**S3 Table.** **Analysis of variance across the irrigation treatments (Trt), parental environment (PE), cultivars (Cul), and their interaction (Cul × Trt × PE) with soybean vegetative growth, development, physiological, and root traits measured at 18 days after sowing (DAS).**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Source | PE | Treatment (Trt) | Cultivar (Cul) | PE × Cul | Trt × Cul | PE × Trt | PE × Trt × Cul |
| Plant parameter |   |   |   |   |   |   |   |
| Seedling emergence, d | \* | \*\* | NS | \* | NS | \* | \* |
| Plant height, cm plant-1 | \* | \* | \*\* | \* | \* | \*\* | \* |
| Node no., plant-1 | NS | NS | NS | NS | NS | NS | NS |
| Leaf area, cm2 plant-1 | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \* | \*\*\* | \*\* |
| Leaf weight, g plant-1 | \*\*\* | \*\*\* | NS | \*\*\* | NS | \*\*\* | NS |
| Stem weight, g plant-1 | \*\*\* | \*\*\* | NS | \*\*\* | NS | \*\*\* | NS |
| Root weight, g plant-1 | \*\*\* | \*\*\* | NS | \*\*\* | NS | \*\*\* | NS |
| Total dry weight, g plant-1 | \*\*\* | \*\*\* | NS | NS | NS | \*\* | NS |
| Root length, cm plant-1 | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\* | \*\*\* | \*\* |
| Root surface area, cm2 plant-1 | \*\*\* | \*\*\* | NS | \*\*\* | NS | \*\*\* | NS |
| Root diameter, mm plant-1 | \* | NS | NS | \* | NS | \* | NS |
| Root volume, mm3 plant-1 | \*\*\* | \*\*\* | NS | \*\*\* | NS | \*\*\* | NS |
| Root tips no., plant-1 | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\*\* |
| Root forks no., plant-1 | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\*\* |
| Root crossings no., plant-1 | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \*\* | \*\*\* | \*\*\* |
| Chlorophyll | NS | NS | NS | NS | NS | NS | NS |
| Flavonoids | NS | \*\* | NS | NS | NS | NS | NS |
| Anthocyanin | NS | NS | NS | NS | NS | NS | NS |
| NBI | NS | \* | NS | NS | NS | NS | NS |
| Photosynthesis, µmol CO2 m-2 s-1 | \*\*\* | \*\*\* | \*\* | \*\*\* | \*\* | \*\*\* | \*\* |
| gs, mol H2O m-2 s-1 | \*\*\* | \*\*\* | \* | \*\*\* | \* | \*\*\* | \* |
| Transpiration, mmol H2O m-2 s-1 | \* | \* | NS | \* | NS | \* | NS |
| Fv/Fm | NS | NS | NS | NS | NS | NS | NS |
| ETR, µmol m-2 s-1 | \*\*\* | \*\*\* | \*\*\* | \*\*\* | \* | \*\*\* | \* |
| Ci/Ca | NS | NS | NS | NS | NS | NS | NS |

¶\*, \*\*, \*\*\* represent Significance levels at P ≤ 0.05, P ≤ 0.01, and P ≤ 0.001. NS represents P > 0.05. Nitrogen balance index (NBI), stomatal conductance (gs), transpiration (E), the ratio of internal to external CO2 concentration (Ci/Ca), fluorescence (Fv/Fm), and electron transport rate (ETR).