PPSD Kien Giang), and Dr. Ngo Vinh Vien (director, National Institute for Plant Protection, NIPP) with the participants.

To avoid virus spread, scientists in Vietnam had developed and implemented an “escape strategy,” which uses light trap records to determine planting times in communities. Dr. Nguyen Huu Huan reported considerable success of the method for “escaping” virus infections. “What is now needed is for research to further refine the escape strategy to make it more reliable and substantiated by scientific research,” said IRRI Scientist and Project Leader K.L. Heong. A range of virus infection symptoms, collectively called “yellowing syndrome,” has been observed in the field. “What we now need is to further define the virus-plant interactions and develop a diagnostic kit to identify the viruses,” said IRRI Virologist Dr. I.R. Choi.

Research using microsatellite markers by Dr. Yolanda Chen of IRRI showed that brown planthoppers in northern, central, and southern Vietnam appear to be genetically similar. “It is likely that the hoppers are constantly moving or displaced by wind,” said IRRI’s Jedeliza Ferrater, who presented a paper.

An analysis of the ministry’s response to the pest outbreaks showed that more than 55% of the emergency funds had been designated to support pesticide purchases and only about 7% for extension activities. “The mass media played an important role in disseminating information and motivating farmers to adopt the escape strategy," said Dr. M.M. Escalada, a communication scientist from the Philippines. “Many of the farmers even knew about transmission periods of the virus infections."

Using SWOT (strengths, weaknesses, opportunities, threats) analysis, the 70 workshop participants developed sets of opportunities in research and extension. In his concluding speech, Mr. Nguyen Quang Minh, director general of PPD, called on overseas expertise to provide technical assistance to Vietnam in developing a more comprehensive pest information and management system that can help farmers.