



Characterization of the Causal of Sugarcane Streak Disease in Indonesia

Tri Asmira Damayanti^{*)}, Lilik Koesmihartono Putra^{**)}

^{*)}Department of Plant Protection, Bogor Agricultural University

^{**)}Indonesian Sugarcane Research Institute

ABSTRACT

During field survey on 2007 in 59 sugarcane plantations in Java, we found a streak mosaic symptom on sugarcane in almost entire plantations. The incidence was vary, however it predominantly infected sugarcane cultivar PS 864. The virus was transmitted mechanically and cutting-cane borne (sett-borne), however it unable to transmitted by aphid *Rhopalosiphum maydis* and mealy bug *Ceratothrips lanigera*. The virus had a narrow host range limited to the gramineae. Among 23 plant species belongs to 8 families, the virus systemically infected *Sorghum bicolor*, *Zea mays* and *Dactyloctenium aegyptium*. The virion form was filament flexious size approximately 890 nm and SDS-PAGE of purified virion showed the size of the CP gene is a 40 Kda. RT-PCR using specific primer for SCSMV successfully amplified a DNA size 1.100 bp of the entire CP gene and partially Nlb gene. DNA sequencing result of the CP gene confirmed the present of *Sugarcane streak mosaic virus* (SCSMV) as the causal of streak mosaic disease. It referred as SCSMV-Iln isolate. The CP sequences size 852 bp, and encoded 283 amino acid. Phylogenetic analysis of the CP gene showed that SCSMV-Iln had 92% sequences homology closely to SCSMV Pakistani isolate (Accession No. U75456). This is the first report of the occurrence of SCSMV on sugarcane in Indonesia .

BACKGROUND

- > Sugarcane is an important crop as raw material for sugar production
- > Streak mosaic is a new disease on sugarcane in Indonesia. It spread rapidly in entire sugarcane mills in Java Island (59 mills) with the incidence up to 1-62%. Predominantly, it infects superior cultivar PS 864.

PURPOSE

To identify the causal of streak mosaic disease on sugarcane

Table 1. Transmission modes of Streak Mosaic Virus

No	Transmission mode	Incidence (%)	Result
1.	Mechanical inoculation		
	a. Healthy	0	-
	b. Cutting knife	31	+
	c. Sein's method	31	+
	d. Abrasive pad rubbing	69	+
	e. Carborundum	25	+
2.	Sett/cutting cane	100	+
3.	Insect		
	a. <i>Rhopalosiphum maydis</i>	0	-
	b. <i>Ceratothrips lanigera</i>	0	-

Table 3. Sequences identity of SCSMV Iln isolate in compared with other isolates

Isolate	SCSMV-ta	SCSMV-Iln	SCSMV-ka	SCSMV-Pktn	SCSMV-AP
SCSMV-ta	ID	0,850	0,989	0,854	0,873
SCSMV-Iln	0,850	ID	0,849	0,921	0,849
SCSMV-ka	0,989	0,849	ID	0,854	0,876
SCSMV-Pktn	0,854	0,921	0,854	ID	0,856
SCSMV-AP	0,873	0,849	0,876	0,856	ID

Iln - Indonesia, AP- Andra Pradesh, Pktn - Pakistan, Ka - Kartaka

Table 2. Host Range Test

Famili/Species	Incubation Period (day)	Symptom	Results*
AMARANTHACEAE			
<i>Amaranthus spinosus</i>	-	-	-
CHENOPODIACEAE			
<i>Chenopodium amaranticolor</i>	-	-	-
<i>C. quinoa</i>	-	-	-
COMPOSITAE			
<i>Ageratum conyzoides</i>	-	-	-
CUCURBITACEAE			
<i>Cucumis sativus</i>	-	-	-
GRAMINAE			
<i>Zea mays</i>	21-30	MM	+
<i>Sorghum bicolor</i>	14-21	SM	+
LEGUMINOSAE			
<i>Arachis hypogea</i>	-	-	-
<i>Phaseolus vulgaris</i>	-	-	-
<i>Vigna unguiculata</i>	-	-	-
SOLANACEAE			
<i>Lycopersicon esculentum</i>	-	-	-
<i>Datura stramonium</i>	-	-	-
<i>Physalis floridana</i>	-	-	-
<i>Solanum melongena</i>	-	-	-
<i>Nicotiana tabacum</i>	-	-	-
<i>N. glutinosa</i>	-	-	-
WEED GRAMINAE			
<i>Cynodon dactylon</i>	-	-	-
<i>Cynodon rotundus</i>	-	-	-
<i>Penisetum purpureum</i>	-	-	-
<i>Digitaria sp.</i>	-	-	-
<i>Echinochloa colonum</i>	-	-	-
<i>Eleusine indica</i>	-	-	-
<i>Dactyloctenium aegyptium</i>	L	-	+

L, latent symptom; SM, streak mosaic; MM, mild mosaic.* detected by RT- PCR

CONCLUSION

1. SCSMV is a new emerging virus on sugarcane in Indonesia. It transmitted mechanically, and sett-borne but not successfully transmitted by maize aphid *R. maydis* and mealybug *C. lanigera*.
2. Cutting knife and sett-borne may play role in the spread of SCSMV in the fields.
3. Sorghum, maize and weed *D. aegyptium* can be infected by SCSMV.
4. The streak mosaic disease is caused by *Sugarcane Streak Mosaic Virus*. The CP gene consist of 852 bp encoding 283 amino acids. It showed that SCSMV-Iln isolate had 92% homology with SCSMV- Pakistani isolate.

ACKNOWLEDGEMENT

This research was supported by Indonesian ministry of Agriculture through Collaboration research program with contract no. 1545/LB. 620/J.1/5/2007 to TAD.

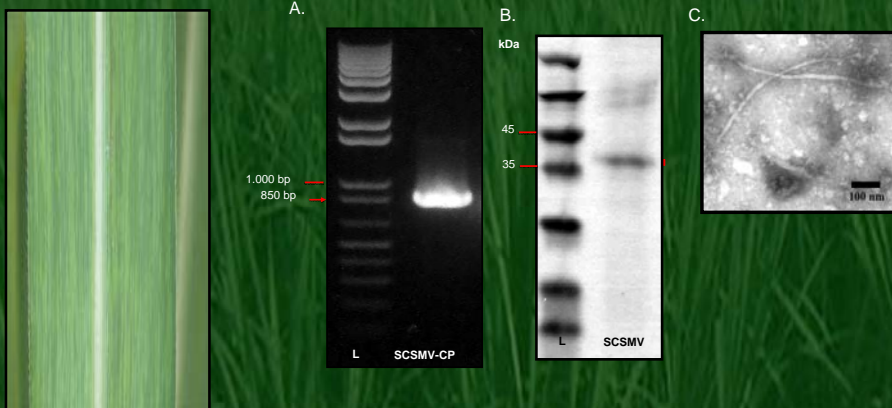


Fig.2. RT PCR of CP gene (A) , SDS-PAGE of the SCSMV virion (B) and viral particles (C)

Fig.1. Phenotypic symptom of streak mosaic on Sugarcane clone PS 864