## High virulence of new brown planthopper (BPH) populations in the Mekong Delta, Vietnam

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Since BPH biotype 2 occurred in the Mekong Delta in 1977 (IRRN 6/ 1977), it has been controlled by integrated pest management using resistant varieties.

However, in late 1986 and early 1987, two populations were detected. They were collected, mass-reared, and tested in the screenhouse with the differential set for BPH biotype by the seedling nursery method (see table).

**Reactions of the differential varieties for BPH biotypes to 2 BPH populations collected in the Mekong Delta, Vietnam, 1986-87.**

| Differential variety | Resistant gene | Reaction to BPH populations[a] | | | |
|---|---|---|---|---|---|
| | | Tien Giang | | An Giang | |
| | | a | b | a | b |
| Taichung Native 1 | Susceptible check | 9 | – | 9 | – |
| IR26 | *Bph 1* | – | – | 5 | 7 |
| Mudgo | *Bph 1* | 2 | 5 | – | – |
| ASD7 | *Bph 2* | 3 | 5 | 5 | 9 |
| NN3A | *bph 2* | – | – | 7 | 9 |
| NN6A | *bph 2* | – | – | 7 | 9 |
| IR13240-10-1 | *bph 2* | – | – | 7 | 9 |
| IR46 | *bph 2 + minor* | 4 | 6 | – | – |
| Rathu Heenati | *Bph 3* | 1 | 2 | 0 | 1 |
| Ptb 33 | *Bph 3 + bph 4* | 1 | 2 | 1 | 1 |
| Balamawee | *bph 4* | 1 | 2 | – | – |

[a]Damage was rated 1 to 9 twice: a = when all plants of TN1 were dead, and b = 7 d after the first scoring.

The population collected from Tien Giang Province in 1986 wet season shows moderate damage on varieties carrying the resistant gene bph 2 (ASD7 and IR46) and even on varieties with Bph I gene (IR26). The population from An Giang Province collected on IR13240-10-1 in early 1987 shows higher damage on the currently cultivated varieties carrying bph 2 gene with damage scores from 5 to 7. The varieties with Bph 3 and bph 4 genes were not damaged, but IR26 with Bph I was moderately attacked.

These results indicate new populations of a new biotype are becoming strong enough to damage resistant varieties widely cultivated in the area. This demands intensive surveillance. □

# Drought tolerance

## Rice sensitivity to water deficit at different growth stages

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In the IRRI greenhouse, we measured sensitivity of rice in various growth stages to water deficit of several durations.

One IR64 plant per pot was grown in pots 55 cm high, 20 cm internal diameter and containing about 16 kg of Maahas clay soil under aerobic conditions. Control pots were watered daily to replenish all water lost by evapotranspiration. In water deficit treatments, water was withheld for 5, 10, or 15 d beginning at 10, 25, 40, 55, 70, 85, and 100 d after seeding (DAS). At the end of each stress period, plants were fully rewatered. During stress, the soil was covered with polyethylene and aluminum to minimize evaporation. Daily transpiration was estimated by weighing pots, and stress intensity was estimated as the cumulative difference between transpiration in control and stress treatments, $\Sigma$(Tc - Ts).

During vegetative growth, water deficit had no effect on grain yield (see table). During the reproductive phase, water deficit of 5 or 10 d reduced yields by 25 to 45% and water deficit of 15 d reduced yields up to 88%. These results confirm previous findings that rice yields are reduced most when drought occurs during reproductive stage.

Control plants transpired about 50 kg total with greatest $\Sigma$Tc from 55 to 70 DAS. In other words, maximum yield reduction coincided with maximum $\Sigma$Tc. Grain yield was highly correlated with $\Sigma$(Tc - Ts), even with data from all growth stages combined (see figure).

The greatest deviation from the regression line is for 15d stress at panicle initiation. We computed $\Sigma$(Tc-Ts) only during the stress period. Possibly because of reductions in leaf area, Ts was also less than Tc after rewatering. If true, then the errant point should fall much closer to the regression.

If rice sensitivity to water deficit changed with growth stage, then we would expect to have different regressions between $\Sigma$(Tc-Ts) and yield at different growth stages. Since yield data from stresses at all growth stages fall on the same regression

**Grain yield of IR64 in response to water deficit at different growth stages and durations. IRRI, 1988.**

| Stress onset in days after seeding | Grain yield[a] (g/plant) at stress duration of | | |
|---|---|---|---|
| | 5 d | 10 d | 15 d |
| 10 | 45 a-f | 51 a-c | 55 a |
| 25 | 52 ab | 49 a-e | 50 a-d |
| 40 | 40 d-g | 41 c-g | 16 i |
| 55 | 40 c-g | 31 gh | 7 j |
| 70 | 37 fg | 36 fg | 26 h |
| 85 | 41 a-f | 39 e-g | 42 b-f |
| 100 | 40 c-g | 39 e-g | – |

[a]Yields followed by the same letter are not significantly different at P<0.05 by DMRT. Control (no stress) grain yield was 54 g/plant.