**Supplemental Table 1.** Results of rank-based ANOVA type analyses of Aphanomyces root rot ratings of pea and lentil. Main effects were analyzed in SAS (version 9.4, SAS Institute Inc. 2014) with the macros *F2\_LD­\_F1* (for combined data sets) and *F1\_LD­\_F1* (for individual data sets) developed by Brunner and Langer (1999) based on relative effects (p̂*ij*). Simple linear contrasts were specified with the mixed model procedure using the ANOVAF option and the minimum variance quadratic unbiased estimation of the covariance parameters method (MIVQUE0) as described by Brunner (2001).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Species | Experimental |  | ANOVA-type statistics (ATS) | | | |
|  | Run |  | *df*N | *df*D | ATS | *P* value |
| Pea | Combined | Experimental run (E) | 2 | 11.417 | 22.95 | 0.00011 |
|  |  | Genotype (G) | 1.75 | 11.417 | 14.99 | 0.00084 |
|  |  | G x E | 3.49 | 11.417 | 0.51 | 0.6934 |
|  |  | Concentration (C) | 3.14 | ∞ | 74.3 | <.0001 |
|  |  | E x C | 4.9153 | ∞ | 5.21 | <.0001 |
|  |  | G x C | 5.12 | 38.9 | 1.26 | 0.27944 |
|  |  | E x G x C | 7.4751 | 38.9 | 1.03 | 0.40681 |
|  |  | 100 vs 500 | 1 | 14.8 | 10.32 | 0.0013 |
|  |  | 500 vs 1,000 | 1 | 14.9 | 5.81 | 0.0159 |
|  |  | 1,000 vs 5,000 | 1 | 17.2 | 39.19 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | 12.6 | 5.38 | 0.0203 |
|  |  | USDA vs CDC Meadow at 100 | 1 | 12 | 2.33 | 0.1269 |
|  |  | USDA vs CDC Meadow at 500 | 1 | 11.2 | 6.7 | 0.0097 |
|  |  | USDA vs CDC Meadow at 1,000 | 1 | 8.19 | 6.89 | 0.0087 |
|  |  | USDA vs CDC Meadow at 5,000 | 1 | 9.71 | 9.79 | 0.0018 |
|  |  | USDA vs CDC Meadow at 10,000 | 1 | 6.9 | 1.68 | 0.195 |
|  | 1 | Genotype (G) | 1.2934 | 2.8671 | 0.48859 | 0.58366 |
|  |  | Concentration (C) | 2.4253 | ∞ | 31.95 | <0.0001 |
|  |  | G x C | 3.4607 | ∞ | 0.94554 | 0.427 |
|  |  | 100 vs 500 | 1 | ∞ | 3.6 | 0.0577 |
|  |  | 500 vs 1,000 | 1 | 18.5 | 0.16 | 0.6912 |
|  |  | 1,000 vs 5,000 | 1 | 12.7 | 21.23 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | 25.5 | 10.74 | 0.001 |
|  |  | USDA vs MN313 | 1 | 29 | 3.64 | 0.0564 |
|  |  | USDA vs CDC Meadow | 1 | 29 | 0.28 | 0.598 |
|  |  | USDA vs CDC Meadow at 100 | 1 | ∞ | 0.26 | 0.6112 |
|  |  | USDA vs CDC Meadow at 500 | 1 | ∞ | 1 | 0.3173 |
|  |  | USDA vs CDC Meadow at 1,000 | 1 | 9.41 | 0.01 | 0.9029 |
|  |  | USDA vs CDC Meadow at 5,000 | 1 | ∞ | 5.04 | 0.0247 |
|  |  | USDA vs CDC Meadow at 10,000 | 1 | ∞ | 0 | 1 |
|  | 2 | Genotype (G) | 1.9892 | 8.9031 | 13.42 | 0.00207 |
|  |  | Concentration (C) | 3.1811 | ∞ | 33.984 | <0.0001 |
|  |  | G x C | 4.3007 | ∞ | 3.0116 | 0.01454 |
|  |  | 100 vs 500 | 1 | 3.05 | 3.06 | 0.08 |
|  |  | 500 vs 1,000 | 1 | 4.2 | 2.65 | 0.1039 |
|  |  | 1,000 vs 5,000 | 1 | 18.7 | 26.16 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | 45 | 2.56 | 0.1094 |
|  |  | USDA vs MN313 | 1 | 4.81 | 14.47 | 0.0001 |
|  |  | USDA vs CDC Meadow | 1 | 45 | 25.34 | <.0001 |
|  |  | USDA vs CDC Meadow at 100 | 1 | 45 | 1.9 | 0.1678 |
|  |  | USDA vs CDC Meadow at 500 | 1 | ∞ | 16.73 | <.0001 |
|  |  | USDA vs CDC Meadow at 1,000 | 1 | 4.84 | 9.11 | 0.0025 |
|  |  | USDA vs CDC Meadow at 5,000 | 1 | 45 | 12.62 | 0.0004 |
|  |  | USDA vs CDC Meadow at 10,000 | 1 | 15.2 | 0 | 1 |
|  | 3 | Genotype (G) | 1.7283 | 6.8475 | 6.531 | 0.02829 |
|  |  | Concentration (C) | 2.607 | ∞ | 13.454 | <0.0001 |
|  |  | G x C | 4.0223 | ∞ | 0.46711 | 0.76098 |
|  |  | 100 vs 500 | 1 | ∞ | 10.81 | 0.001 |
|  |  | 500 vs 1,000 | 1 | ∞ | 0.55 | 0.4583 |
|  |  | 1,000 vs 5,000 | 1 | ∞ | 7.35 | 0.0067 |
|  |  | 5,000 vs 10,000 | 1 | ∞ | 0.01 | 0.9265 |
|  |  | USDA vs MN313 | 1 | ∞ | 4.6 | 0.0319 |
|  |  | USDA vs CDC Meadow | 1 | ∞ | 20.93 | <.0001 |
|  |  | USDA vs CDC Meadow at 100 | 1 | ∞ | 8.25 | 0.0041 |
|  |  | USDA vs CDC Meadow at 500 | 1 | ∞ | 5.42 | 0.0199 |
|  |  | USDA vs CDC Meadow at 1,000 | 1 | ∞ | 3.13 | 0.0769 |
|  |  | USDA vs CDC Meadow at 5,000 | 1 | ∞ | 0.33 | 0.5683 |
|  |  | USDA vs CDC Meadow at 10,000 | 1 | ∞ | 1.54 | 0.2141 |
| Lentil | Combined | Experimental run (E) | 1.9566 | 23.083 | 38.953 | < 0.0001 |
|  |  | Genotype (G) | 2.8815 | 23.083 | 9.5389 | 0.00031 |
|  |  | G x E | 5.1362 | 23.083 | 4.7762 | 0.00364 |
|  |  | Concentration (C) | 3.0253 | ∞ | 118.59 | < 0.0001 |
|  |  | E x C | 5.3477 | ∞ | 9.305 | < 0.0001 |
|  |  | G x C | 7.2284 | ∞ | 1.2093 | 0.2924 |
|  |  | E x G x C | 10.576 | ∞ | 1.0674 | 0.38358 |
|  |  | 100 vs 500 | 1 | 22 | 10.39 | 0.0013 |
|  |  | 500 vs 1,000 | 1 | 29.6 | 0.08 | 0.7758 |
|  |  | 1,000 vs 5,000 | 1 | 27.6 | 109.09 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | 21.9 | 5.37 | 0.0204 |
|  |  | IG72815 vs L01-827A | 1 | 16 | 0.62 | 0.4315 |
|  |  | IG72815 vs Eston and CDC Proclaim | 1 | 18.5 | 2.31 | 0.1287 |
|  |  | L01-827A vs Eston and CDC Proclaim | 1 | 18.9 | 5.77 | 0.0163 |
|  | 1 | Genotype (G) | 2.1484 | 5.0169 | 1.6069 | 0.29098 |
|  |  | Concentration (C) | 1.8918 | ∞ | 74.059 | < 0.0001 |
|  |  | G x C | 3.6913 | ∞ | 0.69997 | 0.58063 |
|  |  | 100 vs 500 | 1 | ∞ | 6.84 | 0.0089 |
|  |  | 500 vs 1,000 | 1 | ∞ | 7.79 | 0.0053 |
|  |  | 1,000 vs 5,0000 | 1 | ∞ | 41.02 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | ∞ | 1 | 0.3173 |
|  |  | IG72815 vs L01-827A | 1 | ∞ | 0 | 0.9854 |
|  |  | IG72815 vs Eston | 1 | ∞ | 3.26 | 0.071 |
|  |  | IG72815 vs CDC Proclaim | 1 | ∞ | 1.52 | 0.2174 |
|  |  | L01-827A vs Eston | 1 | ∞ | 6.12 | 0.0134 |
|  |  | L01-827A vs CDC Proclaim | 1 | ∞ | 1.94 | 0.1636 |
|  | 2 | Genotype (G) | 2.3031 | 8.2537 | 10.394 | 0.00476 |
|  |  | Concentration (C) | 2.4881 | ∞ | 26.707 | <0.0001 |
|  |  | G x C | 5.4671 | ∞ | 1.9814 | 0.07132 |
|  |  | 100 vs 500 | 1 | 18.4 | 10.27 | 0.0014 |
|  |  | 500 vs 1,000 | 1 | 31.4 | 3.34 | 0.0677 |
|  |  | 1,000 vs 5,0000 | 1 | 38.7 | 24.37 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | 46.6 | 9.52 | 0.002 |
|  |  | IG72815 vs L01-827A | 1 | 23.1 | 0.02 | 0.8759 |
|  |  | IG72815 vs Eston | 1 | 59 | 0.02 | 0.8913 |
|  |  | IG72815 vs CDC Proclaim | 1 | 4.7 | 31.92 | <.0001 |
|  |  | L01-827A vs Eston | 1 | . | 0 | 0.9684 |
|  |  | L01-827A vs CDC Proclaim | 1 | 7.23 | 25.77 | <.0001 |
|  | 3 | Genotype (G) | 2.6239 | 9.8767 | 4.4959 | 0.03394 |
|  |  | Concentration (C) | 3.288 | ∞ | 19.956 | <0.0001 |
|  |  | G x C | 4.9815 | ∞ | 0.53265 | 0.75108 |
|  |  | 100 vs 500 | 1 | 58 | 2.18 | 0.1401 |
|  |  | 500 vs 1,000 | 1 | 60 | 0.02 | 0.8884 |
|  |  | 1,000 vs 5,0000 | 1 | 60 | 28.02 | <.0001 |
|  |  | 5,000 vs 10,000 | 1 | ∞ | 0.06 | 0.803 |
|  |  | IG72815 vs L01-827A | 1 | 9.97 | 1.33 | 0.2484 |
|  |  | IG72815 vs Eston | 1 | 60 | 12.79 | 0.0003 |
|  |  | IG72815 vs CDC Proclaim | 1 | 60 | 0.06 | 0.8138 |
|  |  | L01-827A vs Eston | 1 | 4.57 | 3.8 | 0.0513 |
|  |  | L01-827A vs CDC Proclaim | 1 | 6.72 | 1.13 | 0.2883 |