

**Supplementary Table 1.** Estimates of GCA effects

|                | AFW           | D1H     | D3H     | DFF     | DMF     | FFT     | FG     | FL      | FYPP   | NSB    | SR     | VL       |
|----------------|---------------|---------|---------|---------|---------|---------|--------|---------|--------|--------|--------|----------|
| IC 284895      | -50.58**      | 3.65**  | 6.01**  | -2.93** | -0.10   | 1.67*   | 0.62   | -2.34** | -0.08  | 2.45*  | -0.88  | 6.43*    |
| VRBG-3         | 100.70**      | 1.53*   | 3.51**  | -3.30** | -1.23*  | 0.02    | 1.24*  | -1.63*  | -0.02  | 0.36   | -0.75  | 5.24     |
| VRBG-71        | 272.06**      | 1.90*   | 0.76*   | 3.45**  | 1.65**  | 7.90**  | 1.02*  | 4.48**  | 0.22   | -1.47* | -0.69  | -28.38** |
| IC 394739      | -<br>216.59** | 1.28*   | 0.76*   | -0.18   | -1.48*  | 4.75**  | -0.86  | -4.62** | -0.13  | -2.26* | -0.61  | -31.65** |
| N/06-40        | -<br>119.55** | -4.23** | -4.99** | -0.55   | -1.10*  | -5.05** | 0.43   | -3.40** | -0.08  | -0.72  | 2.53*  | 3.89     |
| IC 393752      | -<br>206.93** | -3.85** | -4.74** | 1.45*   | 2.15**  | 6.76**  | -1.12* | -4.72** | -0.22  | -2.26* | 0.51   | 3.72     |
| SEA-83         | 108.57**      | 1.40*   | 2.51**  | 0.33    | 1.28*   | -6.24** | -0.69  | 5.01**  | 0.30   | 4.61** | 2.12*  | -84.78** |
| IC 371745      | -24.27**      | -2.23** | -1.86** | 3.70**  | 2.53**  | -3.25** | -0.58  | 2.52**  | 0.02   | 0.49   | -1.36* | 79.20**  |
| Avinash IV     | -30.85**      | -2.35** | -2.74** | 2.08*   | -0.23*  | -1.17*  | -0.69  | 0.97*   | -0.08  | -0.60  | -0.43  | 20.43*   |
| IC 92362       | 167.43**      | 2.90**  | 0.76*   | -4.05** | -3.48** | -5.39** | 0.64   | 3.73**  | 0.07   | -0.60  | -0.43  | 25.91*   |
| Pusa Majiri    | 12.63**       | -0.10   | 1.04*   | -1.75*  | 0.00    | 0.53    | 0.00   | 1.38*   | 0.97   | 0.53   | 0.34   | -12.05*  |
| Pusa Meghdoot  | -4.12*        | -0.05   | -1.41*  | 0.45    | -1.55*  | 0.57    | 0.00   | -0.65*  | 0.36   | -2.32* | -0.32  | 76.91**  |
| Narendra Pooja | 6.92*         | 1.15*   | -0.76*  | 1.45*   | 1.25*   | -0.20   | 0.00   | 1.26**  | -0.05  | 0.83*  | -0.17  | -33.14** |
| Punjab Round   | -15.43**      | -1.00*  | 1.14**  | -0.15   | 0.30*   | -0.90*  | 0.00   | -1.99** | -1.28* | 0.96*  | 0.16   | -33.14** |

**Supplementary Table 2.** Estimates of SCA effects

|                               | AFW       | D1H     | D3H          | DFF          | DMF     | FFT     | FG      | FL           | FYPP    | NSB     | SR      | VL            |
|-------------------------------|-----------|---------|--------------|--------------|---------|---------|---------|--------------|---------|---------|---------|---------------|
| IC 284895 x Pusa Majiri       | 59.18**   | 7.36**  | 25.13**      | -<br>10.60** | -6.04** | -8.37** | -3.86** | -0.24        | -0.15   | 1.43    | 0.12    | 17.74         |
| IC 284895 x Pusa<br>Meghdoot  | -20.82**  | 6.26**  | 4.59**       | 0.75         | 6.51**  | 8.41**  | 7.19**  | -2.88*       | -3.60** | 1.16    | -1.29*  | -<br>123.17** |
| IC 284895 x Narendra<br>Pooja | -17.84    | -6.37** | -8.79**      | -0.29        | -1.31   | -4.19** | -2.00*  | 1.60*        | 1.08    | 6.28**  | -0.91*  | 122.75**      |
| IC 284895 x Punjab Round      | -124.75** | 2.77*   | 0.36         | 2.91*        | 2.46*   | 5.77**  | 3.89**  | -5.45**      | -0.08   | -0.26   | 0.00    | 10.93         |
| VRBG-3 x Pusa Majiri          | -6.05     | -4.60** | -6.60**      | -2.00*       | -0.24   | -8.10** | -2.16*  | 3.53**       | -2.24*  | 1.67*   | -0.44   | -75.06**      |
| VRBG-3 x Pusa Meghdoot        | 226.50**  | 4.80**  | 4.93**       | 4.01**       | 2.17*   | 9.93**  | 7.97**  | -2.80*       | 2.79*   | -4.31** | -0.14   | 123.80**      |
| VRBG-3 x Narendra Pooja       | 460.18**  | 2.34*   | 2.23*        | 1.27         | -4.59** | 15.85** | 11.64** | -1.16        | 1.76*   | 0.02    | -0.34   | -<br>114.02** |
| VRBG-3 x Punjab Round         | -473.11** | 2.30*   | -0.04        | 4.93**       | 7.84**  | -3.67*  | -6.96** | -4.39**      | -2.96*  | 3.21**  | -0.79*  | -39.10*       |
| VRBG-71 x Pusa Majiri         | 250.80**  | -3.38*  | -2.99*       | -2.97*       | -4.03** | 6.92**  | 2.26*   | 11.50**      | 6.61**  | 2.83*   | -0.81*  | 75.75*        |
| VRBG-71 x Pusa<br>Meghdoot    | 336.71**  | -1.76*  | -4.45**      | 2.10*        | 7.55**  | -2.57*  | 0.46    | 2.46*        | 1.14    | -4.56** | 1.33*   | -<br>122.53** |
| VRBG-71 x Narendra<br>Pooja   | 464.11**  | 9.20**  | 5.00**       | -4.89**      | -4.10** | 2.01*   | 1.52*   | 11.60**      | 3.20**  | -5.09** | -0.85*  | -<br>125.17** |
| VRBG-71 x Punjab Round        | -490.99** | 0.04    | 0.74         | 1.54*        | -4.28** | 0.65    | 4.38**  | -<br>12.25** | -3.31** | 2.48*   | -1.11*  | 47.30*        |
| IC 394739 x Pusa Majiri       | -405.70** | 1.45    | 1.44         | -8.96**      | -3.36** | -9.51** | -4.34** | -9.18**      | -4.32** | -7.42** | 6.32**  | -<br>137.55** |
| IC 394739 x Pusa<br>Meghdoot  | -96.09*   | -6.95** | -6.58**      | 0.72         | -5.49** | -0.16   | -0.73   | -7.30**      | 0.16    | 11.81** | -2.74** | 194.67**      |
| IC 394739 x Narendra<br>Pooja | -225.74** | -4.16** | -8.31**      | 5.88**       | 3.13**  | -5.35** | -5.15** | -3.80**      | -1.61*  | -5.65** | 2.57**  | -46.48*       |
| IC 394739 x Punjab Round      | 281.20**  | -2.00*  | -0.56        | 1.56*        | 2.30*   | 6.14**  | 2.94*   | 6.55**       | 1.18    | -5.99** | -0.10   | -0.35         |
| N/06-40 x Pusa Majiri         | -7.31     | -5.47** | -2.21*       | 1.30         | 2.89*   | 8.97**  | 3.85**  | -4.81**      | -2.26*  | -2.51*  | 1.46*   | -69.98*       |
| N/06-40 x Pusa Meghdoot       | -261.64** | -6.58** | -<br>13.64** | -1.68*       | -2.67*  | 5.61**  | 2.67*   | -7.10**      | -0.54   | -7.46** | 1.59*   | -60.02*       |
| N/06-40 x Narendra Pooja      | -33.78*   | 1.87*   | 5.77**       | 1.15         | 2.31*   | -3.54*  | -5.38** | 5.97**       | 0.70    | -2.26*  | -0.69*  | 159.19**      |

|                             |           |         |         |         |         |         |         |         |         |         |         |          |
|-----------------------------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| N/06-40 x Punjab Round      | 56.36*    | -1.81*  | -6.64** | 3.04*   | 5.18**  | 1.78    | 2.47*   | -4.16** | -0.60   | 8.64**  | -1.20*  | -18.51   |
| IC 393752 x Pusa Majiri     | -282.32** | 3.27**  | 4.13**  | 3.01*   | 3.56**  | -4.73** | 2.63*   | -       | -3.05** | 0.51    | -1.47*  | -93.57** |
|                             |           |         |         |         |         |         |         | 15.07** |         |         |         |          |
| IC 393752 x Pusa Meghdoot   | -226.48** | 4.46**  | 5.25**  | -1.94*  | 2.45*   | -4.32** | -5.42** | -2.32*  | -1.88*  | -9.47** | 0.91*   | -23.36*  |
| IC 393752 x Narendra Pooja  | 287.10**  | -1.36   | -3.49** | 1.61*   | -0.75   | 0.28    | -3.32** | 9.59**  | 0.72    | 7.05**  | -0.91*  | -42.19*  |
| IC 393752 x Punjab Round    | -204.71** | -1.69*  | -0.03   | -1.71*  | -1.05   | -1.64   | -3.36** | -6.24** | -3.59** | -5.00** | 6.59**  | -        |
|                             |           |         |         |         |         |         |         |         |         |         |         | 109.69** |
| SEA-83 x Pusa Majiri        | 340.08**  | -4.52** | -3.29** | 1.64*   | 4.45**  | 1.87    | 1.13    | 7.94**  | 6.97**  | 8.80**  | -1.76** | 240.32** |
| SEA-83 x Pusa Meghdoot      | -62.02*   | -7.67** | -8.05** | 3.20**  | -3.82** | -4.91** | -3.35** | 6.27**  | 3.19**  | 2.99*   | -0.38   | 84.28**  |
| SEA-83 x Narendra Pooja     | -125.33** | 5.13**  | -0.36   | 1.19    | 1.63*   | 1.76    | 0.12    | -7.31** | -1.78*  | -1.64*  | 0.51*   | -85.94** |
| SEA-83 x Punjab Round       | 71.01*    | -0.51   | 7.97**  | 4.58**  | 5.87**  | -3.94*  | -3.72** | 7.98**  | 1.99*   | 5.36**  | -1.58*  | 6.26     |
| IC 371745 x Pusa Majiri     | 281.36**  | 0.33    | -4.11** | 0.23    | -1.04   | 7.13**  | 4.75**  | 1.28    | 2.77*   | -7.38** | 1.37*   | 18.89    |
| IC 371745 x Pusa Meghdoot   | -247.39** | 0.09    | 2.09*   | 3.38**  | -0.88   | 0.36    | -0.58   | 2.01*   | -2.81*  | 7.18**  | -1.38*  | -2.90    |
| IC 371745 x Narendra Pooja  | 40.64*    | 0.15    | -0.20   | 2.54*   | 2.78*   | -6.16** | -4.84** | 8.13**  | 0.76    | 2.78*   | -0.51   | 107.25** |
| IC 371745 x Punjab Round    | -124.63** | -7.73** | -3.99** | -0.48   | -3.26** | -3.14*  | -4.21** | -3.93** | 0.11    | -0.42   | -0.54*  | -24.85*  |
| Avinash IV x Pusa Majiri    | 404.87**  | 2.46*   | -0.41   | -0.25   | 3.65**  | 0.56    | 0.47    | 16.35** | 0.68    | 3.93**  | -1.48*  | -15.46   |
| Avinash IV x Pusa Meghdoot  | -267.83** | 1.54*   | -0.81   | -0.26   | -6.32** | -1.50   | 2.62*   | -       | -2.33*  | -5.91** | 0.18    | 115.76** |
|                             |           |         |         |         |         |         |         | 13.07** |         |         |         |          |
| Avinash IV x Narendra Pooja | -67.48*   | 1.10    | -1.40   | -0.66   | 0.03    | -2.85*  | -6.17** | 2.61*   | -3.23** | 1.84*   | -0.25   | -49.92*  |
| Avinash IV x Punjab Round   | -133.13** | 4.41**  | 6.49**  | -9.06** | -8.16** | -5.27** | -2.77*  | -3.01** | 2.14*   | -2.06*  | 0.45    | 43.85*   |
| IC 92362 x Pusa Majiri      | 212.44**  | 1.21    | 0.62    | 1.99*   | -0.52   | 8.03**  | 5.65**  | 6.03**  | 0.79    | 3.34**  | -0.50   | -17.82   |
| IC 92362 x Pusa Meghdoot    | 342.75**  | 5.45**  | 5.31**  | -8.69** | -       | -4.43** | 0.11    | 16.53** | 6.03**  | -       | -0.81*  | 118.59** |
|                             |           |         |         |         | 10.16** |         |         |         |         | 11.44** |         |          |
| IC 92362 x Narendra Pooja   | -317.60** | 3.99**  | 3.39**  | 3.56**  | 6.63**  | 0.42    | 1.16    | -       | -1.88*  | 4.49**  | -0.04   | -47.06*  |
|                             |           |         |         |         |         |         |         | 11.41** |         |         |         |          |
| IC 92362 x Punjab Round     | 107.44*   | -5.42** | 1.51*   | -3.66** | -1.32   | -4.08** | -1.55*  | -0.08   | -2.53** | 1.05    | -0.38   | -42.61*  |

**Supplementary Table 3.** Estimates of mid-parent heterosis and heterobeltiosis

| Crosses | DMF        |                 | DFF        |                 | SR         |                 | SB         |                 | VL         |                 |
|---------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
|         | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis |
| 1 X 1   | -19.826    | -23.013         | -24.481    | -28.627         | -14.316    | -19.038         | 19.22      | 10.609          | -9.965     | -24.022         |
| 1 X 2   | -7.895     | -12.134         | -8.982     | -10.588         | -57.958    | -70.055         | 62.068     | 30.556          | -12.396    | -35.301         |
| 1 X 3   | -17.345    | -19.247         | -17.358    | -20.364         | -23.586    | -36.373         | 10.113     | -8.757          | -0.091     | -13.54          |
| 1 X 4   | -9.049     | -17.992         | -18.816    | -24.706         | 129.789    | 124.148         | -34.562    | -40.195         | -30.623    | -44.66          |
| 2 X 1   | 0.448      | -0.885          | 1.895      | -2.419          | 27.889     | 26.206          | -7.803     | -11.126         | -3.833     | -7.081          |
| 2 X 2   | 2.483      | 0.442           | 0.81       | 0.403           | -60.159    | -72.352         | 45.997     | 14.131          | 9.821      | -4.239          |
| 2 X 3   | 1.762      | 1.316           | -5.927     | -10.545         | -48.477    | -55.482         | 35.993     | 16.468          | 56.504     | 46.921          |
| 2 X 4   | -1.244     | -8.673          | 1.974      | -4.194          | 16.282     | 14.015          | -36.2      | -39.458         | 25.708     | 21.208          |
| 3 X 1   | 5.287      | 3.373           | -1.222     | -3.504          | -47.986    | -52.47          | 43.384     | 24.837          | 13.787     | 6.146           |
| 3 X 2   | -2.685     | -3.806          | -0.215     | -1.837          | -59.579    | -70.566         | 91.607     | 63.376          | 34.252     | 20.916          |
| 3 X 3   | 9.209      | 5.377           | -8.203     | -14.378         | -39.551    | -51.072         | 7.031      | -16.008         | -1.236     | -10.386         |
| 3 X 4   | 9.307      | 4.151           | 12.421     | 7.697           | -24.431    | -28.798         | -10.515    | -23.164         | 62.979     | 62.978          |
| 4 X 1   | 13.389     | 11.327          | 4.24       | 1.623           | 24.098     | 20.045          | -25.564    | -28.9           | -14.409    | -18.79          |
| 4 X 2   | -13.082    | -14.083         | -2.012     | -3.407          | -73.719    | -82.22          | 107.181    | 52.897          | 75.331     | 42.253          |
| 4 X 3   | -9.505     | -12.68          | -11.307    | -17.113         | 57.564     | 41.807          | -48.272    | -52.309         | -1.945     | -4.21           |
| 4 X 4   | 9.921      | 4.736           | -1.234     | -5.573          | 26.813     | 18.862          | -52.405    | -53.814         | 13.688     | 1.015           |
| 5 X 1   | -13.621    | -15.319         | 8.038      | 4.69            | -14.232    | -22.973         | 14.816     | 10.552          | 53.483     | 36.739          |
| 5 X 2   | -7.121     | -9.555          | 3.463      | 2.622           | -65.337    | -77.456         | 78.11      | 32.158          | 56.535     | 47.713          |
| 5 X 3   | -20.035    | -20.21          | -11.172    | -16.502         | 22.976     | 19.236          | -41.069    | -46.082         | 50.149     | 30.313          |
| 5 X 4   | -21.368    | -27.721         | -16.904    | -21.025         | -23.913    | -33.614         | -62.677    | -63.485         | 71.472     | 63.166          |
| 6 X 1   | -7.149     | -7.568          | -1.462     | -4.324          | -28.757    | -32.207         | 37.035     | 36.775          | 34.69      | 31.256          |
| 6 X 2   | -13.23     | -14.207         | -0.045     | -1.061          | -54.012    | -69.162         | 34.711     | 2.439           | 0.562      | -12.965         |

|        |         |         |         |         |         |         |         |         |         |                 |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------|
| 6 X 3  | -14.364 | -15.491 | -18.628 | -23.658 | -14.325 | -21.696 | -34.914 | -42.362 | -17.945 | -22.33          |
| 6 X 4  | 8.734   | 1.387   | 14.118  | 8.672   | 69.503  | 56.375  | -29.977 | -30.982 | 8.372   | 3.614           |
| 7 X 1  | -2.467  | -5.385  | 2.454   | -1.115  | -22.546 | -25.673 | -5.886  | -9.304  | 43.829  | Heterobeltiosis |
| 7 X 2  | -7.902  | -11.248 | -1.049  | -1.451  | -54.055 | -67.588 | 95.836  | 53.124  | 21.417  | -24.022         |
| 7 X 3  | -5.463  | -6.675  | -6.019  | -11.316 | 5.644   | -10.87  | -16.231 | -28.276 | -10.945 | -35.301         |
| 7 X 4  | 4.939   | -4.479  | 7.558   | 1.828   | -26.475 | -27.122 | 20.117  | 13.951  | 41.472  | -13.54          |
| 8 X 1  | -10.882 | -16.846 | -3.295  | -6.664  | -17.268 | -19.639 | 27.583  | 12.867  | -1.95   | -44.66          |
| 8 X 2  | 2.238   | -5.209  | 1.576   | 1.163   | -52.384 | -66.652 | 97.516  | 65.877  | 22.215  | -7.081          |
| 8 X 3  | -7.851  | -12.567 | -5.341  | -10.676 | -2.242  | -16.667 | -2.194  | -22.194 | 8.113   | -4.239          |
| 8 X 4  | 10.408  | -3.067  | 12.823  | 6.811   | -33.051 | -33.298 | 33.967  | 16.847  | 10.289  | 46.921          |
| 9 X 1  | -2.599  | -12.782 | 3.338   | 0.95    | -27.854 | -35.248 | 17.657  | 16.377  | 13.413  | 21.208          |
| 9 X 2  | 13.243  | 2.023   | -0.19   | -1.813  | -38.044 | -59.719 | -6.415  | -28.198 | 20.504  | 6.146           |
| 9 X 3  | 16.557  | 2.754   | -2.472  | -9.033  | -10.073 | -12.748 | 31.87   | 15.486  | -2.711  | 20.916          |
| 9 X 4  | 12.765  | 7.479   | -0.526  | -4.706  | 174.32  | 139.199 | -25.274 | -27.27  | -11.778 | -10.386         |
| 10 X 1 | 16.353  | 7.891   | 16.796  | 14.48   | -56.857 | -61.929 | 89.061  | 32.59   | 13.411  | 62.978          |
| 10 X 2 | -2.983  | -9.465  | 0.97    | -4.776  | -60.251 | -70.311 | 116.931 | 91.988  | 25.833  | -18.79          |
| 10 X 3 | -16.115 | -23.474 | -23.659 | -31.571 | -1.699  | -22.739 | 7.454   | -29.655 | 17.128  | 42.253          |
| 10 X 4 | 7.958   | 6.833   | -1.45   | -1.45   | -32.133 | -38.329 | 51.354  | 5.159   | 10.251  | -4.21           |

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| Crosses | FL          |                 | FG         |                 | D1H        |                 | D3H        |                 | AFW        |                 |
|---------|-------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
|         | Mid-Parent  | Heterobeltiosis | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis |
| 1 X 1   | 17.163      | -6.925          | 0.676      | -8.509          | 16.55      | 16.225          | 5.32       | 2.197           | 29.02      | 23.461          |
| 1 X 2   | 41.084      | 5.086           | 20.834     | 19.247          | -4.499     | -5.505          | -31.886    | -36.315         | 82.895     | 32.07           |
| 1 X 3   | 34.889      | 28.081          | 44.676     | 43.519          | -4.386     | -5.463          | -28.76     | -31.921         | 67.938     | 60.568          |
| 1 X 4   | -<br>32.548 | -36.92          | 5.624      | 2.005           | 4.746      | 4.013           | -21.03     | -26.553         | -38.56     | -41.449         |
| 2 X 1   | -7.311      | -28.736         | 38.1       | 22.131          | -10.436    | -14.005         | -26.514    | -26.628         | 9.398      | 0.573           |
| 2 X 2   | -<br>40.734 | -57.116         | 38.163     | 32.334          | 5.661      | 0.692           | -15.132    | -18.2           | -5.744     | -33.659         |
| 2 X 3   | 21.647      | 20.706          | 35.641     | 32.63           | -10.021    | -12.415         | -26.772    | -27.807         | 54.315     | 53.852          |
| 2 X 4   | 11.791      | 0.322           | 59.24      | 58.492          | -1.221     | -4.254          | -25.791    | -28.863         | 49.432     | 36.838          |
| 3 X 1   | 99.343      | 66.41           | 7.268      | 3.981           | 0.214      | -6.474          | -25.039    | -25.76          | 73.768     | 71.211          |
| 3 X 2   | 83.749      | 43.037          | 45.874     | 38.17           | -1.203     | -8.463          | -20.78     | -24.463         | 132.984    | 71.453          |
| 3 X 3   | -<br>18.976 | -27.459         | 55.934     | 44.782          | 5.245      | -0.466          | -17.373    | -19.436         | 11.388     | 3.53            |
| 3 X 4   | -5.404      | -5.888          | 66.208     | 50.52           | 3.225      | -2.774          | -14.598    | -19.007         | 67.158     | 63.999          |
| 4 X 1   | 33.555      | 2.5             | 18.58      | 10.48           | -2.1       | -4.311          | -25.415    | -29.521         | 80.027     | 63.367          |
| 4 X 2   | -<br>20.968 | -42.903         | 14.783     | 13.201          | -10.691    | -13.372         | -25.356    | -26.765         | 13.515     | -20.759         |
| 4 X 3   | -<br>39.831 | -40.145         | 40.229     | 35.443          | -11.942    | -12.72          | -36.911    | -39.477         | -26.414    | -27.24          |
| 4 X 4   | -<br>22.893 | -30.96          | -4.492     | -10.127         | 7.96       | 6.547           | -8.006     | -9.236          | -24.67     | -31.906         |
| 5 X 1   | 64.555      | 34.702          | 3.197      | -12.119         | -10.968    | -11.344         | -33.517    | -34.169         | 50.97      | 37.205          |
| 5 X 2   | 50.687      | 15.27           | 29.133     | 18.642          | 3.968      | 2.726           | -17.156    | -19.504         | 55.672     | 24.111          |
| 5 X 3   | -<br>39.212 | -44.355         | 49.359     | 39.956          | 4.304      | 3.276           | -22.852    | -23.312         | -2.404     | -17.94          |
| 5 X 4   | 65.741      | 60.923          | 46.063     | 40.466          | 11.803     | 11.18           | -12.314    | -15.267         | 109.544    | 91.183          |

|        |             |         |         |         |         |         |         |         |         |         |
|--------|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 6 X 1  | 51.67       | 39.631  | -5.968  | -9.833  | -10.417 | -12.515 | -34.449 | -35.124 | 31.475  | 25.755  |
| 6 X 2  | 54.944      | 31.675  | 62.873  | 44.188  | 5.932   | 2.664   | -16.92  | -19.235 | 181.091 | 115.377 |
| 6 X 3  | 57.168      | 28.034  | 21.03   | 5.194   | 15.73   | 14.608  | -15.124 | -15.588 | 104.597 | 80.157  |
| 6 X 4  | -1.586      | -11.223 | -13.674 | -26.67  | -7.374  | -8.665  | -30.834 | -33.132 | -11.995 | -15.475 |
| 7 X 1  | 71.659      | 63.04   | -18.933 | -21.58  | 3.816   | 0.958   | -16.088 | -16.337 | 15.507  | 14.734  |
| 7 X 2  | 97.515      | 72.644  | -9.424  | -19.172 | -1.165  | -4.614  | -25.241 | -27.846 | 90.562  | 40.978  |
| 7 X 3  | 5.182       | -16.461 | 8.517   | -4.943  | 8.101   | 6.595   | -22.816 | -23.801 | 18.627  | 9.43    |
| 7 X 4  | 67.844      | 47.033  | -10.166 | -23.112 | -0.2    | -2.01   | -20.388 | -23.581 | 34.958  | 33.481  |
| 8 X 1  | 65.591      | 49.705  | -13.973 | -23.224 | 1.03    | -3.029  | -28.025 | -30.309 | 42.866  | 22.329  |
| 8 X 2  | 28.966      | 7.822   | 37.025  | 32.566  | 6.882   | 1.822   | -19.103 | -24.518 | 93.641  | 62.876  |
| 8 X 3  | -<br>23.647 | -36.816 | 54.396  | 52.523  | 2.536   | -0.226  | -24.694 | -28.187 | 16.289  | -7.319  |
| 8 X 4  | -6.207      | -13.845 | 4.316   | 2.76    | 2.153   | -1.017  | -23.139 | -28.661 | 3.956   | -10.666 |
| 9 X 1  | 14.216      | 10.216  | 17.871  | 10.717  | -2.699  | -8.205  | -23.662 | -24.481 | 14.93   | 5.572   |
| 9 X 2  | 72.102      | 52.606  | 14.466  | -0.549  | -5.515  | -11.514 | -22.44  | -26.124 | 109.584 | 65.641  |
| 9 X 3  | -<br>18.634 | -36.159 | 19.389  | 1.886   | -7.139  | -11.208 | -32.033 | -33.802 | 21.77   | 3.376   |
| 9 X 4  | -<br>17.582 | -28.813 | -9.287  | -24.297 | -6.554  | -11.017 | -21.307 | -25.449 | -7.285  | -14.497 |
| 10 X 1 | 61.618      | 30.1    | -12.631 | -13.466 | -0.939  | -4.15   | -15.902 | -18.178 | 35.383  | 22.695  |
| 10 X 2 | 19.674      | -9.808  | -6.84   | -13.55  | -13.04  | -16.493 | -28.291 | -32.782 | 32.937  | -7.277  |
| 10 X 3 | -17.72      | -23.156 | 0.896   | -8.177  | 6.272   | 4.258   | -16.488 | -19.985 | -7.483  | -8.653  |
| 10 X 4 | 9.548       | 4.161   | 14.897  | 2.049   | -10.474 | -12.544 | -20.698 | -26.057 | 45.501  | 31.355  |

Continued...

| Crosses | FFT        |                 | FYPP       |                 |
|---------|------------|-----------------|------------|-----------------|
|         | Mid-Parent | Heterobeltiosis | Mid-Parent | Heterobeltiosis |
| 1 X 1   | -5.983     | -13.538         | 56.094     | 40.614          |
| 1 X 2   | 11.465     | 10.308          | 62.756     | 17.119          |
| 1 X 3   | 46.553     | 37.306          | 127.153    | 124.203         |
| 1 X 4   | -13.985    | -19.105         | 16.451     | -9.74           |
| 2 X 1   | 45.839     | 41.159          | 39.047     | 34.457          |
| 2 X 2   | -0.783     | -4.956          | 59.054     | 20.22           |
| 2 X 3   | 16.347     | 14.852          | 150.516    | 135.636         |
| 2 X 4   | 34.108     | 32.92           | 151.635    | 106.465         |
| 3 X 1   | 4.338      | 4.067           | 74.064     | 61.835          |
| 3 X 2   | 41.701     | 31.892          | 121.945    | 63.228          |
| 3 X 3   | 35.389     | 33.055          | -2.601     | -4.667          |
| 3 X 4   | 48.379     | 45.24           | 126.99     | 80.443          |
| 4 X 1   | 15.225     | 5.21            | 68.864     | 51.641          |
| 4 X 2   | 21.365     | 19.175          | 88         | 34.994          |
| 4 X 3   | 47.164     | 36.873          | 30.572     | 28.429          |
| 4 X 4   | 1.081      | -5.632          | 43.518     | 10.961          |
| 5 X 1   | 0.918      | -8.575          | 158.914    | 122.975         |
| 5 X 2   | 29.55      | 26.133          | 102.899    | 78.389          |
| 5 X 3   | 11.303     | 2.692           | 38.502     | 10.424          |
| 5 X 4   | 8.938      | 0.886           | 271.877    | 262.589         |
| 6 X 1   | -3.899     | -5.868          | 79.978     | 77.393          |
| 6 X 2   | 69.391     | 54.311          | 149.927    | 95.451          |
| 6 X 3   | 18.062     | 13.406          | 95.689     | 76.061          |

|        |         |         |         |         |
|--------|---------|---------|---------|---------|
| 6 X 4  | -11.257 | -15.088 | 67.126  | 42.608  |
| 7 X 1  | -4.972  | -14.227 | 92.813  | 71.87   |
| 7 X 2  | -2.204  | -17.355 | 158.772 | 119.944 |
| 7 X 3  | -0.177  | -11.487 | 40.877  | 15.818  |
| 7 X 4  | -17.452 | -27.064 | 139.699 | 124.929 |
| 8 X 1  | 2.139   | -5.093  | 36.847  | 14.728  |
| 8 X 2  | 27.174  | 27.077  | 122.129 | 100.979 |
| 8 X 3  | 38.157  | 30.813  | 51.888  | 18.242  |
| 8 X 4  | 18.379  | 12.519  | 43.922  | 42.918  |
| 9 X 1  | 19.217  | 15.136  | 8.919   | -2.43   |
| 9 X 2  | 33.769  | 28.424  | 141.781 | 104.558 |
| 9 X 3  | 28.023  | 26.092  | 35.706  | 12.061  |
| 9 X 4  | 3.579   | 2.427   | 20.977  | 12.93   |
| 10 X 1 | -10.389 | -14.727 | 69.85   | 61.759  |
| 10 X 2 | 0.443   | -10.901 | 79.421  | 34.177  |
| 10 X 3 | -14.772 | -20.418 | 53.031  | 46.121  |
| 10 X 4 | -6.137  | -12.685 | 20.674  | -2.199  |