

SHORT COMMUNICATION

RICE “YELLOWING SYNDROME” IN MEKONG RIVER DELTA

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ABSTRACT

Twenty-three rice leaf samples were collected from rice fields showing symptoms of “yellowing syndrome” and sent to IRRI in 1996. The leaf samples were serologically indexed for the presence of viruses by enzyme-linked immunosorbent assay (ELISA). A 2005 survey was implemented; fifty two leaf samples were tested against RTBV, RTSV, RGSV and RTYV. Only one of the 43 samples exhibited tungro-like symptoms of yellowing and stunting were positive to RTSV. Usually infection with RTSV does not exhibit any symptom of yellowing and stunting. Meanwhile seven out of 9 samples showing grassy like symptoms of profuse tillering, yellowing and stunting reacted positive to RGSV. Serological indexing of leaf samples by ELISA revealed the presence of RTBV, RTSV, RGSV and RRSV in rice fields of Mekong Delta.

Key words: ELISA, RGSV, RRSV, RTBV, RTSV, serological index, yellowing syndrome

Rice is the most important crop in Vietnam; it is currently cultivated in 4.2 million ha and grown in 7.6m Ha. About 52% of Vietnam rice is produced in Mekong Delta. Farmers in this region adopt direct seeding practice of crop establishment to save labor costs. Soils in the Delta are highly variable, but alluvial, acid sulfate and saline soils are considered to be predominating.

Rice plants showing symptoms of yellowing were first observed in the Mekong Delta as early as 1989 but it became a problem after 1994. In 1997 dry season (DS), incidence of that “yellowing syndrome” was estimated up to 5-10% in almost varieties grown. However, incidence was up to 50% in some fields, which received high nitrogen fertilizer application. Diseased tillers showed interveinal chlorosis to yellowish color, stunting and no further growth. These symptoms were typical of rice tungro disease transmitted by green leafhopper (GLH) prevalent in Southeast Asia. However, in areas showing the “yellowing syndrome” in the Mekong River Delta, GLH populations were very low.

In 1999, Plant Protection Department in South Vietnam named it “benh vang lun” means “stunting and yellowing syndrome”. The disease was still unknown for etiology. Later on, it was also named “grassy stunt virus strain-2” or “benh lua co dong 2” by Pham van Kim in Can Tho University (personal communication).

Twenty-three rice leaf samples were collected from rice fields showing symptoms of “yellowing syndrome” and sent to IRRI in 1996. The leaf samples were serologically indexed for the presence of viruses by enzyme-linked immunosorbent assay (ELISA).

After testing the samples were negative for rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV). The two viruses cause tungro disease, which has not been in the Delta so far. Similarly, the leaf samples were also showing negative reactions to rice dwarf virus (RDV), rice grassy stunt virus (RGSV) and rice ragged stunt virus (RRSV). From leaf samples collected from various sites of Vietnam in 1997, one out of 140 reacted positive to RTBV and RTSV, and

two out of 140 reacted positive to RRSV. Accordingly, a 2005 survey was implemented; fifty two leaf samples were tested against RTBV, RTSV, RGSV and RTYV. Only one of the 43 samples exhibited tungro-like symptoms of yellowing and stunting were

positive to RTSV. Usually infection with RTSV does not exhibit any symptom of yellowing and stunting. Meanwhile seven out of 9 samples showing grassy like symptoms of profuse tillering, yellowing and stunting reacted positive to RGSV.



Fig. 1. Rice plants showing the “yellowing syndrome” collected from rice fields in Mekong Delta in 1996

Table 1: Reaction of leaf samples collected from Mekong Delta rice fields to rice viruses by ELISA

Sampling Date	Sample no.	No. Positive Reaction Against ¹					
		RTBV	RTSV	RRSV	RGSV	RDV	RTYV
April 1996	23	0	0	0	0	0	nt
Jan 1997	140	1	1	2	0	nt	0
Jan 2005							
• Plants with Tungro-like symptoms	43	0	1	nt	0	nt	0
• Plants with Grassy-like symptoms	9	0	0	nt	7	nt	0

¹RTBV-rice tungro bacilliform virus, RTSV-rice tungro spherical virus, RRSV-rice ragged stunt virus, RGSV-rice grassy stunt virus, RDV-rice dwarf virus, RTYV-rice transitory yellowing virus, nt- not tested

Rice plants showing the “yellowing syndrome” had been reported as early as 1960s in South Vietnam and given names such as “yellow stunt”, “chlorotic stunt” or “bushy stunt” (Toan 1969). Rice tungro disease had been reported in Central Vietnam but not in Mekong Delta (Vien et al. 1994; Vien et al. 1996).

This will be the first report on the occurrence of rice tungro virus in Mekong River Delta; although very few samples with typical tungro symptoms (1 out of 140 samples in 1997 and again 1 out of 43 samples in 2005) reacted positive to tungro viruses.



Fig. 2. Leaf samples collected in Angiang Province in January 2005 from rice plants showed “yellowing syndrome”, exhibited negative reaction to tungro viruses RTBV and RTSV.



Fig. 3. Rice plants showing symptoms of stunting and yellowing with profuse tillering collected in rice fields near CLRRRI, Omon exhibited positive reaction to grassy stunt virus.

Although rice grassy stunt have not been reported in Vietnam, Heong (IRRI Entomologist/Ecologist) reported occurrence of suspected grassy stunt infected plants with high brown planthopper population in rice fields near Ho Chi Minh City in 2000. According to the latest survey conducted in 2005, about 70% of the samples collected in rice fields near CLRRI, Omon reacted positive to RGSV. Most of these leaf samples that reacted positive to RGSV showed grassy-like symptoms.

Rice ragged stunt had been found to occur in Vietnam in 1980 after epidemic of BPH in the Mekong delta. Survey conducted by Ossmat Azzam (IRRI) and Nguyen Van Tuat (NIPP) in 2000 revealed detection of RRSV from samples collected from central part of Vietnam. Of 140 collected samples in Mekong Delta in 1997, two samples reacted positive to RRSV.

In summary, serological indexing of leaf samples by ELISA revealed the presence of RTBV, RTSV, RGSV and RRSV in rice fields of Mekong Delta. More studies such as

transmission test involving symptoms recovery from ratoon, virus recovery from infected plants and transfer to healthy seedlings needs to be conducted to understand epidemiology of “yellowing syndrome” and association of the identified viruses with the disease in order to possibly prevent from disease outbreaks in the Delta further.

REFERENCES

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Triệu chứng vàng lá và lùn cây lúa rải rác xuất hiện lần đầu tiên ở ĐBSCL trong những năm 1989, hiện tượng này rất giống với bệnh Tungro do viut gây ra, nhưng quần thể rầy xanh lại rất thấp trong những thời điểm có hiện tượng trên, Cục Bảo vệ Thực Vật phía nam gọi hiện tượng này là bệnh vàng lùn và PGS Phạm văn Kim, khoa nông học Đại Học Cần Thơ gọi “bệnh lùn lúa cô dòng 2”. Bệnh có lúc xảy ra rất nặng đến 50 % trên một số giống. Dùng phương pháp chẩn đoán huyết thanh với máy đọc ELISA kết hợp thực hiện ở Viện IRRI và Viện Lúa ĐBSCL cho thấy có sự hiện diện của dạng virus Tungro RTBV (1/140), RTSV (1/140) và RRSV (2/140) trong năm 1997. Năm 2005, người ta phát hiện RTSV (1/40), dạng lùn lúa cô (RRSV), bụi lúa lùn hẳn và có rất nhiều chồi với 7/9 số mẫu có RGSV. Như vậy triệu chứng “vàng lùn” hiện nay có khả năng do Tungro gây ra nhưng tỉ lệ còn rất thấp trong số 4 dạng virut trên lúa tìm thấy ở ĐBSCL là RTSV, RTBV, RGSV.