Table S1- The first order interaction effects of the irrigation regimes with sowing seasons and nitrogen levels on the proline content

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Nitrogen iii | | | | |  | | Sowing season i | | |  | |  | | |
| N1 | N0 |  | | Spring | | Autumn |  | | Irrigation regime ii | | | |
| 14.9c | 11.9d |  | | 14.1c | | 12.7d |  | | MAD 55% | | | |
| 24.3a | 20.0b |  | | 23.4a | | 20.8b |  | | MAD 85% | | | |
| 0.410 | | | | | | | | | | | |  | LSD 5% |

Means in each column for each experimental factor, followed by similar letter(s) are not significantly different at 5% probability level, using LSD’s test. i Environment: two sowing date in autumn (October 22, 2017) and in spring (March 4, 2018). ii Two irrigation regimes (55% and 85% MAD of ASW, as normal and water stress conditions, respectively). iii Two levels of nitrogen (non-use of nitrogen, N0, and 62.5 kg N ha–1, from urea fertilizer, N1).

Table S2- The first order interaction effects of genotype with sowing seasons, irrigation regimes and nitrogen levels on the proline content

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Nitrogeniii | |  | Irrigationii | |  | Environmenti | | Genotype | |
| N1 | N0 |  | MAD85% | MAD55% |  | Spring | Autumn |
| 19.0g-k | 16.0qr |  | 21.0gh | 14.0l-o |  | 19.5d-g | 15.5s | Mehr | 1 |
| 10.4u | 8.99v |  | 11.2r | 8.1s |  | 9.86u | 9.49u | Khatam | 2 |
| 23.5a | 18.7h-l |  | 25.9a | 16.2j |  | 22.9a | 19.2e-h | Goharan | 3 |
| 19.0g-j | 15.8q-s |  | 21.9e-h | 13.0n-q |  | 18.2g-n | 16.6p-s | Yusef | 4 |
| 18.6i-m | 16.2p-r |  | 22.5c-f | 12.3p-r |  | 18.1h-n | 16.7o-s | Behrokh | 5 |
| 20.5d-f | 15.3rs |  | 23.3b-d | 12.4p-r |  | 18.8f-k | 17.0n-r | Neek | 6 |
| 21.8bc | 17.7k-n |  | 23.8b | 15.7jk |  | 21.6b | 17.9i-p | Nosrat | 7 |
| 20.1d-g | 15.5rs |  | 23.2b-d | 12.4p-r |  | 18.6f-l | 17.1n-r | Fajr30 | 8 |
| 20.7b-e | 17.8j-n |  | 22.3d-g | 16.2j |  | 20.1c-e | 18.4f-m | Reyhan03 | 9 |
| 22.0b | 17.5l-o |  | 25.5a | 14.0l-n |  | 20.8b-d | 18.7f-k | Armaghan | 10 |
| 13.3t | 10.3u |  | 14.4k-m | 9.2s |  | 12.1t | 11.5t | CB-84-10 | 11 |
| 19.5e-i | 16.3o-r |  | 23.1b-e | 12.7o-q |  | 19.2e-h | 16.6q-s | RGT planet | 12 |
| 21.0b-d | 16.0q-s |  | 23.6bc | 13.3m-p |  | 19.2e-i | 17.7k-q | M-92-9 | 13 |
| 21.2b-d | 15.4rs |  | 23.8bc | 12.8n-q |  | 19.1e-i | 17.4l-r | M-93-12 | 14 |
| 20.5c-f | 17.4m-p |  | 22.5c-f | 15.4jk |  | 20.1c-e | 17.8j-q | M-93-14 | 15 |
| 19.0g-k | 16.8n-q |  | 20.7h | 15.1j-l |  | 19.6d-f | 16.2rs | M-93-10 | 16 |
| 24.2a | 20.0d-g |  | 25.9a | 18.3i |  | 23.0a | 21.1bc | M-93-16 | 17 |
| 19.3f-i | 14.7s |  | 22.2d-g | 11.7qr |  | 17.7k-q | 16.3rs | M-94-13 | 18 |
| 18.8h-l | 15.4rs |  | 21.7f-h | 12.4p-r |  | 18.0j-o | 16.2rs | M-94-15 | 19 |
| 19.4f-i | 16.8n-q |  | 23.6bc | 12.6pq |  | 19.1e-j | 17.1m-r | Khasil5 | 20 |
| 19.6 | 15.9 |  | 22.1 | 13.4 |  | 18.8 | 16.7 | Mean |  |
| 1.30 | | | | | | | | | LSD |  |

Means in each column for each experimental factor, followed by similar letter(s) are not significantly different at 5% probability level, using LSD’s test. i Environment: two sowing date in autumn (October 22, 2017) and in spring (March 4, 2018). ii Two irrigation regimes (55% and 85% MAD of ASW, as normal and water stress conditions, respectively). iii Two levels of nitrogen (non-use of nitrogen, N0, and 62.5 kg N ha–1, from urea fertilizer, N1).

Table S3. Analysis of variance (ANOVA) for SSI in the barley genotypes under different sowing seasons and nitrogen levels.

|  |  |  |  |
| --- | --- | --- | --- |
| Mean Square |  | | |
| SSI | | DF | **SOURCE** |
| 0.002ns | | 1 | Environment (E)i |
| 0.001ns | | 4 | Rep (E) |
| 0.002ns | | 1 | Nitrogen (N)ii |
| 0.000ns | | 1 | E\* N |
| 0.001ns | | 4 | N\* Rep (E) |
| 0.093\*\* | | 19 | Genotype (G)iii |
| 0.163\*\* | | 19 | E\* G |
| 0.020\*\* | | 19 | N\* G |
| 0.046\*\* | | 19 | E \* N\* G |
| 20.5 | | 224 | Error |
| 5.30 | |  | CV |

ns Non-significant. \* Significant at the 0.05 probability level. \*\* Significant at the 0.01 probability level. SSI: stress susceptibility index (55% as normal vs 85 MAD% of ASW, as water stress conditions, respectively). i Environment: two sowing dates in autumn (October 22, 2017) and in spring (March 4, 2018). ii Two levels of nitrogen (non-use of nitrogen, N0, and 62.5 kg N ha–1, from urea fertilizer, N1). iii Genotype:20 barley genotypes.