**Supplemental Data. Ramireddy et al., Zn-fortified cereal grains in field-grown barley by enhanced root cytokinin breakdown.**

**Supplemental Table 1.** Morphological and yield-related phenotypes of field-grown transgenic barley plants. n = 60 for plant height and spike number. For the1000-grain-weight six replicates were analyzed for each genotype. Data are means ± SE. Asterisks indicate significant differences from the WT-A as determined by Student´s *t*-test (\*, *p* < 0.05; \*\*, *p* < 0.01, \*\*, *p* < 0.001).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Genotypes** | **Plant height [cm]** | ***t*-test** | **Spike number per plant** | ***t*-test** | **Area** **[m2]** | **Number of plants per plot** | **Grain yield per plot** **[g]** | **Grain yield****[g x m-2]** | **1000-grain-weight** **[g]** | ***t*-test** |
| **WT-A** | 67.67 ±0.42 |  | 8.25 ±0.17 |  | 4.87 | 857 | 3169.52 | 650.56 | 40.54 ±0.18 |  |
| **WT-B** | 69.93 ±0.83 |  | 8.64 ±0.29 |  | 4.91 | 864 | 2773.77 | 565.15 | 41.25 ±0.20 | \*\* |
| ***pEPP:CKX1-4*** | 61.77 ±0.52 | \*\*\* | 10.98 ±0.21 | \*\*\* | 5.90 | 1044 | 3273.03 | 554.38 | 40.37 ±0.43 |  |
| ***pEPP:CKX1-109*** | 67.33 ±0.62 |  | 10.12 ±0.30 | \*\*\* | 5.54 | 981 | 3541.19 | 638.74 | 40.92 ±0.14 |  |
| ***pEPP:CKX2-16*** | 60.63 ±0.67 | \*\*\* | 9.35 ±0.22 | \*\*\* | 5.69 | 1006 | 3140.65 | 549.79 | 41.33 ±0.19 | \* |
| ***pEPP:CKX2-72*** | 59.52 ±0.55 | \*\*\* | 7.93 ±0.21 |  | 5.78 | 1021 | 3173.4 | 552.15 | 39.91 ±0.20 | \*\* |

**Supplemental Table 2. Element concentration in grains of transgenic barley plants.**  Element concentration was analyzed from seeds of field-grown transgenic and wild-type plants. Four biological replicates for each genotype were analyzed, each replicate containing grains from a mix of >100 plants. Bars represent means ± SE. Asterisks indicate significant differences from the WT as determined by Student *t*-test (\*, *p* < 0.05; \*\*, *p* < 0.01, \*\*, *p* < 0.001). Part of the data are shown in Figure 1.

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| --- | --- | --- | --- | --- | --- |
|   | **WT** | ***pEPP:CKX1-4*** | ***pEPP:CKX1-109*** | ***pEPP:CKX2-16*** | ***pEPP:CKX2-72*** |
| **Element****(μg g-1 DW)** | Mean ±SE | Mean ±SE | % WT | *t*-test | Mean ±SE | % WT | *t*-test | Mean ±SE | % WT | *t*-test | Mean ±SE | % WT | *t*-test |
| **B**  | 0.37 ±0.19 | 0.28 ±0.09 | 76 |  | 0.09 ±0.01 | 25 |  | 0.15 ±0.05 | 40 |  | 0.24 ±0.07 | 65 |  |
| **Ca**  | 570 ±20 | 580 ±4 | 101 |  | 520 ±10 | 91 |  | 550 ±10 | 96 |  | 552 ±10 | 97 |  |
| **Cd**  | 0.04 ±0.005 | 0.06 ±0.002 | 139 | \* | 0.05 ±0.006 | 122 |  | 0.06 ±0.004 | 133 | \* | 0.06 ±0.004 | 128 |  |
| **Co**  | 0.02 ±0.004 | 0.02 ±0.01 | 100 |  | 0.01±0.002 | 62 |  | 0.01 ±0.001 | 50 |  | 0.02 ±0.01 | 113 |  |
| **Cu**  | 10.5 ±0.6 | 10.15 ±0.4 | 96 |  | 9.5 ±0.3 | 87 |  | 10 ±0.3 | 92 |  | 11.01 ±0.4 | 102 |  |
| **Fe**  | 56 ±0.5 | 66 ±1 | 116 | \*\*\* | 56 ±0.3 | 100 |  | 54 ±1.2 | 96 |  | 74 ±4.8 | 132 | \* |
| **K**  | 4890 ±50 | 4760 ±40 | 97 |  | 4490 ±80 | 92 | \*\* | 4350 ±60 | 89 | \*\*\* | 5270 ±50 | 108 | \*\*\* |
| **Mg**  | 1240 ±10 | 1340 ±10 | 108 | \*\*\* | 1260 ±10 | 102 |  | 1280 ±10 | 103 |  | 1380 ±10 | 111 | \*\*\* |
| **Mn**  | 10.5 ±0.07 | 13 ±0.12 | 122 | \*\*\* | 11.1 ±0.19 | 105 |  | 11.5 ±0.13 | 109 | \*\* | 14.4 ±0.2 | 136 | \*\*\* |
| **Mo**  | 1.5 ±0.004 | 1.75 ±0.01 | 116 | \*\*\* | 1.45 ±0.01 | 97 | \* | 1.4 ±0.01 | 91 | \*\*\* | 2.2 ±0.03 | 149 | \*\*\* |
| **Na**  | 260 ±10 | 210 ±3 | 80 | \*\*\* | 220 ±10 | 85 | \*\* | 240 ±10 | 92 |  | 200 ±10 | 75 | \*\*\* |
| **Ni**  | 1.29 ±0.4 | 0.75 ±0.07 | 58 |  | 0.51 ±0.04 | 40 |  | 0.5 ±0.02 | 37 |  | 0.7 ±0.06 | 55 |  |
| **P**  | 3450 ±30 | 3510 ±40 | 102 |  | 3480 ±10 | 101 |  | 3390 ±20 | 98 |  | 3930 ±40 | 114 | \*\*\* |
| **Pb**  | 0.34 ±0.02 | 0.35 ±0.04 | 104 |  | 0.43 ±0.05 | 129 |  | 0.37 ±0.04 | 109 |  | 0.42 ±0.07 | 124 |  |
| **S**  | 1470 ±10 | 1500 ±10 | 102 | \* | 1470 ±10 | 100 |  | 1520 ±3 | 103 | \*\* | 1440 ±10 | 98 | \* |
| **Zn**  | 37 ±0.09 | 46 ±0.21 | 124 | \*\*\* | 45 ±0.64 | 122 | \*\*\* | 40 ±0.48 | 108 | \*\* | 48 ±1.16 | 130 | \*\*\* |