

TRAVEL REPORT FORM

출장보고서

결 재	사원	부서장	원장	
	05/31 Christian ne Aikins	06/01 문상원	06/02 정홍상	
협 조	팀장			
	05/31 김광형			

I. Reporter 보고자

Department 소속	Position 직위(직급)	Name 성명	Travel Date 날짜	Note 비고
Strategic Planning Team, Climate Application Department	Team Leader	Dr. Kwanghyung Kim	2017.03.13~1 8	
Climate Prediction Team, Climate Prediction Department	Research Fellow	Dr. Seongkyu Lee		
External Affairs Department	International Project Officer	Ms. Christianne Aikins		

II. Major Activities 주요업무 수행내용

1. Main Contents and Activities 주요내용 및 활동

- 5th Annual BAWP Technical Workshop as part of the APCC Bicol Rice Disease Project (BIRD)

2. Relevance to APEC Climate Center's Activities 결론 및 소감

- As part of the collaboration with the International Research Institute of Climate and Society at Columbia University (IRI) on the Bicol Agri-Water Project (BAWP), where APCC's activities in BIRD focus on the application of a rice disease model for seasonal yeild loss simulation in the region, APCC co-hosted and supported the 5th Annual BAWP Technical Workshop in Naga, the Philippines
- During the workshop, a hands-on training session was held by APCC staff on the final BIRD project output (CAMDT-Disease), so that beneficiaries were familarized with the tool, key data was collected on any errors, and feedback was given.

-
- BIRD will end in September 2017 with a handover of CAMDT-Disease.
 - Please see the linked Workshop Report and the attached Travel Report for more details.

III. References 참고사항

1. Presented and Collected Materials 주요 수집자료

1. Please see the linked Workshop Report and the attached Travel Report for more details
2. PPT slides for the presentation and hands-on training for CAMDT-Disease delivered by Dr. Kwanghung Kim and Dr. Seongkyu Lee.

2. Suggestions and Remarks 건의사항

Travel Report

BIRD Project
Naga, City Philippines
11-18 March, 2017

2017.03.02. PREPARED BY CHRISTIANNE AIKINS @ EXTERNAL AFFAIRS DEPARTMENT

1 Summary

1.1 Personnel

- Dr. Kwanghyung Kim (Team Leader, Strategic Planning Team, Climate Application Department)
- Dr. Seongkyu Lee (Research Fellow, Information Service Team, Climate Prediction Department)
- Ms. Christianne Miko Aikins (International Project Officer, External Affairs Department)

1.2 Details

Location: Naga City, the Philippines

Dates: Monday 13 – Saturday 18 March, 2017

Project: Bicol Rice Disease project (BIRD)

1.3 Itinerary

Date	Day	Details
13-Mar	Mon	Travel to Manila
14-Mar	Tue	Travel to Naga City and begin workshop
15-Mar	Wed	BAWP Technical Workshop*
16-Mar	Thu	
17-Mar	Fri	
18-Mar	Sat	Return to Busan

*Details of the 2017 BAWP Technical Workshop may be found in the 2017 BAWP Technical Workshop Plan and Report

1.4 Purpose of Travel

- This business trip to Naga City was essential for the project, *The application of a rice disease model for seasonal yield loss simulation in the Bicol region*, or the APCC Bicol Rice Disease Project (BIRD), which supports the Bicol Agri-Water Project (BAWP) and a collaboration with the International Research Institute for Climate and Society (IRI)

- While BIRD mainly focuses on the integration of a disease model into the Climate-Agriculture Modelling Decision Tools (CAMDT) suite, called CAMDT-Disease, APCC has also supported the 2016 and 2017 BAWP Technical Workshops
- APCC supported the 5th annual BAWP Technical Workshop from March 14-17, 2017, which focused on models and tools for water, agriculture and knowledge sharing in Naga City, the Philippines
 - o Final versions of the models such as Water Evaluation and Planning (WEAP) Model-Bicol, Climate-Agriculture Modeling Decision Tool (CAMDT) and Knowledge Sharing Portal and Maproom (KSPM) were presented to project partners
 - o This served as the final event for BAWP, as the project has now ended. APCC's BIRD, however, will continue into September 2017, until the completion of the CAMDT-Disease component. Details can be found in the attached 2017 BAWP Technical Workshop Plan
 - o Training delivered to users and gather feedback to improve APCC's research output: the integration of a disease model into the Climate-Agriculture Modelling Decision Tools (CAMDT) suite, called CAMDT-Disease
 - o Official turnover was held for the models/tools for target users for their operational uses in the future for agricultural climate risk management, excepting CAMDT-Disease (to be turned over in September 2017)

2 Travel Report

2.1 Outcomes

- Important training delivered and critical feedback collected for the improvement of CAMDT-Disease
- Key users were familiarized with and trained on the use of CAMDT-Disease
- Increased visibility of APCC research and projects in the Asia Pacific
- Increased awareness of BIRD and its relevance to the region
- Enhanced relations with project partners
- Consolidated input from stakeholders on beta version of CAMDT-Disease and errors identified for improvement

2.2 Meetings and Events

14 – 17 March 2017

BAWP Technical Workshop

Please see a full report of the 2017 BAWP Technical Workshop in the Workshop Report

17 March 2017

BAWP Staff and Partners Meeting

- A meeting was held after the close of the BAWP Technical Workshop, to discuss a number of non-workshop related topics
- The minutes of the Monthly Staff and Partners Meeting of BAWP from Feb 1, 2017 were reviewed
- The development of a publication "Towards Climate Risk Resilient Farm Communities" in the Bicol was discussed, to present the Bicol experience
- The latest Climate Forecast and Extension Advisory (CLEA) and BAWP bulletins were presented

Background CAMDT-Disease



Yield gap in rice is attributed to production constraints

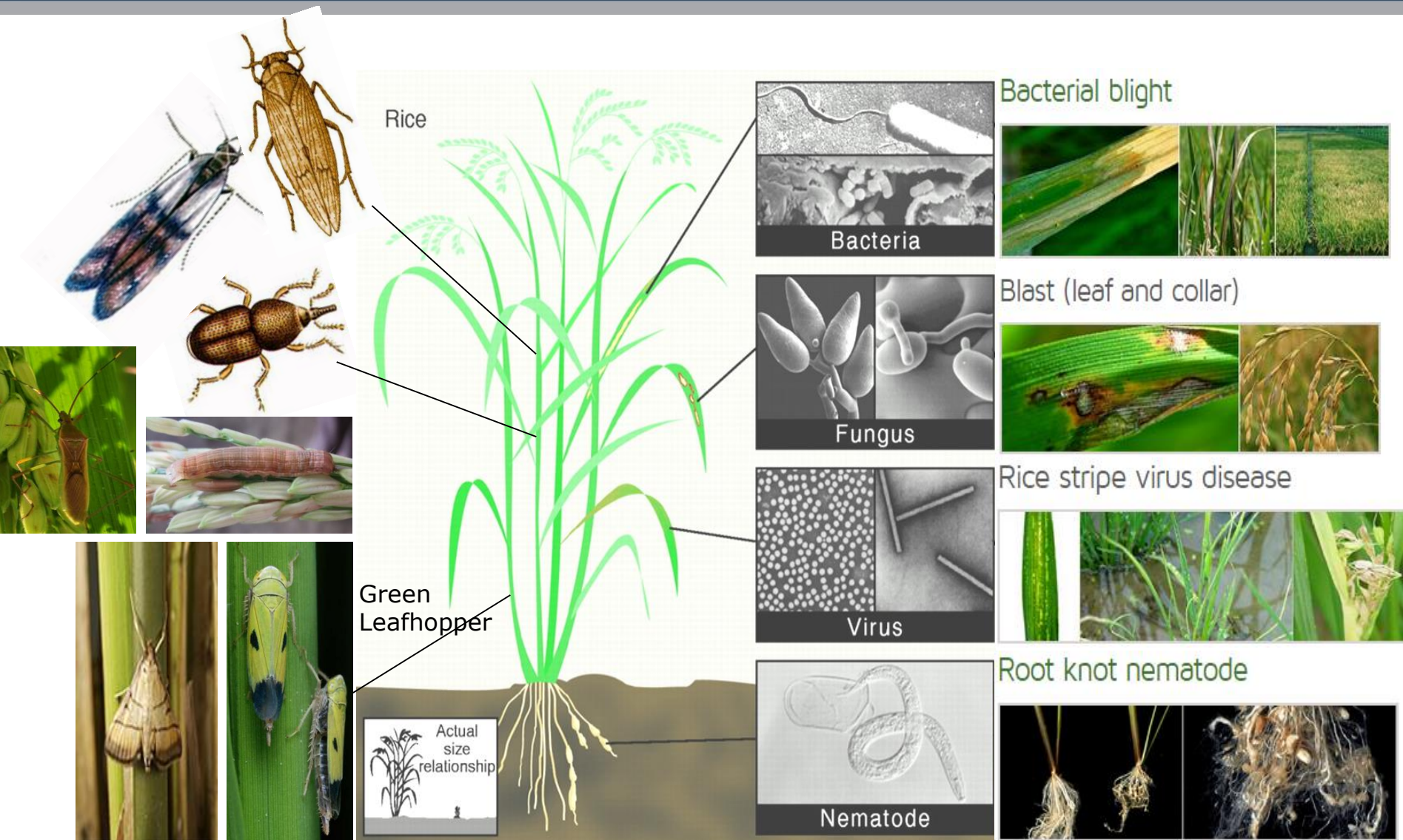
■ Insect pests & diseases.....	35 %
■ Inappropriate water management.....	26 %
■ Inappropriate fertilizer & soil management.....	21 %
■ Weeds.....	9 %
■ Inappropriate seeds & seedling management.....	9 %

What is a Pest?

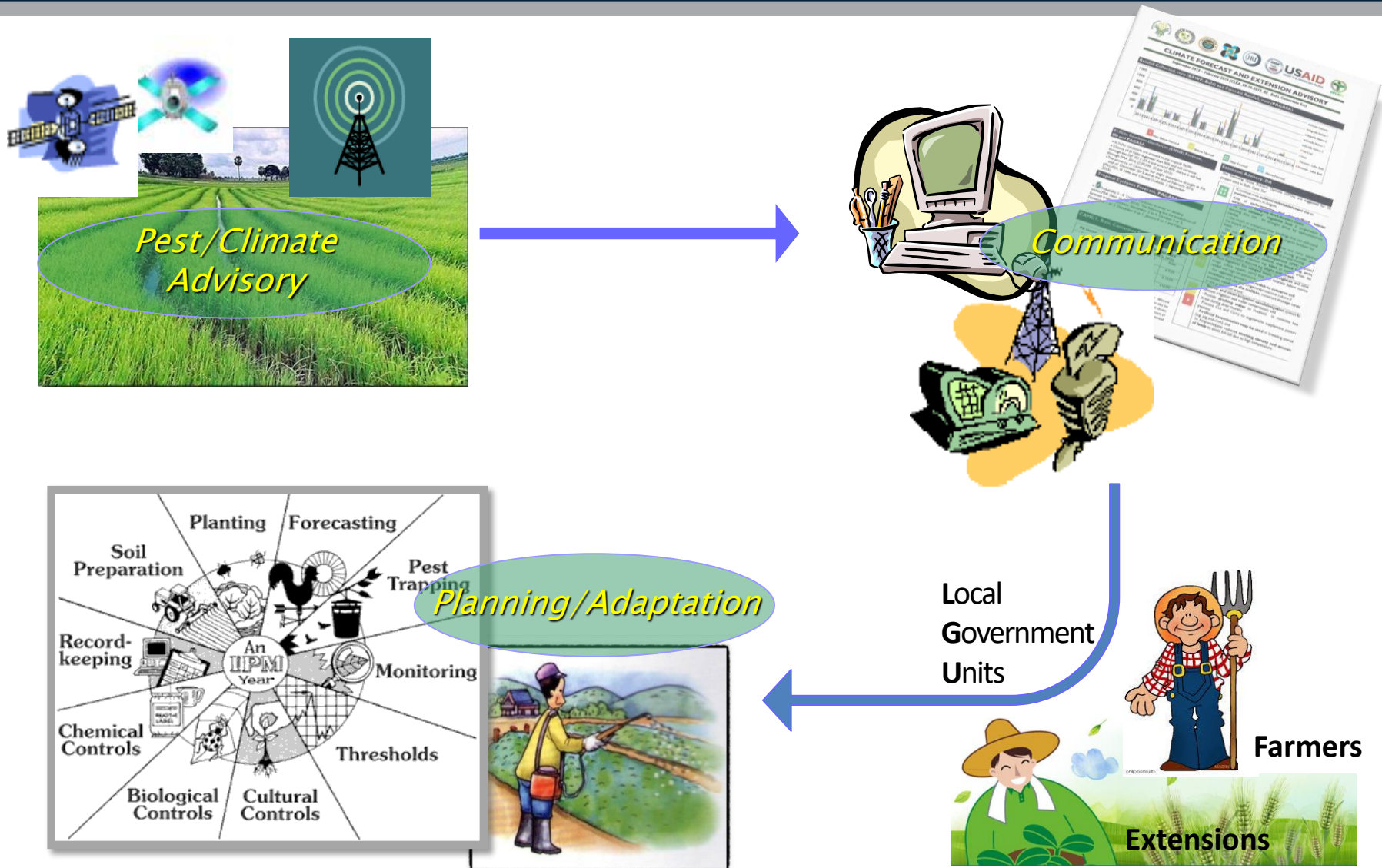


- **Pest – any species, strain, or biotype of plant, animal, or pathogenic agents injurious to plants or plant products.**
- **Pest = Disease + Insect + Animal + ...**

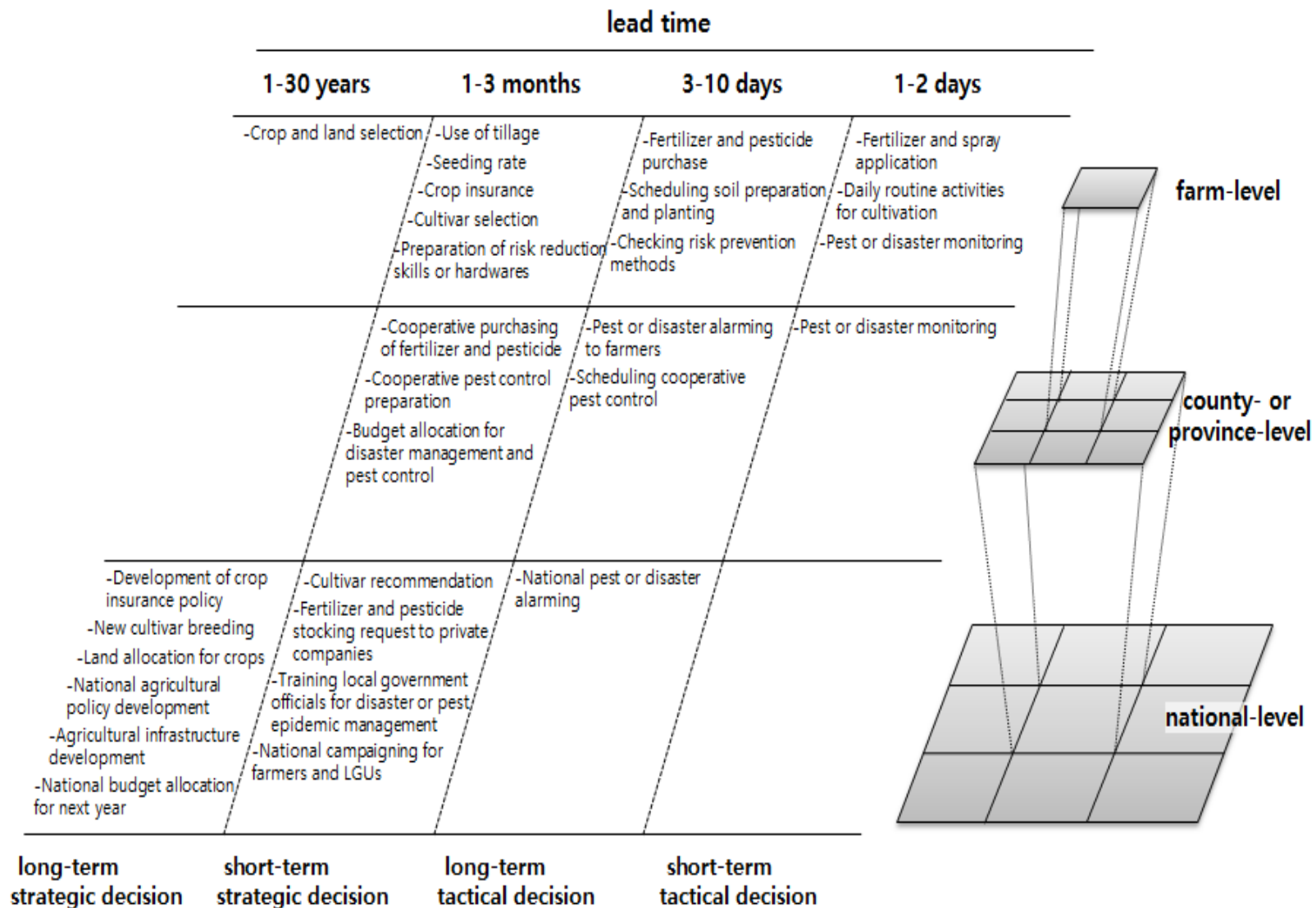
Rice Pests



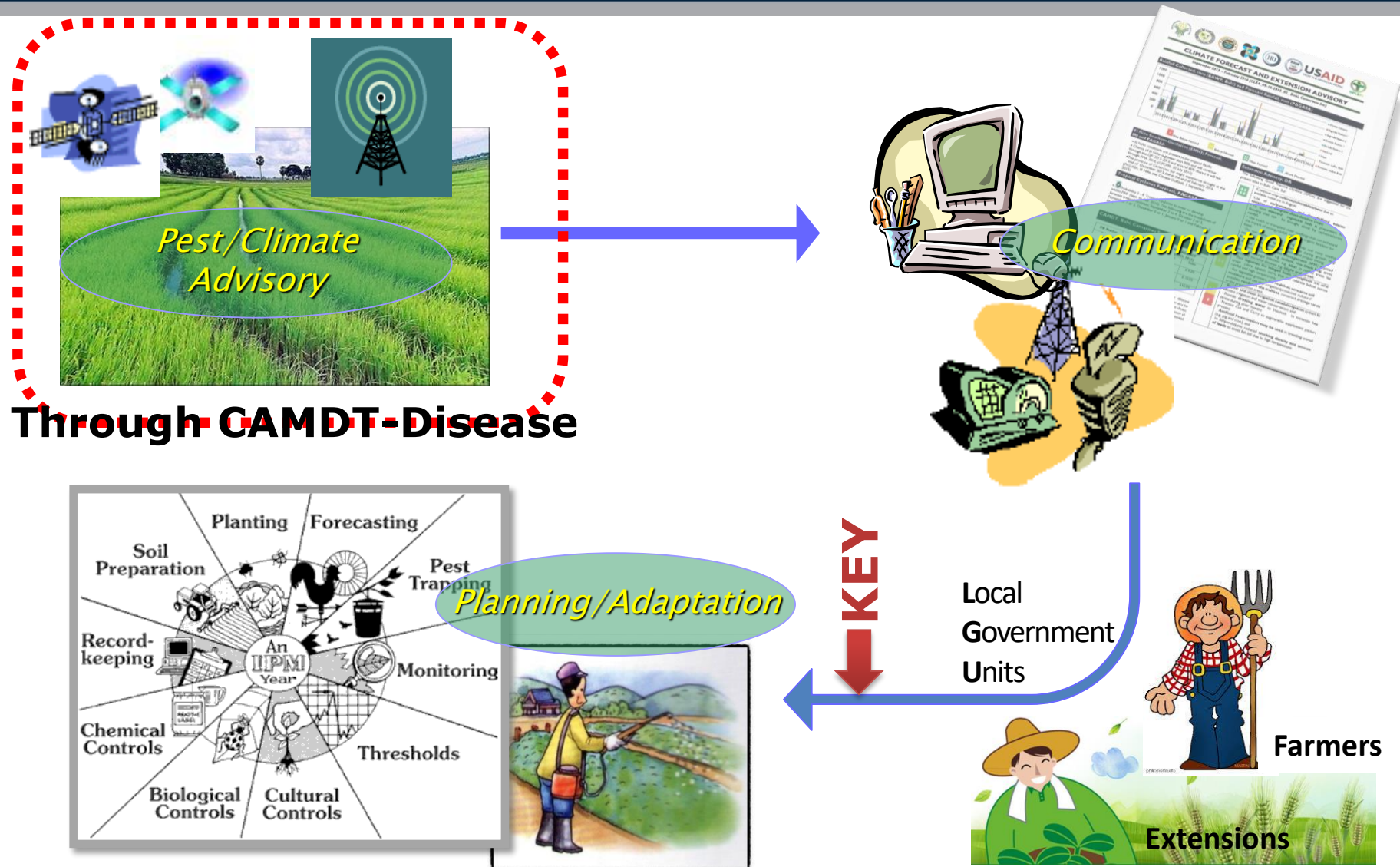
Pest Warning & Counteracting Measures



Decisions in a spatial, a lead-time basis

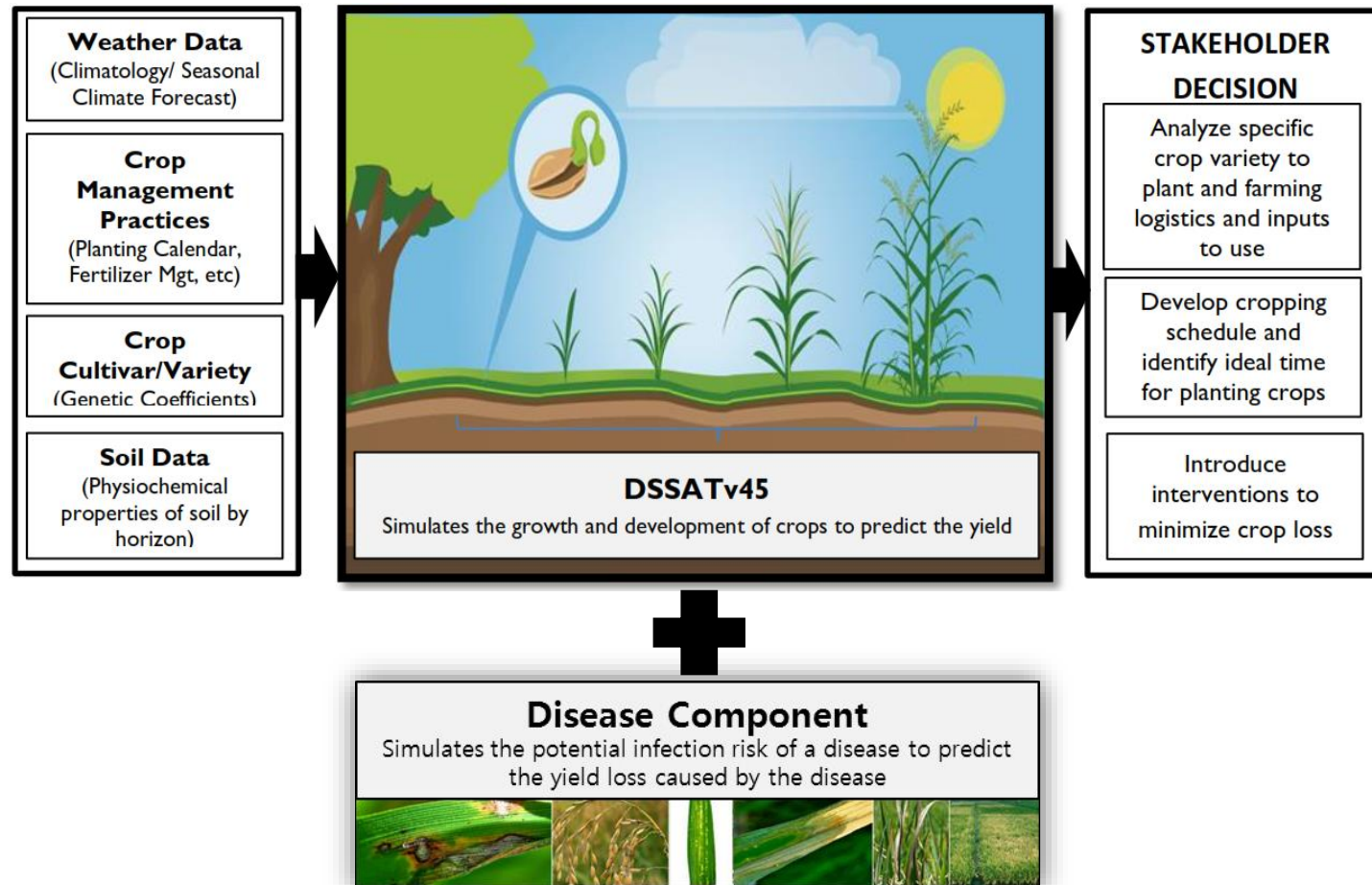


Seasonal Rice Pest Outlook

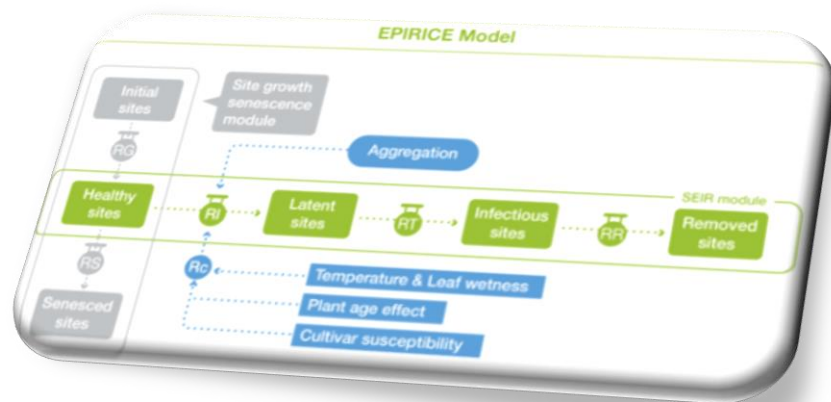




Climate-Agriculture Model Decision Tools (CAMDT-Disease) for Diseases



Target Diseases for CAMDT-Disease



- sheath blight
- bacterial blight
- brown spot

- tungro disease



A tungro forecasting model



Collaboration with DA RFO 5, IRRI, PhilRice for data collection



Sheath Blight

- **Pathogen:** *Rizoctonia solani*
(fungal pathogen)
- **Symptom:**
large oval spots on the leaf sheaths
- **Contributing factors:**
 - warm temperature and high humidity
 - higher rates of nitrogen fertilizers
 - dense stands with a heavily developed canopy





Bacterial Blight

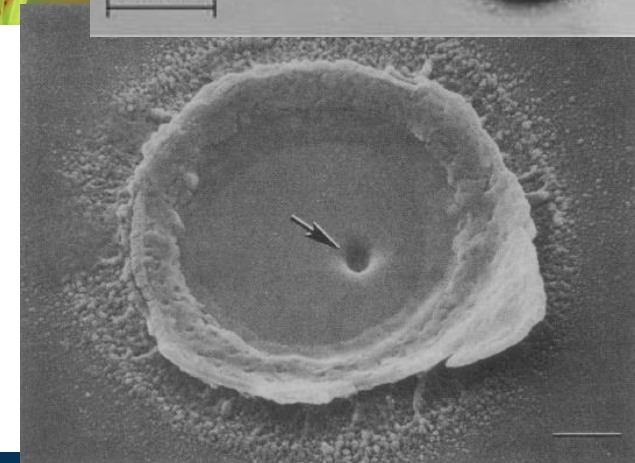
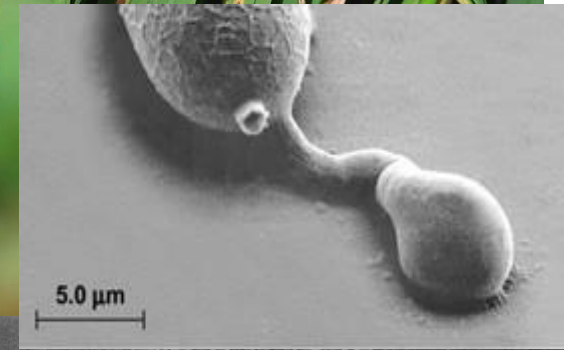
- **Pathogen:** *Xanthomonas oryzae*
(bacterial pathogen)
- **Symptom:**
wilting of seedlings and yellowing and drying of leaves
- **Contributing factors:**
 - Favors temperatures at 25-34°C, with relative humidity above 70%
 - Strong winds and continuous heavy rains
 - High nitrogen fertilizer





Brown Spot

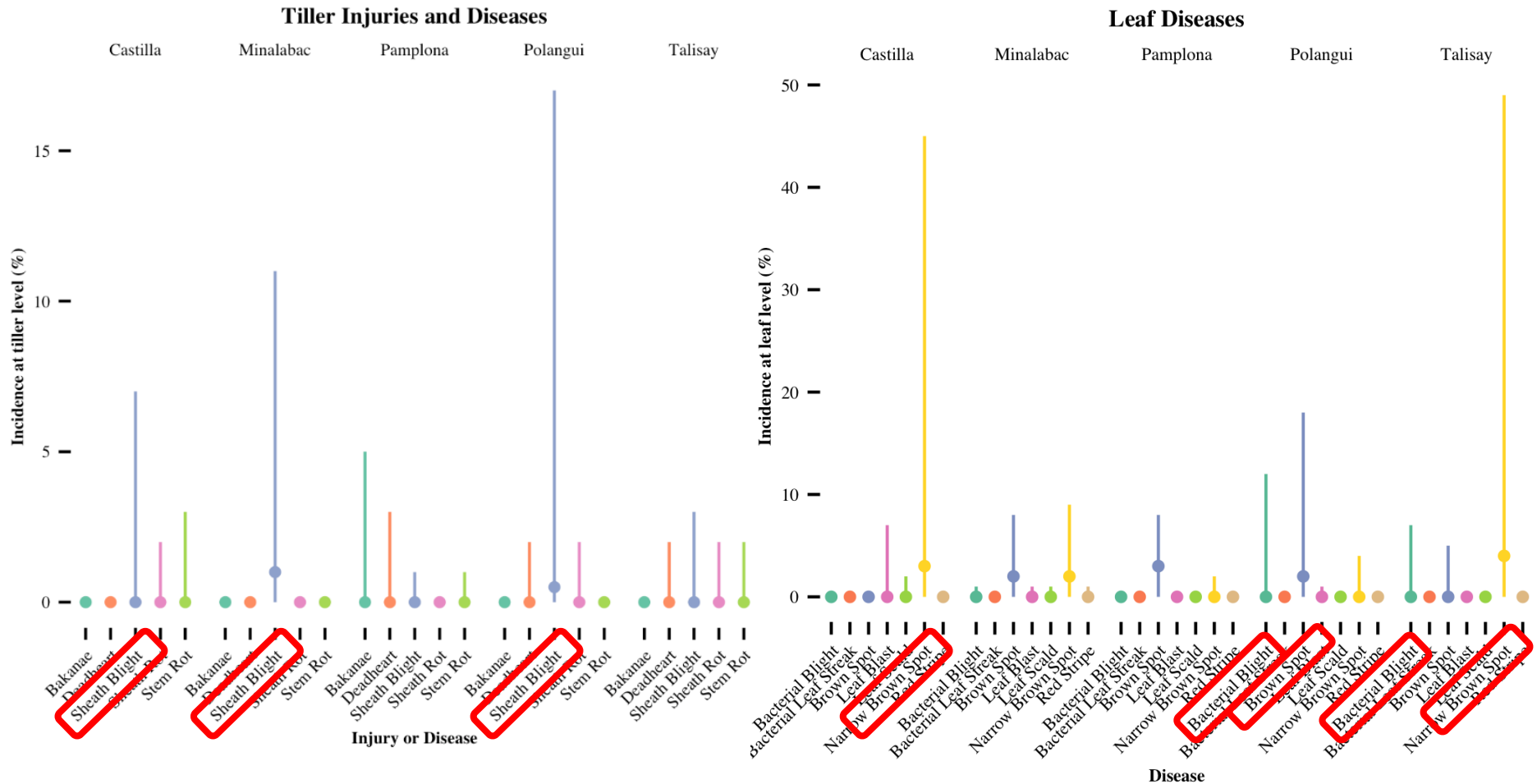
- **Pathogen:** *Helminthosporium oryzae*
(fungal pathogen)
- **Symptom:**
numerous big spots on the leaves;
unfilled grains or spotted seeds
- **Contributing factors:**
 - Favors temperatures at 16-36°C,
with relative humidity above 86%
 - Unflooded and nutrient-deficient soil
 - Long term wet leaves for 8-24 hours
 - Most infection during maximum tillering





Sheath Blight, Bacterial Blight, and Brown Spot Epidemics in Bicol

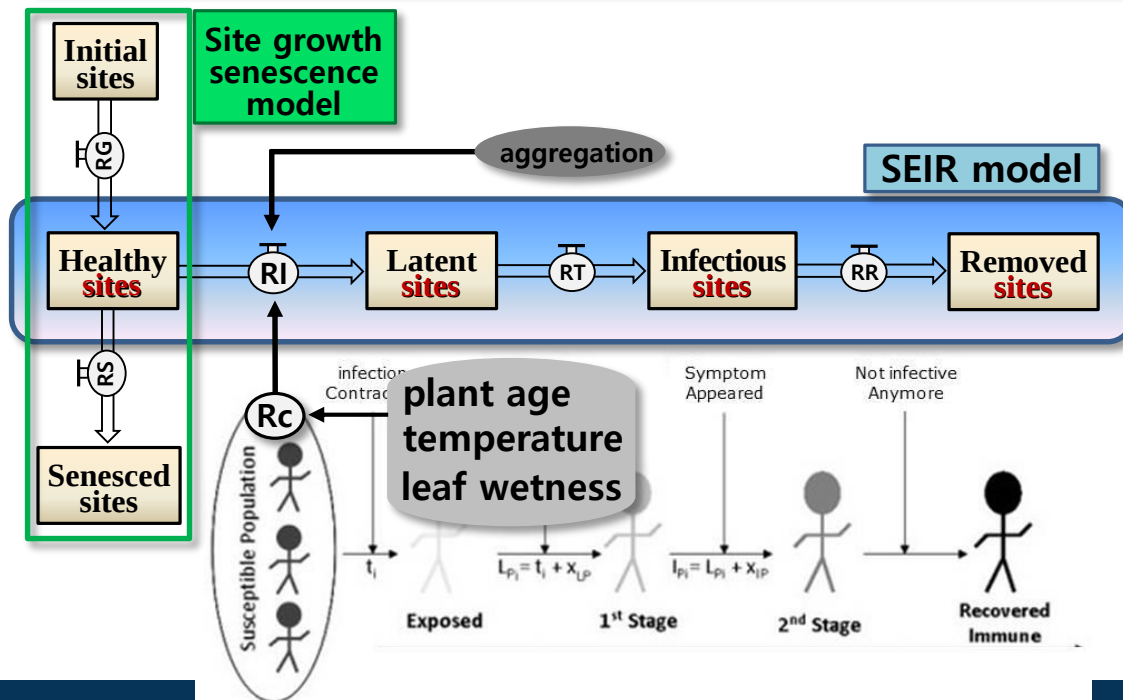
2015 Wet Season



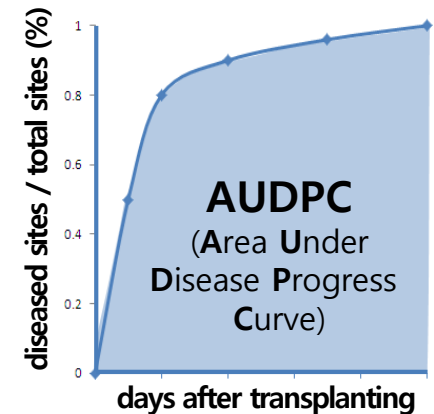
EPIRICE model for sheath blight, bacterial blight, and brown spot

- Developed based on a SEIR (Susceptible-Exposed-Infectious-Removed) model
- Key concept: site (depends on the disease)
- Some added components: crop(site) growth, senescence of plant tissue
- Key process: infection rate modified by plant age, temperature & leaf wetness

EPIRICE Model



EPIRICE output



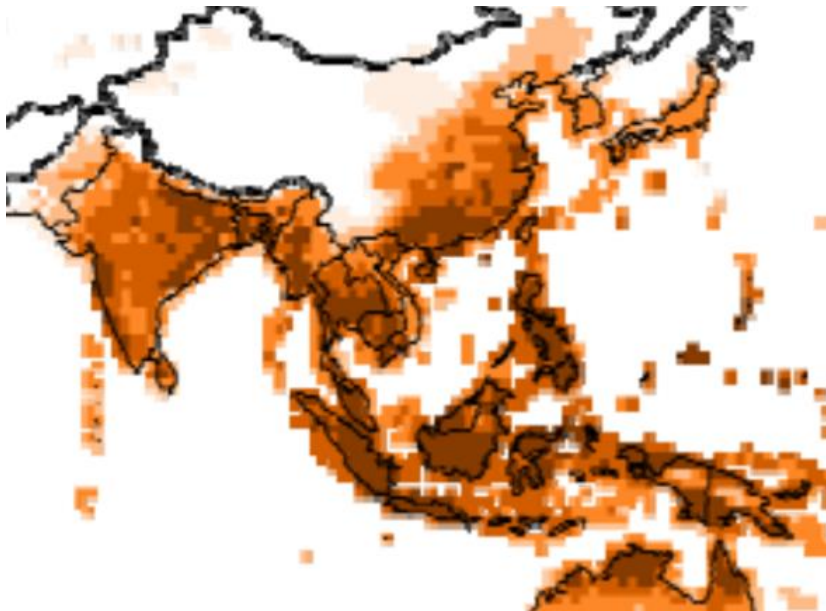
(Savary et al., 2012)



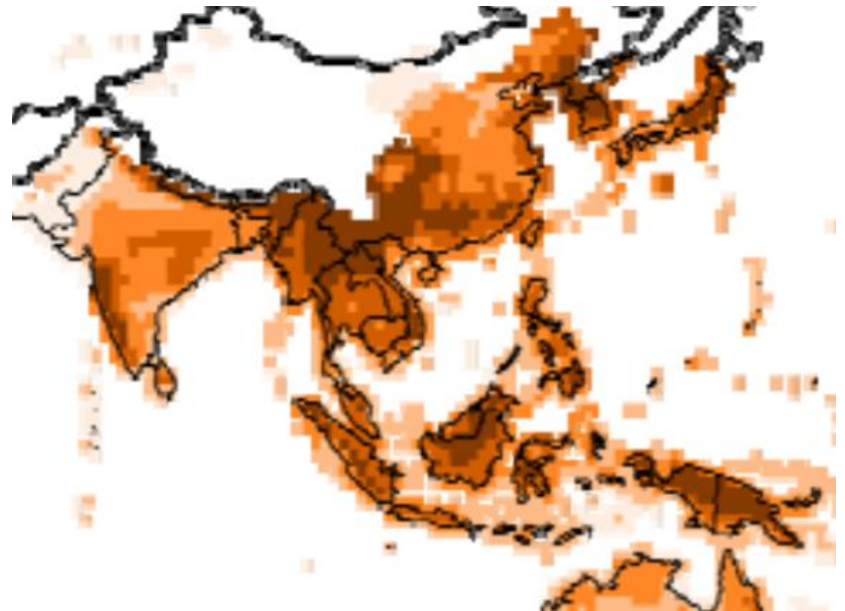
EPIRICE Model – Evaluation

- **EPIRICE was developed based on data collected from the Philippines**

Sheath Blight Epidemics
in Southeast Asia



Brown Spot Epidemics
in Southeast Asia



- Low resolution but reasonable epidemics estimation

(Savary *et al.*)

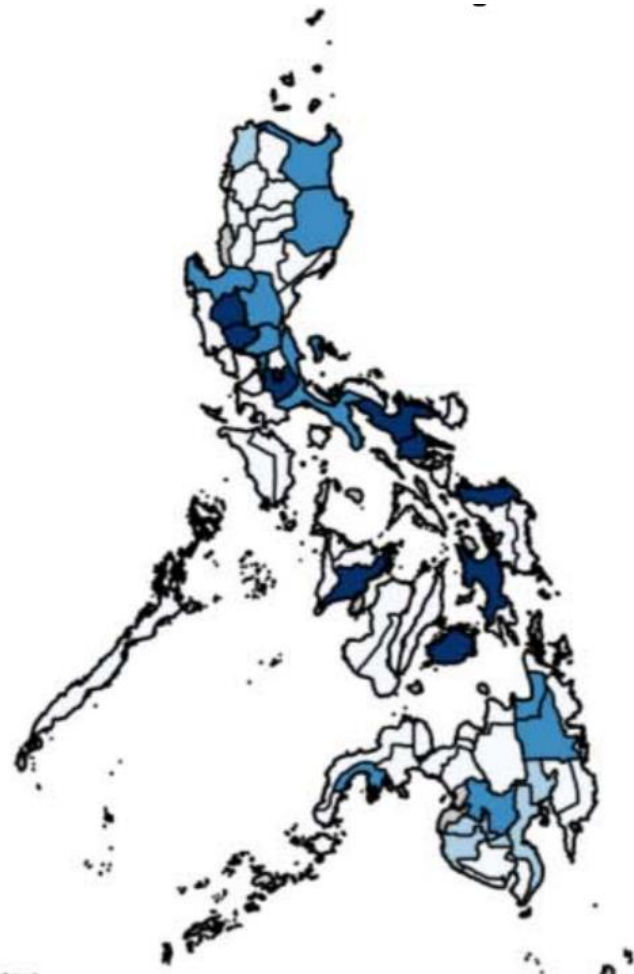
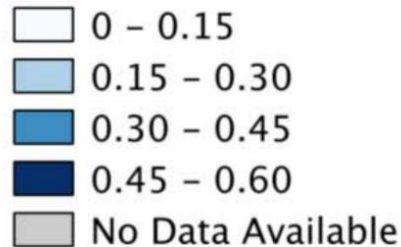


EPIRICE Model – Evaluation

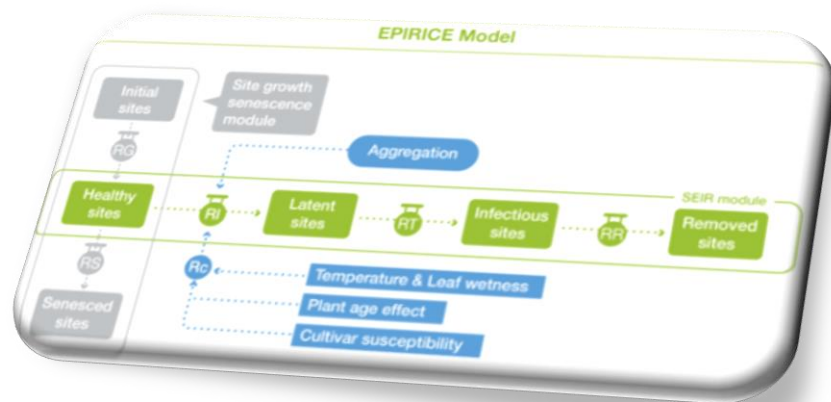
- **EPIRICE was combined with a yield loss model**

Effect of Bacterial Leaf
Blight Resistant Releases

Tonnes/HA



Target Diseases for CAMDT-Disease



- sheath blight
- bacterial blight
- brown spot

- tungro disease



A tungro forecasting model



Collaboration with DA RFO 5, IRRI, PhilRice for data collection



Tungro Disease

- **Pathogen:** *Virus transmitted by green leafhopper*
- **Symptom:**
leaf discoloration, stunted growth, reduced tiller numbers
- **Contributing factors:**
 - Good weather condition for green leafhopper reproduction and virus transmission
 - Cultivar susceptibility
 - Asynchronous planting

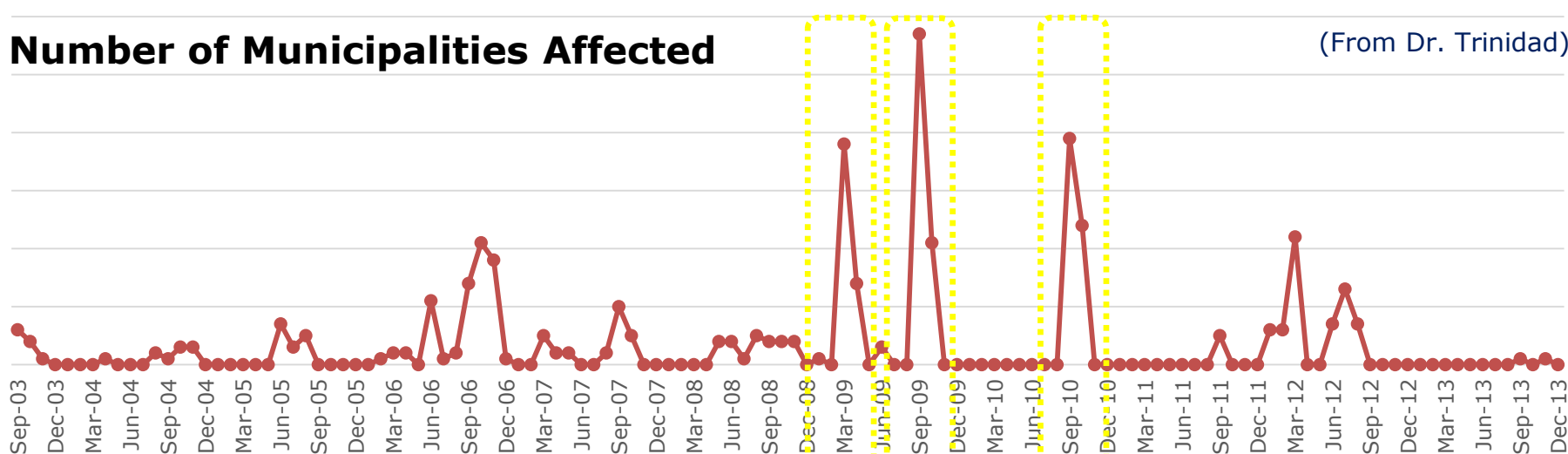




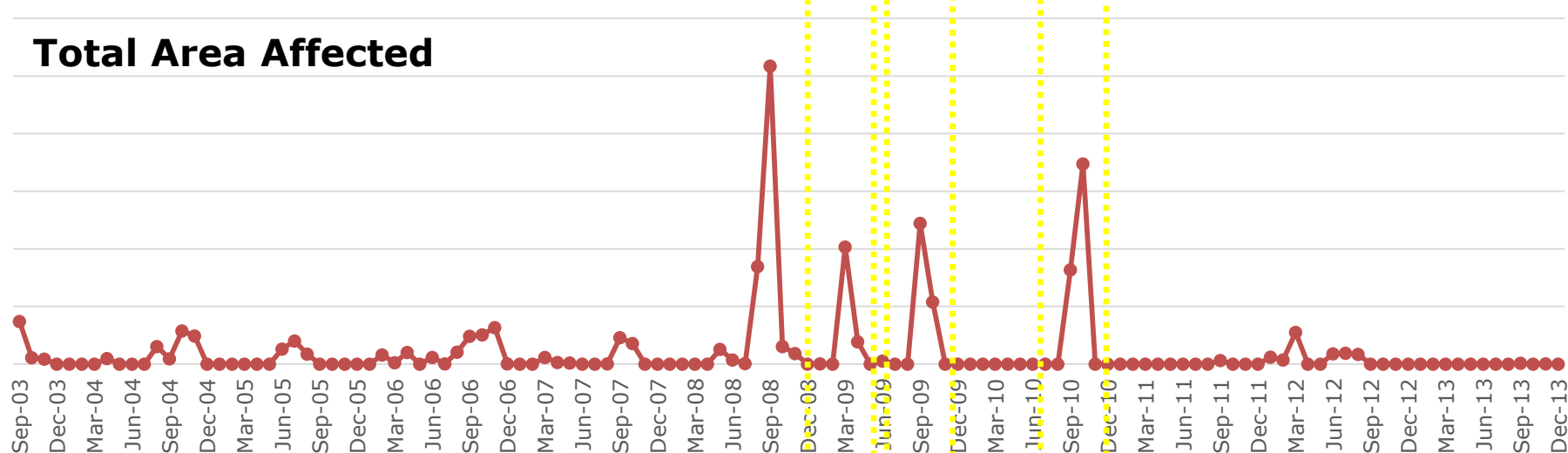
Tungro Disease Infestation in Bicol

Number of Municipalities Affected

(From Dr. Trinidad)



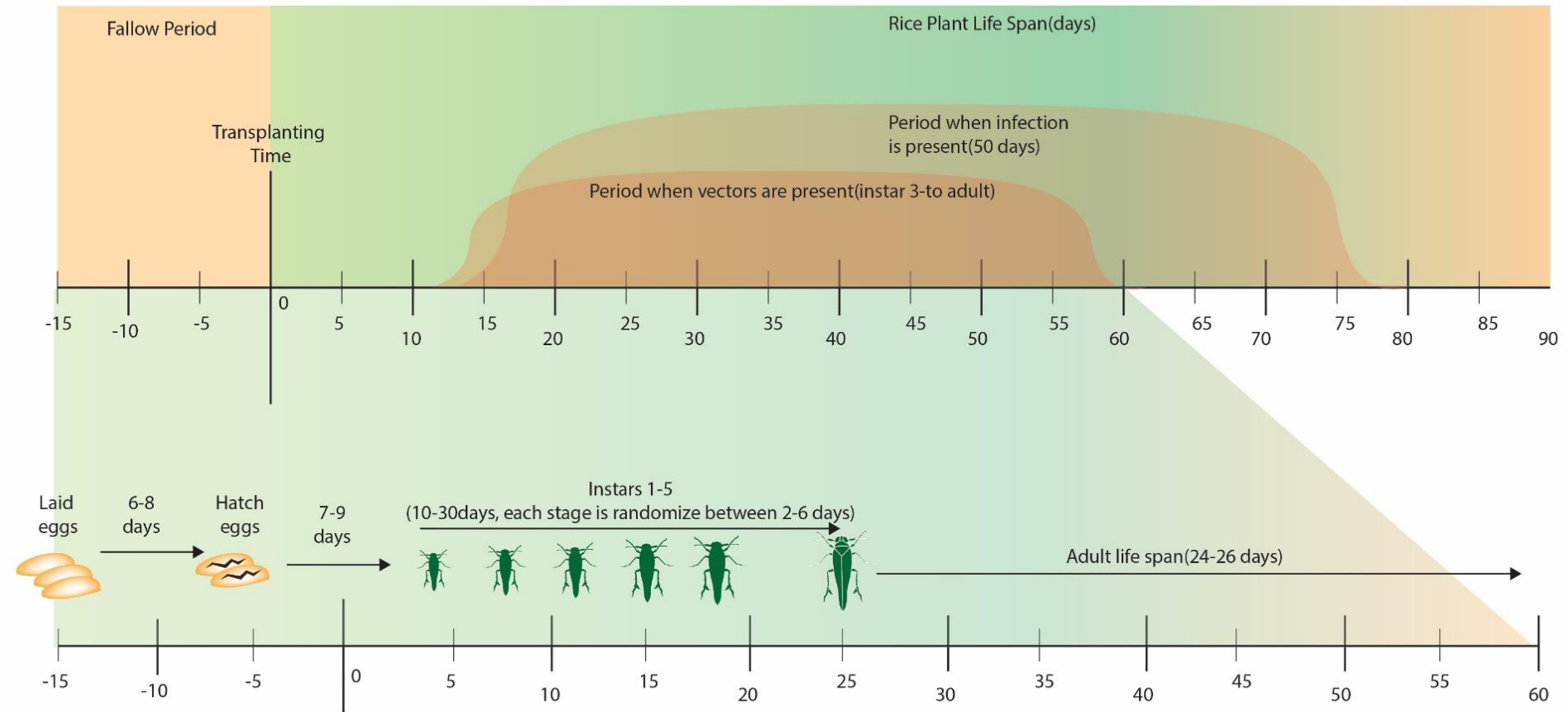
Total Area Affected





Tungro model development

Infographic of green leafhopper life cycle in relation to rice growth stage



Data

Model Calibration

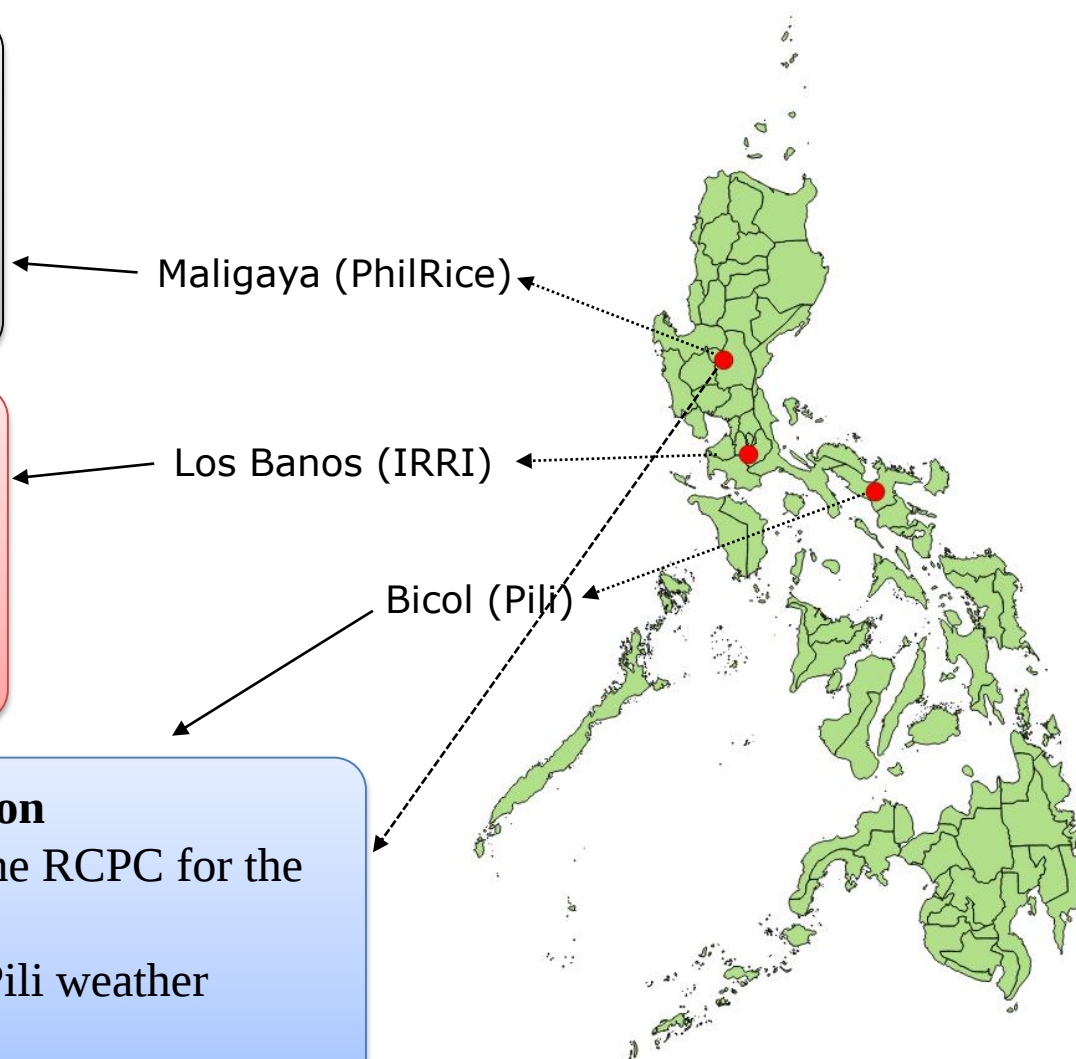
- Tungro incidence data in the 1995 wet season
- Daily weather data from a weather station in PhilRice

Model Validation

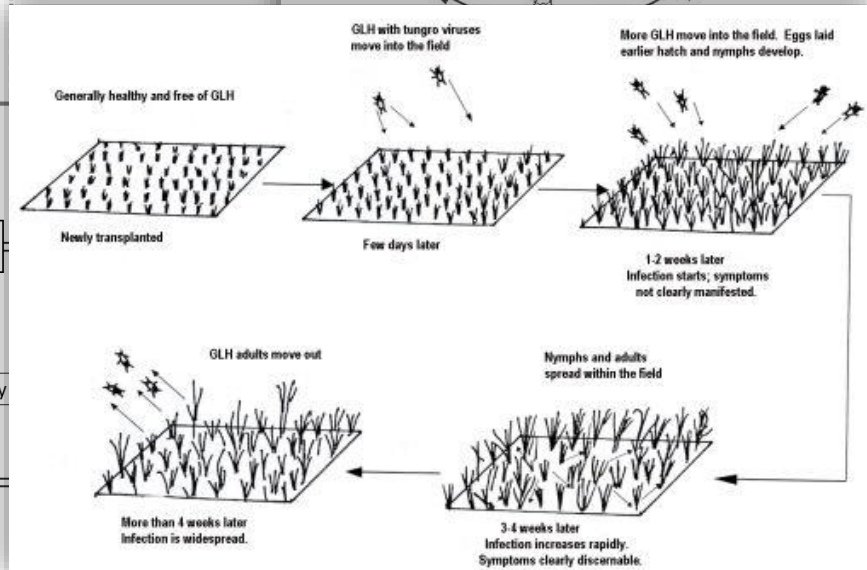
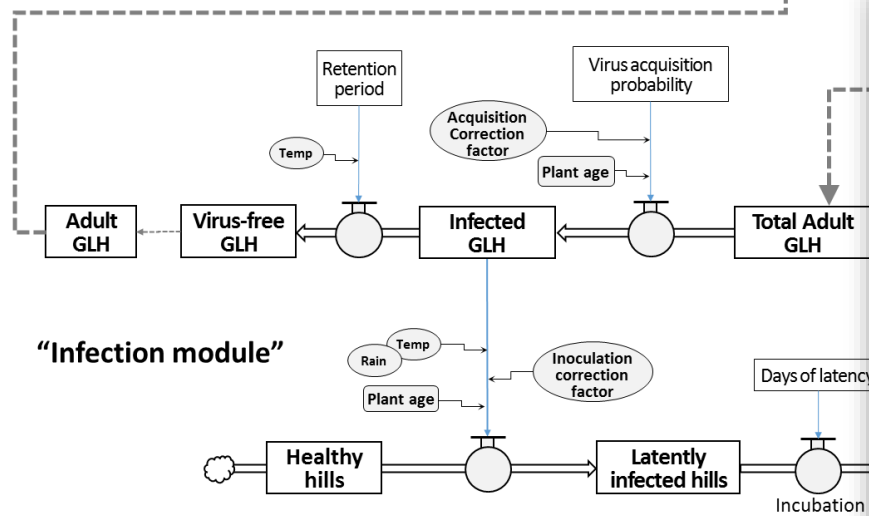
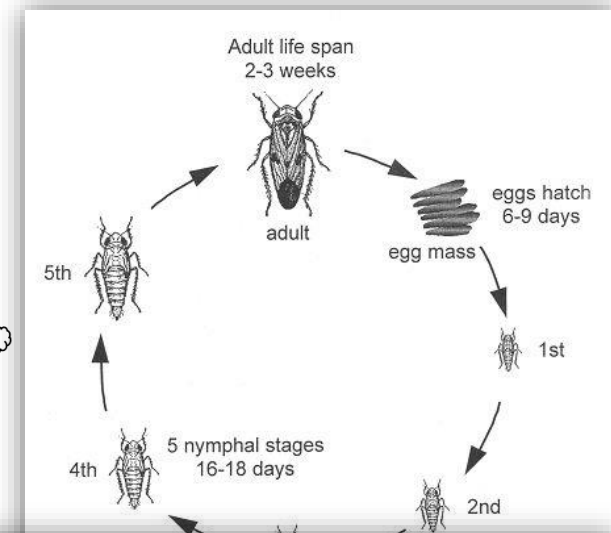
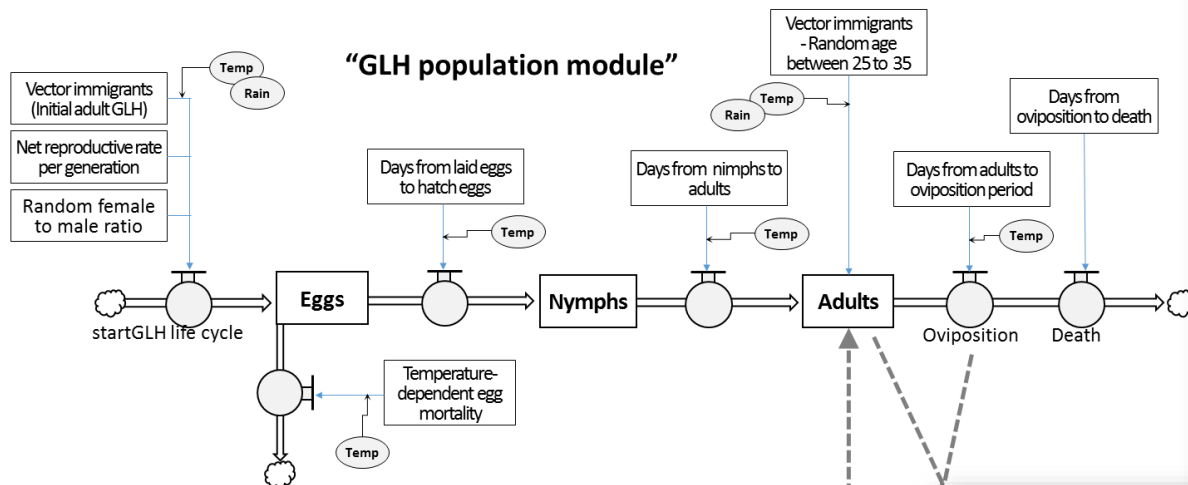
- Tungro incidence data in the 1991 and 1992 wet seasons
- Daily weather data from a weather station in IRRI

Model Evaluation

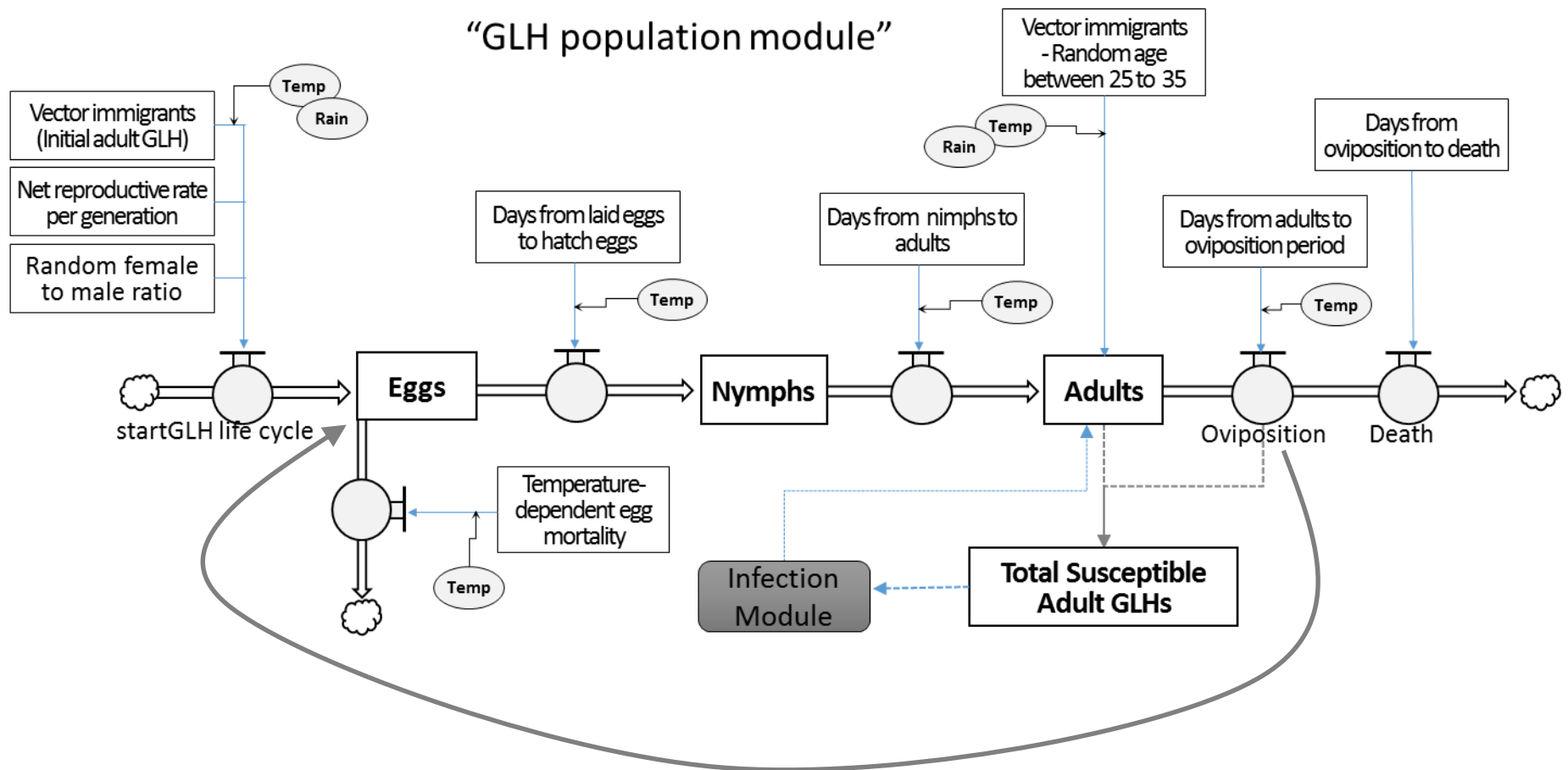
- Tungro incidence data from the RCPC for the period of 2003~15
- Daily weather data from the Pili weather station of PAGASA



rtdSim Model

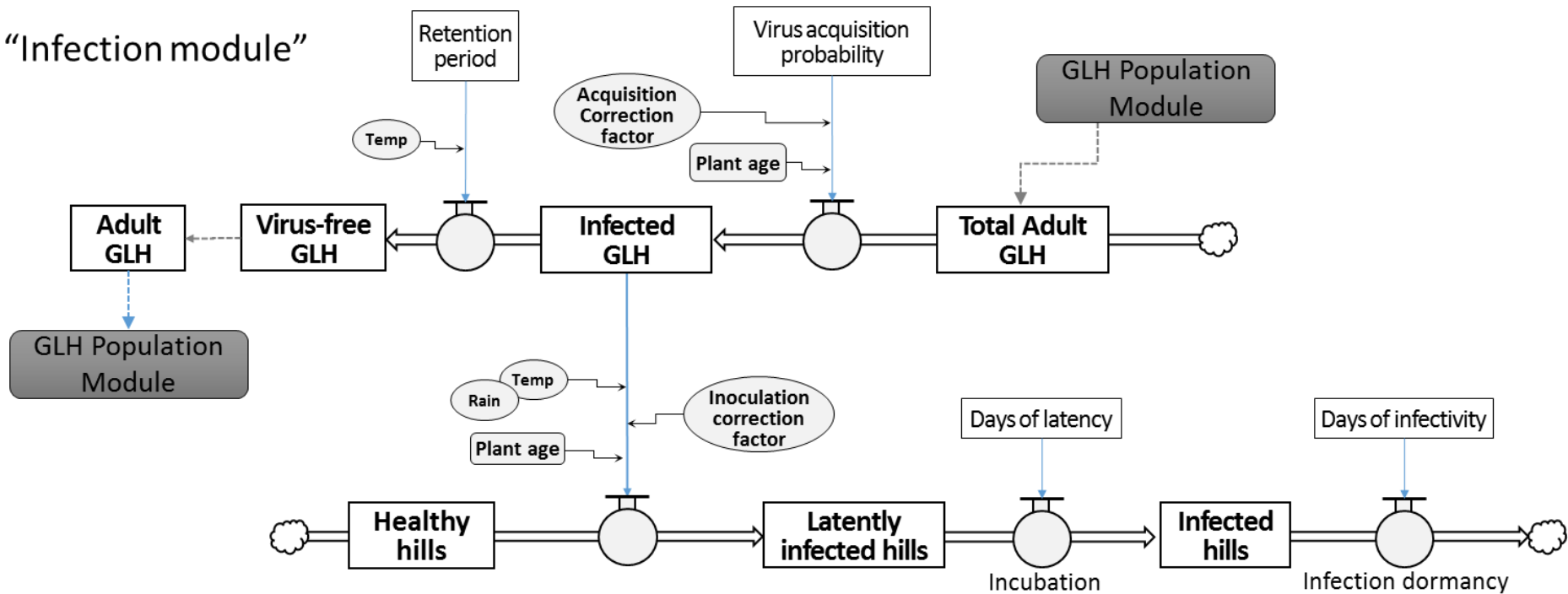


rtdSim Model – GLH population module



rtdSim Model – Infection module

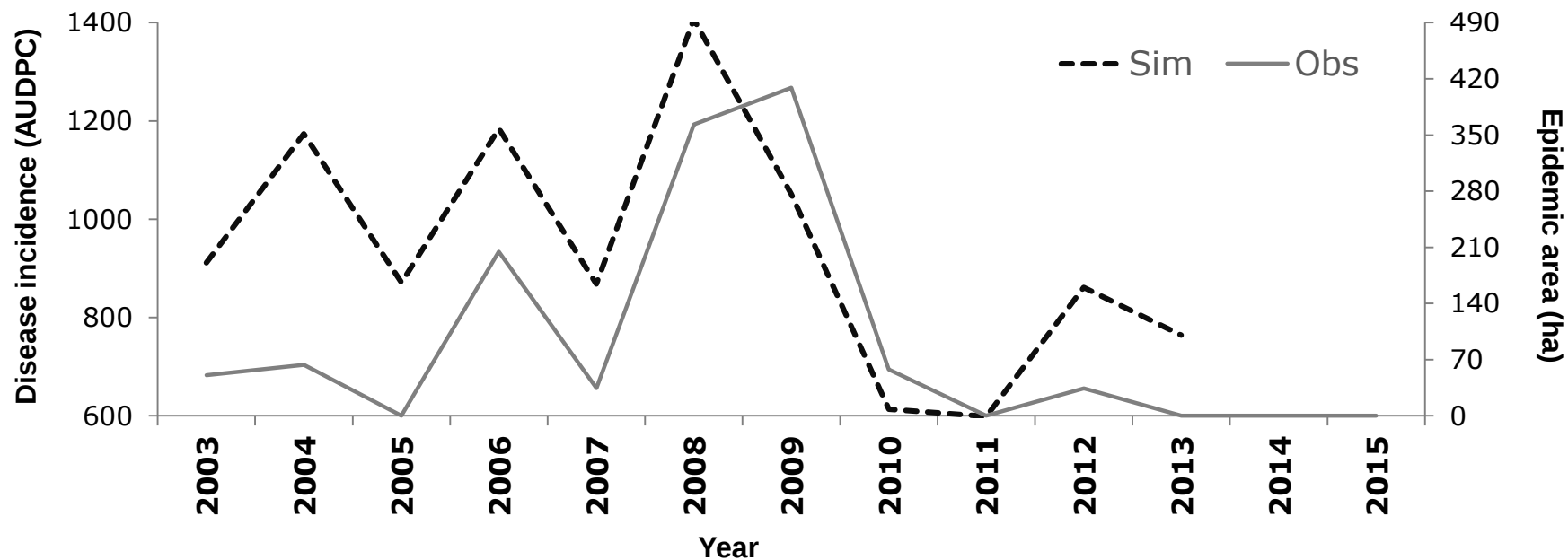
“Infection module”



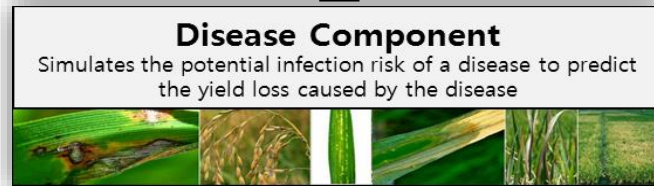
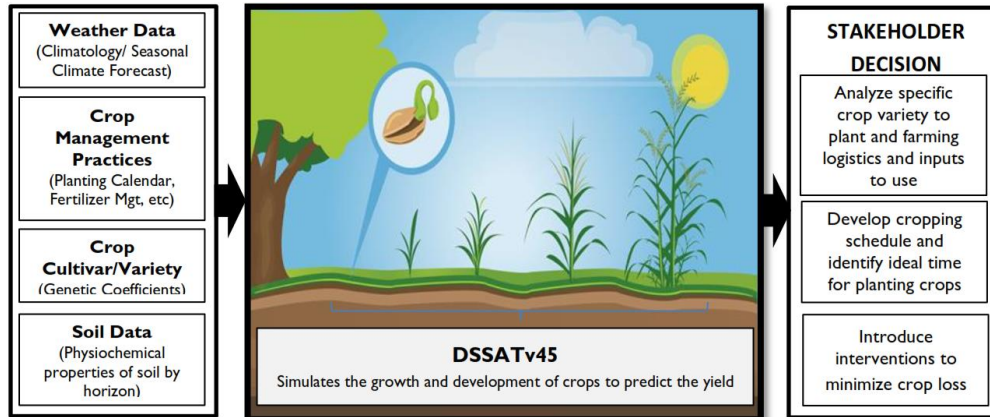


rtdSim Model – Evaluation

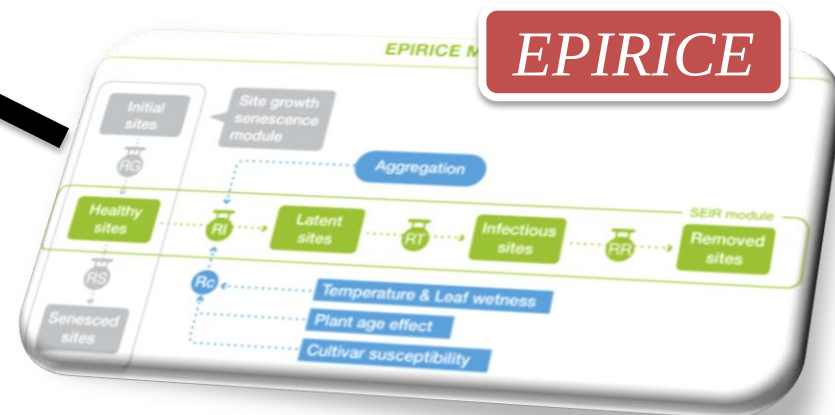
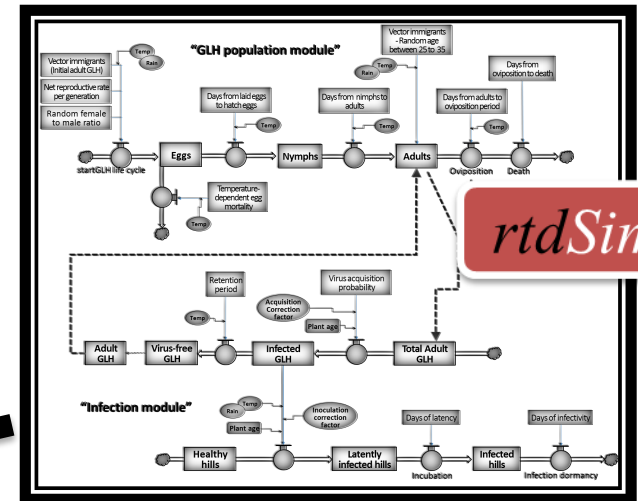
Tungro Incidence in Bicol



Climate-Agriculture Model Decision Tools (CAMDT-Disease) for Diseases



- sheath blight
- bacterial blight
- brown spot
- tungro disease





Climate-Agriculture Model Decision Tools (CAMDT-Disease) for Diseases

7x CAMDT 2.0 alpha User-Interface

USAID FROM THE AMERICAN PEOPLE IRI UPLBFI APCC

Simulation setup | Temporal Downscaling | DSSAT setup 1 | DSSAT setup 2 | **DISEASE setup** | *Scenarios setup | *CREDIT

Run DISEASE model ?
☐ Yes ☒ No

Set Source Directory for R
Path for RScript.exe: C:/Program Files/R/R-3.2.2/bin
Click to change the path for RScript.exe
Click to detect the path for RScript.exe automatically
*Example: "C:\Program Files\R\R-3.2.2\bin\RScript.exe"

Load Save
Exit

Hands-on CAMDT-Disease

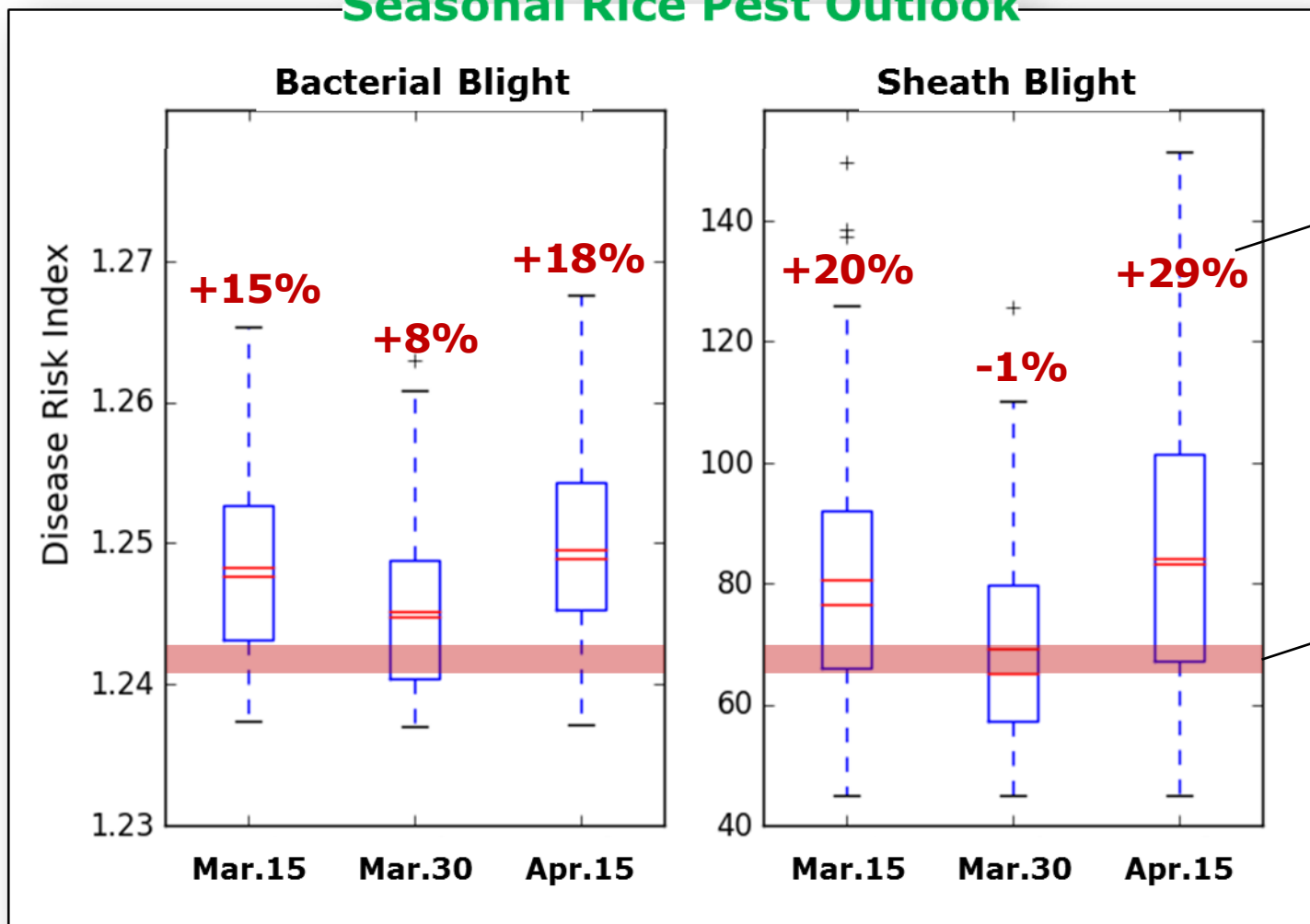


Run CAMDT-Disease

1. Different planting dates (15 days interval)
→ Daily weather-dependent variation
2. Different planting dates (wet vs dry)
3. Different years with same planting date → Interannual variation
4. Different seasonal forecasts in the hindcast mode
→ comparing with the result from observed weather

Interpreting the CAMDT-Disease result

Seasonal Rice Pest Outlook

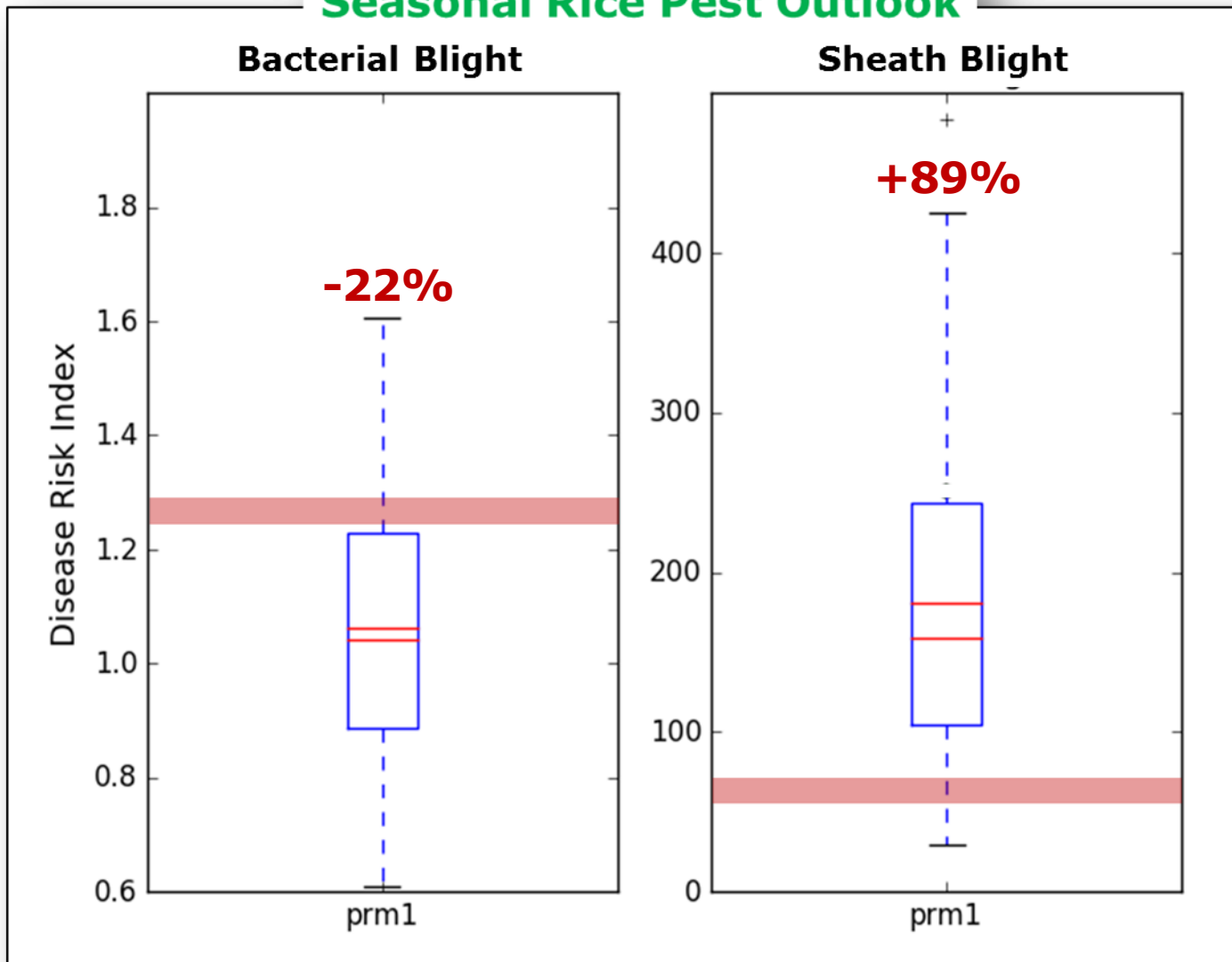


Relative percent change compared to the climatological value

Past 30 years' average risk = Climatological disease risk

Interpreting the CAMDT-Disease result

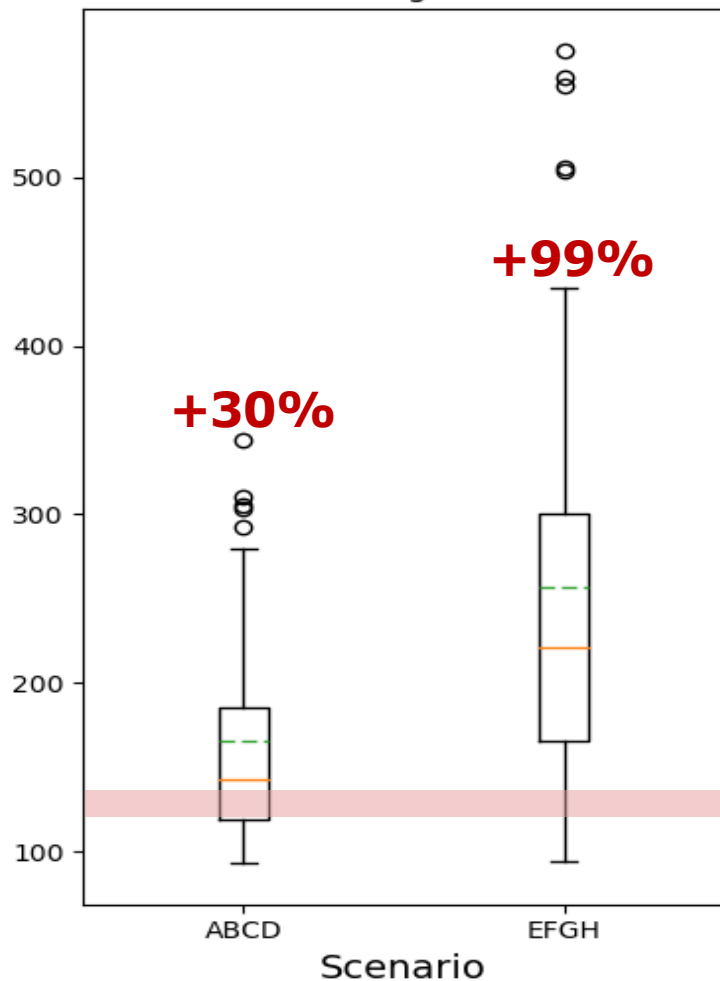
Seasonal Rice Pest Outlook



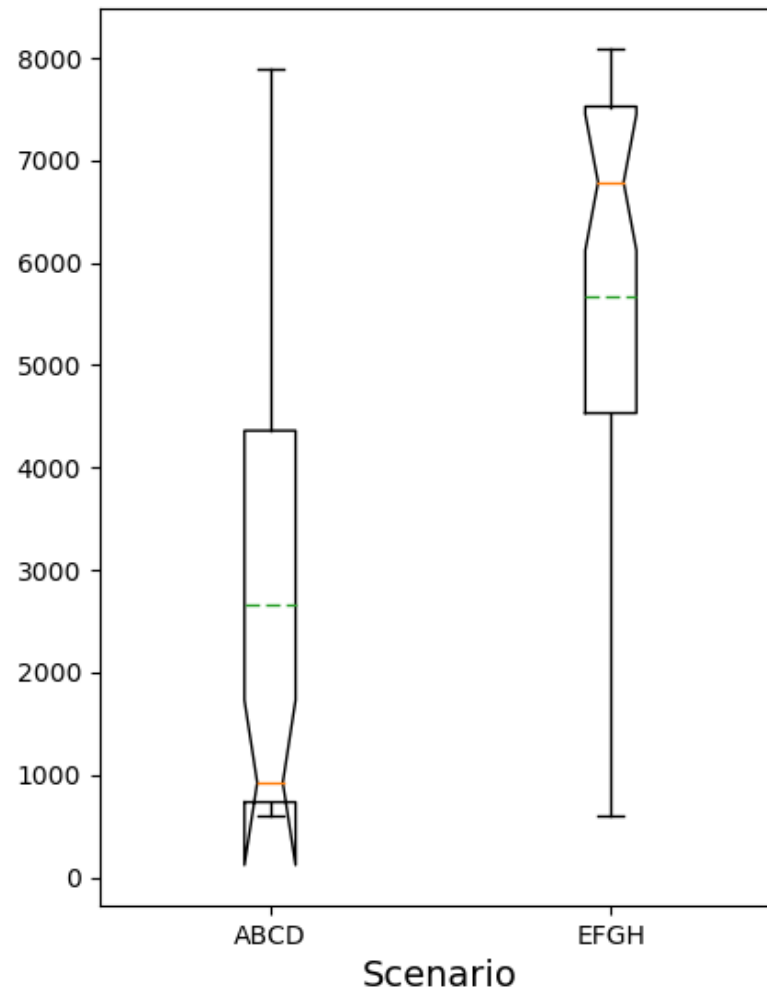


Interpreting the CAMDT-Disease result

Tungro



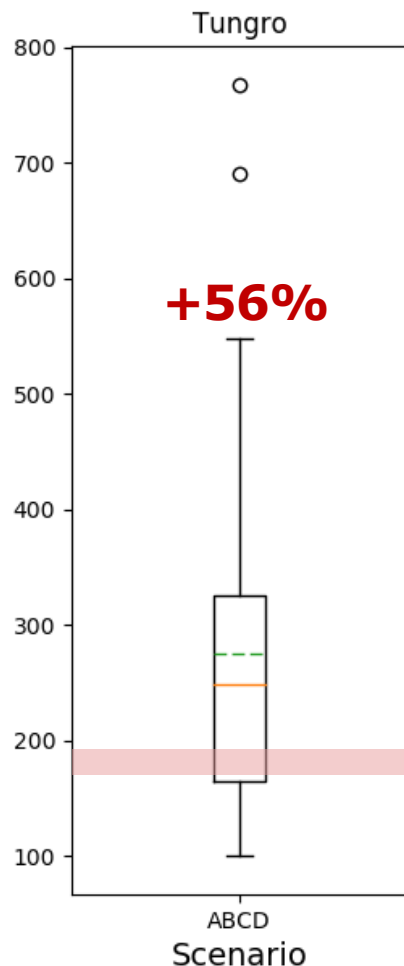
Yield





Utilizing the CAMDT-Disease result

(Seasonal Rice Pest Outlook)



CONTROL STRATEGIES (SEASONAL SCALE)

- Synchronous and early planting
- Plant resistant varieties
- Adjust fertilizer and mineral level
- Change cropping pattern → Fallow period
- Increase surveillance activity
- Train extension officers for the identification and management of the tungro disease
- Purchase crop insurance