Supplemental Table 1. ANOVA table showing sources of variation and P values for rice variables from weed-free plots.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Tiller number at midseason  | Shoot biomass at midseason  | Mid-season height | Harvest height  | Emergence to heading | Grain yield |
| Source of variation | no. m-2 | g m-2 | cm | cm | days | kg ha−1 |
|  | P value | P value | P value | P value | P value | P value |
| Cultivar | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Seeding rate  | <0.0001 | 0.0011 | 0.0117 | 0.1238 | <0.0001 | 0.4184 |
| Cultivar\* Seeding rate | <0.0001 | <0.0001 | 0.0009 | <0.0001 | 0.0061 | 0.0057 |

Supplemental Table 2. ANOVA table showing sources of variation and P values for percent reduction of rice growth traits in weedy plots.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Tiller number at midseason  | Shoot biomass at midseason  |  | Mid-season height | Harvest height  | Emergence to heading | Grain yield |
| Source of variation | % reduction | % reduction |  | % reduction | % reduction | % reduction | % reduction |
|  | P value | P value |  | P value | P value | P value | P value |
| Cultivar | 0.1977 | 0.3194 |  | 0.8502 | 0.7070 | 0.0010 | 0.0272 |
| Seeding rate  | 0.0521 | 0.1327 |  | 0.1582 | 0.0012 | 0.7948 | <0.0001 |
| Cultivar\* Seeding rate | 0.5916 | 0.6464 |  | 0.5542 | 0.0878 | 0.4277 | 0.4956 |

Supplemental Table 3. ANOVA table showing sources of variation and P values for rice variables from weed-infested and weed-free plots at three seeding rates.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Tiller number, midseason  | Shoot biomass, midseason  | Early season height  |  | Mid-season height | Harvest height  | Emergence to heading | Grain yield |
| Source of variation | no. m-2 | g m-2 | cm |  | cm | cm | days | kg ha−1 |
|  | P value | P value | P value |  | P value | P value | P value |  |
| Cultivar | 0.0061 | 0.0001 | <0.0001 |  | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Seeding rate  | 0.0010 | 0.0420 | 0.1251 |  | 0.8721 | 0.1441 | <0.0001 | 0.0002 |
| Weed level | <0.0001 | <0.0001 | 0.7362 |  | 0.0990 | <0.0001 | 0.7371 | <0.0001 |
| Cultivar\* Seeding rate | 0.3622 | 0.5354 | 0.6491 |  | 0.7682 | 0.3982 | 0.2963 | 0.0394 |
| Cultivar\* Weed level | 0.1783 | 0.8435 | 0.1783 |  | 0.9231 | 0.8935 | 0.0669 | 0.3195 |
| Seeding rate \* Weed level | 0.1441 | 0.3775 | 0.8794 |  | 0.4156 | 0.0033 | 0.9269 | 0.0002 |
| Cultivar\*Seeding rate\* Weed level | 0.7012 | 0.8263 | 0.8671 |  | 0.8923 | 0.1652 | 0.9377 | 0.6818 |

Supplemental Table 4. ANOVA table showing sources of variation and P values for barnyardgrass late season (maximum) biomass and weed control ratings.

|  |  |  |
| --- | --- | --- |
|  | Barnyardgrass biomass; late season  | Weed control rating  |
| Source of variation | g m-2 | % |
|  | P value | P value |
| Cultivar | 0.7397 | <0.0001 |
| Seeding rate  | 0.0003 | <0.0001 |
| Cultivar\* Seeding rate | 0.6563 | 0.0851 |

Supplemental Table 5. Correlations and probability values for selected variables from this studya.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | By Variable | Correlation | Count | Lower 95% | Upper 95% | Significance probability |
|  |  |  |  |  |  |  |
| Emergence to rice heading, weedy | Emergence to rice heading, weed-free | 0.976 | 120 | 0.966 | 0.983 | <0.0001 |
| Rice harvest height, weedy | Visual weed control rating | 0.722 | 119 | 0.623 | 0.798 | <0.0001 |
| Rice harvest height, weedy | Rice harvest height, weed-free | 0.398 | 119 | 0.235 | 0.540 | <0.0001 |
| Rice yield in weed-free plots | Emergence to rice heading, weed-free | -0.334 | 119 | -0.485 | -0.164 | <0.0001 |
| Rice yield in weed-free plots | Emergence to rice heading, weedy | -0.376 | 119 | -0.521 | -0.210 | <0.0001 |
| Rice yield in weed-free plots | Rice harvest height, weed-free | 0.501 | 119 | 0.353 | 0.625 | <0.0001 |
| Rice yield in weed-free plots | Rice harvest height, weedy | 0.239 | 118 | 0.061 | 0.403 | 0.009 |
| Rice yield in weedy plots | Visual weed control rating | 0.853 | 118 | 0.794 | 0.895 | <0.0001 |
| Rice yield in weedy plots | Emergence to rice heading, weed-free | -0.266 | 118 | -0.426 | -0.090 | 0.004 |
| Rice yield in weedy plots | Emergence to rice heading, weedy | -0.322 | 118 | -0.475 | -0.150 | <0.0001 |
| Rice yield in weedy plots | Rice harvest height, weedy | 0.783 | 118 | 0.702 | 0.844 | <0.0001 |
| Rice yield in weedy plots | Rice yield in weed-free plots | 0.281 | 117 | 0.105 | 0.440 | 0.002 |
| Rice shoot biomass, weed-free mid-season  | Emergence to rice heading, weed-free | -0.413 | 120 | -0.552 | -0.253 | <0.0001 |
| Rice shoot biomass, weed-free mid-season  | Emergence to rice heading, weedy | -0.366 | 120 | -0.512 | -0.200 | <0.0001 |
| Rice shoot biomass, weed-free mid-season  | Rice harvest height, weed-free | 0.279 | 120 | 0.105 | 0.436 | 0.002 |
| Rice shoot biomass, weed-free mid-season  | Rice yield in weed-free plots | 0.306 | 119 | 0.134 | 0.461 | 0.001 |
| Rice shoot biomass, weedy mid-season  | Visual weed control rating | 0.584 | 120 | 0.452 | 0.691 | <0.0001 |
| Rice shoot biomass, weedy mid-season  | Emergence to rice heading, weed-free | -0.321 | 120 | -0.473 | -0.151 | <0.0001 |
| Rice shoot biomass, weedy mid-season  | Emergence to rice heading, weedy | -0.356 | 120 | -0.503 | -0.189 | <0.0001 |
| Rice shoot biomass, weedy mid-season  | Rice harvest height, weedy | 0.505 | 119 | 0.358 | 0.628 | <0.0001 |
| Rice shoot biomass, weedy mid-season  | Rice yield in weed-free plots | 0.262 | 119 | 0.087 | 0.423 | 0.004 |
| Rice shoot biomass, weedy mid-season  | Rice yield in weedy plots | 0.644 | 118 | 0.525 | 0.739 | <0.0001 |
| Rice shoot biomass, weedy mid-season  | Rice shoot biomass, weed-free mid-season  | 0.448 | 120 | 0.292 | 0.580 | <0.0001 |
| Barnyardgrass biomass, late-season weedy plots | Visual weed control rating | -0.608 | 116 | -0.712 | -0.479 | <0.0001 |
| Barnyardgrass biomass, late-season weedy plots | Rice harvest height, weedy | -0.591 | 115 | -0.699 | -0.458 | <0.0001 |
| Barnyardgrass biomass, late-season weedy plots | Rice yield in weedy plots | -0.525 | 114 | -0.647 | -0.378 | <0.0001 |
| Barnyardgrass biomass, late-season weedy plots | Rice shoot biomass, weed-free mid-season  | 0.289 | 116 | 0.113 | 0.448 | 0.002 |
| Barnyardgrass biomass, late-season weedy plots | Rice shoot biomass, weedy mid-season  | -0.334 | 116 | -0.486 | -0.161 | <0.0001 |
| Difference in rice leaf number between weed-free and weedy plots, early | Difference in rice height between weed-free and weedy plots early | 0.250 | 120 | 0.074 | 0.411 | 0.006 |
| Difference in rice tiller number between weed-free and weedy plots  | Visual weed control rating | -0.381 | 119 | -0.525 | -0.216 | <0.0001 |
| Difference in rice tiller number between weed-free and weedy plots  | Rice harvest height, weedy | -0.359 | 118 | -0.507 | -0.191 | <0.0001 |
| Difference in rice tiller number between weed-free and weedy plots  | Rice yield in weedy plots | -0.291 | 117 | -0.449 | -0.115 | 0.001 |
| Difference in rice tiller number between weed-free and weedy plots  | Rice shoot biomass, weed-free mid-season  | 0.226 | 119 | 0.048 | 0.390 | 0.013 |
| Difference in rice tiller number between weed-free and weedy plots  | Rice shoot biomass, weedy mid-season  | -0.350 | 119 | -0.499 | -0.182 | <0.0001 |
| Difference in rice tiller number between weed-free and weedy plots  | Barnyardgrass biomass, late-season weedy plots | 0.469 | 115 | 0.313 | 0.601 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, mid-season  | Rice harvest height, weedy | -0.319 | 119 | -0.472 | -0.147 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, mid-season  | Rice yield in weedy plots | -0.215 | 118 | -0.381 | -0.036 | 0.019 |
| Difference in rice height between weed-free and weedy plots, mid-season  | Barnyardgrass biomass, late-season weedy plots | 0.257 | 116 | 0.078 | 0.420 | 0.005 |
| Difference in rice emergence to heading between weed-free and weedy plots | Emergence to rice heading, weed-free | 0.354 | 120 | 0.187 | 0.502 | <0.0001 |
| Difference in rice emergence to heading between weed-free and weedy plots | Rice harvest height, weedy | 0.274 | 119 | 0.098 | 0.432 | 0.003 |
| Difference in rice emergence to heading between weed-free and weedy plots | Rice shoot biomass, weed-free mid-season  | -0.307 | 120 | -0.461 | -0.135 | 0.001 |
| Difference in rice emergence to heading between weed-free and weedy plots | Barnyardgrass biomass, late-season weedy plots | -0.227 | 116 | -0.393 | -0.046 | 0.014 |
| Difference in rice height between weed-free and weedy plots, harvest | Visual weed control rating | -0.657 | 119 | -0.749 | -0.541 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, harvest | Rice harvest height, weed-free | 0.226 | 119 | 0.047 | 0.390 | 0.014 |
| Difference in rice height between weed-free and weedy plots, harvest | Rice harvest height, weedy | -0.804 | 119 | -0.859 | -0.729 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, harvest | Rice yield in weedy plots | -0.715 | 118 | -0.793 | -0.614 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, harvest | Rice shoot biomass, weedy mid-season  | -0.460 | 119 | -0.591 | -0.306 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, harvest | Barnyardgrass biomass, late-season weedy plots | 0.605 | 115 | 0.474 | 0.709 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, harvest | Difference in rice tiller number between weed-free and weedy plots  | 0.340 | 118 | 0.169 | 0.490 | <0.0001 |
| Difference in rice height between weed-free and weedy plots, harvest | Difference in rice height between weed-free and weedy plots, mid-season  | 0.311 | 119 | 0.139 | 0.465 | 0.001 |
| Difference in rice height between weed-free and weedy plots, harvest | Difference in rice emergence to heading between weed-free and weedy plots | -0.247 | 119 | -0.408 | -0.070 | 0.007 |
| Difference in rice yield between weed-free and weedy plots | Visual weed control rating | -0.791 | 117 | -0.850 | -0.711 | <0.0001 |
| Difference in rice yield between weed-free and weedy plots | Rice harvest height, weedy | -0.691 | 117 | -0.775 | -0.582 | <0.0001 |
| Difference in rice yield between weed-free and weedy plots | Rice yield in weedy plots | -0.893 | 117 | -0.925 | -0.850 | <0.0001 |
| Difference in rice yield between weed-free and weedy plots | Rice shoot biomass, weedy mid-season  | -0.544 | 117 | -0.660 | -0.402 | <0.0001 |
| Difference in rice yield between weed-free and weedy plots | Barnyardgrass biomass, late-season weedy plots | 0.574 | 113 | 0.435 | 0.686 | <0.0001 |
| Difference in rice yield between weed-free and weedy plots | Difference in rice tiller number between weed-free and weedy plots  | 0.317 | 116 | 0.143 | 0.472 | 0.001 |
| Difference in rice yield between weed-free and weedy plots | Difference in rice height between weed-free and weedy plots, mid-season  | 0.234 | 117 | 0.054 | 0.398 | 0.011 |
| Difference in rice yield between weed-free and weedy plots | Difference in rice height between weed-free and weedy plots, harvest | 0.761 | 117 | 0.672 | 0.828 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Visual weed control rating | -0.551 | 120 | -0.665 | -0.413 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Rice harvest height, weedy | -0.449 | 119 | -0.582 | -0.292 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Rice yield in weedy plots | -0.491 | 118 | -0.617 | -0.341 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Rice shoot biomass, weed-free mid-season  | 0.500 | 120 | 0.352 | 0.623 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Rice shoot biomass, weedy mid-season  | -0.551 | 120 | -0.664 | -0.412 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Barnyardgrass biomass, late-season weedy plots | 0.579 | 116 | 0.443 | 0.689 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Difference in rice tiller number between weed-free and weedy plots  | 0.553 | 119 | 0.415 | 0.667 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Difference in rice height between weed-free and weedy plots, mid-season  | 0.216 | 120 | 0.038 | 0.381 | 0.018 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Difference in rice emergence to heading between weed-free and weedy plots | -0.355 | 120 | -0.502 | -0.187 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Difference in rice height between weed-free and weedy plots, harvest | 0.530 | 119 | 0.387 | 0.648 | <0.0001 |
| Difference in rice shoot biomass between weed-free and weedy plots midseason | Difference in rice yield between weed-free and weedy plots | 0.513 | 117 | 0.366 | 0.635 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Visual weed control rating | 0.606 | 56 | 0.408 | 0.750 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Rice harvest height, weedy | 0.508 | 56 | 0.283 | 0.680 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Rice yield in weedy plots | 0.565 | 55 | 0.352 | 0.722 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Rice shoot biomass, weedy mid-season  | 0.571 | 56 | 0.362 | 0.725 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Barnyardgrass biomass, late-season weedy plots | -0.835 | 56 | -0.901 | -0.734 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Difference in rice tiller number between weed-free and weedy plots  | -0.465 | 55 | -0.650 | -0.228 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Difference in rice height between weed-free and weedy plots, harvest | -0.539 | 56 | -0.702 | -0.321 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Difference in rice yield between weed-free and weedy plots | -0.581 | 55 | -0.733 | -0.373 | <0.0001 |
| Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | Difference in rice shoot biomass between weed-free and weedy plots midseason | -0.568 | 56 | -0.723 | -0.358 | <0.0001 |
| Barnyardgrass biomass in weedy-no-rice plots | Rice shoot biomass, weedy mid-season  | 0.270 | 60 | 0.018 | 0.491 | 0.037 |
| Barnyardgrass biomass in weedy-no-rice plots | Difference in barnyardgrass biomass between weedy-no-rice and weedy plots | 0.493 | 56 | 0.264 | 0.669 | <0.0001 |

a These data include only the correlations that resulted in r values >0.2 and P values <0.05.

Supplemental Figure 1. Effect of seeding rate and barnyardgrass presence on yield of five rice cultivars. Values presented on graph are least squares (LS) means for all combinations of seeding rate, barnyardgrass presence, and cultivar. The cultivar x seeding rate x barnyardgrass presence interaction from the main analysis was not significant (P=0.6818). Thus, the ‘No’ barnyardgrass data were obtained from a separate analysis that included only the weed-free rice plots. For this analysis, the cultivar x seeding rate data were sliced by cultivar such that the Tukey-Kramer groupings apply only within individual cultivars. LS means within a cultivar accompanied by the same lowercase letter are not different according to an LS means test at P≤0.05, and values among cultivars cannot be compared directly. The P value for XL 723 was 0.079, and the P values for the remaining four cultivars exceeded 0.450. Note that the “no-barnyardgrass” means for the cultivars at different seeding rates are similar to those presented for rice yield in Table 1. The ‘Yes’ barnyardgrass data were obtained from a separate analysis that included only rice plots containing barnyardgrass. For this analysis, the cultivar x seeding rate data were sliced by cultivar such that the Tukey-Kramer groupings apply only within individual cultivars. Thus, LS means within a cultivar accompanied by the same uppercase letter are not different according to an LS means test at P≤0.05, and values among cultivars cannot be compared directly. P values for Rondo, 4612, PI 312777, Wells and XL 723 were 0.055, 0.764, 0.852, 0.0067, and 0.0002, respectively. Note: these yield trends over the three seeding rates among the five cultivars generally were similar to the trends (P=0.0851) observed for weed control ratings in the same weedy plots (i.e. weed control by PI 312777 and 4612 was relatively unaffected by seeding rate compared with the other cultivars; data not shown).

