



Mid-Term Review

Objective 3: Surveillance and Diagnostics

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Department

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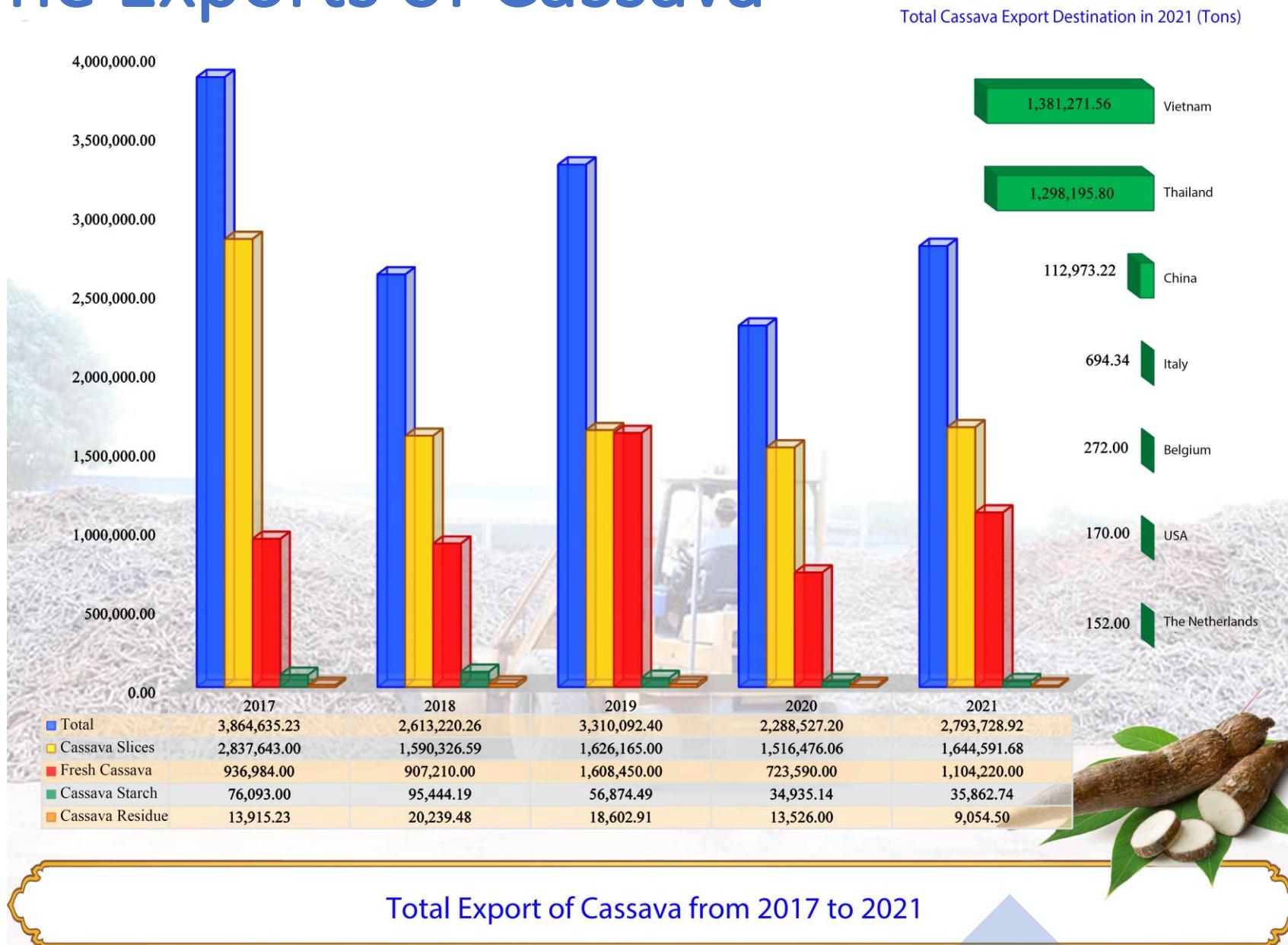
CIAT

International Center for Tropical Agriculture
Since 1967 *Science to cultivate change*

Outlines

1. The Exports of Cassava
2. Site Surveillance and Protocols
3. CMD and CWBD Surveillance
4. Other Pest/Diseases Found during Surveillance
5. Challenges
6. Next Activities

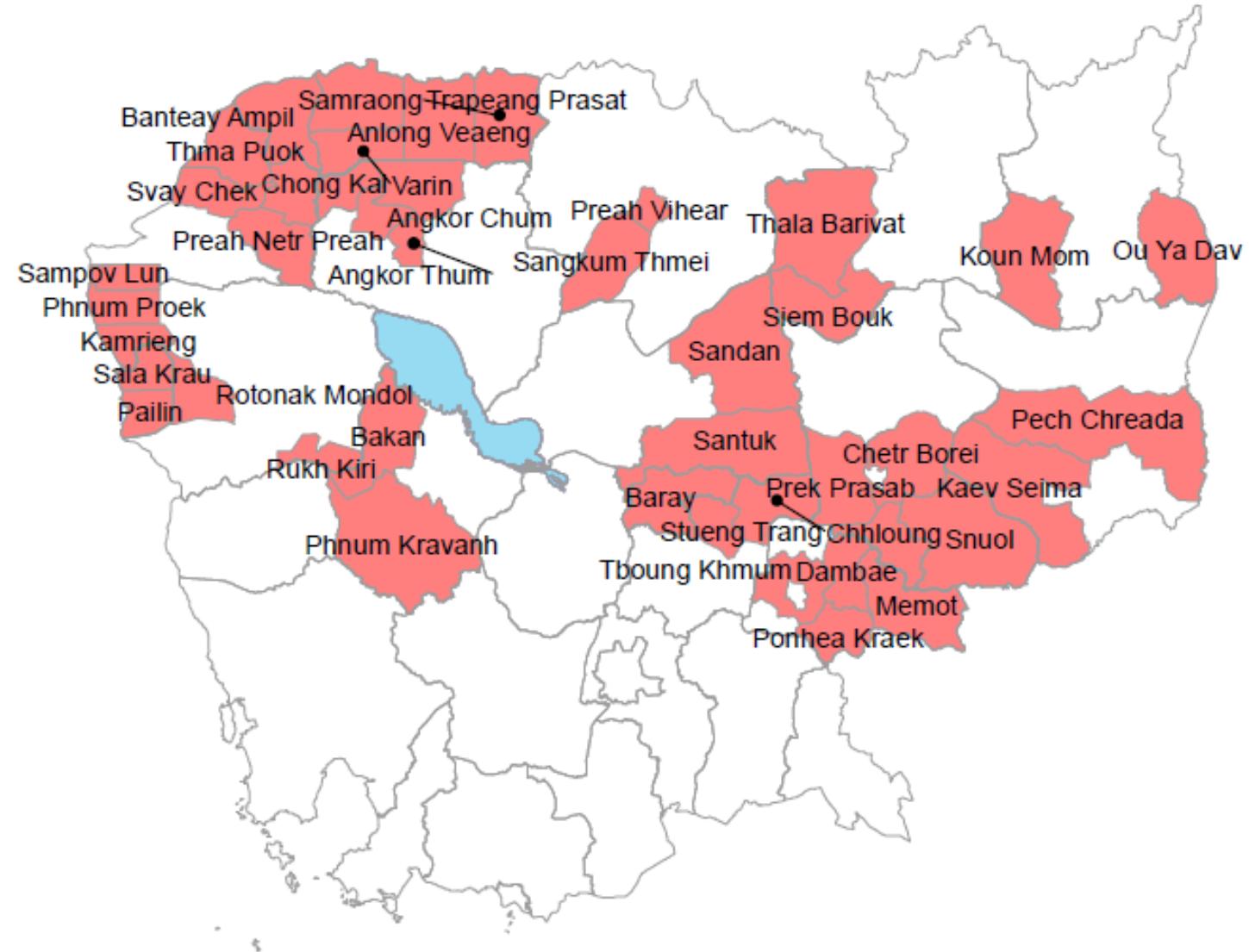
1. The Exports of Cassava



2. Site Surveillance & Protocols

There are 14 provinces that selected to conduct CMD and CWBD.

1. Banteay Meanchey
2. Battambang
3. Odor Meanchey
4. Pailin
5. Preah Vihear
6. Pursat
7. Siem Reap
8. Kampong Cham
9. Kampong Thom
10. Kratie
11. Mondulkiri
12. Ratanakiri
13. Steung Treng
14. Tboung Khmum



Map: Jonathan Newby

Surveillance Protocols

- The field sampling protocol is follows by CIAT-Virology-Crop Protection Protocol v2.0 (*Wilmer J. Cuellar and Maria I. Gomez*)



Field sampling: Whiteflies, Cassava Mosaic Disease (CMD) and Cassava Witches' Broom Disease (CWBD)

Wilmer J. Cuellar; Maria I. Gomez, Virology Laboratory, Crops for Nutrition and Health, International Center for Tropical Agriculture (CIAT), The Americas Hub, Colombia.

Before you go to the field

1 -Prepare the following materials

- [Ziploc bags](#) of 10 x 10 cm (see figure below). Each bag should have written the Date, Field and Location identifiers e.g. 01/06/20; F1; Tay Ninh.
- Prepare each Ziploc bag with 20 g of silica gel.
- You should collect 60 leaf samples per field (see below) and each bag can contain 4 samples. So that per each field you will have a total of 15 Ziplock bags.
- A GPS tracker or a mobile phone that can store the GPS location of photographs (be sure you have your phone with 100% battery or acquire an external charger).
- Tissue paper. 1.5 mL eppendorf tubers (for collecting whiteflies), ethanol 80%, water-proof

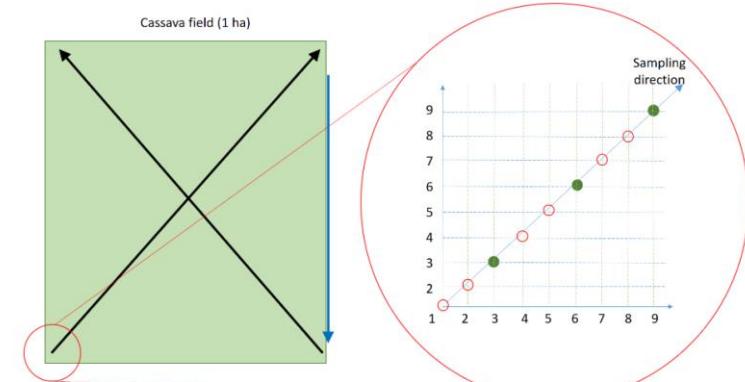
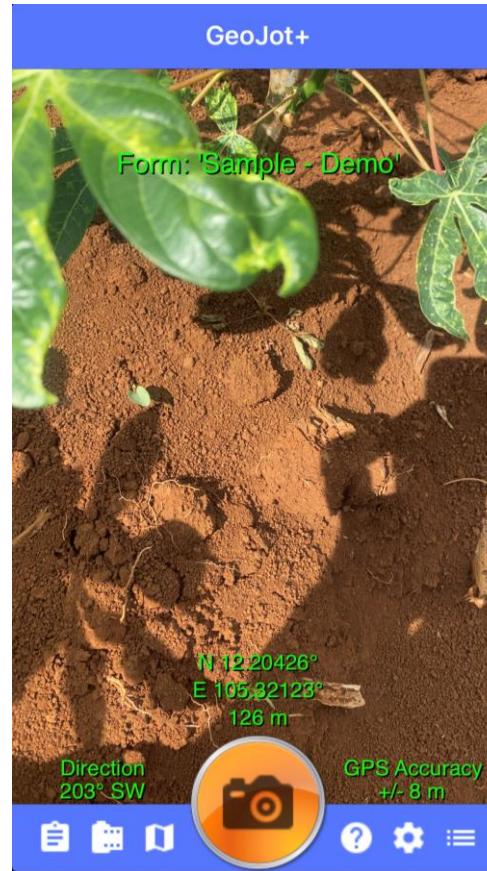


Figure 3. Sampling for CMD (photographs and top leaves) will follow the X pattern indicated by the back arrows (left panel). Sampling for whteflies (photographs and whitefly collection) should follow only one diagonal (one black arrow). The blue arrow indicates the direction to follow (aprox 100 plants) before starting sampling in the second diagonal. For fields smaller than 1 ha, one should adjust the sampling (every second plant or every plant in the diagonal, but not the final number of samples collected).

Field Data Collection to Report



Enter Values		Save
Form: 'CMD and CWBD E Suveillance 2020'		
	Survey ID	>
Cassava CMD and CWBD e-suveillance...		
	Sample Lab Code	>
1		
	Image	>
<None>		
	Cultiva Name	>
<None>		
	Collection Date (YYYYMM...)	>
<None>		
	Country (ISO3)	>
KHM		
	Location Level2	>
<None>		
	Location Level3	>
<None>		
	Location Level4	>
<None>		
	Latitude (decimal)	>
<None>		
	Longitude (decimal)	>
<None>		
	Cancel	
	Enter Values	Save

Targets: CMD, CWBD and WF

Leaf mosaic and deformation



Leaf yellowing, short petioles



Photo: Dr. Wilmer J. Cuellar



Information platforms: data integration and communication

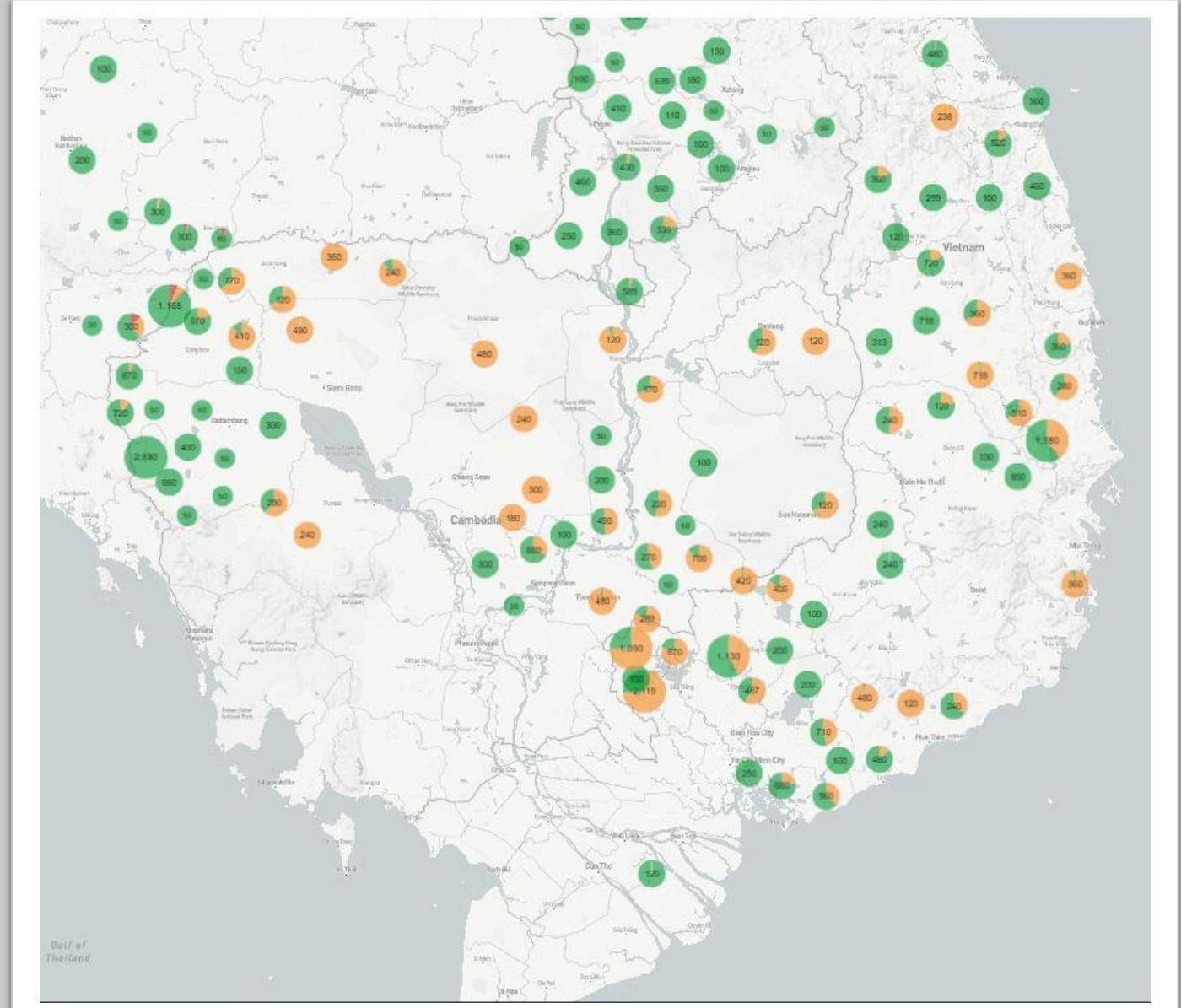
<https://pestdisplace.org>

The image displays the PestDisPlace platform interface, showing a project dashboard for 'PDP_00063' (62458 Samples). The dashboard includes:

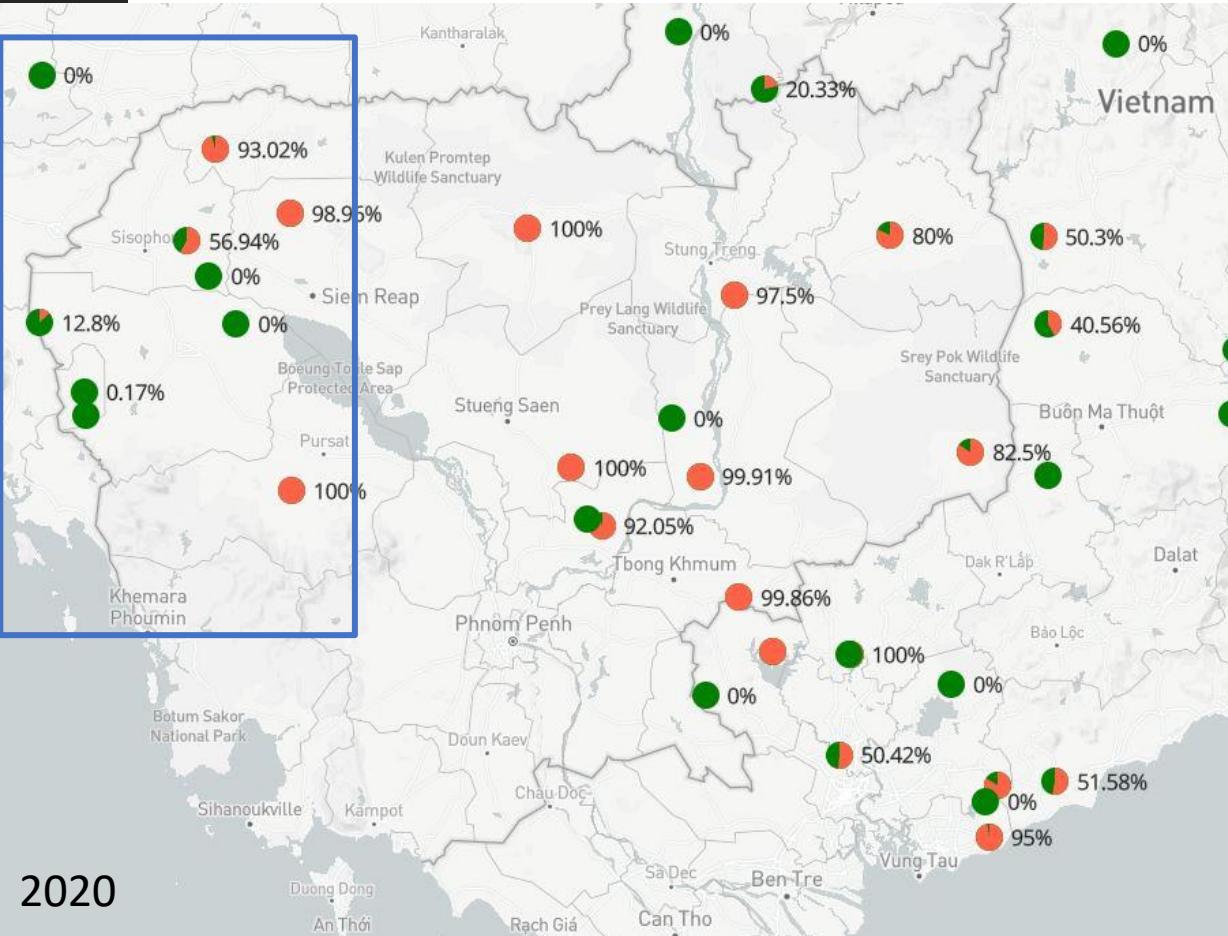
- Project Header:** PDP_00063 (62458 Samples), Submitter: Wilmer Cuellar, Corresponding: Rafael Rodriguez, Privacy: Public, Upload Data button.
- Project Details:** Name: Prueba3-2020-CMD-SEA, Purpose: ACIAR Activity 3, Sampling Protocol: CIAT-Virology-Crop Protection Protocol v2.0, Grant Code: Grant Code.
- Sample Images:** A grid of 14 images labeled F37-S3 through F37-S14, showing close-up views of cassava plants.
- Contributors:** A list of names with ORCID links, including Jenyfer Jimenez, Samoul Oeurn, Hoat Hoat, pinkham Vongphachanh, Hang Lee, Phuong Dung Le, and Jonathan Newby.
- Map:** A world map showing the distribution of samples, with a large green circle centered over the Philippines indicating 62,458 samples.

3. Surveillance

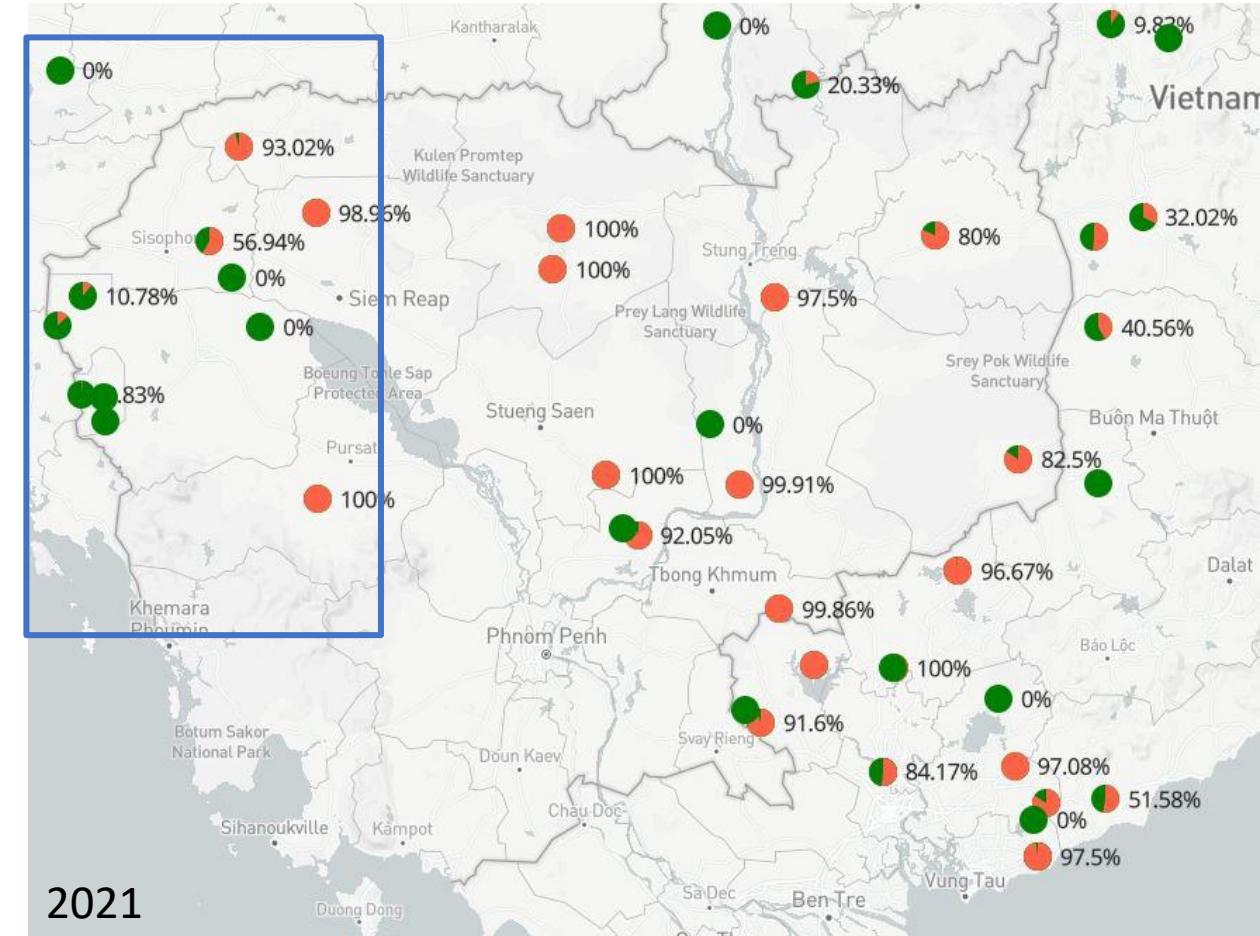
- Two consecutive years (2020-2021).
- Photo records 'observations' allow the identification of CMD and CWBD symptoms.
- Around 18000 'observations' in 2020 and 3360 'observations' in 2021 (more observation will be added)



Incidence maps: CMD

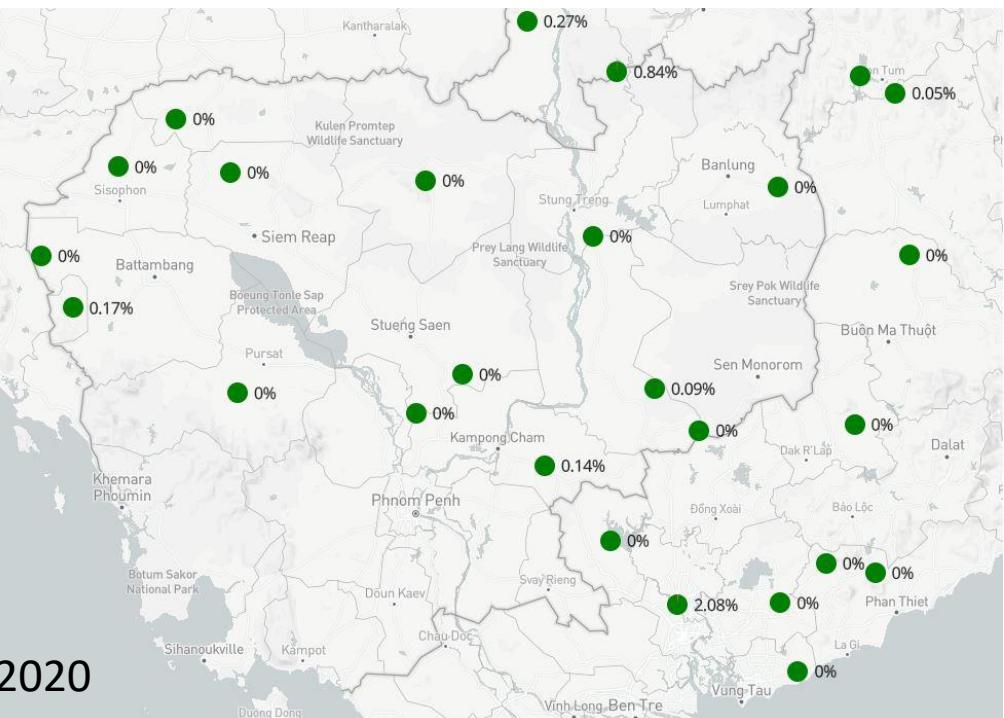


2020



2021

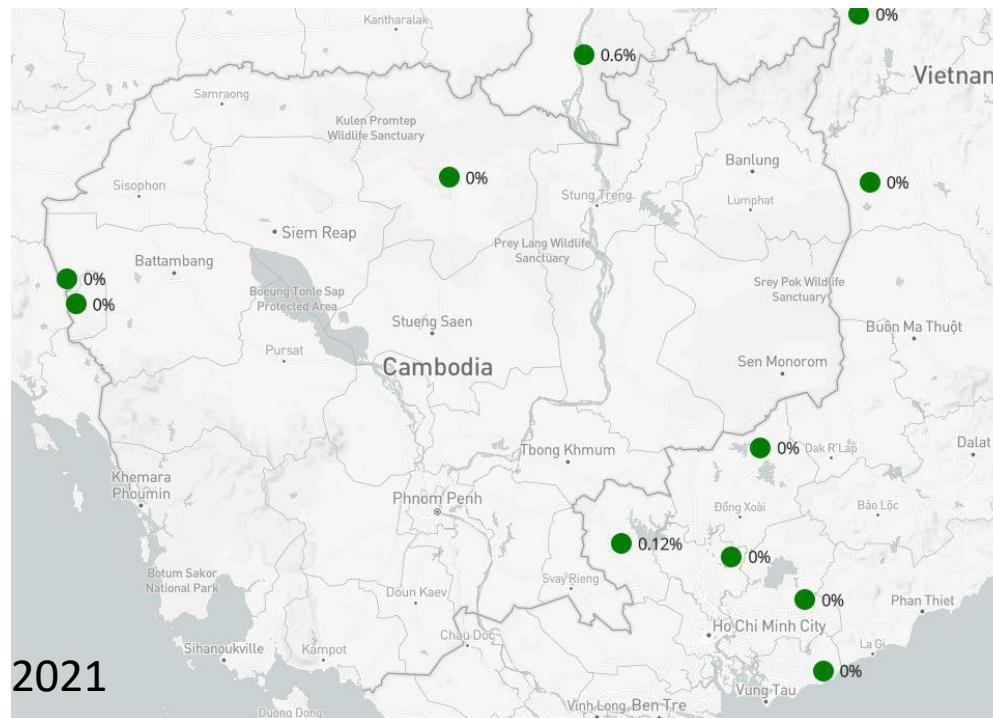
Incidence maps: CWBD



2020

2014

2021



Whiteflies (WF)

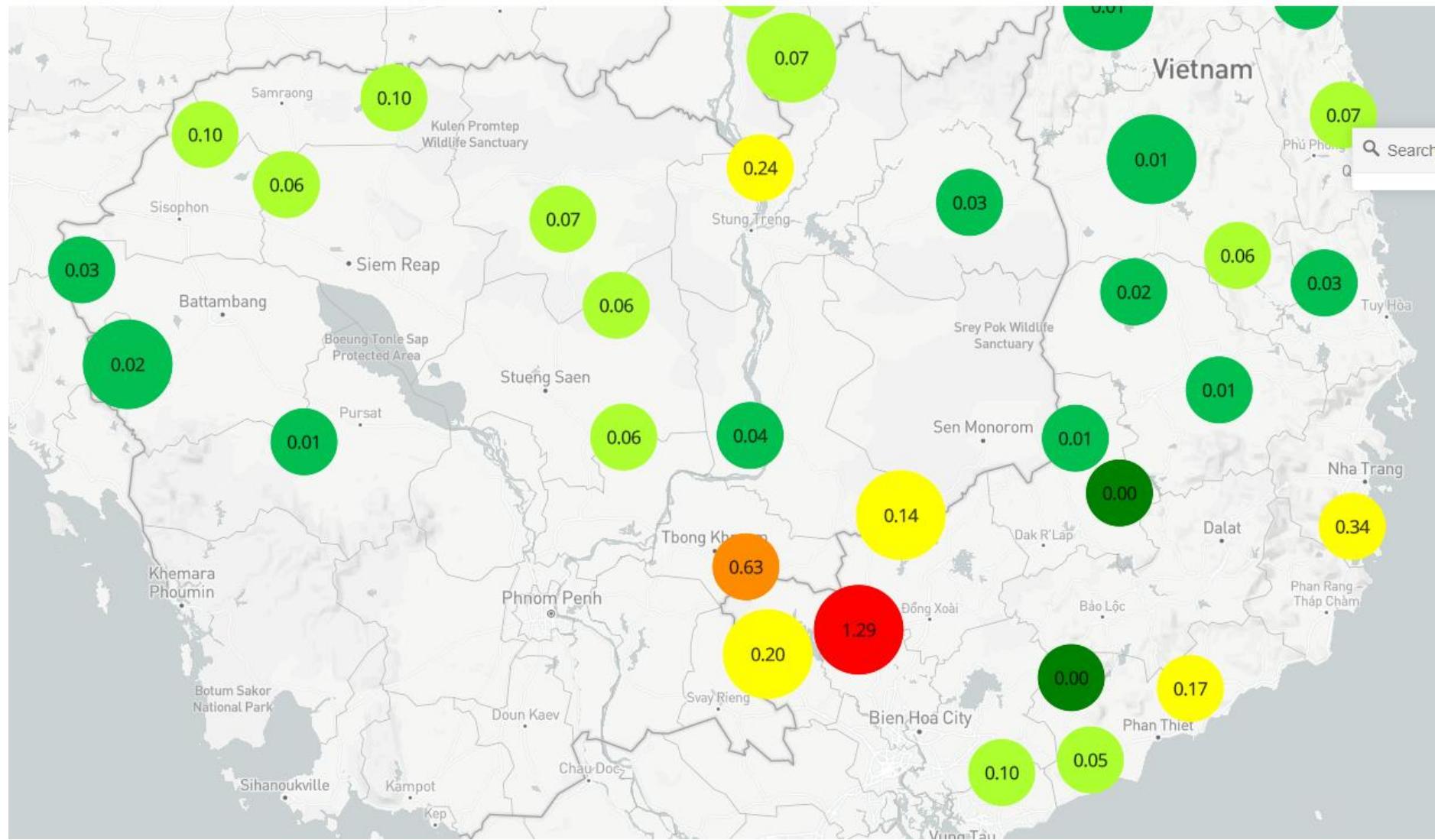
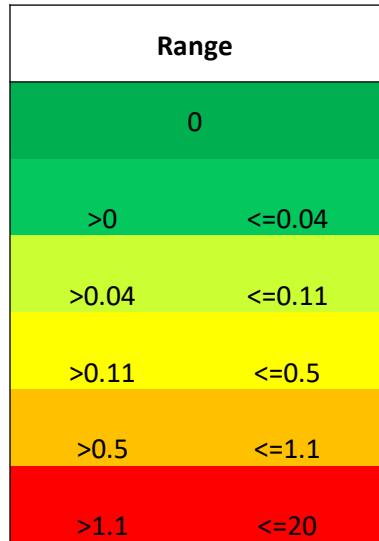


In the last years in Cambodia and Vietnam, the outbreaks of CMD caused by SLCMV were found to be associated with *Bemisia tabaci* Asia II 1 whiteflies, the only known efficient vector for SLCMV (Wang et al., 2016; Uke et al., 2018; Y. Chi et al., 2020)

A fast, efficient and standardized method was established for the surveillance of whiteflies and diseases. For WF, 30 plants were evaluated following a diagonal:

- In 2020 around 4500 'observations' and 840 'observations' in 2021 (more observation will be added)

Whitefly relative abundance (Adults/second leaf/plant)



4. Other Pest/Diseases Found during Surveillance

1. Cassava Bacterial Blight Disease
2. Mealybugs



(Photo Fen Beed, CABI)



(Photo Rob Reeder, CABI)

5. Challenges

- The weather (heavy raining, hot...)
- Traveling and communication
- Covid-19 pandemic
- Lack of technical officers on molecular identification



6. Next Activities

- Continue to CMD and CWBD and Whitefly surveillance
- Preparing and sending the whitefly sample and cassava leaf sample from Cambodia to CIAT for molecular identificaiton and further research.



Thank You