

Table 2. Virulence spectrum of China *P. grisea* lineages against PRC differentials, near-isogenic lines (NIL) bearing single resistance genes and weeping lovegrass

Lineage	No. of isol.	Compatible isolates on PRC differentials ^a							NIL R-genes ^b						Wlg ^c
		I A	I B	I C	J D	J E	J F	J G	Pi-1	Pi-2	Pi-3	Pi-4a	Pi-4b	0039	
PRC-1	7	2	4	4	0	0	4	7	4	0	3	2	2	7	4
PRC-2	7	0	2	0	2	2	6	6	2	0	5	3	2	7	0
PRC-3	1	0	0	0	0	1	0	1	0	0	0	0	1	1	1
PRC-4	7	0	6	6	4	3	3	7	0	0	4	2	2	7	0
PRC-5	3	0	1	1	0	0	0	3	1	0	3	1	0	3	0
PRC-6	1	0	1	0	1	0	1	1	0	0	1	1	1	1	1
PRC-7	1	0	0	0	0	0	1	1	0	0	1	1	1	1	1
PRC-8	7	0	3	4	5	4	7	7	0	4	6	2	0	7	0
PRC-9	5	1	3	3	0	1	3	5	2	1	5	4	0	5	2
PRC-10	7	0	6	6	0	1	6	7	5	2	7	4	3	7	1
PRC-11	6	1	2	1	0	1	3	6	4	0	5	5	2	6	1
PRC-12	8	0	7	7	0	0	6	8	2	0	7	1	4	8	0
PRC-13	2	0	2	1	1	1	2	2	1	0	2	3	1	5	0
PRC-15	6	0	4	3	1	0	2	6	0	0	0	0	0	2	0
PRC-16	5	1	3	3	4	4	4	5	0	0	1	1	0	1	0
PRC-17	4	1	2	1	0	0	2	4	0	1	2	1	1	1	0
PRC-19	3	0	1	0	0	0	0	3	0	1	1	0	0	1	0
PRC-20	2	0	1	0	1	1	1	2	0	0	1	1	0	1	0
PRC-21	1	0	1	0	1	0	0	1	0	0	1	0	0	1	0
PRC-22	2	0	0	0	0	0	1	1	0	1	2	1	1	1	0
PRC-24	1	0	1	1	0	0	1	1	0	1	1	0	0	1	0
PRC-25	1	0	0	0	0	0	1	1	0	0	1	1	0	1	0
PRC-26	1	0	1	1	0	0	1	1	0	0	1	0	0	1	0
PRC-27	1	0	0	0	1	1	1	1	0	0	1	0	0	1	0
PRC-28	1	0	0	0	0	0	1	1	0	0	1	1	0	1	0
PRC-30	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1
PRC-31	1	0	0	0	0	0	1	1	0	0	1	0	1	1	1
PRC-38	2	1	2	1	1	1	2	2	2	0	1	2	1	2	1
Others	3	0	2	2	0	0	0	3	2	0	3	1	1	3	0

^a A = Tetep, B = Zhenlong13, C = Sifeng43, D = Dongnong51, F = Hejiang18, G = Lijiang Xintuan-heigu, I = Indica, J = Japonica. ^b NIL were C101LACP*Pi*-1, C101A51*Pi*-2(t), C104PKT*Pi*-3(t), C101PKT*Pi*-4a(t), C105TTP-4L23*Pi*-4b(t), and 0039 lunhui. ^c Wlg = Weeping lovegrass (*Eragrostis curvula*).

The ENSO event and rice planthopper occurrence in China

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The rice planthopper, including brown planthopper (*Nilaparvata lugens* Stal) and white-backed planthopper (*Sogatia furcifera* Horvath), is one kind of tropical pests. They immigrate with the southeast monsoon from low-latitude area into China at March or April. The global climatic anomaly especially the El Niño event and the Southern Oscillation (the ENSO event) directly influence the rice plan-

thopper outbreaks. The occurrence of rice planthopper in China and its relationship with ENSO event were studied.

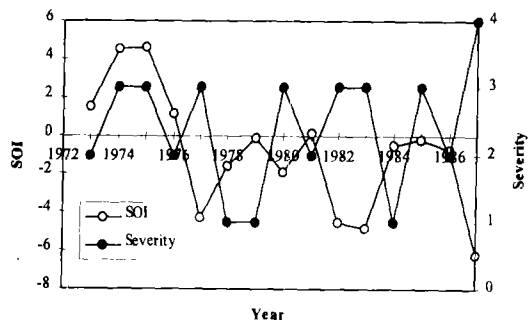
As the trade-wind rapidly attenuates in the Pacific and the warm-water moves to the east, the temperature on sea surface off the Pacific coast will rise higher than the normal level. Such phenomenon is known as El Niño event. From the late 1950's to the early 1990'

s, rice planthopper outbreak occurred for 14 years in China. Among them, 5 ones appeared in the El Niño year and 4 in the inverse El Niño years. It means that 64.3 % of the outbreak was in the period of El Niño event (see table). From 1973 to 1991, there were 4 years that the occurrence of the rice planthopper was light. None of them appeared in the El Niño or the inverse El Niño years.

In addition, the Southern Oscillation is one of the most important meteorological process of the annual change of general circulation in tropical and is associated with the El Niño event. After comparing with rice planthopper occurrence and the sum SOI of each season annually from 1973 to 1987 (see figure), a negative correlation was found. Usually, rice planthopper outbreak occurred in China at the years when the absolute SOI reached to the top. During the intermission of ENSO event which the SOI was normal, the rice planthopper only caused light damage. Base on the above analysis, following conclusions were derived for the occurrence of rice planthopper in China (1), If the SO was quite unusual and the SOI deviated far from the average value, it is highly probable to have an outbreak of planthopper; (2), During the El Niño and the inverse El Niño years, the occurrences of planthopper would be from mid extent to out-

break; (3), During the intermission of ENSO event, the occurrence would be at light extent.

Based on our research, we predicted that the damage severity of rice planthopper would be from mid to outbreak in 1995 because it was an EL Niño year. As predicted at the beginning of this year, the rice planthopper has broken out in China. If the relationship between ENSO and the outbreak of planthopper can be confirmed, the occurrence of planthopper can be predicted earlier, which would has a great significance on pest control.



Relationship between the SOI and rice planthopper occurrence in China

Damage severity of the rice planthopper from 1973~1992 in China*

Year	Severity*	El Niño event	Year	Severity	Niño event	Year	Severity	Niño event
1973	M		1980	O		1987	SO	E
1974	O	IE	1981	M		1988	O	
1975	O	IE	1982	O		1989	O	IE
1976	M	E	1983	O	E	1990	M	
1977	O		1984	L		1991	SO	E
1978	L		1985	O	IE	1992	L	
1979	L		1986	M				

* Severity: L:Light, M:middle, O:outbreak, SO: serious outbreak, *IE: Inverse El Niño year, E: El Niño Year