

Differentiation of rice tungro virus strains

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ABSTRACT

IR-20, Utrirajapan, Virippu, Daya, Moti, Habiganj, Jeera, Saket-4, IR-48, IR-34 and TN1 were used as differentials to differentiate various isolates of tungro namely Burdwan (West Bengal), Cuttack, Konark, Jajpur, Salipur, Bhadrak (Orissa) etc. Moti was susceptible to Cuttack and Salipur isolates. Saket-4 was susceptible to Burdwan and Jajpur isolates. Virippu cultivar was found susceptible to Konark isolate. Habiganj was susceptible to Bhadrak isolate. All other differentials were found resistant to all the tungro isolates.

Key words: Rice, tungro, differentials, isolates

The existence of strains in tungro virus was first reported from the Philippines (Rivera and Ou, 1967). Two strains designated as 'S' and 'M' were identified. Strain 'S' was characterized by severe interveinal chlorosis or stripes on the infected leaves while strain 'M' produced only mild diffused mottling. Strain 'S' was more common in Philippines and generally produced more severe symptoms. Subsequently, a third strain designated as 'T' which produced narrow leaves as well as stunting and yellowing on Taichung Native-1 was reported from Philippines (IRRI, 1971). Anjaneyulu and John (1972) collected 10 isolates from different regions of Andhra Pradesh, Bihar and West Bengal and identified four distinct strains designated as RTV 1, RTV 2A, RTV 2B and RTV 3. RTV 1 produced mild symptoms in Taichung Native-1, RTV 2A and RTV 2B produced very severe symptoms in Taichung Native-1. The plants infected with RTV 3 initially showed severe symptoms and later on recovered from the disease.

Eleven differentials namely, IR-20, Utrirajapan, Virippu, Daya, Moti, Habiganj, Jeera, Saket-4, IR-48, IR-34 and TN1 were planted in galvanized iron trays in 4 rows of 10 seedlings each. Each cultivar was planted in different trays. Each seedling in two rows in each tray was inoculated with 3 viruliferous leafhoppers. The hoppers were released on diseased plants for 48 hours of acquisition period and inoculated onto differential seedlings for inoculation period of 24 hours. After inoculation period was over, the hoppers were killed by

application of Carbofuran @ 1 g/tray. Remaining two rows in each tray were kept as healthy. Fifteen days after inoculation, the numbers of seedlings infected were counted in each differential. Various isolates of tungro viz., Burdwan (West Bengal), Cuttack, Konark, Jajpur, Salepur, Bhadrak (Orissa), etc. were collected and maintained in net house. Each isolate was tested on all differentials to observe the differential reaction of tungro isolates.

Moti was susceptible to Cuttack and Salipur isolates. Saket-4 was susceptible to Burdwan and Jajpur isolates. Virippu was found susceptible to Konark isolate. Habiganj was susceptible to Bhadrak isolate. All other differentials were resistant to all tungro isolates. TN1 was susceptible to all tungro isolates (Table 1).

Reaction of different isolates on TN1 was studied. Incubation period, per cent reduction in plant height and number of tillers were recorded on different isolates (Table 2). In case of Burdwan and Jajpur isolates, the incubation periods, per cent reduction in plant height and number of tillers were 60% and 2, respectively showing severe symptoms of tungro. This resembled RTV 2 strain reported by Anjaneyulu *et al.* (1972). Konark isolate and Bhadrak isolate recorded incubation period of 12 days, 17% reduction in plant height and 4 tillers resembling RTV 1 reported by Anjaneyulu *et al.* (1972). Based on above results, it was concluded that Burdwan and Jajpur isolates were

Table 1. Reaction of different tungro viruses isolates on differential rice varieties

| Differentials | Reaction of isolates | | | | | |
|---------------|----------------------|---------|--------|--------|---------|---------|
| | Burdwan | Cuttack | Konark | Jajpur | Salepur | Bhadrak |
| IR-20 | R | R | R | R | R | R |
| Utrirajapan | R | R | R | R | R | R |
| Virippu | R | R | S | R | R | R |
| Daya | R | R | R | R | R | R |
| Moti | R | S | R | R | S | R |
| Habiganj | R | R | R | R | R | S |
| Jeera | R | R | R | R | R | R |
| Saket-4 | S | R | R | S | R | R |
| IR-48 | R | R | R | R | R | R |
| IR-34 | R | R | R | R | R | R |
| TN1 | S | S | S | S | S | S |

R- Resistant; S- Susceptible

Table 2. Reaction of different tungro virus isolates on TN1

| Isolate | Incubation period (days) | *Percent reduction in plant height | No. of tillers |
|-------------|--------------------------|------------------------------------|----------------|
| Burdwan | 7.2 | 58.9 (50.1) | 2 |
| Cuttack | 9.2 | 35.2 (36.4) | 3 |
| Konark | 11.5 | 17.0 (24.3) | 4 |
| Jajpur | 7.4 | 58.4 (49.8) | 2 |
| Salepur | 9.7 | 38.2 (38.2) | 3 |
| Bhadrak | 12.3 | 16.2 (23.7) | 4 |
| CD (P=0.05) | 0.7 | 1.1 | 0.3 |
| CV% | 1.4 | 1.7 | 1.0 |

*Figures in parentheses are Arcsin transformed values

most severe as compared to remaining isolates.

The results revealed that the differentials were mostly resistant to different isolates. Incubation period, percent reduction in plant height and appearance of disease symptoms were considered for the reaction of different isolates on differentials. Differentiation of isolates based on incubation period and severity of stunting is correlated with their reaction on the set of differentials used are presented in Table 3. Their reaction on the set of differentials is similar to their reaction in TN1. Burdwan and Jajpur isolates were similar in their infectivity towards differentials even though these isolates produced severe symptoms

Table 3. Reaction of different isolates on differential varieties as far as Incubation period is concerned

| Differentials | Reaction of isolates (Incubation period in no.of days) | | | | | |
|---------------|--|---------|--------|--------|---------|---------|
| | Burdwan | Cuttack | Konark | Jajpur | Salepur | Bhadrak |
| IR-20 | R | R | R | R | R | R |
| Utrirajapan | R | R | R | R | R | R |
| Virippu | R | R | 11.9 | R | R | R |
| Daya | R | R | R | R | R | R |
| Moti | R | 9.4 | R | R | 8.9 | R |
| Habiganj | R | R | R | R | R | 12.0 |
| Jeera | R | R | R | R | R | R |
| Saket-4 | 7.0 | R | R | 7.6 | R | R |
| IR-48 | R | R | R | R | R | R |
| IR-34 | R | R | R | R | R | R |
| TN1 | 7.2 | 9.2 | 11.5 | 7.4 | 9.7 | 12.3 |

R- No symptoms (Resistant)

Table 4. Infulence of different tungro virus isolates on hight of differential rice varieties

| Differentials | Reaction of isolates (percent reduction in plant height) | | | | | |
|---------------|--|---------|--------|--------|---------|---------|
| | Burdwan | Cuttack | Konark | Jajpur | Salipur | Bhadrak |
| IR-20 | R | R | R | R | R | R |
| Utrirajapan | R | R | R | R | R | R |
| Virippu | R | R | 17.2 | R | R | R |
| Daya | R | R | R | R | R | R |
| Moti | R | 36.5 | R | R | 39.6 | R |
| Habiganj | R | R | R | R | R | 17.5 |
| Jeera | R | R | R | R | R | R |
| Saket-4 | 59.6 | R | R | 57.9 | R | R |
| IR-48 | R | R | R | R | R | R |
| IR-34 | R | R | R | R | R | R |
| TN1 | 58.9 | 35.2 | 17.0 | 58.4 | 38.2 | 16.2 |

R- No symptoms (Resistant)

compared to other isolates on TN1. The reaction of Burdwan and Jajpur isolates were similar in their infectivity towards differentials except Saket-4 in which susceptible reaction was noticed. Disease severity of Burdwan and Jajpur isolates was 58.9% and 58.4% in reduction in plant height, respectively (Table 4) and hence these two isolates are more aggressive compared to other isolates.

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