Investigations on sugarcane yellow leaf disease in sugarcane growing areas of Guangxi



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Introduction

(1) Sugarcane yellow leaf virus (SCYLV) is the pathogen of sugarcane yellow leaf disease.

(2) The major symptom of the disease is an intense yellowing of the midrib on mature leaves, which discoloration subsequently spreads to the leaf blade.

(3) The disease leads to reduce sucrose content in canes, and causes significant yield losses .



(4) Sugarcane yellow leaf disease was first noted in Hawaii in 1989, and it has since been spred to more than 30 sugarcane growing countries worldwide .

Sugarcane yellow leaf disease was first reported in Taiwan in 2001.

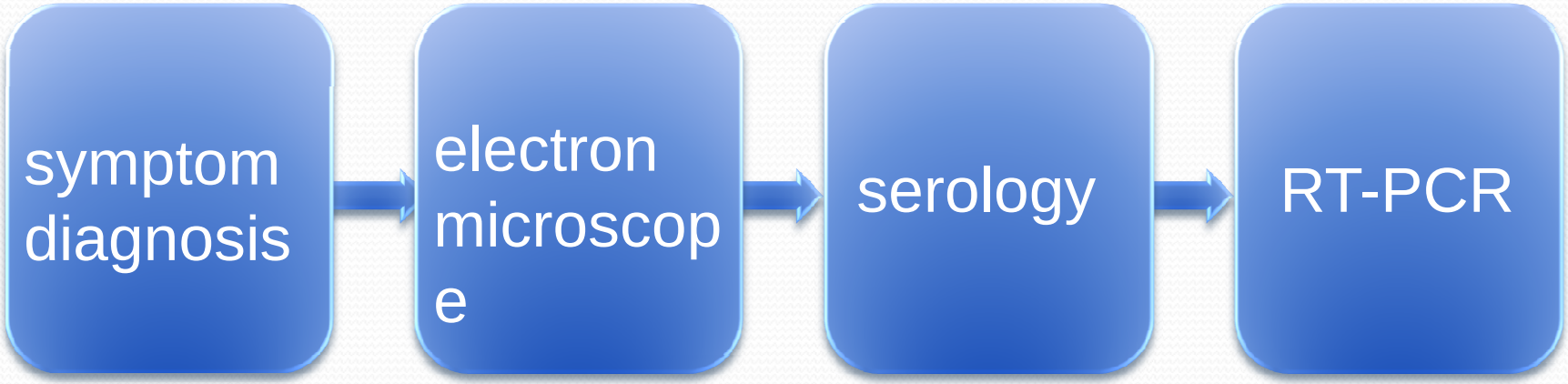
The virus has been found to spread in sugarcane growing areas of Fujian, Guangdong, Hainan in 2004.

Sugarcane yellow leaf disease was first discovered in Guangxi in 2004. But systemic investigation of the disease hasn’t reported in Guangxi.

(5) The virus distributes in the phloem tissue of plants and is mainly transmitted by the aphid vectors in a persistent manner .

SCYLV is also transmitted to a long distance by planting infected seed canes .

(6) Diagnosis of SCYLV has mainly experienced four stages.



(7) Control

- resistant cultivars
- SCYLV-free seedcane



objective

- The present study was conducted to find out the occurrence of sugarcane yellow leaf virus (SCYLV) disease in sugarcane growing areas of Guangxi, and to provide scientific basis for healthy seedcane production of sugarcane.

Method

(1) Sugarcane leaf samples with different stages of symptoms were collected from different sugarcane growing areas of Guangxi.

(2) The virus was detected using one-step RT-PCR method with SCYLV specific primers (P1:5'-AATCAGTGCACACATCCGAG-3'/P2:5'-GGAGCGTCGCCTACCTATT-3') and its amplified cDNA products were sequenced.


eppendorf

Results

(1) RT-PCR Detection for SCYLV

①The size of RT-PCR amplification of SCYLV product is about 630 bp.

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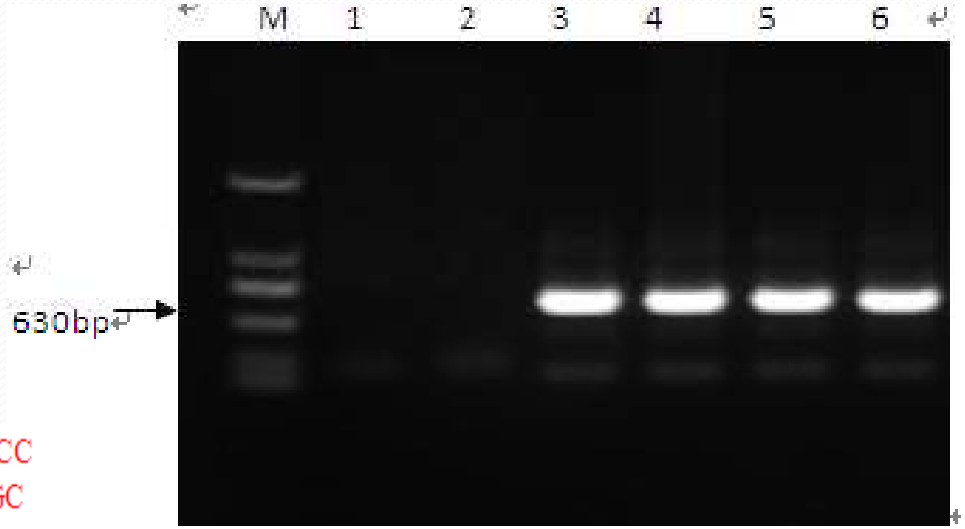


Fig.1 RT-PCR detection of SCYLV in sugarcane leaves collected from fields

M： Marker DL 2000, 1: healthy leaf, 2: negative control, 3-8: sugarcane leaves samples collected from fields

CTACCTATTTGGGATTCTGGAATAAACATTCAATCGGCAGACGAATTGTCC
TGCTAGGCTTCCGTCTCCATTCCCTTTGTACAAAAGCCAAAACTGATCAGC
TGATGTAGTCATGAAGTCTTTCCCCCTGATGAAGGGGGCCGGGAAGGTTTT
CTTGGCGTTCCTCTTGACGGGGAAGCTAGTAATCTTGGAGCCTGTTGTTGT
TTGGGAGCAGGATGTATCCACTTCAAGTGCGATTGCACCTGGAGTTGCGTC
GGAGGAGCATGAGTTATACTGAATTGTGAGACTTGTGATTTTATACTCATGG
TAGGCTTTGAGTAAGCCATTGTTGAACGCTGCGTACTGAGATAGGTTCGGT
CCGAATTTGAGGATCCCGGTTGAGTTGGCCTTGAGATCGTCAATCGTGAAA
GTGAGAACATCCCTGTTGCTTCTTCCTCCCGGTCCTCGCACAGCGTTTCCTC
CAACACGTGCTCTACGTCGTCGTACTCGTCTAGGTCCTGCGGCAGGCCGGA
CCACGACCACTGGCCGAGTCTGTCGACGACGGTTAGCGCGTCTTCTGACAT
TCCTTCGTGAGCGGTTAGCGCCCGTATTCATTAACAATCGCTCGGATGTTG

- ② Blast in NCBI showed nucleotide sequence of the RT-PCR product was 99% identical to the sequence of those from United States, Brazil, Argentina, Germany, Colombia etc.

AF369928.1	Sugarcane yellow leaf virus isolate SCYLV-C3 protease and RNA-de	1053	1053	99%	0.0	99%
EU647742.1	Sugarcane yellow leaf virus isolate CBmc86032 putative aphid trans	1040	1040	96%	0.0	100%
EU647737.1	Sugarcane yellow leaf virus isolate CBS611 putative aphid transmis	1040	1040	96%	0.0	100%
EU089689.1	Sugarcane yellow leaf virus isolate CB94005 read-through protein r	1040	1040	96%	0.0	100%
EU647743.1	Sugarcane yellow leaf virus isolate CBV94101TN putative aphid trar	1035	1035	96%	0.0	99%
EU647739.1	Sugarcane yellow leaf virus isolate CBvpt86010 putative aphid trans	1035	1035	96%	0.0	99%
EU647734.1	Sugarcane yellow leaf virus isolate CBBT putative aphid transmissic	1035	1035	96%	0.0	99%
EU089688.1	Sugarcane yellow leaf virus isolate CBAPHIDS read-through protein	1035	1035	96%	0.0	99%
EU089687.1	Sugarcane yellow leaf virus isolate CB99016 read-through protein r	1035	1035	96%	0.0	99%

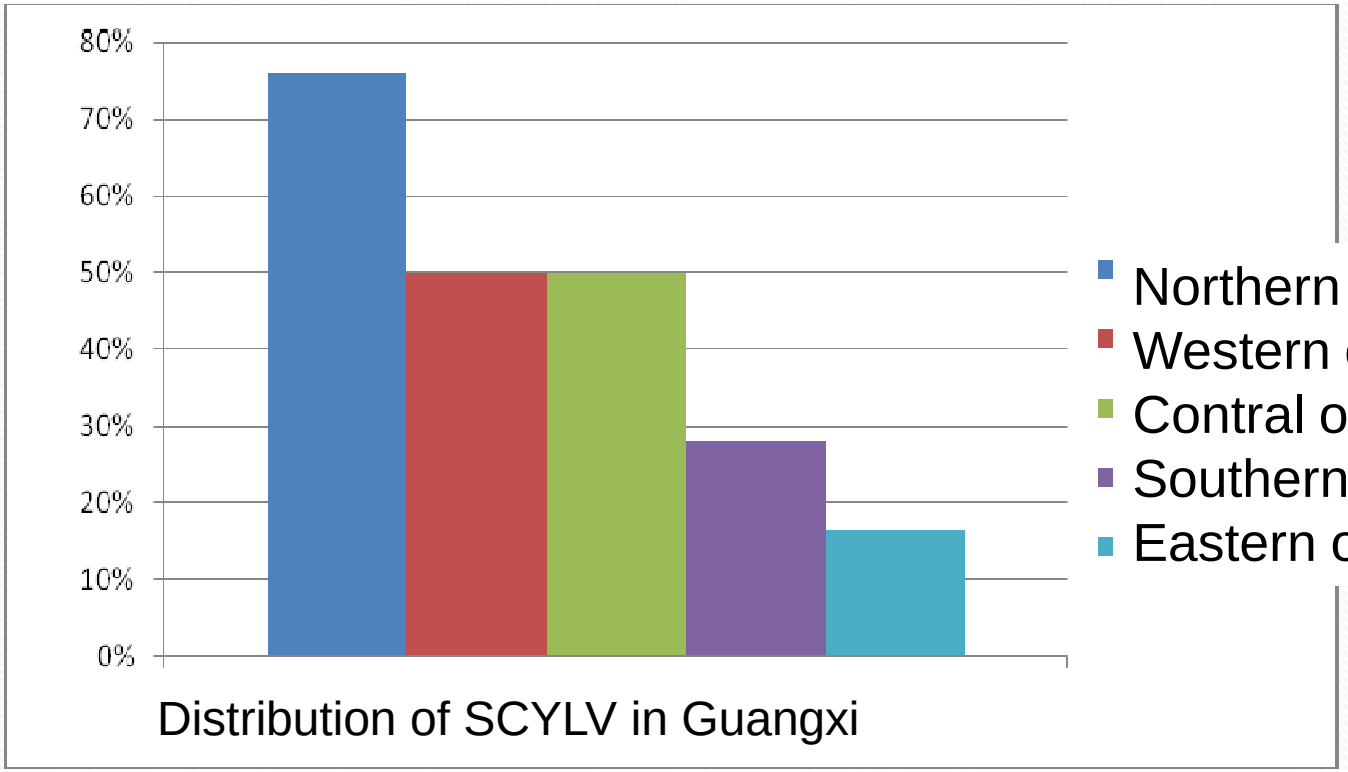
- ③ The results indicated that CP gene of SCYLV is amplified successfully and samples displayed positive in RT-PCR are infected by SCYLV

(2) The survey of SCYLV

①The results of SCYLV survey showed that fourty two samples were found to be positive by RT-PCR detection from total 84 samples, namely, infected cultivars with SCYLV made up 50% of total cultivars.

- The varieties in sugarcane planting locations of north Guangxi including Liuzhou areas were found to be infected by SCYLV seriously, which accounted for 76% of the total samples. Especially, it was the most serious in Liucheng, where 100% sugarcane cultivars were infected by SCYLV.
- Followed by the western and central sugarcane growing areas, they both shared the same infected rate of 50%.
- The infected rate with SCYLV of southern sugarcane growing areas of Guangxi was 28.2%.
- The lowest infected rate was found in the eastern sugarcane growing area of Guangxi, which was 16.6%.


76% in Liuzhou and Hechi
100% in Liucheng
50% in western Guangxi
50% in central of Guangxi
16.6% in eastern Guangxi
28.2% in southern Guangxi
河池市
柳州市
来宾市
贵港市
玉林市
崇左市
凉山市
tp. Lang Son
太原市
tp. Thai Nguyên
钦州市
北海市
湛江市


80%
70%
60%
50%
40%
30%
20%
10%
0%
Northern of Guangxi
Western of Guangxi
Contral of Guangxi
Southern of Guangxi
Eastern of Guangxi
Distribution of SCYLV in Guangxi

② The results of SCYLV detection also revealed that the variety Liucheng 03-182 was affected by SCYLV seriously. It was found that the variety was infected in five of eight locations investigated.

- The cultivar Guitang 21 was found to be positive in 3 of 5 locations.
- The cultivar Yuetang 55 and Yuetang 93-159 both were infected by SCYLV in 2 areas, and which planted in 4 places.
- The cultivar ROC 22, which is dominant in Guangxi, was also found to be affected by SCYLV in Yizhou and Jinguang Farm.

Conclusion

- SCYLV not only has been happened in the sugarcane growing areas of Guangxi, but also is spreading.
- Further work

  Diversity analysis of SCYLV


Thank you for your attention