

**Title: Determining the Status of Ratoon
Stunting Disease (RSD)
in
the Jamaican Sugar Industry**

By

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Introduction

◆ Ratoon Stunting Disease (RSD)

- First recognised in Australia(1944-45)
- Caused by bacterium *Leifsonia xyli* subsp. *xyli*
- Infects the xylem vessels of the plant

◆ Symptoms of the Disease

- No specific external symptoms
- Stunting
- Reduced growth
- Shortened slender internodes
- Red discoloration of vascular bundles



Ratoon stunting disease of sugarcane. Note reddening of the internal tissue near the node.
Courtesy H. Koike, Houma, LA, 1996.


Distribution

- Attained widespread geographical distribution
- 86% of plantations sampled had positive fields ranging from 25% to 80% in Barbados
- RSD in 1.3% of stalks sampled, with infection rate of 4.5% in Belize
- 23% of the samples diagnosed with the disease in Martinique
- 4.3% of samples were positive to RSD in Guadeloupe
- Infection level of 81% with yield loss of 19% in Cuba
- Yield reduction of 20% – 40% in South Africa

RSD in Jamaica

- Listed since the 1950s
- Work done at Long Pond on variety Co421
- High correlation between intensity of symptoms and effect of the disease
- Depression of yield by 29% in 1st ratoon noted
- ◆ **Survey Done**
- ◆ Survey conducted by Dr. Davis (1987)
- Unable to identify positives in 61 fields sampled
- Survey initiated by SIRI (2004) saw positives in 9 of the 64 fields sampled

Reason for 2006 Survey

- ◆ Due to potential loss from RSD
 - ◆ To obtain a comprehensive picture of its geographic distribution
 - ◆ To determine its intensity
 - ◆ Determine susceptible varieties
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- A stylized silhouette of a mountain range in shades of teal, located in the bottom right corner of the slide.

Materials and Methods

◆ Cane sampling

- 15 stalks per field randomly chosen
- Stalks cut close to ground
- Bundled, tied, labelled
- At SIRI lab, stalks cut with sharp knife 3 cm below a node.

Materials and Methods cont'd

- Removal of inner core of cane with a cork borer 1 cm in diameter
- Core pressed for 15 seconds on nitrocellulose membrane, with absorbent paper below to absorb excess cane juice
- Blotted prints air-dried, covered and placed in envelope to be analyzed at MoA- Bodles
- Random samples duplicated and a set sent to Guadeloupe for comparison

Materials and Methods cont'd

◆ Testing Procedure

- Blotted membranes immersed in BSA and TBS buffer for 30 minutes
- First antibody: NC membranes incubated in goat antibody, BSA and TBS sol'n for 1.5 hours at room temp.
- NC membranes washed and rinsed 3 times (of 5 mins each) in TBS Tween
- Second antibody: rinsed membranes incubated in rabbit conjugate for 1 hr. at room temp.

Materials and Methods cont'd

- Membranes were again washed with 3 rinses of 5 mins each in TBS Tween.
- Membranes immersed in substrate for 5 to 20 mins at room temp.
- Reaction was stopped by dipping membranes in distilled water
- After drying, prints were observed under microscope
- Colonized vascular bundles appeared **blue**

RESULTS



Table 1: Ratoon Stunting Disease Survey, 2006, Summary – Estates

Estate	# of fields Sampled	#of fields Infected	# of stalks Sampled	# of stalks Infected	% Stalks Infected
Appleton	8	1	120	1	0.83
B/Lodge	28	3	402	4	1.00
Frome	20	8	290	11	3.79
Long Pond	13	2	189	3	1.59
Monymusk	14	0	204	0	0
N/Yarmouth	4	0	60	0	0
St. Thomas	8	2	150	21	14.00
W/Park	10	6	150	15	10.00
			1565	55	3.51

Table 2: Ratoon Stunting Survey, 2006, Summary – Farmers' Holdings

Farmers' Location	# of Fields Sampled	# of Fields Infected	# of Stalks Sampled	# of Stalks Infected	% Stalks Infected
Clarendon	8	6	118	7	5.93
Frome	9	1	133	4	3.01
St. Elizabeth	5	0	73	0	0
St. Catherine	29	3	427	5	1.17
St. Thomas	7	1	95	2	2.11
			846	18	2.12

Table 3: Ratoon Stunting Disease Survey, 2006, Summary – Varieties

Variety	# of Fields Sampled	# of Fields Infected	# of Stalks Sampled	# of Stalks Infected	% Stalks Infected
BJ7504	39	4	589	5	0.85
BJ7015	22	1	313	1	0.32
BJ7627	8	3	120	7	5.83
B41227	3	1	45	3	6.67
B49119	2	0	30	0	0
BJ8252	1	1	15	1	6.67
BJ8226	5	0	69	0	0
BJ82119	4	2	58	2	3.45
BJ7452	11	1	163	1	0.61
BJ7262	3	0	45	0	0
BJ7465	20	6	292	12	4.11
BJ82102	4	1	60	1	1.67

Table 3: Ratoon Stunting Disease Survey, 2006, Summary – Varieties

Variety	# of Fields Sampled	# of Fields Infected	# of Stalks Sampled	# of Stalks Infected	% Stalks Infected
BJ78100	15	3	211	5	2.37
BJ82156	5	5	75	10	13.33
BJ7555	1	0	15	0	0
UCW5465	6	1	88	1	1.14
BJ7451	3	1	45	1	2.22
BJ7230	1	0	15	0	0
J9501	1	0	15	0	0
BJ7314	2	1	30	2	6.67
BJ8207	2	0	45	0	0
D14146	2	2	45	21	46.67
UK	3	0	43	0	0
Total	163	33	2411	73	3.03

Table 4: Percentage positive fields for RSD at different locations/ varieties in Jamaica

Location/Estates	# of Fields Sampled	% of Positive Fields
Appleton	8	13
B/Lodge	28	11
Frome	20	40
Long Pond	13	15
St. Thomas	8	25
Worthy Park	10	60
Location/Farmers		
Clarendon	8	75
Frome	9	11
St. Catherine	29	10
St. Thomas	7	14

Table 4 *Cont'd*

Location/Estates	# of Fields Sampled	% of Positive Fields
Variety		
BJ7314	2	50
BJ7627	8	38
BJ7465	20	30
B41227	1	33
BJ82156	5	100
D14146	2	100

Conclusion

- Presence of RSD has been re-confirmed by this survey
- Incidence of the disease relatively low
- High stalk infection at Worthy Park – associated with susceptible variety BJ82156
- High stalk infection at St. Thomas Co. – associated with susceptible variety D14146
- Varieties showing no infection appeared to be resistant

Conclusion

- High infection rate at Worthy Park and Clarendon –might be attributed to the extensive use of mechanical harvesters
- Decontamination of tools used for harvesting should be considered
- Heat treatment and the establishment of clean seedcane nurseries should aid in arresting the spread of RSD in Jamaica