



Update on CMD and CWBD in Thailand

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CMD and Preventive Measures



- *In 2016, cassava mosaic disease caused by **Sri Lankan cassava mosaic virus (SLCMV)** was reported in Cambodia and Vietnam.*



- **In Thailand**, *emergency action plan for SLCMV was established by the Department of Agriculture (DOA), Ministry of Agriculture and Cooperatives.*

CMD and Preventive Measures



- **The International Standards for Phytosanitary Measures (ISPM No. 6 Guidelines for Surveillance)** *were conducted in the endangered area of cassava plantations in six provinces* ★

Udon Ratchathani

Buriram

Sa Kaeo

Prachin Buri

Srisaket

Surin

➤ *This survey during 2016 - 2017 showed that **SLCMV** was not detected in Thailand.*



CMD and Preventive Measures

❖ Surveillance Programs for CMD in Thailand : ISPM No. 6 (Guidelines for Surveillance)

- *Short term*
- *Long term*
- *Emergency action plan*





CMD and Preventive Measures



Surveillance Programs for CMD in Thailand : ISPM No. 6 (Guidelines for Surveillance)



Short Term Measures

- *Inform stake holders e.g. farmers, private sectors, industry etc. by using poster, info-graphic, radio and TV.*
- *Inform extension, local agencies and military.*
- *Conduct specific survey followed ISPM No.6 in cassava planting area along Thai-Cambodia border.*
- *Set up emergency action plan.*
- *Alert Plant Quarantine (PQ) Station along Thai-Cambodia border.*





CMD and Preventive Measures



Surveillance Programs for CMD in Thailand : ISPM No. 6 (Guidelines for Surveillance)

Long Term Measures

- *Research on pest status of SLCMV in Thailand*
- *Research for cassava resistant varieties*
- *Set up hot line center*





CMD and Preventive Measures



Surveillance Programs for CMD in Thailand : ISPM No. 6 (Guidelines for Surveillance)

Emergency action plan

- *Inform DG-DOA and Ministry (MOAC)*
- *Eradicate protocol*
- *Legal action (Specific controlled area)*
- *Section No.17*





CMD and Preventive Measures



Surveillance Programs for CMD in Thailand : ISPM No. 6 (Guidelines for Surveillance)

Survey Areas

1. Determination of survey areas in high-risk cassava plantation areas.

*1.1 The cassava plantation areas where **the border of Cambodia.***

*1.2 The cassava plantation areas where **the border of Laos.***

*1.3 The cassava plantation areas where **the found symptom of CMD.***

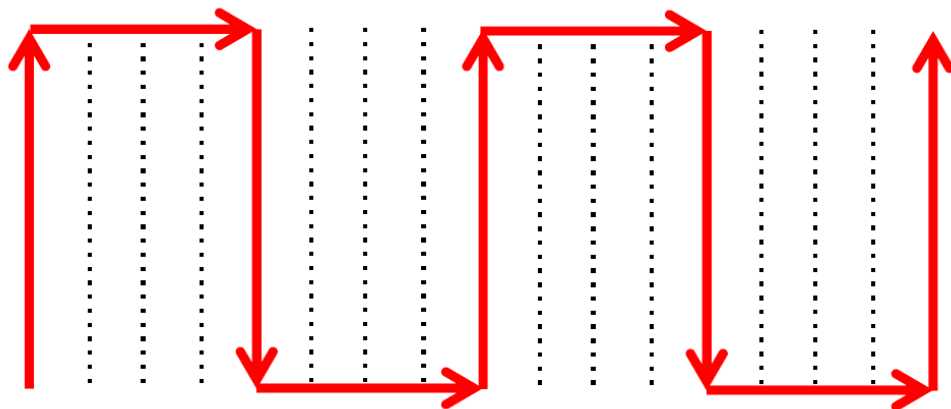
2. Determination of survey areas in general cassava plantation areas.





CMD and Preventive Measures

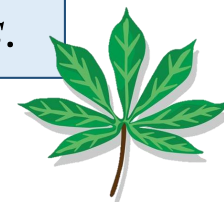
❖ Surveillance Programs



Every cassava plant was surveyed by walking 1 row, except 3 rows, U pattern.

Cassava plantation areas (ha)	Survey areas (ha)	
	<i>High-risk areas</i>	<i>General areas</i>
0.16-4,000	8	4
> 4,000-4,800	16	8
> 4,800-6,400	24	12
> 6,400	32	16

Note: *In the case of finding infected cassava plants, additional survey in 5 km. radian from the infected area, continually every 2 weeks.*

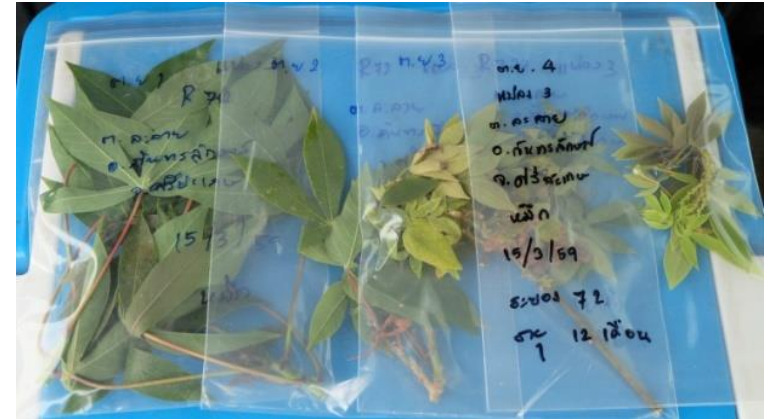




CMD and Preventive Measures

❖ Plant Sample Collection for Diagnosis

- *The **leaves, shoot tip, stem, and root** of infected plant samples were collected and packed in plastic bag, contained in cool box.*
- *The sample were sent to the recognize laboratory for confirmation by **PCR technique**.*

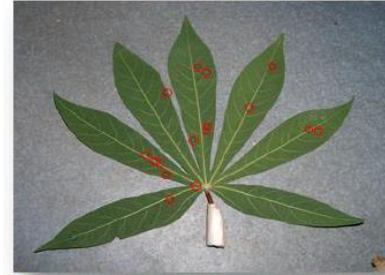


Plant name:.....Sample no.....
Symptoms.....
Location.....
Geographic coordinates.....
Collector..... Date of collection



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❖ Whitefly Sample Collection



- **Adults** *were collected from cassava leaves and contained in 70-95% alcohol.*

- **Nymphs and pupae** *were contained paper bag.*

Plant name:.....Plant variety.....
 Plant age..... Symptoms.....
 Amount of whiteflies
 Location.....
 Geographic coordinates.....
 Collector..... Date of collection

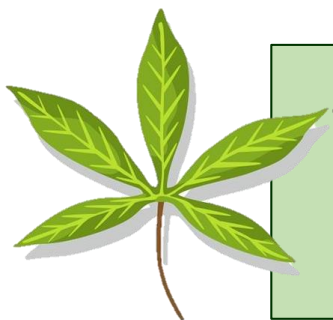
CMD and Preventive Measures



- *In July – August 2018, some plant with the SLCMV similar symptoms were found around **68 rai (2.27 ha)** in **Srisaket province** and **250 rai (8.36 ha)** in **Prachin Buri province**.*

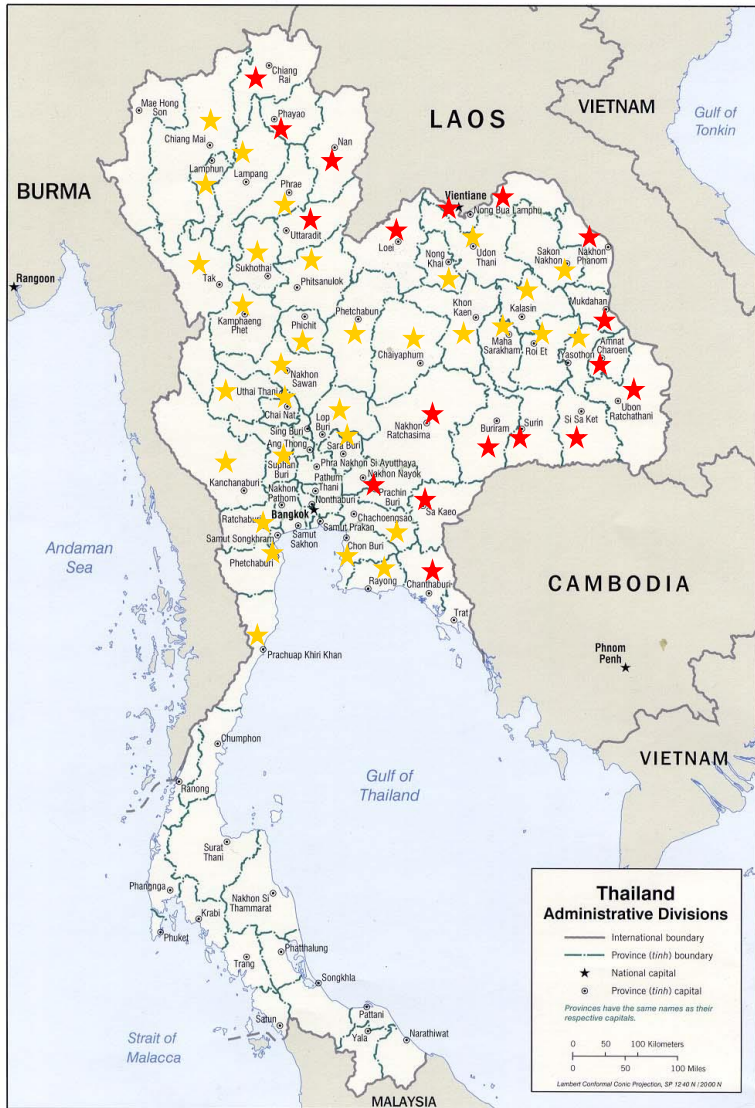


- *Infected cassava plants were collected for SLCMV confirmation by using **Polymerase Chain Reaction (PCR)** technique.*
- *The results showed that **the causal agent was CMV**.*



- *All cassava plants in the infected plantation areas **were eradicated.***

CMD and Preventive Measures



- *The confirmation result, DOA had extended the detection surveys to cover **51 provinces in Thailand**, around 8.9 millions rai (297,661 ha) of cassava plantations.*

- ★ *High-risk cassava plantation areas*
- ★ *General cassava plantation areas*



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❖ Laboratory Confirmation



- *The plant and whitefly samples were confirmed by using **PCR** technique.*



- *Infected cassava plants were sent to the recognized laboratory for re-confirmation based on **Next Generation Sequencing (NGS)** technique.*



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❖ Plant Quarantine Act B.E. 2507

Section No. 17

- *In the event of an Outbreak of Plant Pest which might bring about serious damages.*
- *The Director-General shall have the power to determine by notification such locality as plant pest controlled area and determine the local checking station as are necessary.*





CMD and Preventive Measures

❖ Eradication Programs



➤ $3 \times 2 \times 5 \text{ m}$ (20 rai = 3.2 ha)



CMD and Preventive Measures

❖ Eradication Programs





CMD and Preventive Measures

Insecticides control Tobacco whitefly

1. **Imidaclopid 70% WG ratio 12 g/ 20 L**
2. **Dinotefuran 10% SL ratio 20 ml/ 20 L**
3. **Thiamethoxam 25% WG ratio 12 g/ 20 L**
4. **Buprofezin 40% SC ratio 40 ml/ 20 L**
5. **Bifentrin 2.5% EC ratio 30 ml/ 20 L**



CMD and Preventive Measures



- *As a result of this eradication program, **SLCMV** was **eliminated**.*



- *The surveillance program for SLCMV in cassava plantation areas will be continued.*

Status CMD in 2019



1. **Ubon Ratchathani**
2. **Buriram**
3. **Surin**
4. **Srisaket**
5. **Sa Kaeo**
6. **Prachin Buri**
7. **Nakhon Ratchasima**
8. **Chachoengsao**
9. **Chonburi**
10. **Rayong**

45,400 rai
(7,265 ha)

Compensation of government



- ❖ *In 2019, SLCMV was detected in 10 provinces, total 45,400 rai (7,265 ha).*
- ❖ *The government provides compensation of 272 millions bahts (9 millions dollars) for eradicated fields.*
 - *3,000 bahts/rai (625 dollars/ha)*
 - *Provide healthy cassava stems for eradicated field*





Cassava witches' broom disease (CWBD)



**In 2019, survey and sampling of
cassava shoot in 29 provinces (140 ha)**



Detection by Nested PCR



CWBD was detected in 23 provinces (28 ha)



CWBD infected plants were eradicated

Thank you for your attention



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