Survey and Identification of cassava diseases in Lao PDR

Presented by Ms. Pinkham Vongphachanh

Plant Pathology unit, Plant Protection Center, Department of Agriculture

Outline

I. Background

Total area for grown cassava in Lao PDR around 194,900 ha,

Resouce: Statistic of DOA, 2021.

- **The province grown cassava including Champasack, Salavan, Xekong, Bolikhamxay, Xayabouly, Laungnumtha, Vientiane attapue and etc.,`**
- **Variety: KU50, Rayong 11….**

I. Background Cont.

- The survey and monitoring of CMD and CWBD from 2014 reported only CWBD in Laos (6 Provinces) but no CMD

Ignazio Graziosi et al., 2016. Emerging pests and diseases of South-east Asian cassava: a comprehensive evaluation of geographic priorities, management options and research needs

- In 2020-2022 continue for survey CMD and CWBD supported by CIAT–ACIAR project: Laungnumtha, Xayabouly, Vientiane, Bolikhamxay, Xiengkhoung, Xaysomboun, Champasak, Salavan and Attapue

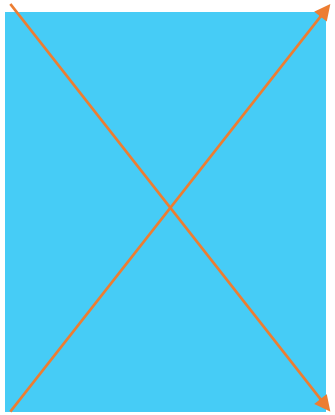
- Found and report CMD in Champasak, Salava, Attapue, Savanaket and Vientiane capital

Chittarath et al., 2021. First report of CMD and SLCMV in Laos. Plant Disease.

II. Survey and Identification of cassava diseases

- 1. Survey of CMD and CWBD
- -The determination of the survey area for cassava is based on the pest risk analysis of farmers fields and the companies that imported planting material from Thailand, Vietnam, China, and Cambodia in 2018 and 2019.
- -The determination survey area of cassava at the border, such as Thailand, Vietnam, China, and Cambodia, by asking and interviewing the farmer within these areas.

II. Survey, Identification, and Monitoring of cassava disease cont.



2.1. Survey of CMD and CWBD (Cont.)

Survey and collection information is based on ISPM6; By surveying the age of the cassava from 2 to 4 months by observing the signs of damage and collecting samples that show symptoms and asymptoms in 60 samples per hectare.

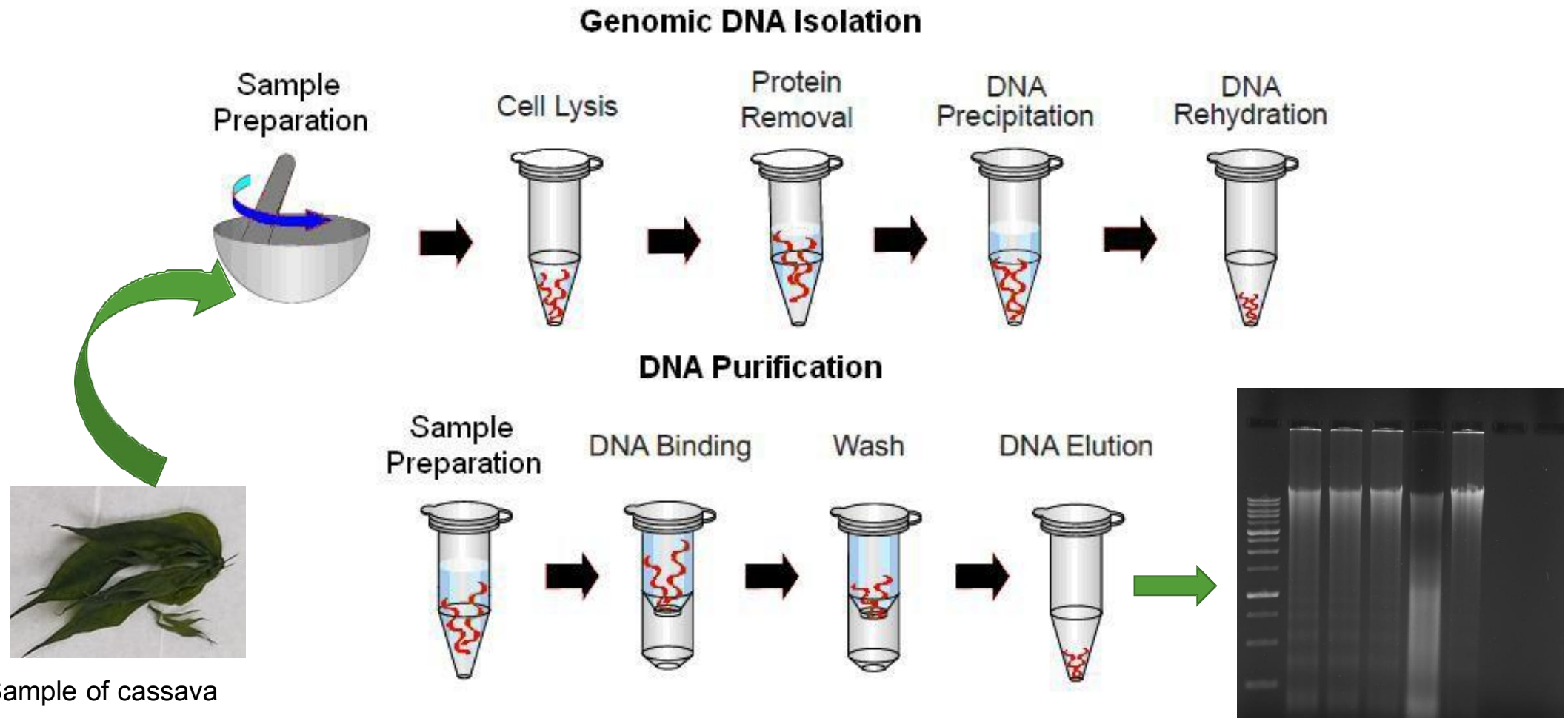
White fly 30 samples

Sample collection is to collect leaves from 1-4 leaves wrapped in tissue paper, put them in a plastic bag with silica gel to dry them, and take them to the lab for identification.

2. Identification of cassava diseases and White fly

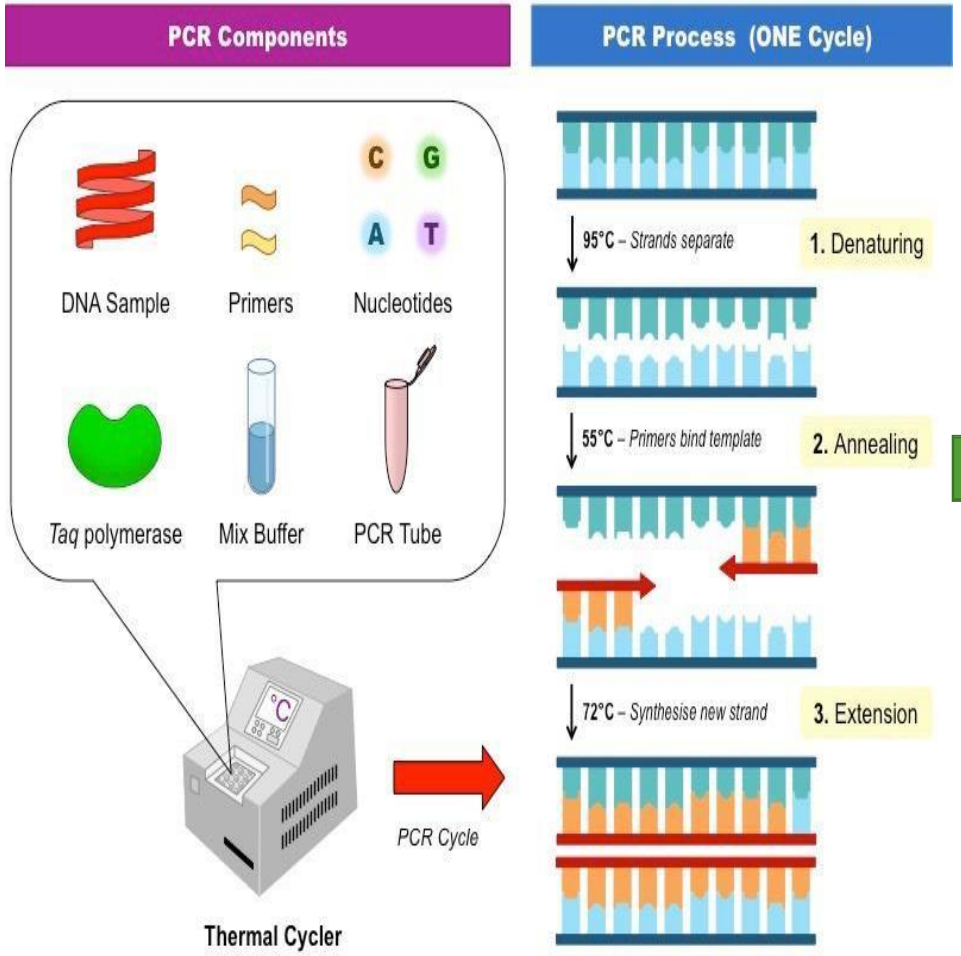
- Molecular (PCR)
- LAMP-based field diagnostics for Detect CMD

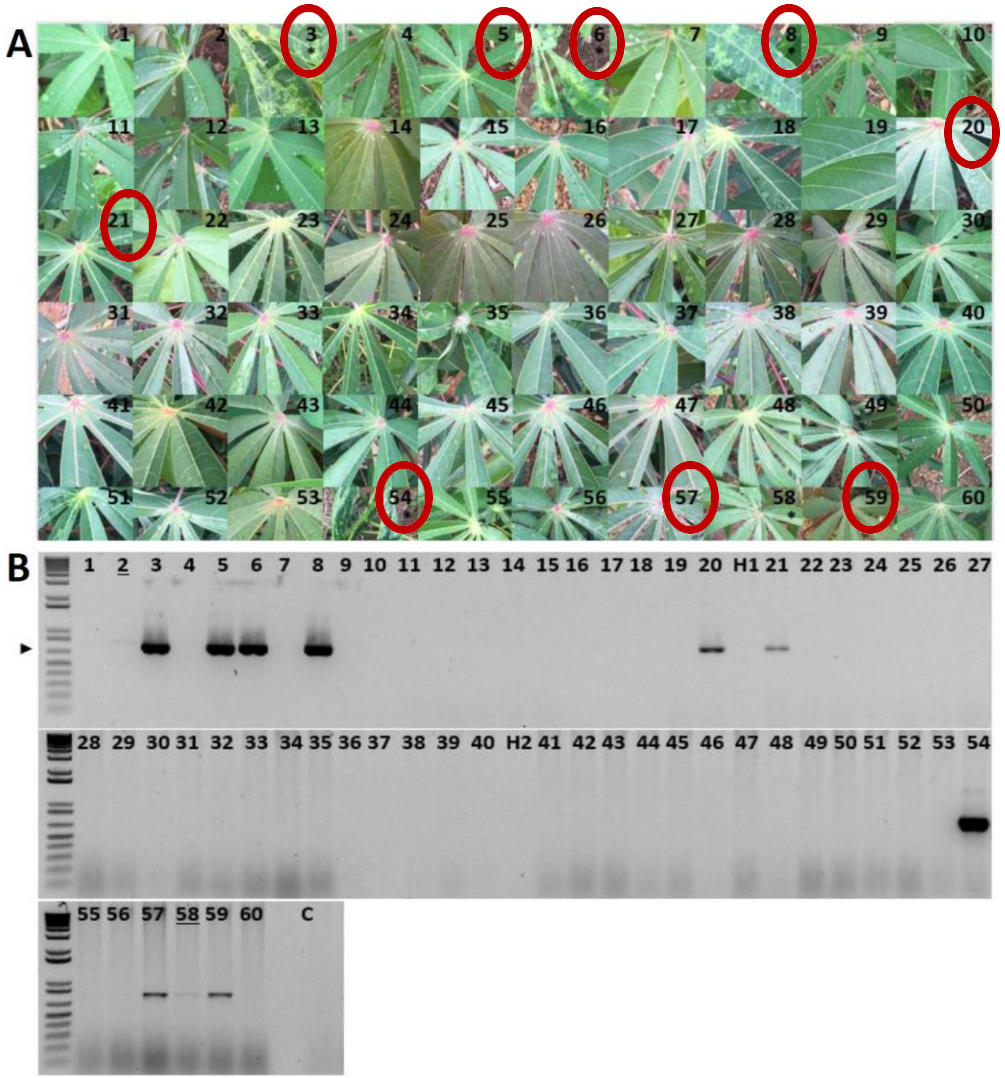
2.1.Extraction **DNA by CTAB**



Sample of cassava

ယောဟိမာ https://microdok.com





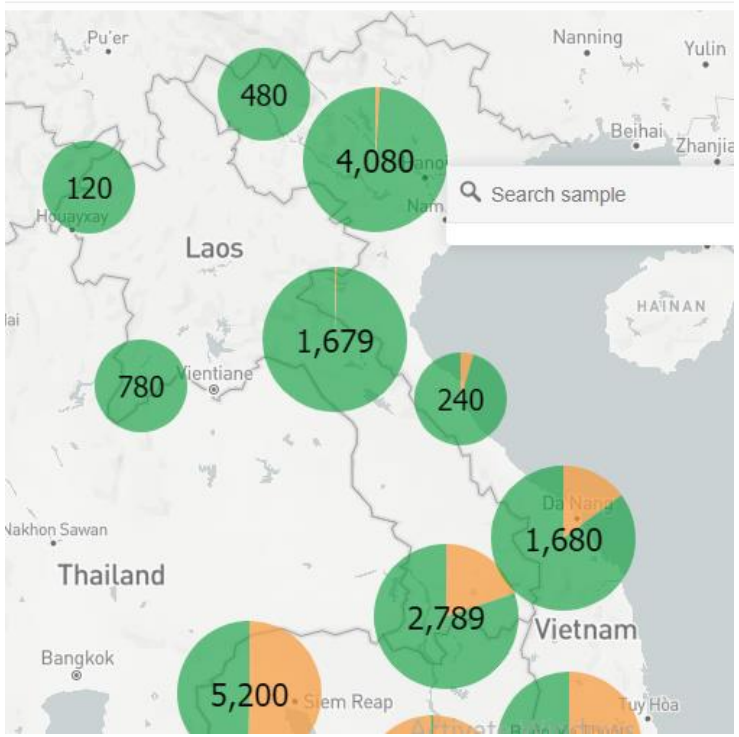
The results of the survey in Champasak province, Khong district, show that 60 samples showed positive results for SLCMV disease, which is similar to the Cambodian strain in Rattanakyli province at 99.78% (GenBank id KT861468, KT861469).

ທ່ຽງທິນ: https://longroadtoinnovation.wordpress.com

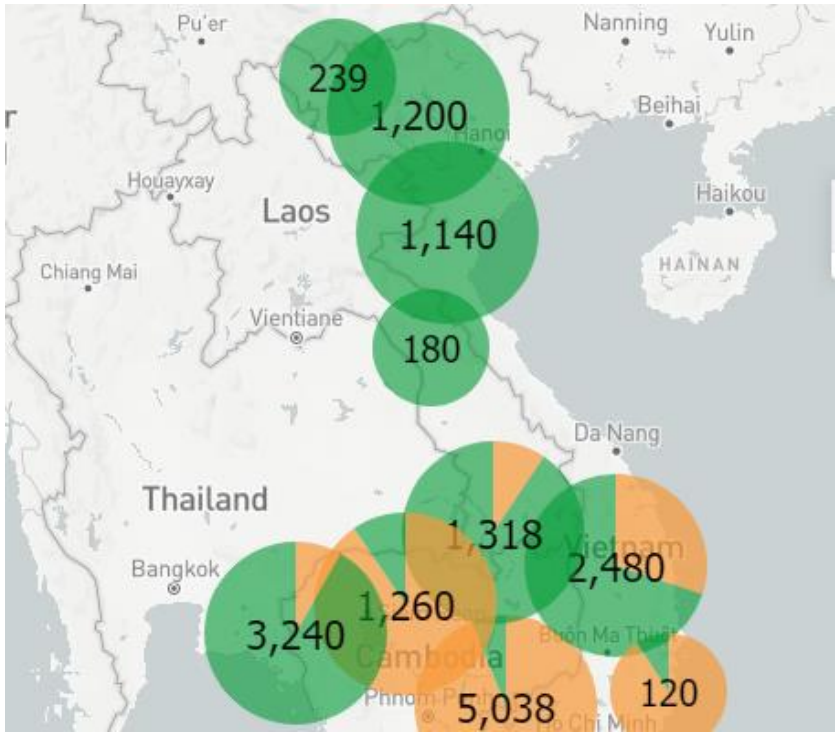
Map of distribution of CMD

PestDisPlace

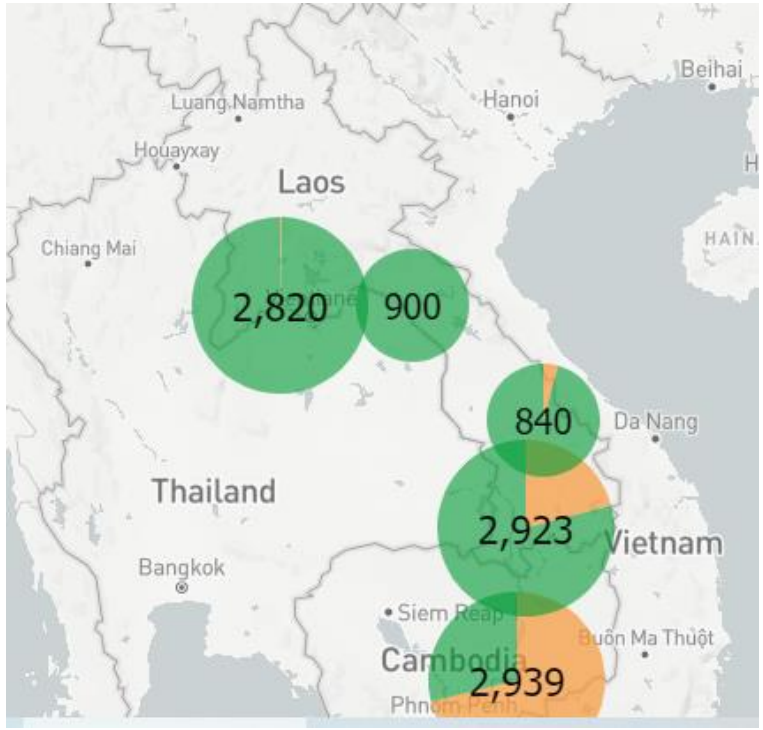
Year 2020

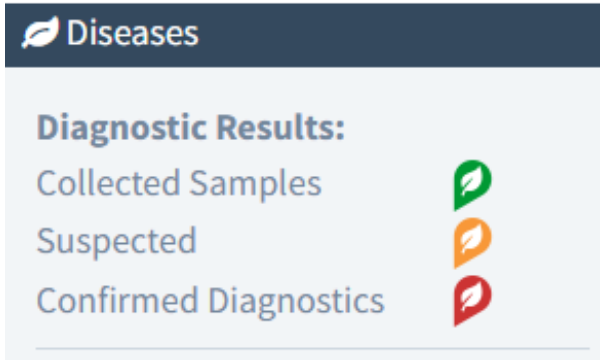


Year 2021



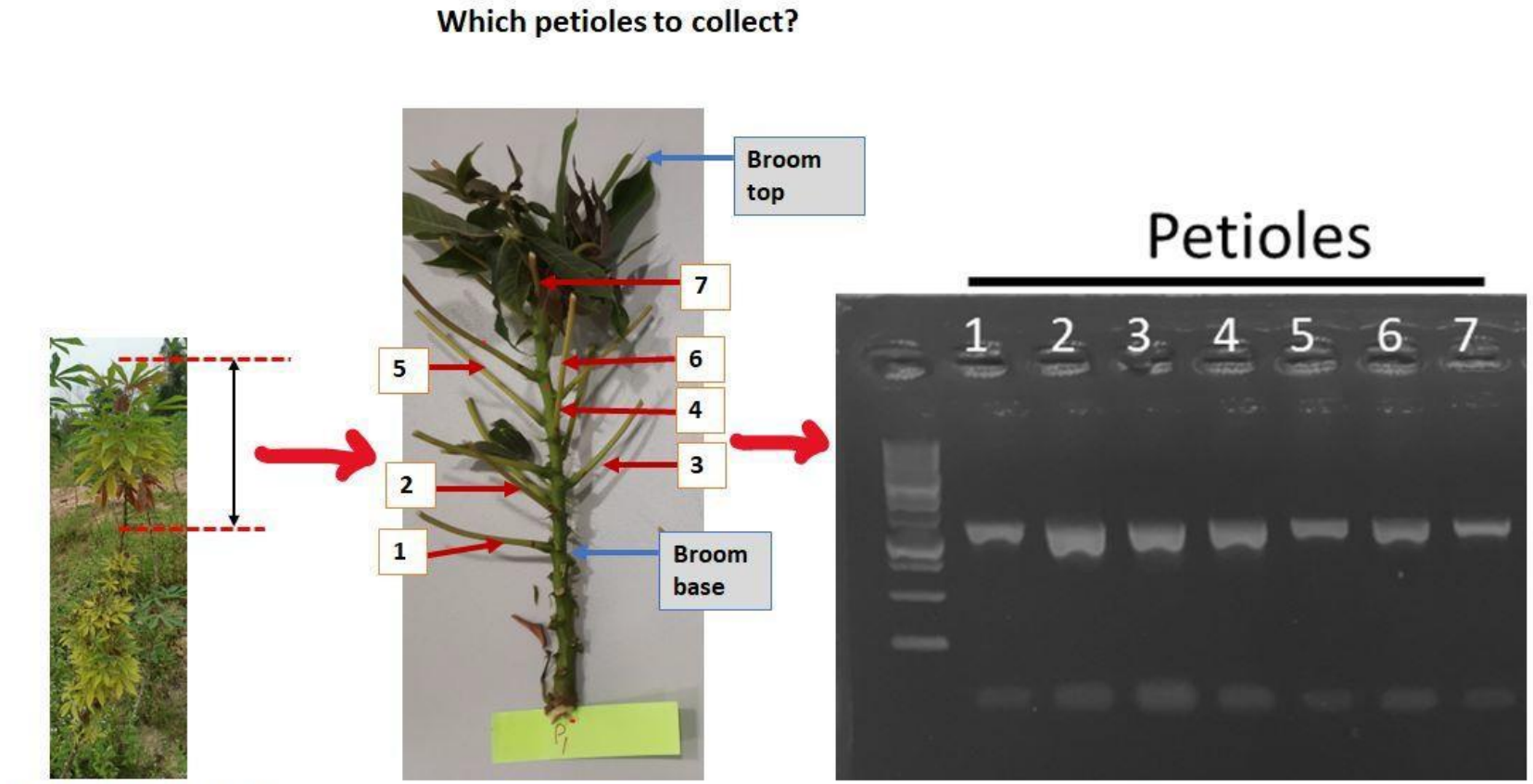
Year 2022



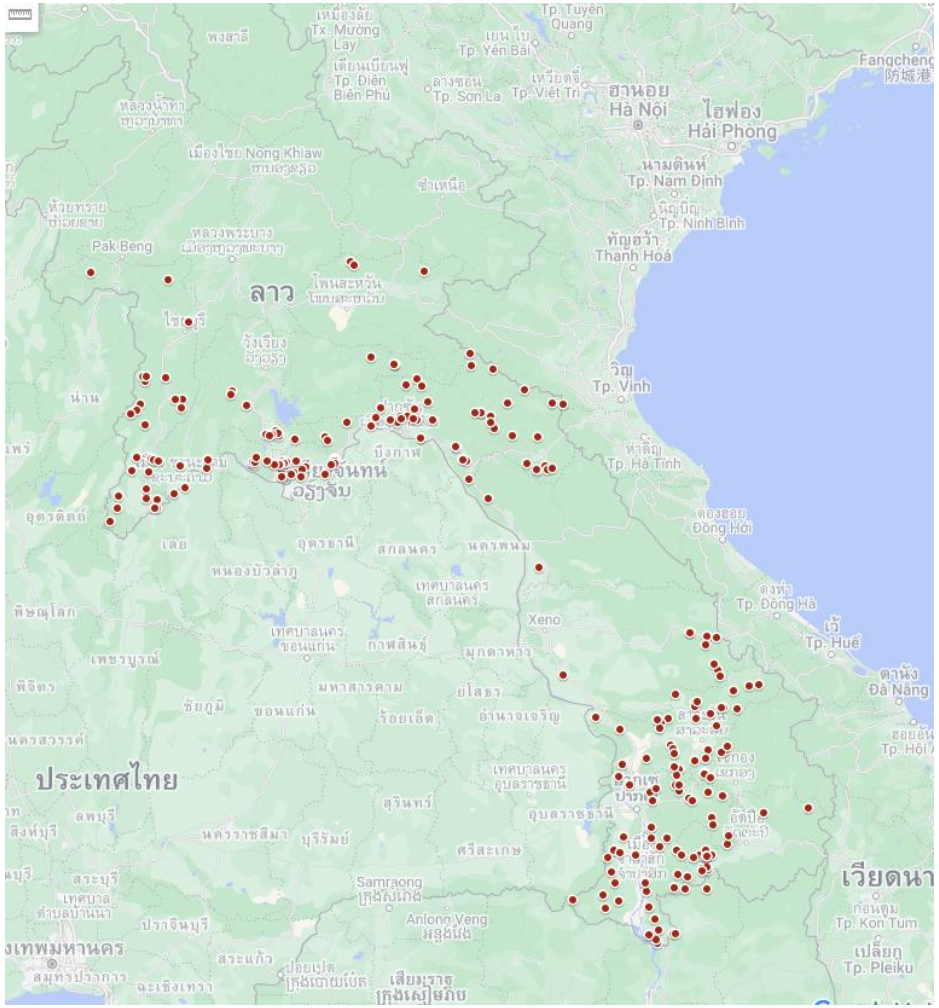


Code project PDP_00063

2.3. Identification of Witche's broom



Map of distribution of CWBD



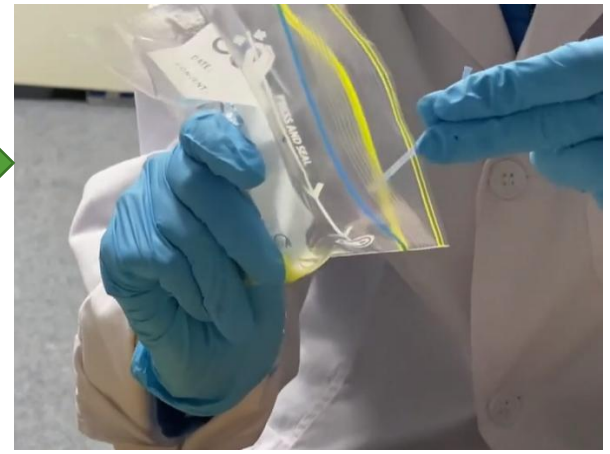
CWBD in Vientiane capital

Survey distribution of CWBD for 2020-2022

Resource: Rafael Rodríguez (CIAT)

2.2. LAMP-based field diagnostics for Detect CMD

Sample from the field



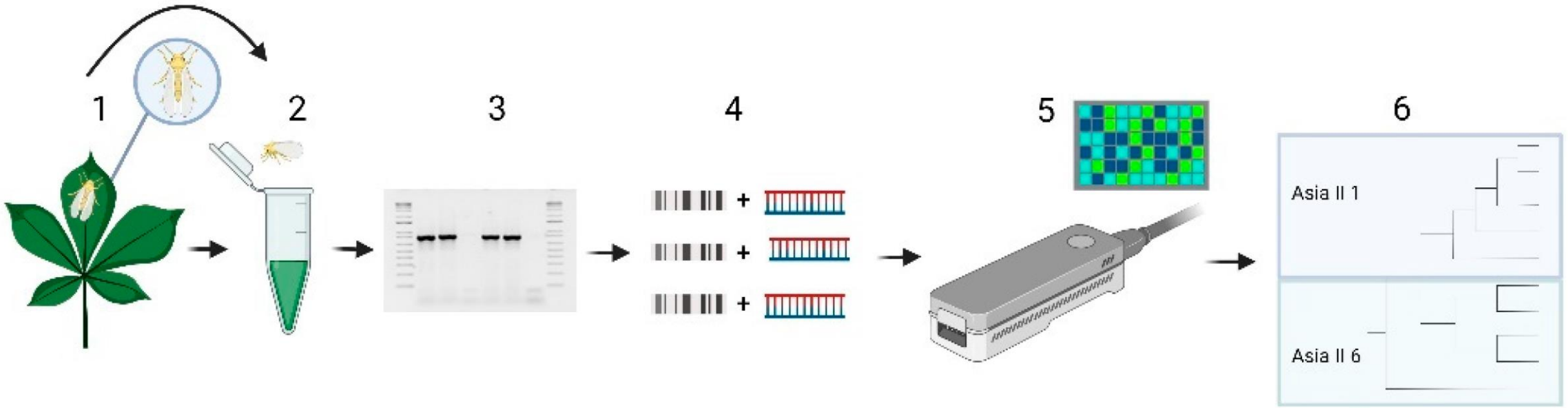
Dipsticks

LAMP reaction mix

Incubated into the Droid (8 samples each time)

(Jimenez et al., 2021)

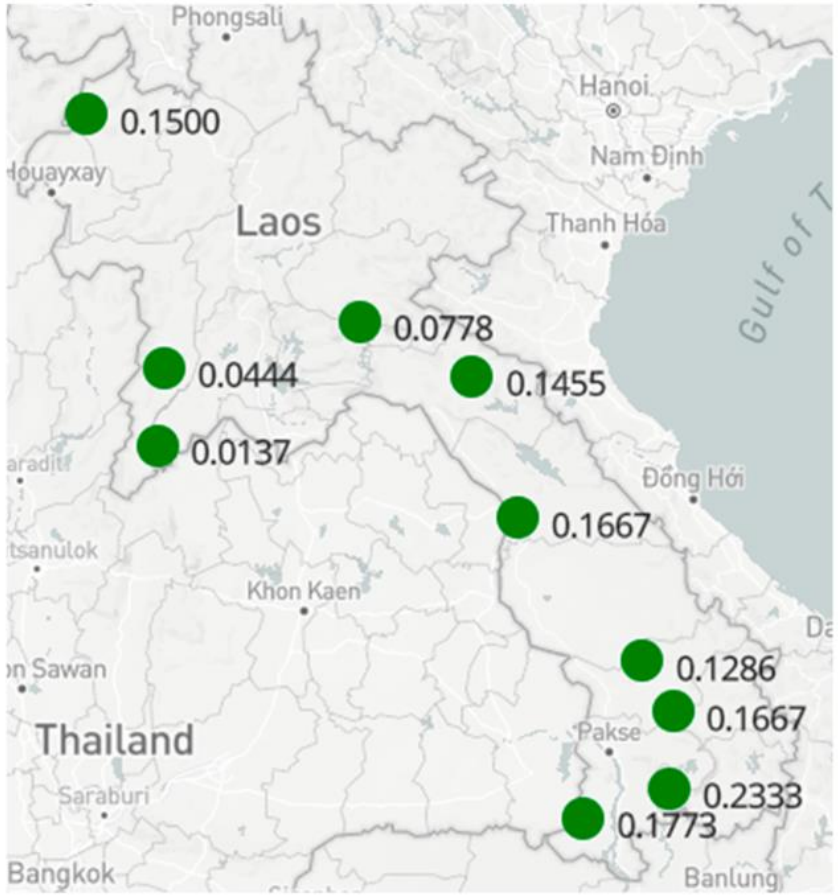
Identification White fly



Workflow employed in this work. 1—collected sample, 2—direct PCR using the whole whitefly, 3—confirm the PCR by electrophoresis, 4—library preparation, 5—sequencing using Nanopore Tech, 6—data analysis. Created with Biorender.com (Toronto, ON, Canada).

Ana M. Leiva et al., 2022. Mitochondrial Genetic Diversity of *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) Associated with Cassava in Lao PDR

Map of distribution of White fly



Country	Province	No. of Fields	Abundance (Per Leaf)	Cryptic Species
	LaoungNamTha	2	0.150	Asia II 1
	Sayabouly	9	0.041	Asia II 1
	Vientiane	5	0.014	Asia II 1/Asia II 6
Lao PDR	Xaysomboun	3	0.078	Asia II 1
	Bolikhamxay	11	0.145	Asia II 1/Asia II 6
	Khammoun	1	0.166	Asia II 1
	Salavan	7	0.129	Asia II 1/Asia II 6
	Sekong	1	0.167	Asia II 6
	Champasack*	25	0.177	Asia II 1/Asia II 6
	Attapue*	6	0.233	Asia II 1/Asia II 6
Tanzania			2.35-71.99	SSA1-SG1-SG2-SG3
Nigeria		24	2.34-265.5	SSA1-SG5,SSA1-SG1-Bemisia after, Med-ASL

Table 1. List of surveyed provinces and abundance data for whiteflies associated to cassava in Lao PDR. Comparative whitefly abundance data from Tanzania and Nigeria is included. The asterisks indicate provinces where CMD was observed.

Ana M. Leiva et al., 2022. Mitochondrial Genetic Diversity of *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) Associated with Cassava in Lao PDR

IV. Management of cassava disease

- **Monitoring:**

1. It is necessary to monitor the plantation every 2 weeks to observe if any plants are showing symptoms or if there are any whiteflies.

2. If you find leaf mosaic symptoms, please notify the district, provincial, and Plant Protection Center staff or send a sample to the Plant Protection Center for more confirmation

- **Management:**

1. Do not bring infected planting material into the new planting area.

2. Do not move any infected planting material and all plant part of cassava out of the field

- **Management cont.:**

3. Destroy the infected plants by putting them in black bags to dry in the sun or burning them; spray the herbicide Ametryn at 80% WG at a rate of 500 grams per 60–80 liters, and plow the soil to cover. at least 0.5 meters deep.

If you want to sell the cassava product, you must cut the fresh cassava tuber and slice it into small pieces. Dry before transporting outside the plantation.

- **Management cont. :**

4. Avoid planting host ranges of viruses and insect vectors.

5. Crop rotation for at least 1 year: corn, sugarcane

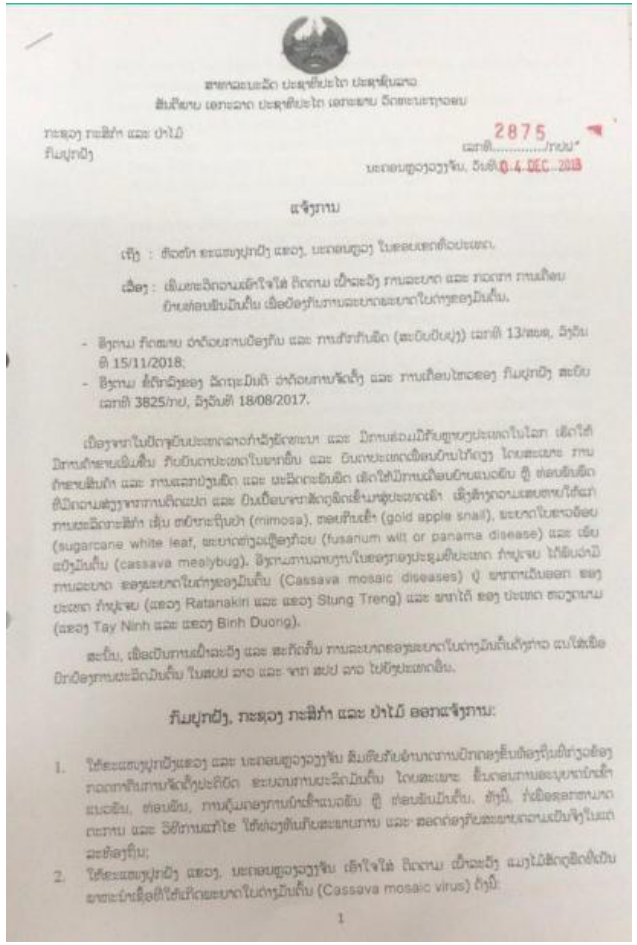
6. Management for insect vector white fly

- Using biological and herbal extracts such as neem seed extract, heart-leaved moonseed, and custard apple seeds at a rate of 20 cc per 10 liters within the garden and surrounding areas

- Chemical control: Imidacloprid 70% WG at a rate of 12 grams per 20 liters of water; alternate with thiamethoxam 25% WG at a rate of 12 grams per 20 liters of water.

1. Create a group to exchange pest information between the Plant Protection Center, provincial technical staff, and the district.

2. Modify orders and notices on moving planting material for cassava and importing from vulnerable countries.



ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ກະຊວງ ກະສິກຳ ແລະ ປ່າໄມ້
ກົມປຸກຝັງ

2875
ເລກທີ.....ກປປ"
ນະຄອນຫຼວງວຽງຈັນ, ວັນທີ 04 DEC 2018

ແຈ້ງການ

ເຖິງ : ພະແນກປຸກຝັງ ແຂວງ, ນະຄອນຫຼວງ ໃນຂອບເຂດທົ່ວປະເທດ.

ເລື່ອງ : ເພີ່ມເຂດເຝົ້າລະວັງເຂົ້າໃຈໃສ ຕິດຕາມ ເຝົ້າລະວັງ ການລະບາດ ແລະ ການກວດ ການເກີດ ຫ້ຽນທ່ອນພັນປັ້ນຕົ້ນ ເພື່ອປ້ອງກັນການລະບາດລະບາດໃນຕ່າງປະເທດ.

- ອີງຕາມ ກົດໝາຍ ວ່າດ້ວຍການປ້ອງກັນ ແລະ ການກຳຈັດພືດ (ສະບັບປັບປຸງ) ເລກທີ 13/ສພຊ, ລົງວັນ ທີ 15/11/2018;
- ອີງຕາມ ຂໍ້ຕົກລົງຂອງ ລັດຖະມົນຕີ ວ່າດ້ວຍການຈັດຕັ້ງ ແລະ ການເຄື່ອນໄຫວຂອງ ກົມປຸກຝັງ ສະບັບ ເລກທີ 3825/ກປ, ລົງວັນທີ 18/08/2017.

ເນື່ອງຈາໃນປັດຈຸບັນປະເທດຕ່າງໆໃນໂລກ ແລະ ມີການສ່ວມມືລ້ຽງສັດຫຼາຍປະເທດໃນໂລກ ເຊິ່ງໄດ້ ມີການກ້າຍແດນເຂົ້າມາ ກັບມັນຕ່ປະເທດໃນພາກພື້ນ ແລະ ບັນດາປະເທດພົ້ນບ້ານໃກ້ຄຽງ ໂດຍສະເພາະ ການ ກ້າຍແດນເຂົ້າ ແລະ ການລະບາດຂ້ຽນ ແລະ ພະລິດກະຈັດພືດ ເຊິ່ງໃຫ້ມີການເຄື່ອນຍ້ານແບບຜິດ ຫຼື ທ່ອນພັນພືດ ທີ່ມີການສ່ຽງຈາກການຕິດເຊື້ອ ແລະ ມີນເປື້ອນຈາສັດຕຸພືດເຂົ້າມາສູ່ປະເທດເຮົາ ເຊິ່ງສັກຫຼວນແລ້ວ ການລະລິດກະສິກຳ ເຊັ່ນ ໜ້ຳກະຖິນປ່າ (mimosa), ຫອຍເຫຼື້ອໜ້ຳ (gold apple snail), ພະຍາດໃບຂາວ (sugarcane white leaf, ພະຍາດຫ່ຽວເຫຼືອງກ້ານ (fusarium wilt or panama disease) ແລະ ເພັ້ຍ ແປ້ງມັນຕົ້ນ (cassava mealybug). ອີງຕາມການຫາລຸກໃນຂອງກອງປະຊຸມສ້ຽປະເທດ ກຳປູເຈ ໄດ້ຍົກຍ່ານ ການລະບາດ ຂອງພະຍາດໃນຕ່າງຂອງມັນຕົ້ນ (Cassava mosaic diseases) ທີ່ ຫາກເປັນອອກ ຂອງ ປະເທດ ກຳປູເຈ (ແຂວງ Ratanakiri ແລະ ແຂວງ Stung Treng) ແລະ ຫາກໄດ້ ຂອງ ປະເທດ ຫວຽດນາມ (ແຂວງ Tay Ninh ແລະ ແຂວງ Binh Duong).

ສະນັ້ນ, ເພື່ອເປັນການເຝົ້າລະວັງ ແລະ ສະກັດກັ້ນ ການລະບາດຂອງພະຍາດໃນຕ່າງມັນຕົ້ນເຂົ້າສູ່ກ່າວ ແນໃສ່ເພື່ອ ປົກປ້ອງການຜະລິດມັນຕົ້ນ ໃນສປປ ລາວ ແລະ ຈາກ ສປປ ລາວ ໄປຍັງປະເທດອື່ນ.

ກົມປຸກຝັງ, ກະຊວງ ກະສິກຳ ແລະ ປ່າໄມ້ ຂໍອາແຈ້ງການ:

1. ໃຫ້ພະແນກປຸກຝັງແຂວງ ແລະ ນະຄອນຫຼວງວຽງຈັນ ສັ່ມເຫີຍລ້ຽຍອຳນາດການປົກຄອງຮັ້ນຫ້ອງຖິ່ນທີ່ກ່ຽວຂ້ອງ ກວດກາຄົ້ນການຈັດຕັ້ງປະຕິບັດ ພະນັກງານລະລິດມັນຕົ້ນ ໂດຍສະເພາະ ຂັ້ນຄາມການລະບຸພາບ້ານ ແບບອົ່ນ, ທ່ອນພັນ, ການຄຸ້ມລາຍການນຳເຂົ້າແບບອົ່ນ ຫຼື ທ່ອນພັນມັນຕົ້ນ, ຕ້ານ, ກ່ຽວຂ້ອງ ຕະການ ແລະ ວິທີການແກ້ໄຂ ໃຫ້ທ່ວງທັນເຂົ້ານະພາບການ ແລະ ສອດຄ່ອງກັບສະພາບຄວາມເປັນຈິງໃນແຕ ລະທ້ອງຖິ່ນ;
2. ໃຫ້ພະແນກປຸກຝັງ ແຂວງ, ນະຄອນຫຼວງວຽງຈັນ ເອົາໃຈໃສ່ ຕິດຕາມ ເຝົ້າລະວັງ ແນ່ນໍ້ມີສັດຕຸພືດທີ່ເປັນ ພາຫະນຳເຊື້ອທີ່ໃຫ້ເກີດພະຍາດໃນຕ່ານມັນຕົ້ນ (Cassava mosaic virus) ຕ້ານ.

1

3. Organize a consultation meeting with local people and farmers to determine measures to prevent the outbreak of cassava mosaic disease.

4.Workshop and exchange knowledge with farmers

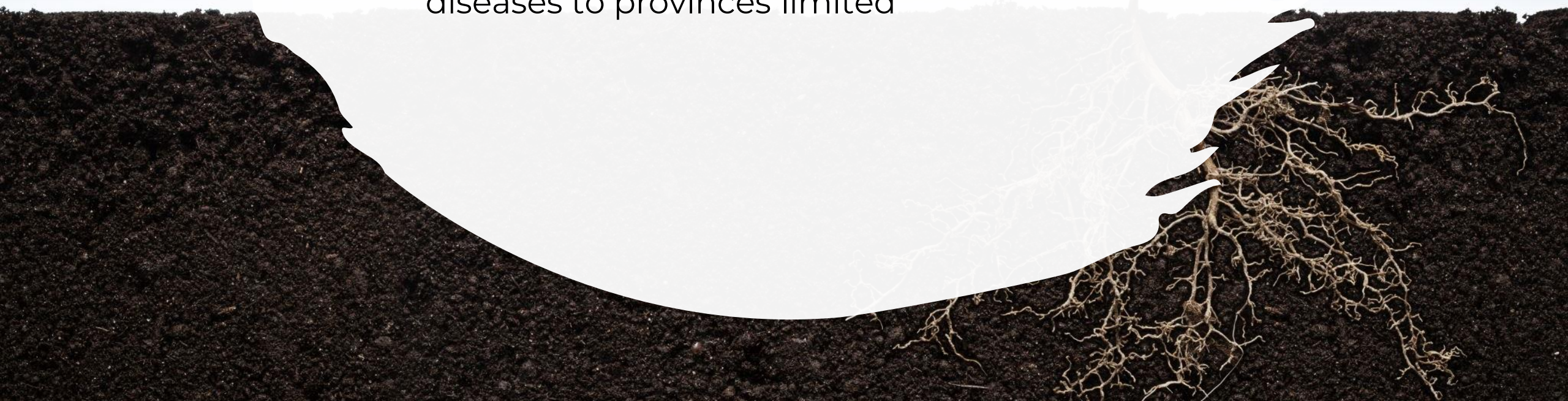
5. Workshop and exchange knowledge with farmers

Good points

- There was a networked exchange of information on pest research with an international professor (CIAT)
- There has been notification and initial information about the outbreak of the cassava disease.
- There has been a network for exchanging information on the status of pests with various provinces.
- The local staff has advised the farmers to prevent and manage cassava mosaic disease.

Weak points

- Distribution information on cassava diseases to provinces limited



Next steps:

- Focus on CWBD
- Continue with the optimization of CWBD transmission
- Diversity of fungus across regions, different crops including weeds
- Chemical and biocontrol
- Check for resistant varieties.
- Farmer sensitization

Acknowledgements

Thank you **ACIAR-CIAT** for supporting this project

Thank you