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Establishing sustainable solutions to cassava disease in Mainland Southeast Asia

Dr Jonathan Newby

Cassava Program Leader – Global

ACIAR Project Final Review and Symposium

Thank you

Tây Ninh People's Committee

Tây Ninh Department of Agriculture
and Rural Development





Cassava Program Mission Statement

To improve the livelihoods of cassava-growing smallholders and their communities, the Cassava Program will co-develop innovative solutions for specific regions, farming systems, and markets that boost farm productivity, enhance consumer benefits, and drive sustainability throughout the value chain.

Project final review of ACIAR supported project AGB 2018/172

Establishing sustainable solutions to cassava diseases in mainland South-East Asia



Outline of the review



Sustainable cassava disease solutions in Southeast Asia

Enhancing smallholder livelihoods and economic development

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Millions of smallholder farmers in Southeast Asia depend on cassava for their livelihoods

[Join the discussion](#)

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Day 2 – Thursday 5th October

8:00	Registration			
<p>Session 3: Enhance the capacity and collaboration between breeding programs in mainland Southeast Asia to develop new product profiles for commercially viable cassava varieties</p> <p>Discussion Padlet</p>				
			1	2
8:30-9:00	Overview of breeding activities, outputs & outcomes (30mins)	Dr Xiaofei Zhang (CIAT)	Presentation – extended	Youtube – extended
9:00-9:30	Breeding and evaluation of CMD resistant varieties in Vietnam (30mins)	Ms Pham Thi Nhan (HLARC) Dr Anh Nguyen Hai (AGI)	Presentation	Youtube
9:30-9:45	Evaluation of CMD resistant varieties in Laos (15mins)	Mr Laothao Youabee (CIAT)	Presentation	Youtube
9:45-10:00	Evaluation of CMD resistant varieties in Cambodia (15mins)	Ms Kan Sopha (GDA)	Presentation	Youtube
10:00-10:20	Breeding and evaluation of CMD resistant varieties in Thailand (20mins)	Dr Chalempol Phumichai (KU)	Presentation	Youtube
10:20-10:40	Q&A (20mins)			
10:40- 11:00	Coffee			
11:00-11:15	CATAS germplasm exchange and evaluation within the Asia Pacific Region	Dr Chen Songbi (CATAS)		
11:15-11:30	Cassava breeding for multiple pathogens and market segments in Africa	Dr Elizabeth Parkes (IITA)		

What are 'sustainable' solutions?

What are we trying to sustain?

- Practices
- Processes
- Partnerships

Which relies on

- Capacity building and capacity sharing
- Alternative funding and collaboration models between research, government, NGOs, private sector
- Realistic plans and expectations based on specific practices, biophysical conditions and value chain context
- Trust, transparency and personal relationships between stakeholders

Global knowledge exchange and partnership strengthening

- Reflect on the outcomes and lessons learnt from the CMD in Mainland Southeast Asia
- Prepare now for the movement of CMD into the rest of the Indo-Pacific region, where cassava remains an important food crop – market segments not currently being addressed.
- Prepare for future incursions of novel pathogens into Asia from Africa and Latin America
- Strengthen the global alliance of institutions working on cassava with contributions from Asia to other regions.
- Build the network of young cassava scientists working across the globe



RESEARCH PROGRAM ON
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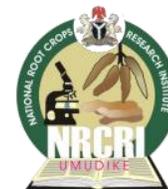
ບໍລິການ-ສົ່ງເສີມກະສິກໍາຮອບດ້ານ
LURAS Lao Upland
Rural Advisory Service ບສກສ



THAI WAH



Mekong Timber
Plantations Ltd



plant disease

Editor-in-Chief: Alison E. Robertson
Published by The American Phytopathological Society

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May 2016, Volume 100, Number 5
Page 1029
<http://dx.doi.org/10.1094/PDIS-10-15-1228-PDN>

DISEASE NOTES

First Report of *Sri Lankan cassava mosaic virus* Infecting Cassava in Cambodia

H. L. Wang, X. Y. Cui, X. W. Wang, and S. S. Liu, Institute of Insect Sciences, Zhejiang University, Hangzhou 310058, China; **Z. H. Zhang**, Holley Group CO., LTD, Hangzhou 310058, China; and **X. P. Zhou**, Institute of Biotechnology, Zhejiang University, Hangzhou 310058, China.

Timeline I

Surveillance and politics (3-year lag)

- ?? Import of material to Cambodia
- May 2015 – Outbreak sampling by Chinese Scientists on plantation
- December 2015 – Aware of preprint (RTB meeting Peru)
- January 2016 – GCP21 meeting (China)
- March 2016 – Online first publication
- May 2016 – First report published
- July 2016 – ACIAR SRA on surveillance
- July 2017 – ACIAR SRA closing workshop
- **September 2018 Phnom Penh Regional Meeting (ACIAR, GCP21, RTB)**



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Timeline II

Funding (1 year lag)

- **September 2018 Phnom Penh Regional Meeting (ACIAR, GCP21, RTB)**
- December 2018 – IITA Clones arrive in Hanoi (AGI)
- January 2019 – AR- CR lines arrive in Hanoi (AGI)
- **September 2019 - ACIAR Inception meeting**



The import of germplasm to Vietnam after the Phnom Penh meeting prior to any funded project saved a year in the implementation of the project activities

But the ability to draw on past investments saved decades.....

Aim of the ACIAR project

The overall project aim is to enhance smallholder **livelihoods and economic development in mainland SEA** by improving the resilience of cassava production systems and value chains by addressing the rapidly evolving disease constraints.



Project objective

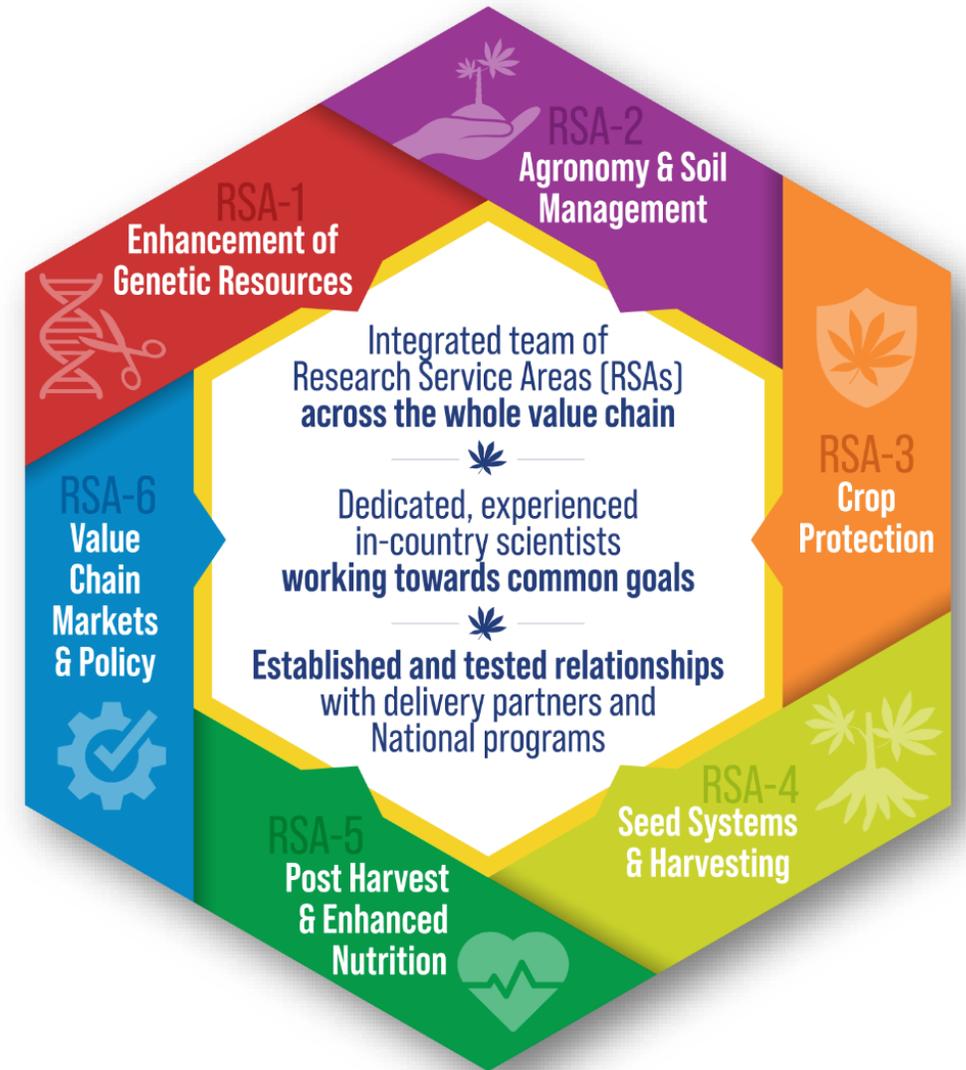
- **Objective 1:** Assess the opportunities, challenges and risks for the development of sustainable regional solutions for cassava disease management in mainland SEA including coordinated policy development, sustainable business and public-private funding models;
- **Objective 2:** Enhance the capacity and collaboration between breeding programs in mainland Southeast Asia to develop new product profiles for commercially viable cassava varieties by identifying and incorporating known and novel sources of resistance to Cassava Mosaic Disease (CMD) and Cassava Witches Broom Disease (CWBD) into national breeding programs:
- **Objective 3:** Develop, test and deploy diagnostic protocols, tools, and information platforms fit for purpose in monitoring, surveillance, and certification applications; and
- **Objective 4:** Develop and evaluate technically feasible and economically sustainable cassava seed system models for the rapid dissemination of new varieties and clean planting material to smallholder farmers in different production systems and value chains.
- **Objective 5:** *Evaluate the impact of soil fertility status and management practices on the prevalence, incidence, and severity of cassava disease. Co-develop and evaluate alternative cropping-system options relevant in different biophysical, social and market contexts that mitigate the impact of disease and improve the overall sustainability of smallholder cassava production.*

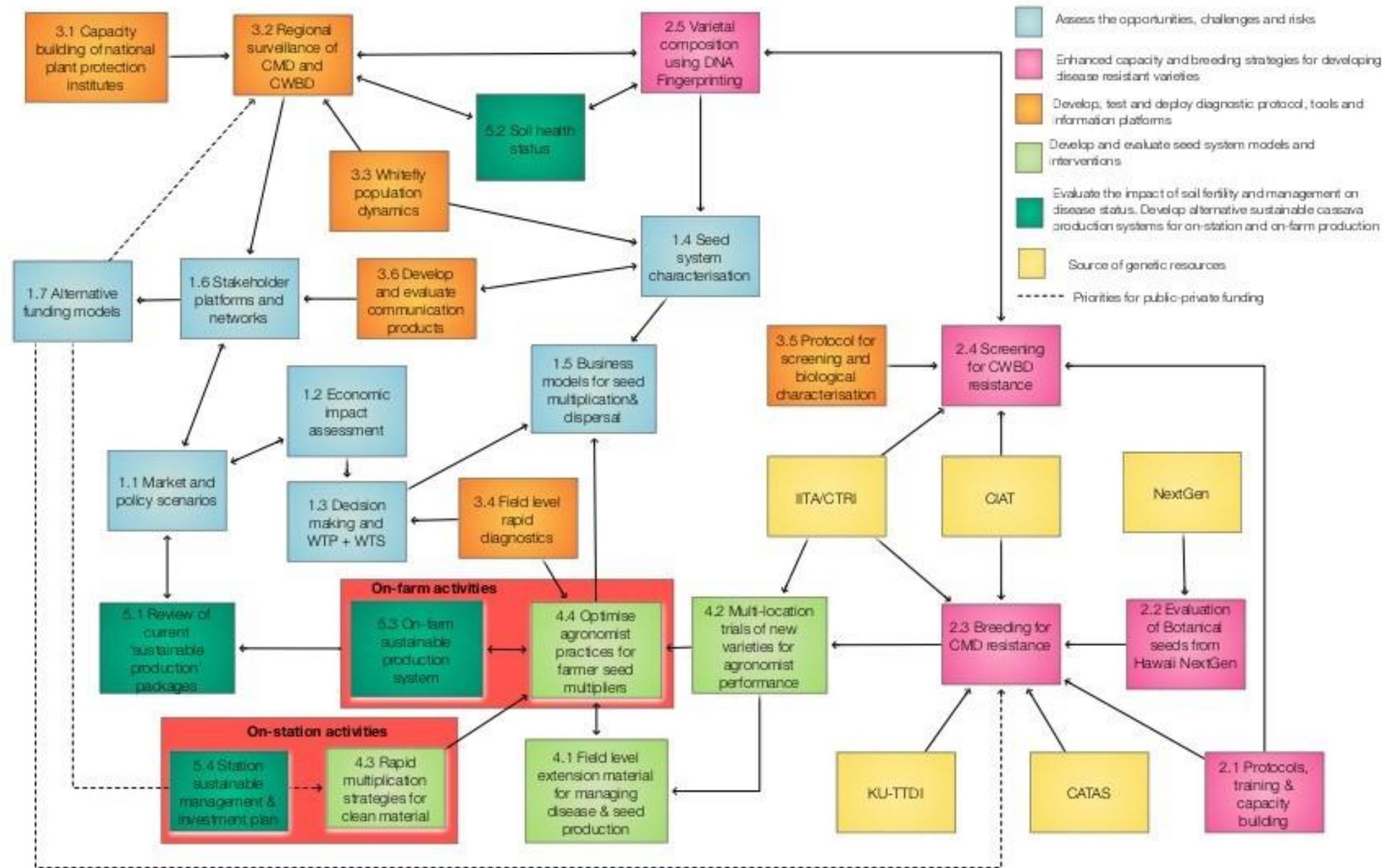
Approach

Three key features of this project are:

1. **Transdisciplinary** research team and work packages;
2. **Engagement with value chain actors** (core actors - *farmers, traders, processors, exporters*, and supporting - *extension, input suppliers, credit etc*); and
3. **Regional scale** of the partnerships and networks developed.

All three elements are critical to maximising the research outputs and ensuring they are utilised by next users and rapidly scaled to target farmers across borders into the regional cassava economy.





What were the planned outputs? (2019)

1. Commercially competitive and acceptable cassava varieties resistant to CMD or CWBD through a process of screening, breeding and selection;
2. Enhanced regional diagnostic protocols, tools and information platforms fit for purpose in monitoring, surveillance, and certification applications across scales;
3. Models for the development of economically sustainable cassava seed systems for the rapid dissemination of new varieties and clean planting material to farmers in different value chains.
4. Business models, policy recommendations and alternative funding models for sustainability of interventions across multiple scales.
5. *Cropping system options to mitigate the impacts of cassava disease and improve the productivity and sustainability of smallholder cassava cultivation.*

COVID-19: Laos closes border gates

Laos recently ordered the temporary closure of 10 border gates with its neighbouring countries, including Vietnam, amid the rapid spread of the COVID-19 epidemic in the world.

VNA - Monday, March 16, 2020 16:25

Like 0 Share

RELATED NEWS

Laos cancels several regional high-level conferences

Saturday, March 14, 2020
17:03

COVID-19: Big gatherings suspended in many ASEAN countries

Friday, March 13, 2020
16:15

AEM Retreat issues joint statement on economic resilience to COVID-19

Wednesday, March 11, 2020 20:00



Passengers passing in front of a temperature screening camera at the arrivals area of Wattay International Airport in Vientiane - Illustrative image (Source: AFP)

MOST POPULAR

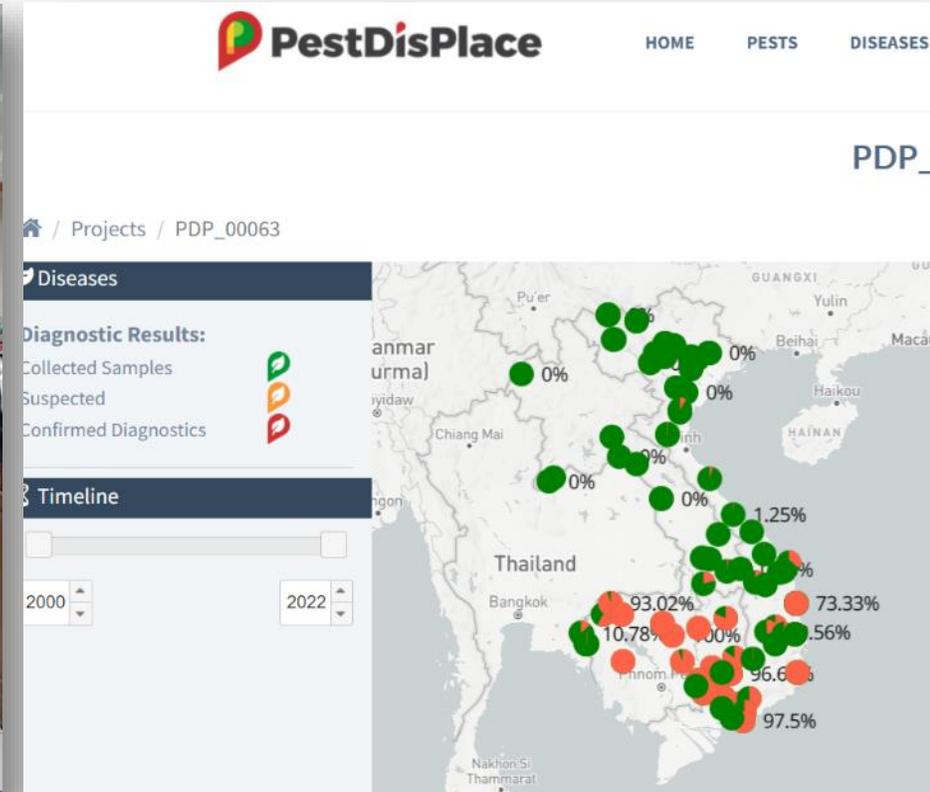


- 1 Vietnam – second biggest exporter of Cambodia
- 2 Thailand prepares response plans to flood-hit areas
- 3 ASEAN-Australia high-level dialogue on climate change, energy transition takes place in Hanoi
- 4 ASEAN businesses seek investment



Disease surveillance and diagnostics

Standardizing protocols and sharing data





Interventions in infected fields and destruction of infected stems made possible through rapid (1hr) in-field diagnostics



Challenges remain when smallholders have invested in the crop

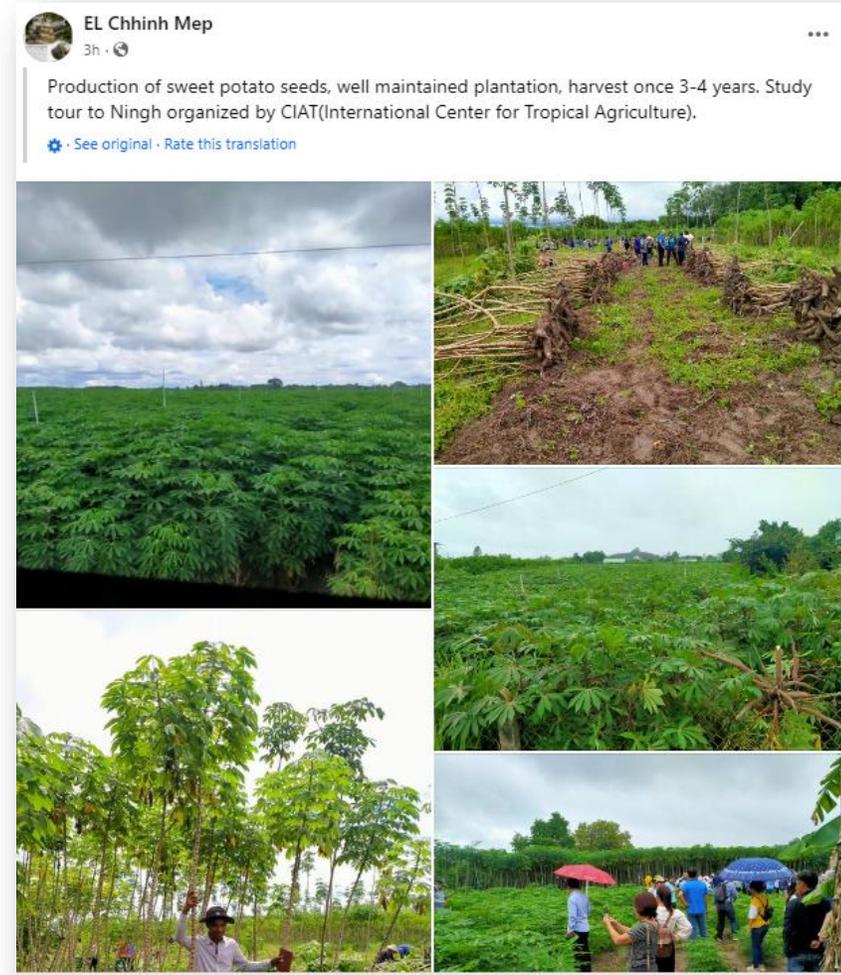
Extension information co-developed with development projects and government



ພະຍາດໃບດ່າງມັນຕົ້ນ ຫຼື Cassava mosaic disease (CMD in Lao PDR)



Linking to farmer and industry social networks – this is the future of extension: great opportunities and potential risks



Questioning assumptions to make progress: the CWBD story is a good example



Without fertiliser





Variety development

Recommendation for farmers under different disease pressure scenarios

- Short-term – least susceptible existing Asian elite varieties that can be part of a clean seed system under low disease pressure; and which varieties to avoid
- Medium Term – best-bet CMD resistant clones from IITA and CIAT in different locations.
- Long term – progress on introgressing CMD resistance into elite Asian germplasm with the use of modern breeding tools and approaches



Crossing Nursery 2023
Plot 1 - 3000m², Lam Dong, Vietnam

- **31 progenitors**
 - 17 CMD resistant
 - 5 CBSD-CMD dual resistant
 - 9 Elites
- **Pair cross block: 1**
- **Poly cross block: 1**
- **Pruning testing block: 1**
- **Plant distance: 1.6m x 2.0m**

Planted: 21/04/2023

The sign features logos for ACIAR, Australian Aid, Alliance Bioversity & CIAT, and CGIAR. It also includes several circular inset images showing people working in the field and close-ups of cassava plants.



Movement of disease-free stems within the region



PHYSANTARY CERTIFICATE No. 000085/22/1603

FROM: The National Plant Protection Organization of LAO PEOPLE'S DEMOCRATIC REPUBLIC	TO: The National Plant Protection Organization of CAMBODIA
DESCRIPTION OF CONSIGNMENT	
ROOT CROP RESEARCH UNIT, MAIZE AND CASH CROP RESEARCH CENTRE, NAFELP O BOX 7073, VIENTIANE, LAO PDR. PHONE NUMBER: 856-21-808861 FAX: 856-21-770892 ATTN: SAYTHONG QUOTTHACHIT	GENERAL DIRECTORATE OF AGRICULTURE NO. 045/07E, STREET, 305 806, SANKANT TEBUK LAAK 3, KHAN TUCU SOC, PHNOM PENH, CAMBODIA TEL: 855(23) 882 482, FAX: (855) 23 883 267 ATTN: PG-488 SOMPA
NUMBER AND DESCRIPTION OF PACKAGES: 8 BOXES	DISTINGUISHING MARKS: NL
PLACE OF ORIGIN: LAO PEOPLE'S DEMOCRATIC REPUBLIC	DECLARED POINT OF ENTRY: TRAFANG KIRAL, STENG TRENG, CAMBODIA
CASSAVA STEMS (G.W: 160.00 KG(S), N.W: 160.00 KG(S))	MATERIAL CLASSIFICATION: MANHOUT ASSAULTING ORIGIN
TREATMENT AND/OR DISINFECTION TREATMENT	
Treatment Date: 12-JAN-2022	Disinfection Date: 16-JAN-2022
Date Issued: 16-JAN-2022	Place of Issue: PAS - CH

SENGSOUVANH VONGSANA
DEPUTY HEAD OF AGRICULTURE SECTION
No. 142805

IMPORT CERTIFICATE FOR PLANT QUARANTINE MATERIAL No. 000061/21

Country of origin: LAOS	Entry point: STENG TRENG, CAMBODIA
Botanical name: CASSAVA STEMS - 8 BOXES, NET WEIGHT: 160.0 KG(S)	Common name / Variety / Quantity (V/No):
General Entry Conditions:	
(i) Free from soil and weed seeds. (ii) Accompanied by an official Phytosanitary Certificate by the authorized officer of the country of origin. (iii) Free from Cambodian Plant Quarantine Permit.	
Special Entry Conditions:	
- Upon import, the consignments must be inspected at checkpoint upon arrival. - The stems import as permitted by this Certificate are not allowed to move or distribute to other areas without permission from GC/MMPF within the PECO period.	
PECO Requirements	
For a period of 90 Days	
Date of issue: DEC 20 2021	Place of issue: PHNOM PENH
Validity date: MAR 12 2022	
BRUN SOKHOM DEPUTY DIRECTOR GENERAL	KEN BORTHUTH, Ph.D. DIRECTOR



Maintain the regional spirit of collaboration once new resistant Asian varieties are developed to share germplasm and data

Southeast Asia's best cassava breeders form network

ON October 19, 2015

 DSC_6191

A network of Southeast Asia's cassava breeders, who have achieved some of the best progress in breeding history worldwide, met in Hanoi, Vietnam on October 9th and 10th to discuss research milestones and next steps.

Around two million hectares of cassava are planted to Southeast Asia's breeding programs, said Dr. Clair Hershey, CIAT's cassava program leader in his opening remarks.

Significant impact has been achieved, with high returns on investment in breeding, he noted. Market demand has been very robust for cassava, and since the 1980s, members of the network have improved the genetic diversity of cassava so that more varieties are now available for farmers throughout the region.

"The regional exchange of germplasm wasn't just one way, but within the region there was an informal interchange of varieties, and now we have an opportunity to make that interchange more formal," he said.

Demand for cassava in Southeast Asia remains high. But with competition from other sources of carbohydrates such as maize, there is still a great need to increase yield, efficiency, sustainability and profitability for regional farmers, which is what the network

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Seed system development

Enhanced capacity in tissue culture labs and strengthen network between the national labs



Opening of 'FutureStems' & High-level engagement



Public and Private multiplication partnerships

National government



Provincial government



Universities



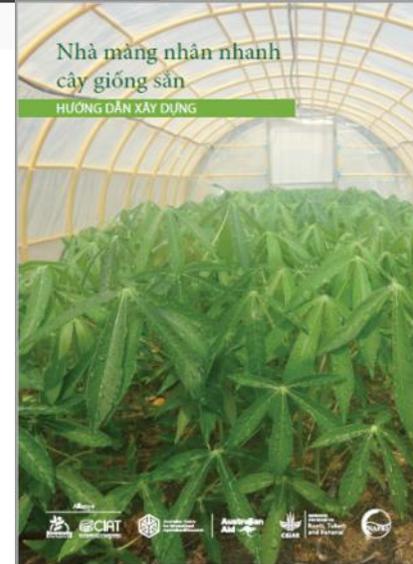
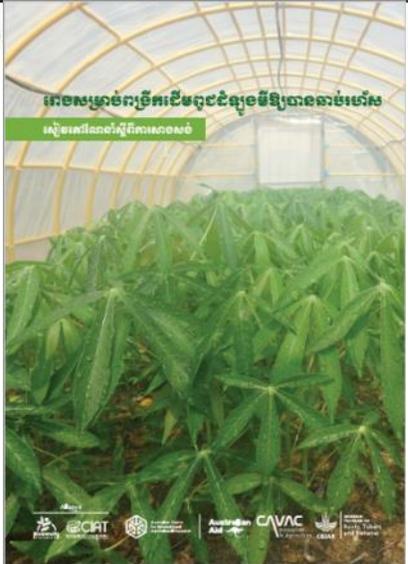
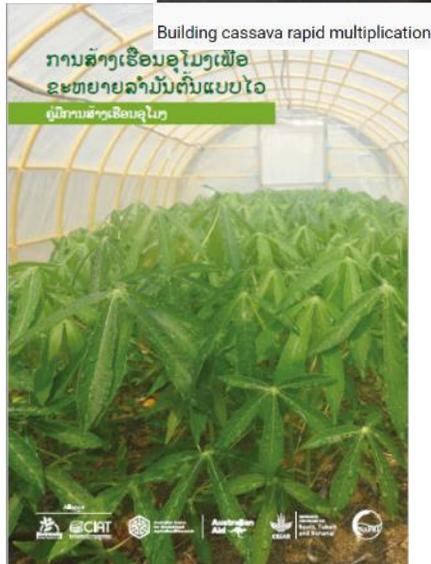
Private sector traders



Associations



Scaling rapid multiplication tunnels





សមាគម កសិករដីឆ្មារដីខ្មែរ Khmer Farmer Cassava Association

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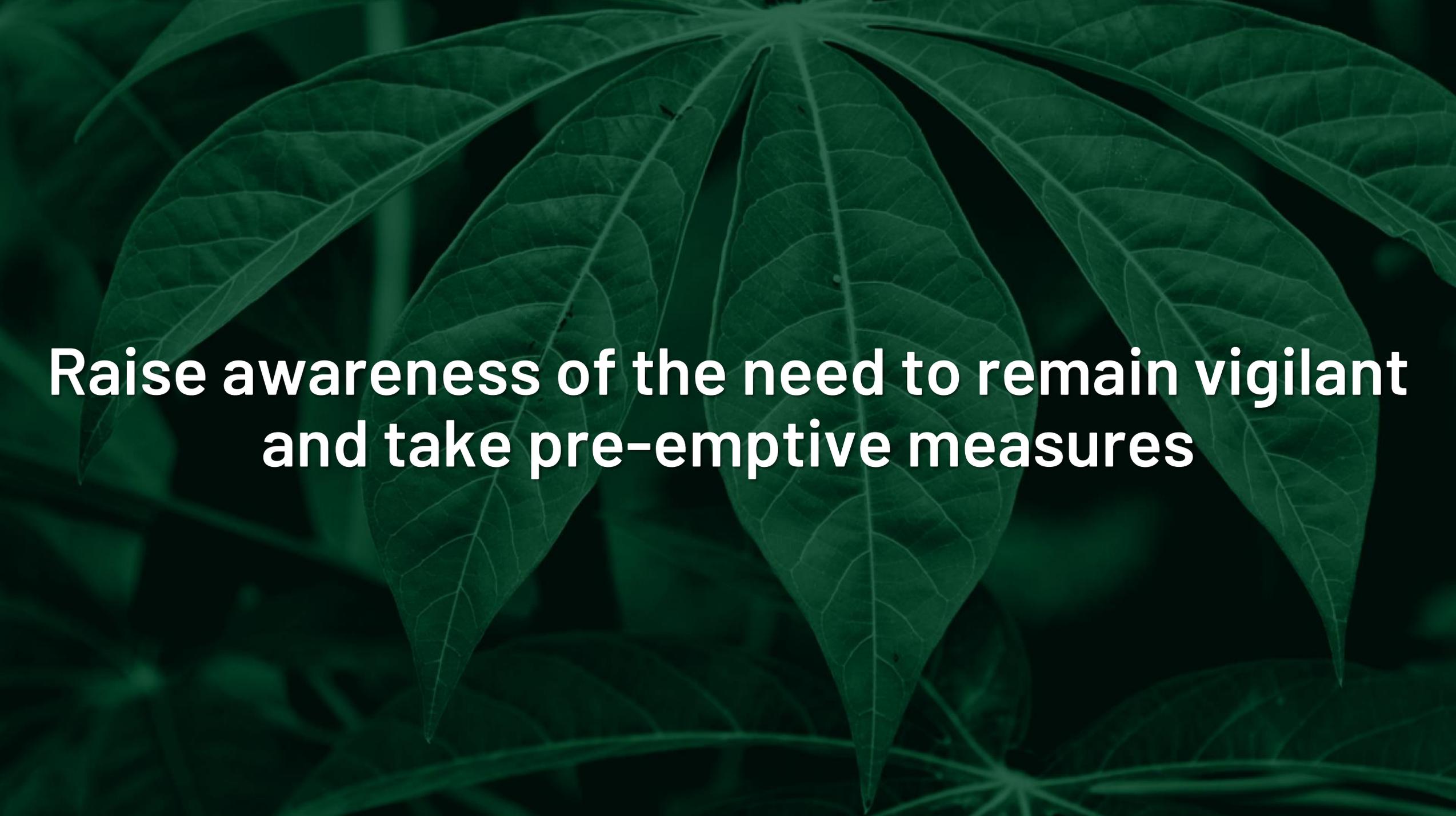
Very exciting to see the update from our scaling partner in southern Laos. The 🇺🇸 U.S. Department of Agriculture funded CLEAN project implemented by #DOA and 🇸🇨 Winrock International is scaling the clean seed system together with the Lao Cassava Association (LCA).





Test sale of disease-free stems in an outbreak area as management response if done quickly





**Raise awareness of the need to remain vigilant
and take pre-emptive measures**

Pre-emptive research on potential threats:

**Cassava Browns streak disease (Africa); Cassava Frogskin Disease (South America);
Additional strains of cassava mosaic disease (Africa, India); SLCMV to the Indo-Pacific**





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Thanks!



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Contact: Jonathan Newby – j.newby@cgiar.org