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Diagnostic and surveillance of cassava whiteflies in mainland Southeast Asia

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Proyect Mid-term Review

February 2022

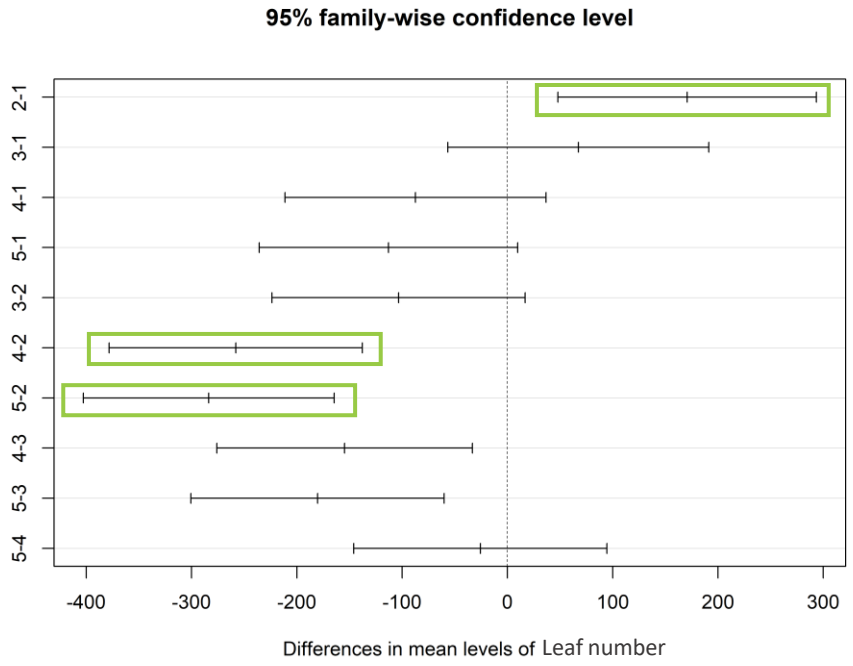
Whiteflies (WF)

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)

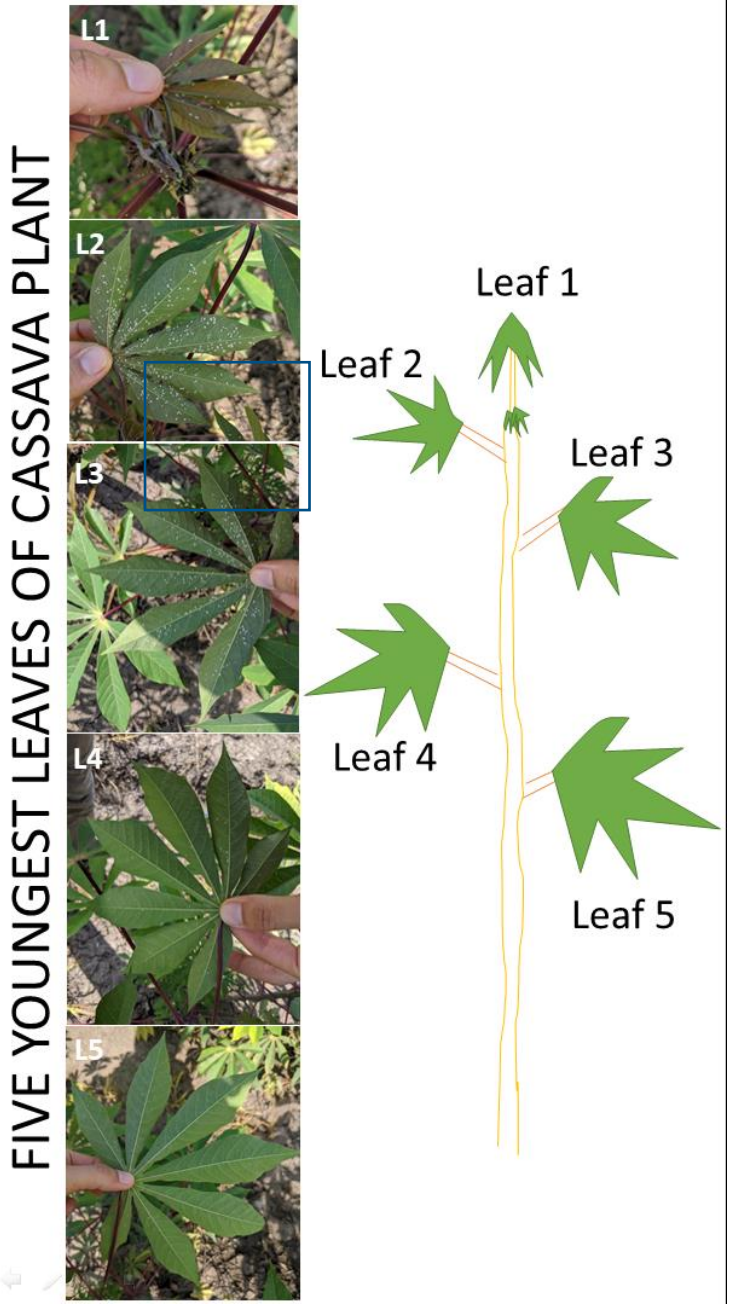
A fast, efficient and standardized method was established for the surveillance of whiteflies and diseases. For WF, 30 plants were evaluated following a diagonal in each of 1335 fields.

Team

Surveillance

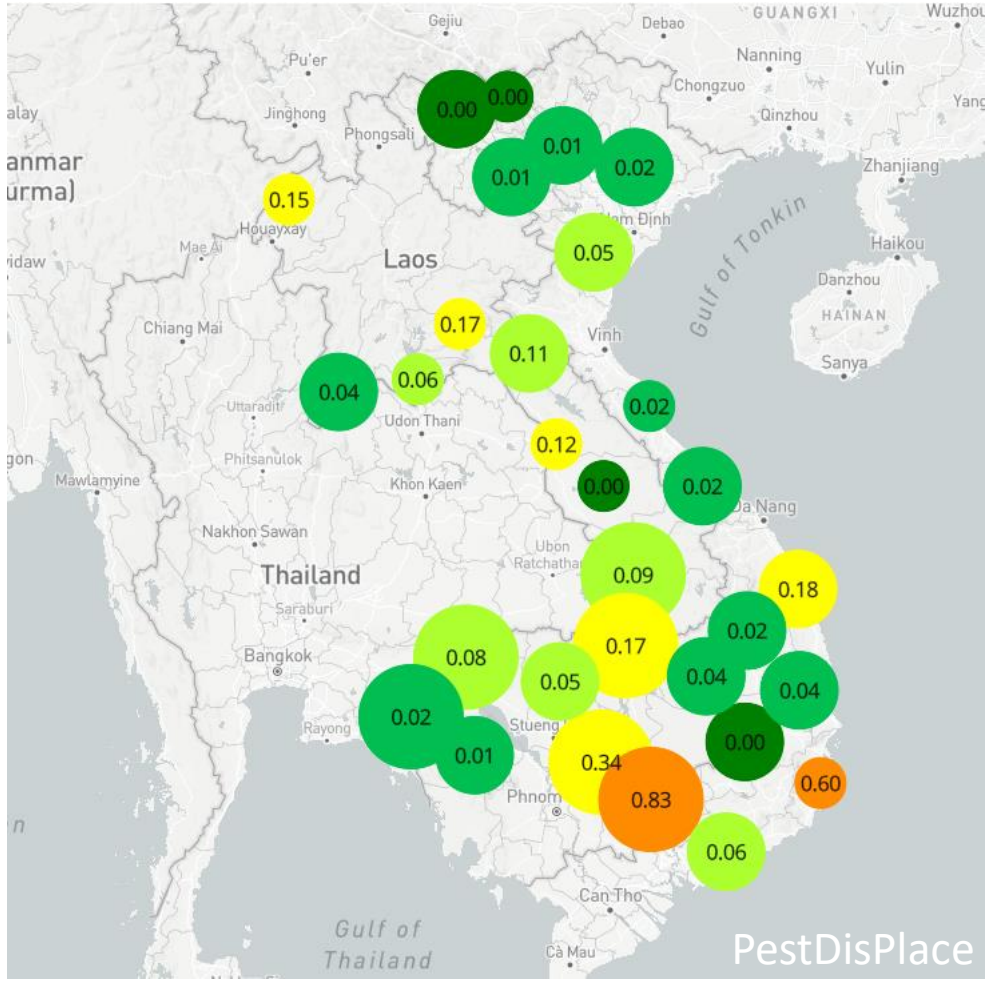


The evaluation was made evaluating photographs of the second youngest leaf based on the preference of whiteflies in Latin America and experiences in Uganda.



Surveillance

- The variable to measure the populations is the WF relative abundance= No. adults/leaf/plant
- Two consecutive crop cycles with regional relative abundances of 0.068 in 2020 and 0.267 in 2021.
- Photo records allow the recognition and counting of 2854 WF.
- 22420 photographs, 15778 leaves evaluated in the cycle of 2020 and 6642 in 2021.



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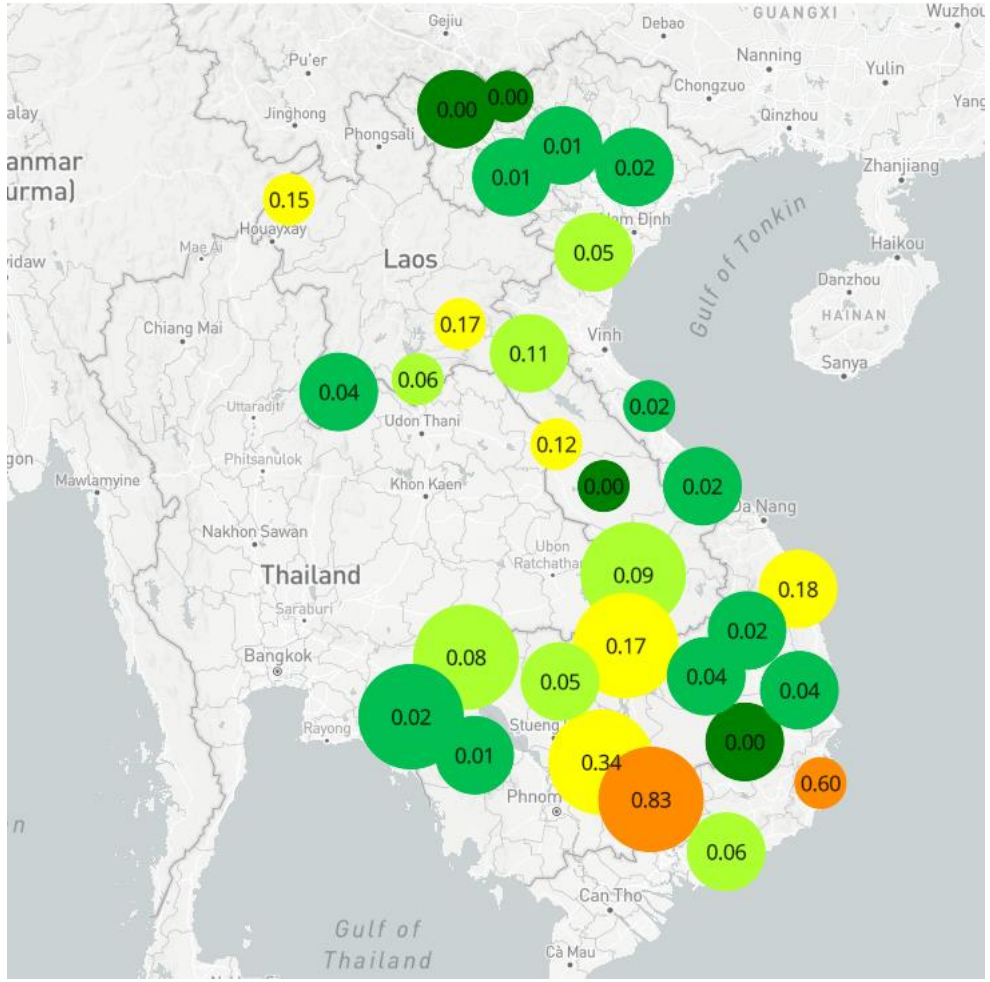
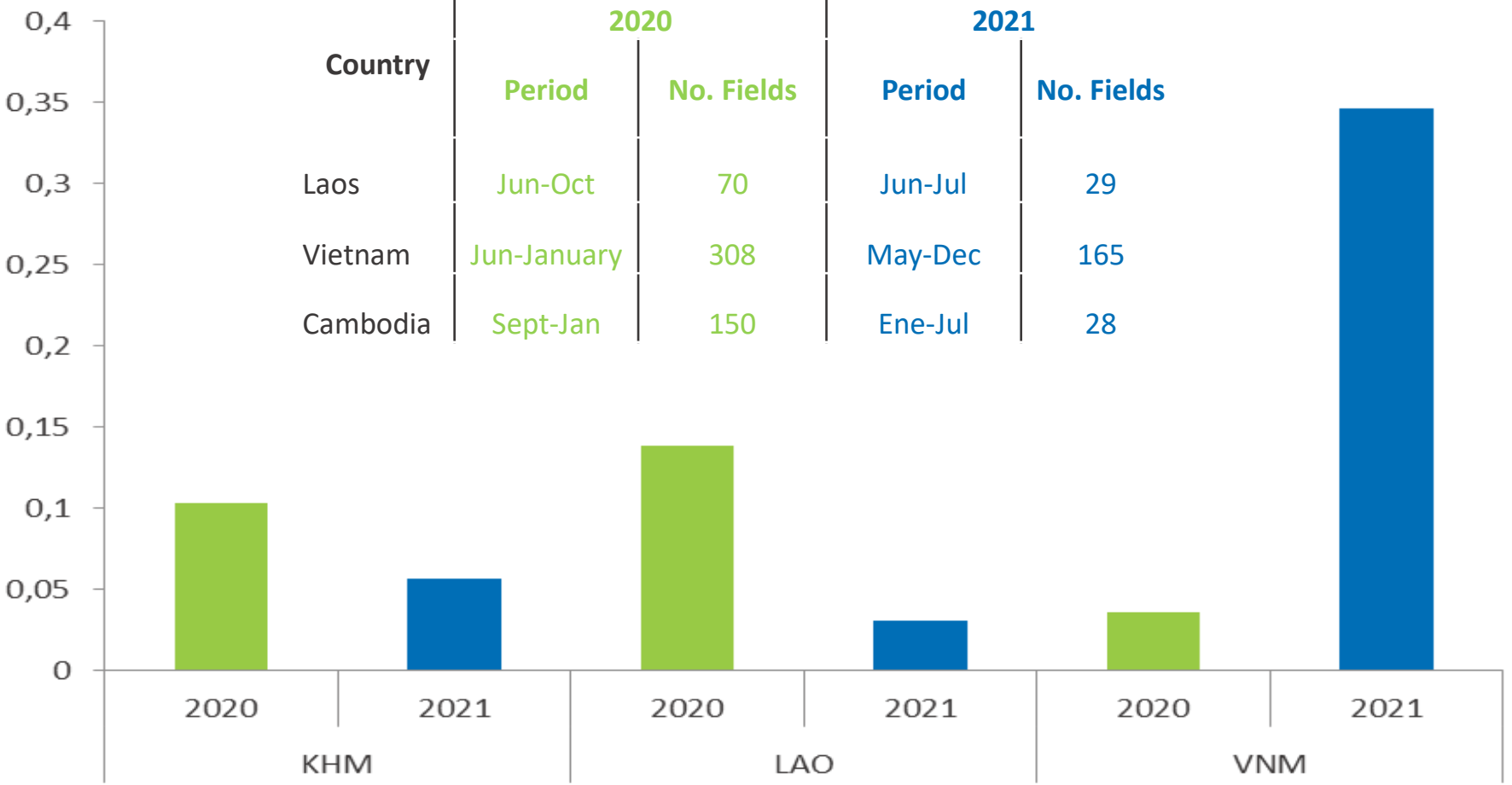
Range		Frequency
0		394
>0	<=0.04	116
>0.04	<=0.11	106
>0.11	<=0.5	112
>0.5	<=1.1	16
>1.1	<=20	6

750 fields

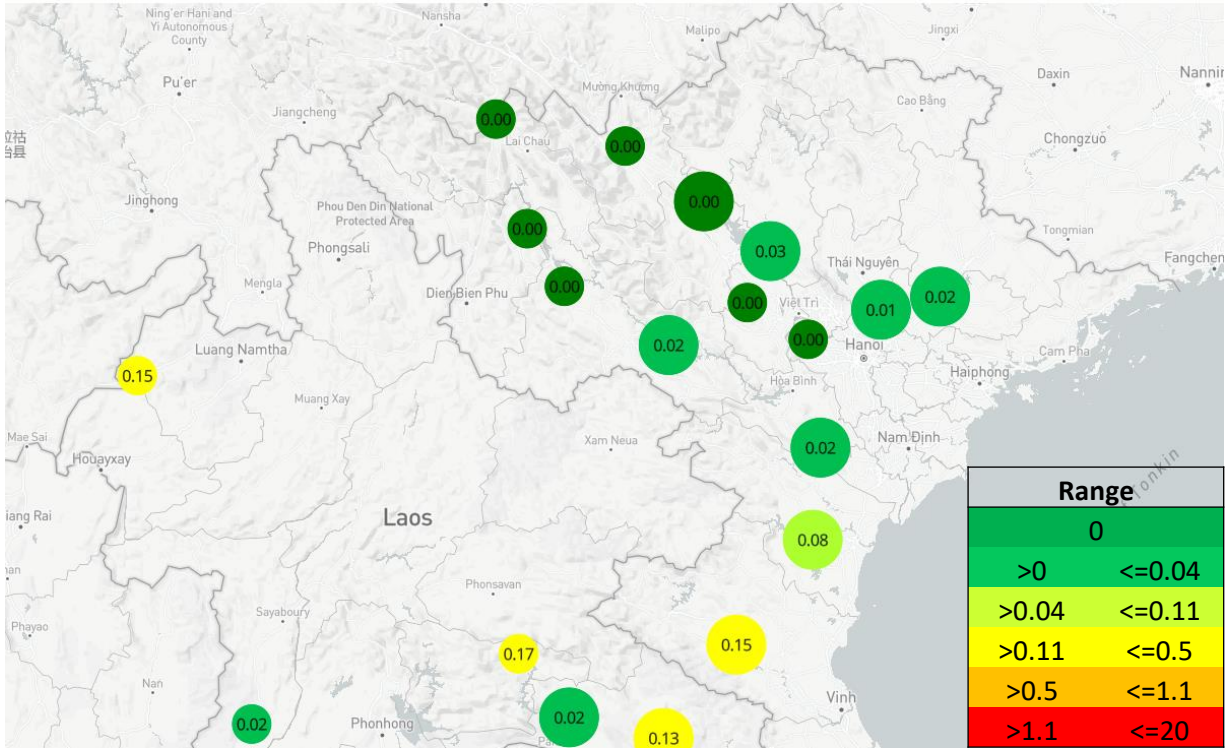


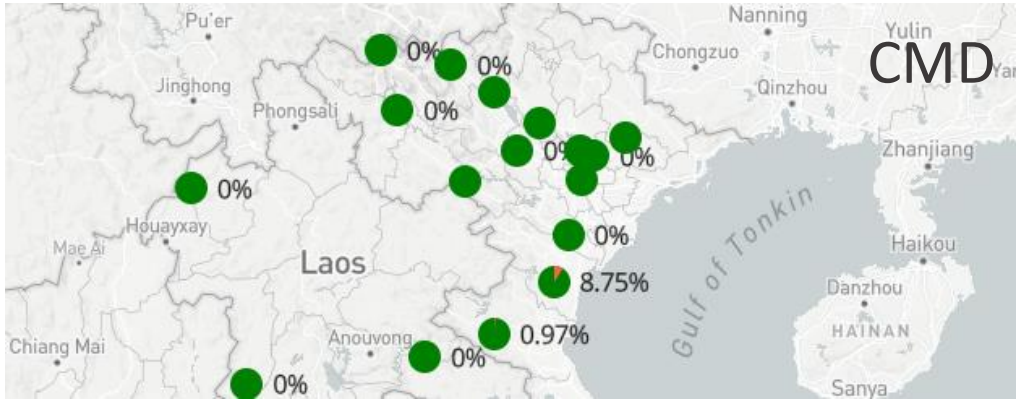
Countries WF abundance (Adults/leaf/plant)

Country	2020		2021	
	Period	No. Fields	Period	No. Fields
Laos	Jun-Oct	70	Jun-Jul	29
Vietnam	Jun-January	308	May-Dec	165
Cambodia	Sept-Jan	150	Ene-Jul	28

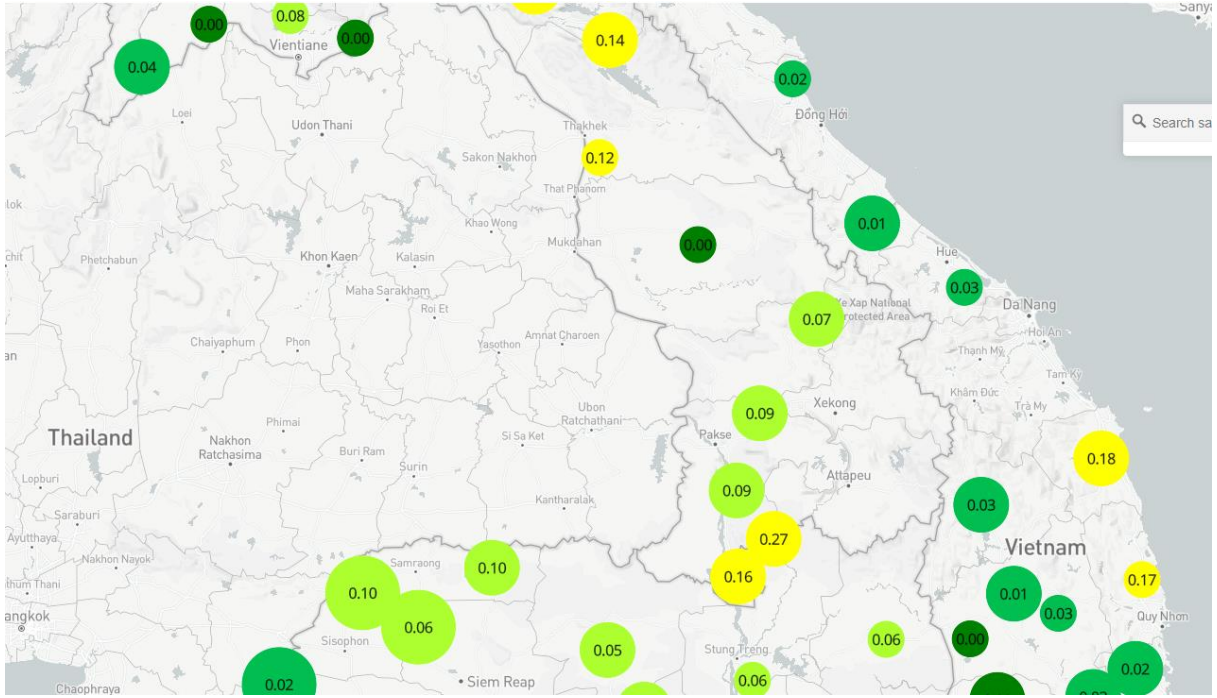


North zone - WF relative abundance 2020-2021

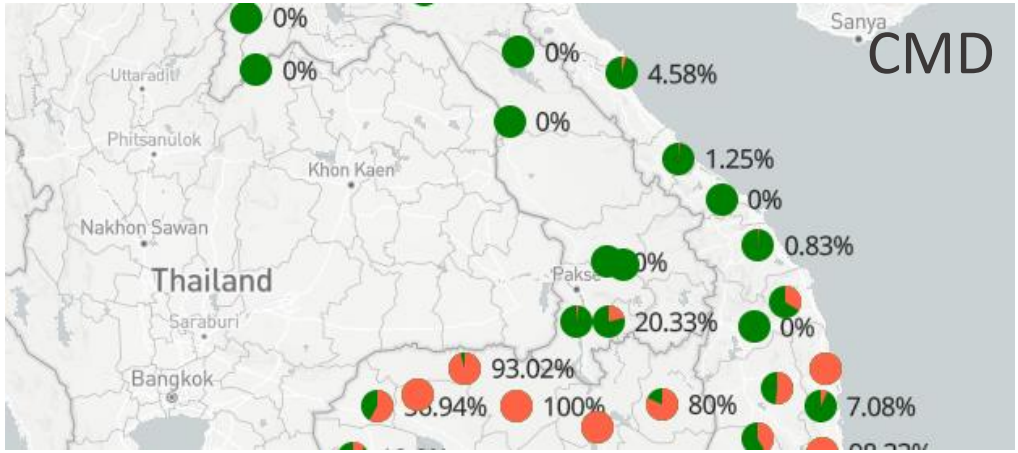




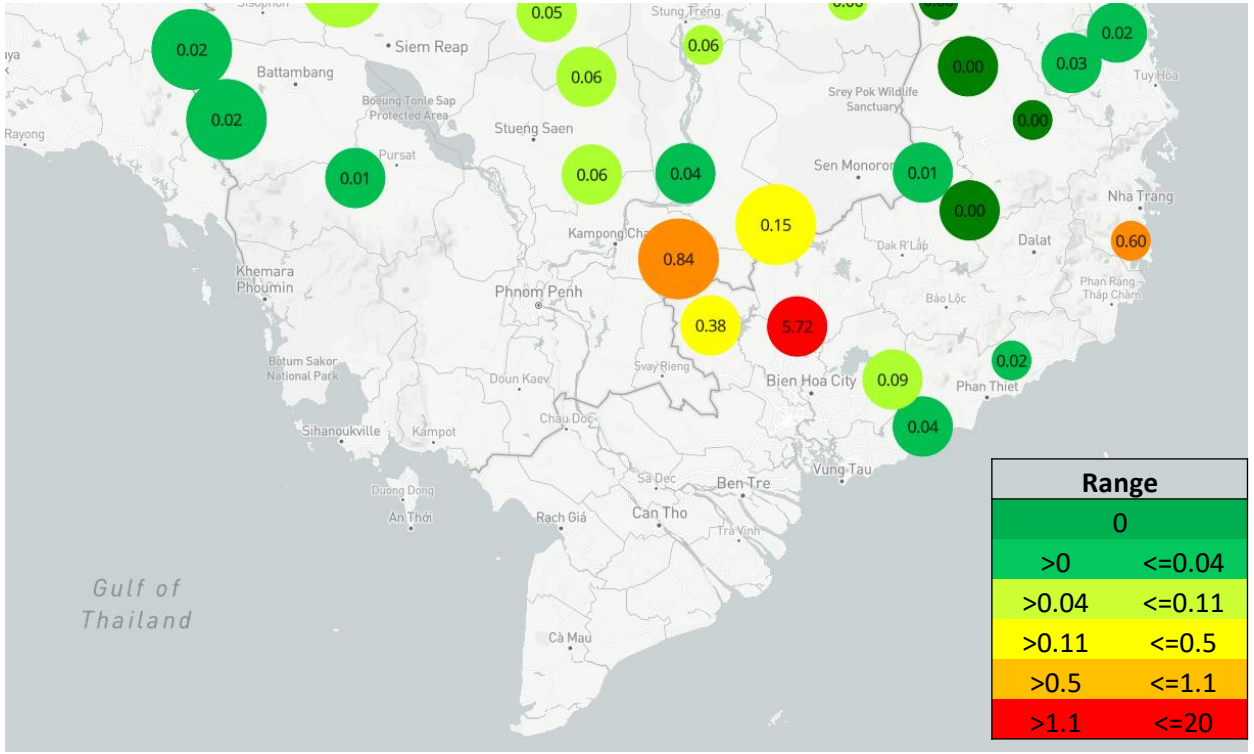
Middle Zone- WF relative abundance 2020-2021

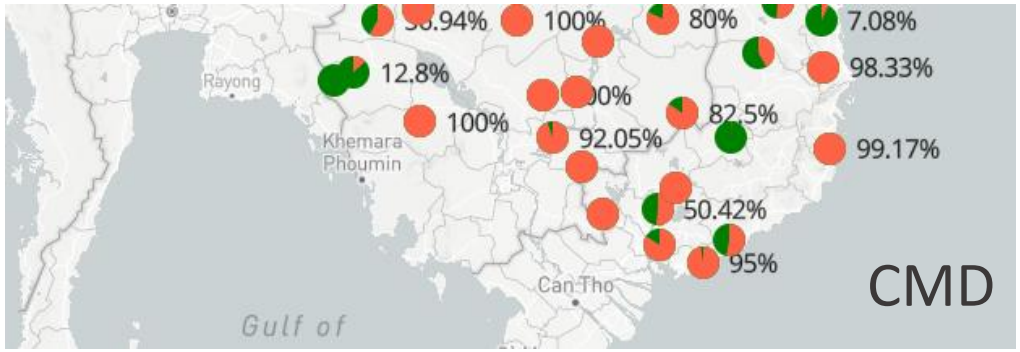


Range	
0	
>0	<=0.04
>0.04	<=0.11
>0.11	<=0.5
>0.5	<=1.1
>1.1	<=20



South zone - WF relative abundance 2020-2021





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WF relative abundance vs. CMD incidence

Range	Frequency	Incidences
0	394	0 to 100%
>0 <=0.04	116	0 to 100%
>0.04 <=0.11	106	0 to 100%
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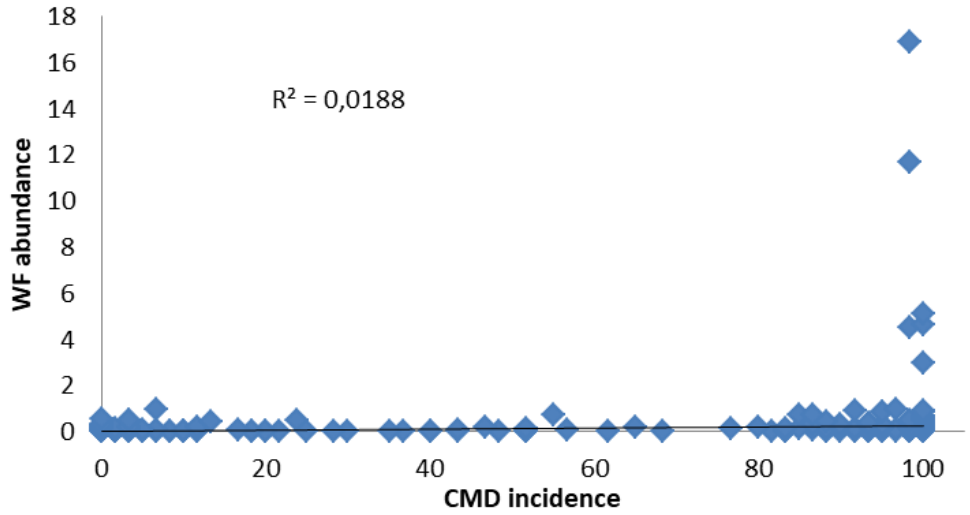
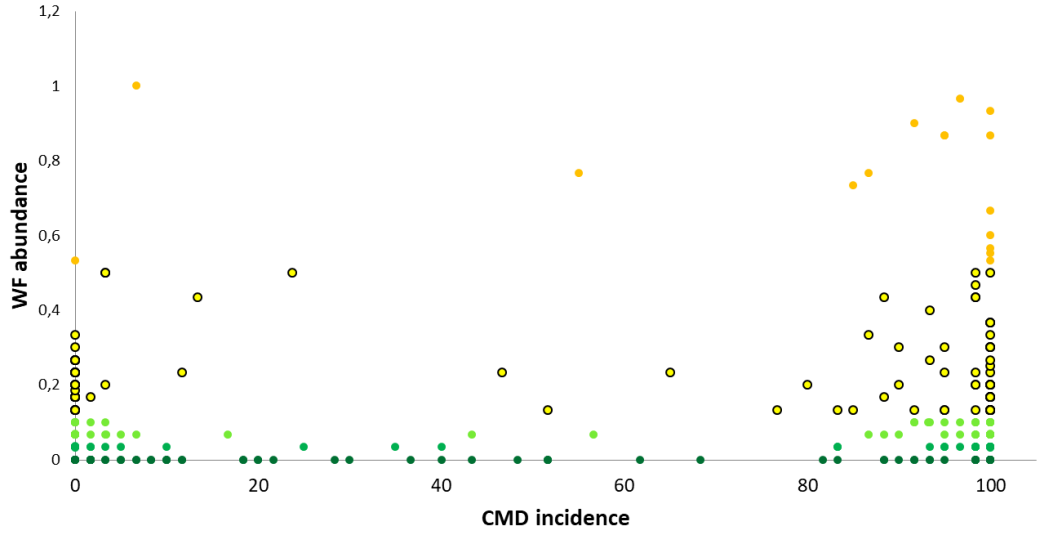
>0.5 <=1.1	16	0 to 100%
>1.1 <=20	6	Over 98,33%





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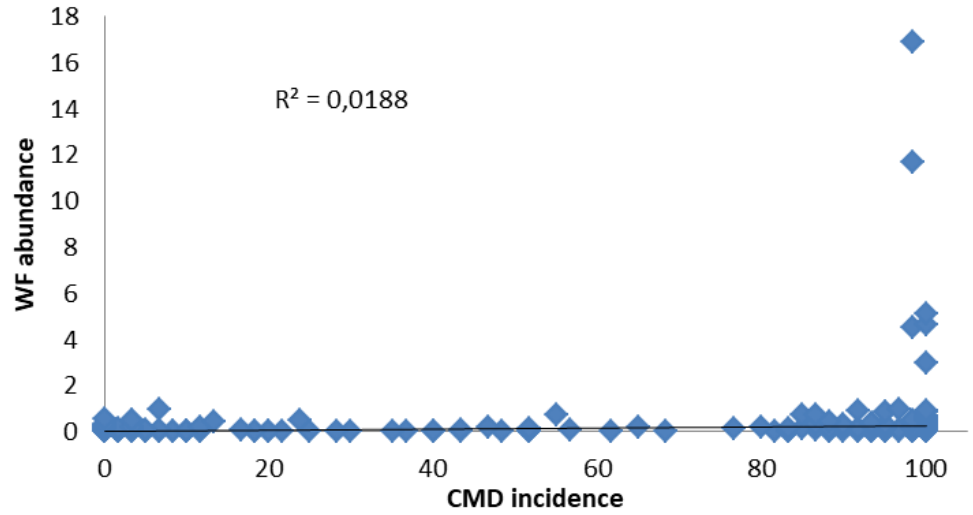
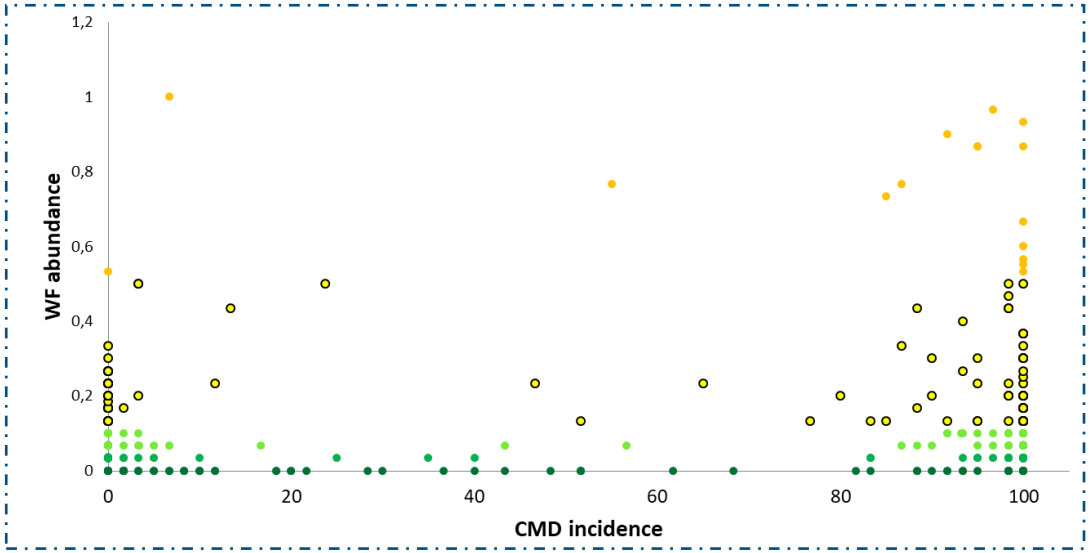
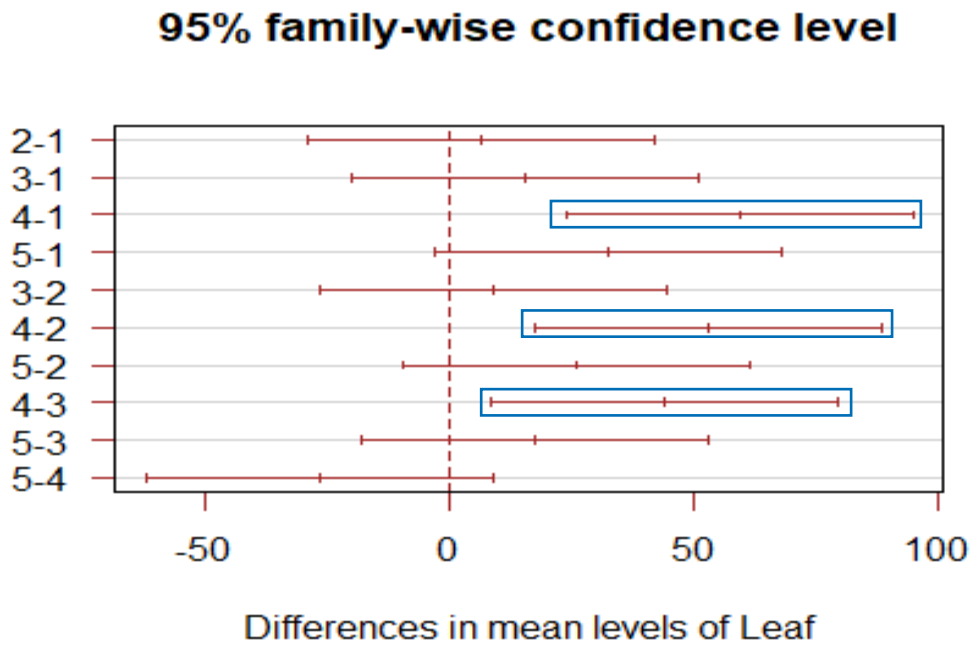


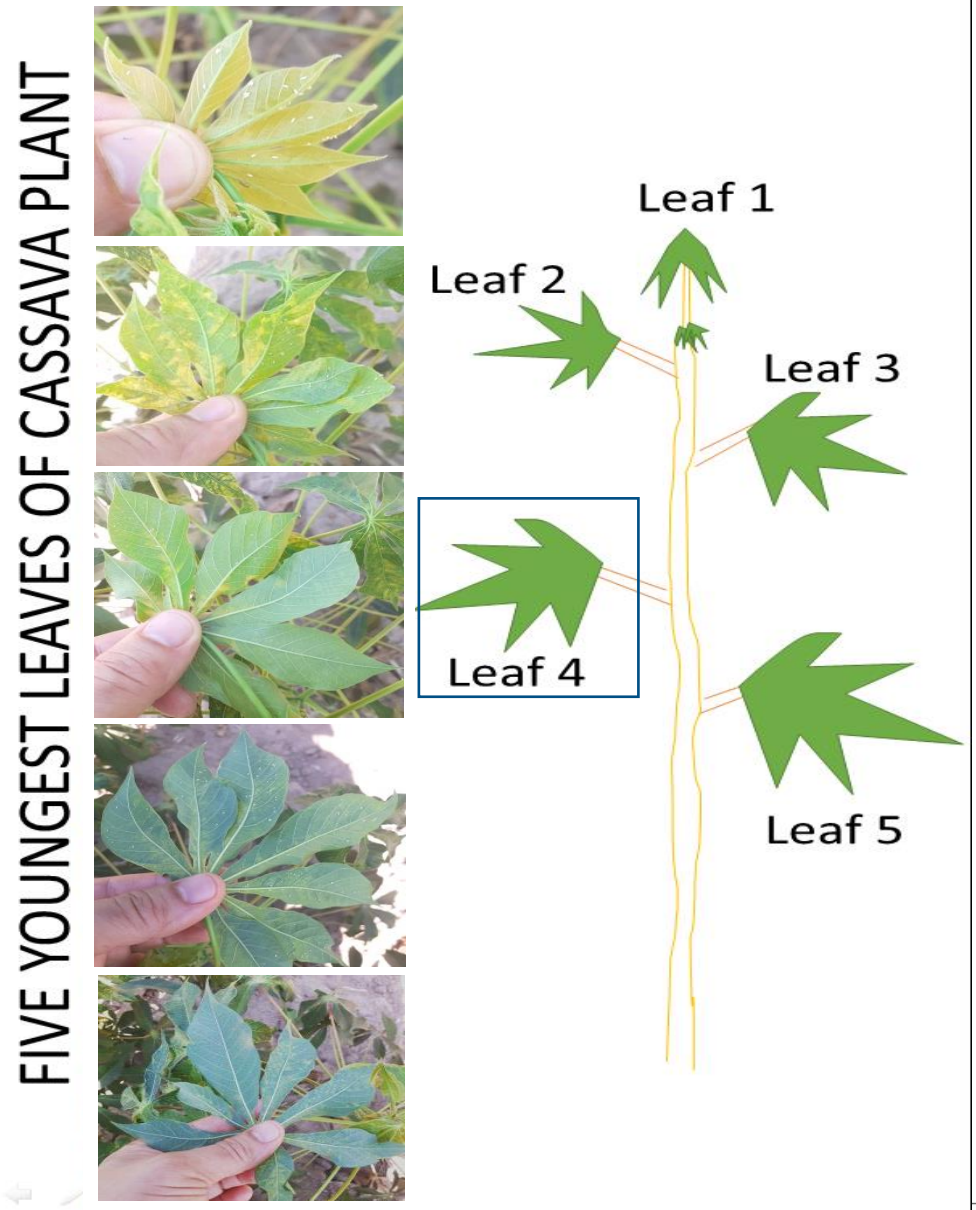


Whitefly preference

Vietnam-Chon Thanh-Binh Phuoc
Whitefly species *Bemisia tabaci* pos. Asia II-1



Tukey HSD test



WF or stakes?

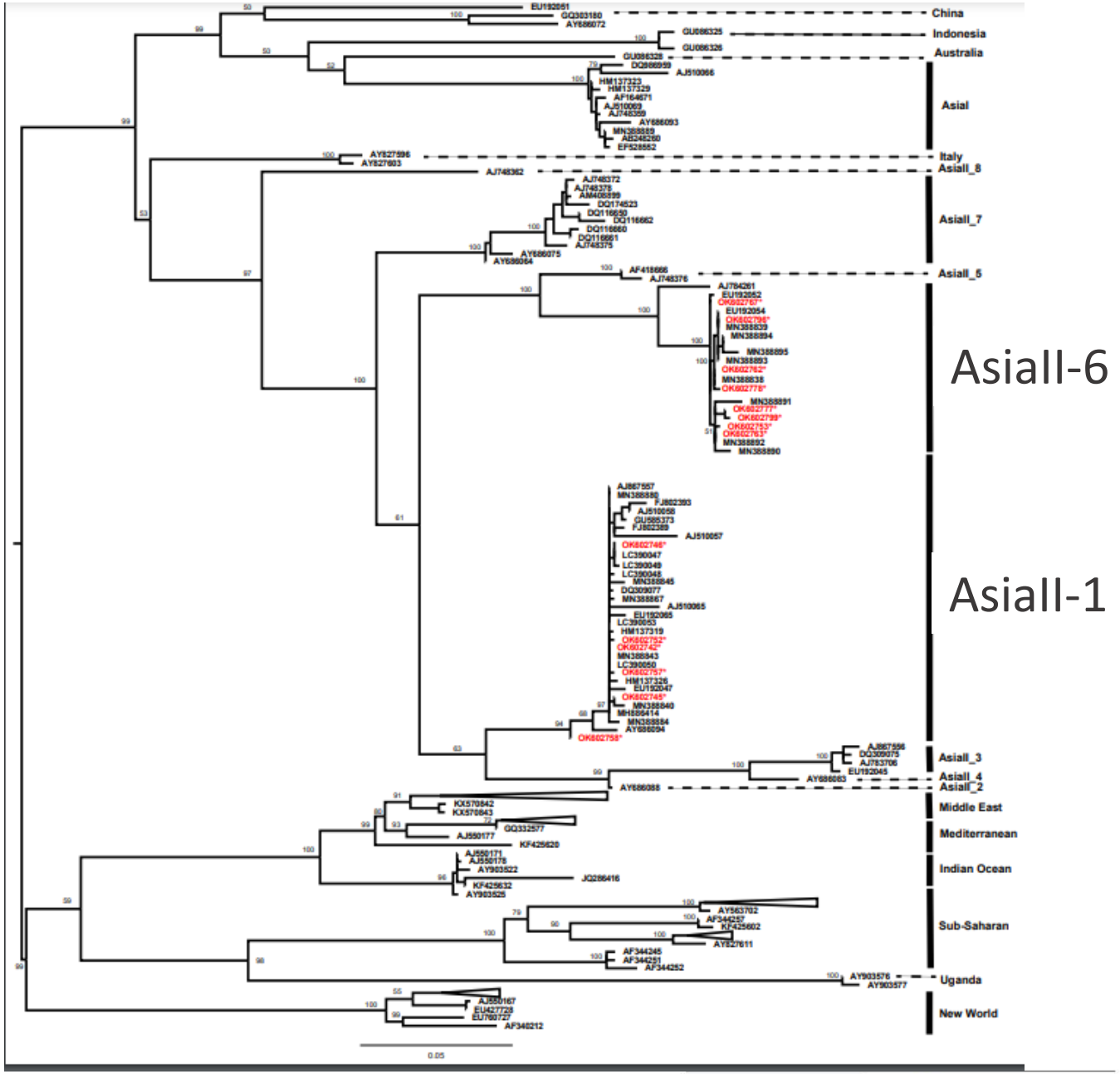
- Contribution of WF transmission to dissemination of CMD is not yet known but it is possible to evaluate if the disease was transmitted since stake or by viral-borne vectors using the photos for CWB of previous crop cycles.

Diagnostic

Samples from the cycle 2020 from Laos were analyzed using Nanopore in Colombia.
Samples from Vietnam were analyzed in PPRI.

The indigenous species found on the Indian sub-continent and SEA, Asia II-1 and Asia II-6 were identified in Laos and Vietnam.

Given delays in transport samples due to COVID restrictions we have pending to analyze the diversity in samples from Cambodia.



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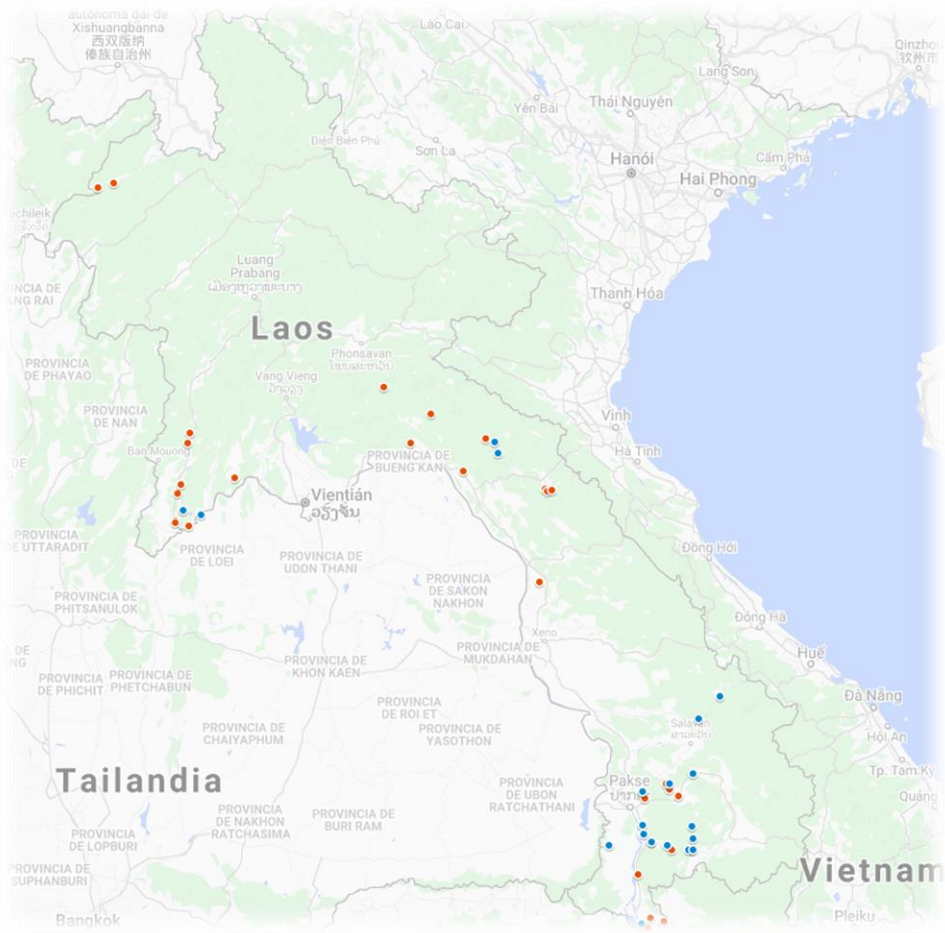
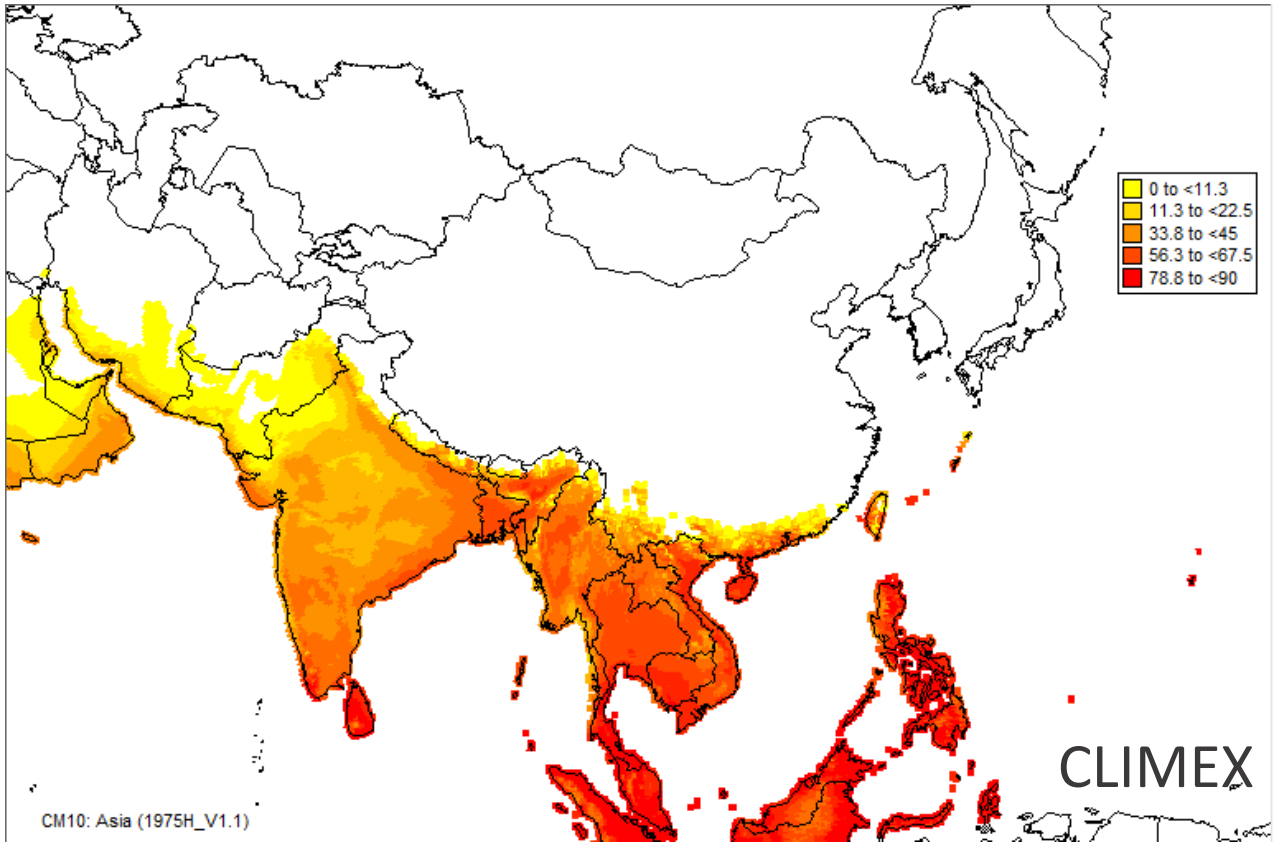
Potential distribution of Asia II-1





Ecoclimatic index to measure the suitability of the places for a species

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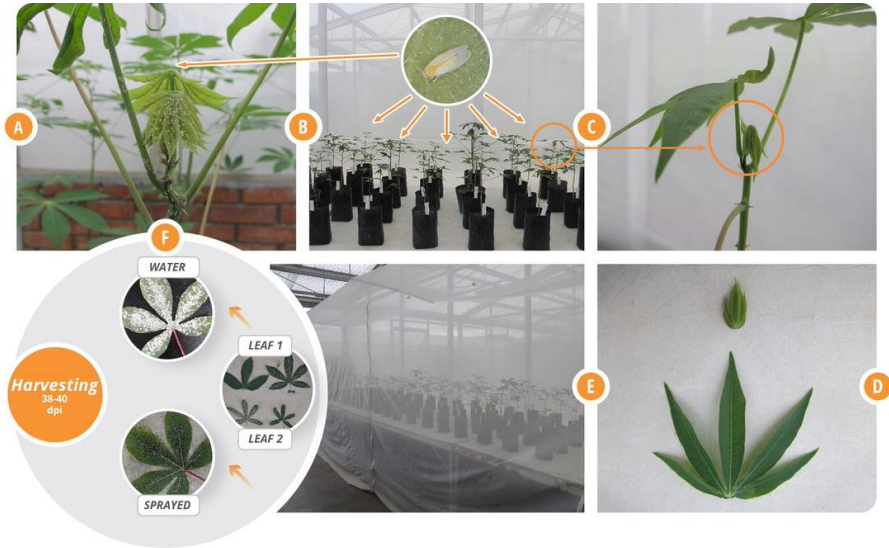
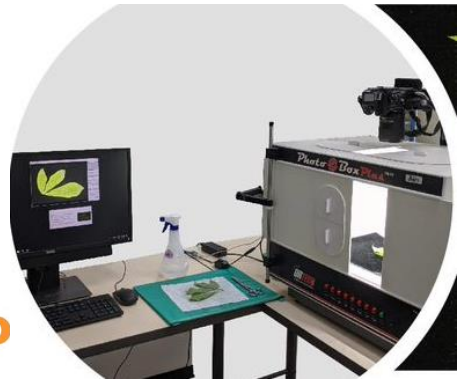
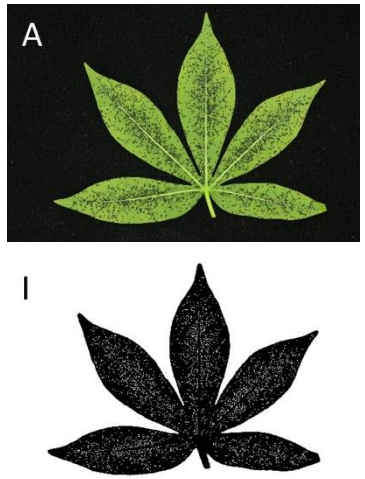
Management

- The population in some regions is increasing making worse the incidence of CMD.
- It is required to have available varieties with resistance to CMD, but given resistance is not neccesarily inmunity, is required to control the WF populations too.
- Use of the high-throughtput phenotyping platform to evaluate the resistance to WF of SEA varieties.







In summary

- Surveillance protocol allows to mapped low and high populations of whiteflies in the region. Evaluate the preference for leaves of whiteflies in different regions.

- Evaluate alternative hosts, Asia II-1 use at least 11 species as hosts.

- Contribution of WF transmission to dissemination of CMD is not yet known. We can use the CWBD photos to evaluate this from crop cycles of 2020 and 2021.

- It is possible to evaluate CBB from photographs of 2020 and 2021 crop cycle as well as from the surveillance activities of the 2022 cycle.

- It is pending to analyze the diversity of whiteflies from Cambodia.

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Thank you!

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