## SHORT COMMUNICATIONS

# Bacterial Wilt Incidence and Field Performance of an Exotic Germplasm of Tomato

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Bacterial wilt of tomato caused by *Ralstonia solanacearum* (Smith) Yabuuchi *et al* is an important disease that limits tomato production in many tropical and subtropical regions of the world. Disease control is difficult because of broad host range, widespread distribution and vast genetic variability of the pathogen (Hayward, 1991). Identifying resistant sources and combining bacterial wilt resistance with other characters like large fruit size and high temperature fruit set should be the main objective of tomato improvement programmes in the tropics. (AVRDC, 1992). Existence of different strains, races and biovars has been responsible for the breaking down of resistance of varieties evolved through breeding programmes. This necessitates continuous screening of tomato germplasm for resistance to bacterial wilt and developing new resistant varieties. Under the above circumstances the present study was undertaken to screen an exotic germplasm of tomato for bacterial wilt resistance and to assess their performance.

The material for the present investigation comprised an international set of 36 reportedly wilt resistant lines from different parts of the world collected from Bundaberg Research Station, Queensland, Australia. Pusa Ruby, a universally susceptible check and a local resistant check Sakti were also included in the study. The thirty-six lines were evaluated in the wilt sick plots maintained at Agricultural Research Station, Mannuthy, Kerala for two consecutive seasons during 1999-2000 and 2000-01 in a randomized block design with two replications in 0.60 x 0.45m crop geometry. Each genotype was grown in a single row of 12 plants in each replication. Out of this, five randomly selected plants were utilised for recording biometrical observations. Wilt resistance was recorded at weekly intervals. The presence of bacteria in the wilted plants was tested through ooze test. The genotypes were rated for wilt resistance as per the scale suggested by Mew and Ho, (1976). Data for two seasons were pooled and statistically analysed. The wilt resistant genotypes identified were further subjected to artificial inoculation by leaf clipping method (James, 2001) to confirm wilt resistance. Fresh bacterial ooze was collected from wilted plants in the field in 100ml of sterile distilled water and optical density (OD) of the suspension was adjusted to 0.3 at 600 nm containing $10^8$ cfu/ml. Twenty seedlings each of the genotypes found resistant in field trials were raised in sterilized growing media in plastic pots along with the susceptible check Pusa Ruby. When seedlings were 18-20 days old, artificial inoculation was carried out by making 3-4 cuts across the veins on the leaf blade of the top four fully opened leaves of healthy plants with a pair of sterilized scissors dipped in the freshly prepared bacterial suspension. The number of plants wilted was recorded separately for each genotype and percentage wilt incidence was calculated.

There was wide variation among the genotypes for wilt resistance in field screening (Table 1). Such wide variation in disease reaction could be due to strain differences in the pathogen and environmental effects on host and pathogen (Elphinstone, 1994, Hanson *et al.*, 1996). The susceptible check, Pusa Ruby showed 100 percent wilt incidence thereby confirming the presence of virulent inoculum in the field. Twenty-one lines including the resistant check Shakthi were found resistant to bacterial wilt (< 20 percent wilt incidence) in the present study during both the seasons. Only one genotype (LE 25) recorded 0 percent wilt. Fourteen lines expressed moderate resistance to wilt and rest were susceptible to wilt.

The twenty-one lines found resistant in field trials were also resistant to bacterial wilt under artificial inoculation. Here also the susceptible check showed 100 percent wilt incidence confirming virulence of pathogen in the inoculum. Fourteeen genotypes did not show any disease symptoms while the remaining genotypes showed varying levels of disease incidence.

Pooled analysis of field data for the two years recorded significant differences among the 36 genotypes

**Table 1. Bacterial wilt incidence in tomato genotypes under field screening**

| S.No | Genotypes | EC number | Fruit colour and shape | Bacterial wilt incidence (%) | *Disease reaction |
|---|---|---|---|---|---|
| 1 | LE 1 | 398693 | Round, uniform | 11.26 | R |
| 2 | LE 2 | 398715 | Oval, uniform | 25.65 | MR |
| 3 | LE 3 | 398695 | Oval, uniform | 4.41 | R |
| 4 | LE 4 | 398697 | Round, green shouldered | 25.15 | MR |
| 5 | LE 5 | 398692 | Round, green shouldered | 24.00 | MR |
| 6 | LE 6 | 398700 | Oval, uniform | 9.32 | R |
| 7 | LE 7 | 398684 | Round, uniform | 7.25 | R |
| 8 | LE 8 | 398699 | Oval, uniform | 65.65 | S |
| 9 | LE 10 | 378696 | Oval, uniform | 21.42 | MR |
| 10 | LE 11 | 398688 | Oval, uniform | 8.00 | R |
| 11 | LE 12 | 398710 | Oval, uniform | 10.80 | R |
| 12 | LE 13 | 398718 | Round, uniform | 67.15 | S |
| 13 | LE 14 | 398704 | Round, green shouldered | 13.95 | R |
| 14 | LE 15 | 398694 | Round, uniform | 18.51 | R |
| 15 | LE 16 | 398701 | Oval, uniform | 14.82 | R |
| 16 | LE 17 | 398691 | Round, green shouldered | 44.64 | MS |
| 17 | LE 18 | 398703 | Round, green shouldered | 56.90 | MS |
| 18 | LE 19 | 398685 | Round, green shouldered | 18.51 | R |
| 19 | LE 20 | 398711 | Round, green shouldered | 32.14 | MR |
| 20 | LE 21 | 398707 | Round, green shouldered | 6.66 | R |
| 21 | LE 22 | 398712 | Round, uniform | 4.00 | R |
| 22 | LE 23 | 398686 | Round, uniform | 16.12 | R |
| 23 | LE 24 | 398702 | Pear, uniform | 13.84 | R |
| 24 | LE 25 | 398708 | Oval, green shouldered | 0.00 | R |
| 25 | LE 26 | 398687 | Round, uniform | 11.67 | R |
| 26 | LE 27 | 398714 | Round, uniform | 22.45 | MR |
| 27 | LE 28 | 398713 | Oval, uniform | 22.22 | MR |
| 28 | LE 29 | 398719 | Oval, uniform | 26.08 | MR |
| 29 | LE 30 | 398716 | Round, uniform | 15.52 | R |
| 30 | LE 31 | 398709 | Oval, uniform | 27.77 | MR |
| 31 | LE 32 | 398698 | Oval, uniform | 20.00 | R |
| 32 | LE 34 | 398689 | Oval, green shouldered | 33.33 | MR |
| 33 | LE 35 | 398717 | Oval, uniform | 32.25 | MR |
| 34 | LE 36 | 398705 | Round, uniform | 20.92 | R |
| 35 | LE 66 | H-7997 | Oval, uniform | 4.63 | R |
| 36 | Shakthi | Released variety | Round, green shouldered | 18.61 | R |
| 37 | Pusa Ruby | Released variety | Round, uniform | 100.00 | S |

*Mean of two seasons

**Scale**: 0 – 20% Resistant (R), 20 – 40%, Moderately Resistant (MR), 40 – 60%, Moderately susceptible (MS) and 60 – 80% Susceptible (S)

for all the six quantitative characters studied (Table 2). Maximum variation was recorded for fruit yield (500.19-1399.50g) followed by number of fruits per plant (14.25-106.57). Minimum variation was recorded for number of locules. Eight lines out yielded the standard resistant check, Shakti. On the basis of resistance to bacterial wilt, fruit yield and fruit weight the lines LE 66, LE 12, LE 1 and LE 32 were found promising and could be utilised in further improvement programmes.

**Table 2. Mean performance of tomato genotypes (Pooled data)**

| S.No | Genotypes | Plant height (cm) | Days to flowering | Fruits/ plant | Fruit yield (g) | Fruit weight (g) | Locules/ fruit |
|---|---|---|---|---|---|---|---|
| 1 | LE 1 | 59.42 | 64.53 | 26.26 | 1158.92 | 44.96 | 2.41 |
| 2 | LE 2 | 69.20 | 64.55 | 31.40 | 822.56 | 29.51 | 2.24 |
| 3 | LE 3 | 53.90 | 64.56 | 33.18 | 1192.70 | 38.33 | 2.20 |
| 4 | LE 4 | 82.62 | 64.26 | 53.72 | 893.21 | 16.84 | 2.08 |
| 5 | LE 5 | 51.50 | 65.72 | 38.80 | 847.51 | 22.42 | 2.07 |
| 6 | LE 6 | 55.75 | 65.00 | 21.83 | 782.28 | 36.28 | 2.26 |
| 7 | LE 7 | 57.50 | 63.51 | 27.24 | 1093.18 | 39.90 | 2.19 |
| 8 | LE 8 | 69.83 | **73.00** | **14.25** | **500.19** | 44.41 | 2.30 |
| 9 | LE 10 | 98.25 | 67.78 | 31.08 | 594.85 | 20.45 | 2.15 |
| 10 | LE 11 | **109.75** | 72.25 | 33.75 | 712.17 | 19.97 | 2.60 |
| 11 | LE 12 | 71.25 | 64.50 | 34.55 | **1243.81** | 35.85 | 2.03 |
| 12 | LE 13 | **41.50** | 69.05 | 18.25 | 576.88 | 32.17 | 2.05 |
| 13 | LE 14 | 56.00 | 63.38 | 38.25 | 683.60 | 20.42 | 2.54 |
| 14 | LE 15 | 61.17 | 68.93 | 28.36 | 949.00 | 33.45 | 2.07 |
| 15 | LE 16 | 68.00 | 64.50 | 26.83 | 627.08 | 23.26 | 2.05 |
| 16 | LE 17 | 56.00 | 69.05 | 23.25 | 816.66 | 35.26 | **2.00** |
| 17 | LE 18 | 58.00 | 65.95 | 47.15 | 1013.75 | 22.17 | 2.40 |
| 18 | LE 19 | 62.00 | 67.25 | 48.05 | 918.75 | 20.40 | 2.00 |
| 19 | LE 20 | 53.50 | 66.40 | 16.83 | 971.75 | **58.17** | 2.19 |
| 20 | LE 21 | 53.92 | 68.60 | 25.99 | 826.39 | 28.79 | 2.12 |
| 21 | LE 22 | 42.50 | 65.75 | 26.12 | 673.81 | 26.40 | 2.22 |
| 22 | LE 23 | 82.75 | 65.12 | 28.75 | 1016.28 | 35.31 | 2.01 |
| 23 | LE 24 | 44.50 | 64.68 | 66.41 | 1064.00 | 15.62 | 2.15 |
| 24 | LE 25 | 69.25 | 65.55 | 28.54 | 1003.50 | 35.62 | 2.25 |
| 25 | LE 26 | 53.85 | 68.12 | 19.43 | 753.07 | 47.15 | 2.33 |
| 26 | LE 27 | 61.00 | 66.15 | 21.40 | 896.10 | 42.67 | 2.21 |
| 27 | LE 28 | 65.17 | 67.25 | 29.49 | 799.08 | 27.26 | 2.15 |
| 28 | LE 29 | 50.00 | 66.75 | 47.65 | 1152.60 | 25.06 | 2.06 |
| 29 | LE 30 | 64.00 | 68.55 | 28.48 | 969.04 | 34.01 | 2.30 |
| 30 | LE 31 | 66.50 | 65.55 | 20.31 | 818.83 | 40.38 | 2.17 |
| 31 | LE 32 | 66.00 | 68.60 | 43.42 | **1278.00** | 28.44 | 2.07 |
| 32 | LE 34 | 84.00 | 67.00 | 19.26 | 664.66 | 44.11 | **2.42** |
| 33 | LE 35 | 69.00 | **62.84** | **106.57** | 536.33 | **5.12** | 2.00 |
| 34 | LE 36 | 67.00 | 70.80 | 26.32 | 937.75 | 50.27 | 2.20 |
| 35 | LE 66 | 60.00 | 65.25 | 38.83 | **1399.50** | 30.49 | 2.19 |
| 36 | Shakthi | 67.50 | 65.25 | 39.44 | 942.17 | 28.27 | 2.16 |
| | Se ± | 4.93 | 1.15 | 2.91 | 68.08 | 1.88 | 0.09 |
| | CV (%) | 7.70 | 2.45 | 12.27 | 10.80 | 8.40 | 5.90 |

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