

## **Supplementary figures and tables**

**Table S1. Summary statistics of grain protein concentration in an experiment with 369 European elite wheat genotypes evaluated during 3 years**

| Trait          | Year         | Mean  | Min.  | Max.  | Var.  | Median | %CV  | <i>s.d</i> |
|----------------|--------------|-------|-------|-------|-------|--------|------|------------|
| <b>GPC (%)</b> | <b>2015</b>  | 11.85 | 9.90  | 14.15 | 0.404 | 11.84  | 5.36 | 0.64       |
|                | <b>2016</b>  | 10.90 | 9.72  | 13.12 | 0.371 | 10.85  | 5.58 | 0.61       |
|                | <b>2017</b>  | 11.32 | 9.52  | 15.31 | 0.82  | 11.29  | 7.98 | 0.90       |
|                | <b>BLUEs</b> | 11.37 | 10.01 | 13.99 | 0.274 | 11.33  | 4.61 | 0.52       |

Min.: Minimum; Max.: Maximum; Var.: Variance; %CV: coefficient of variation; s.d: standard deviation

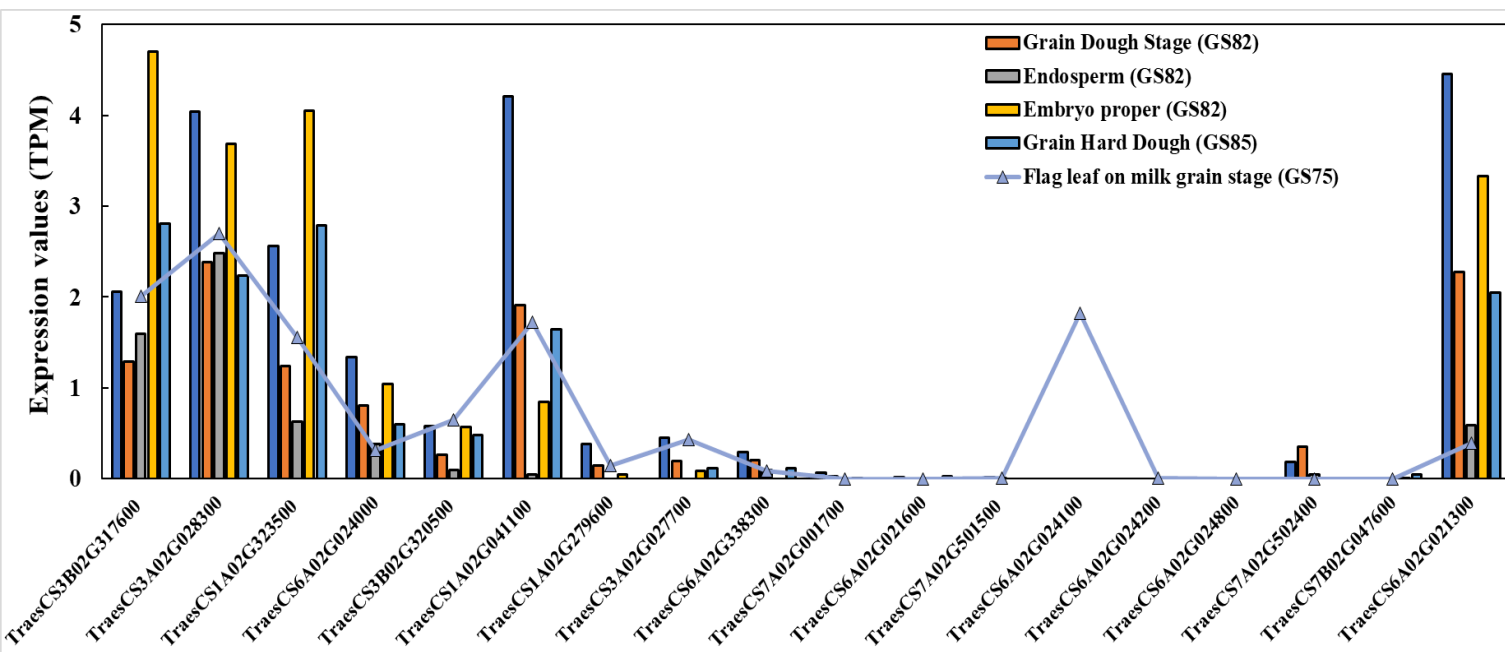
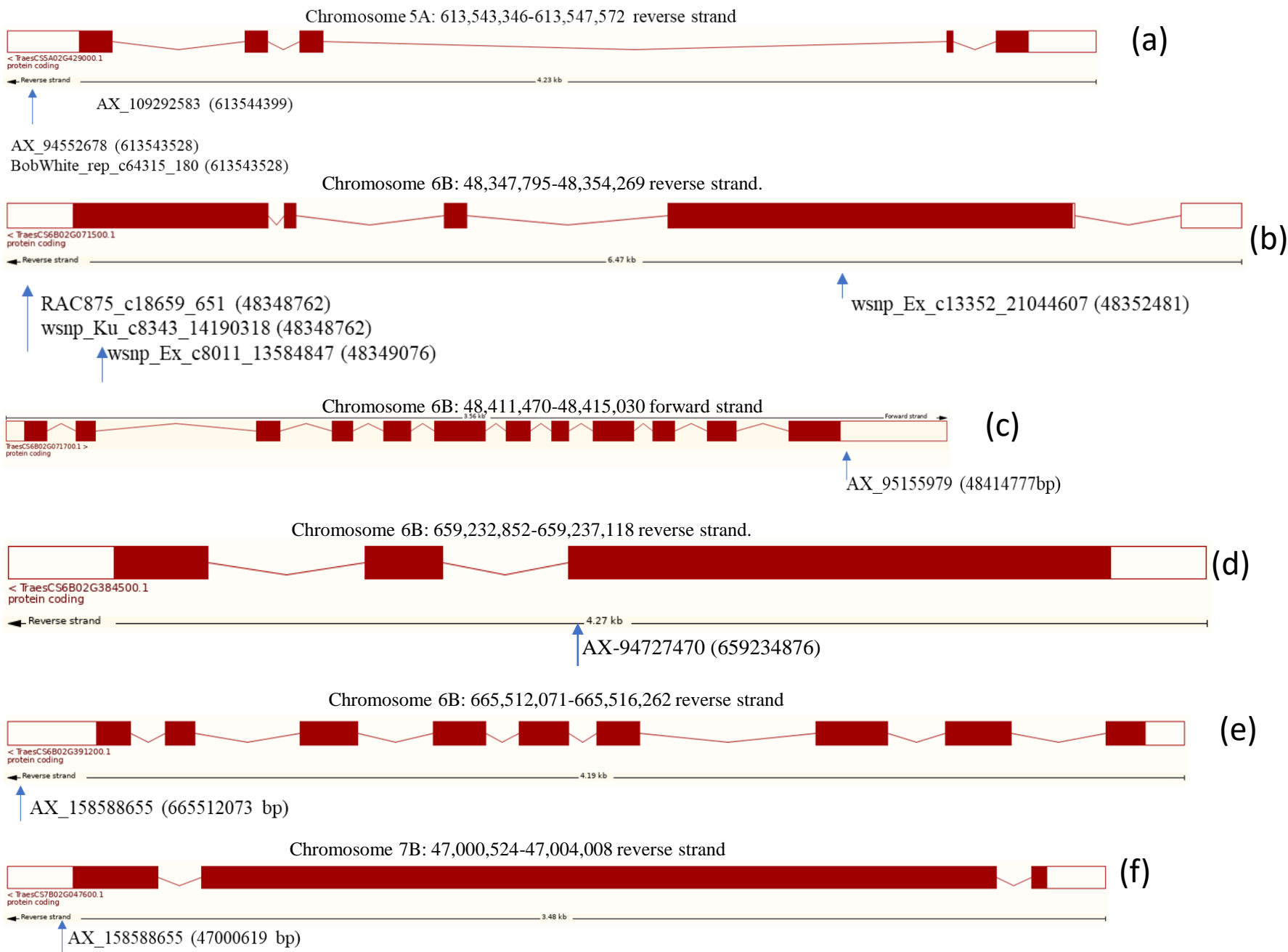
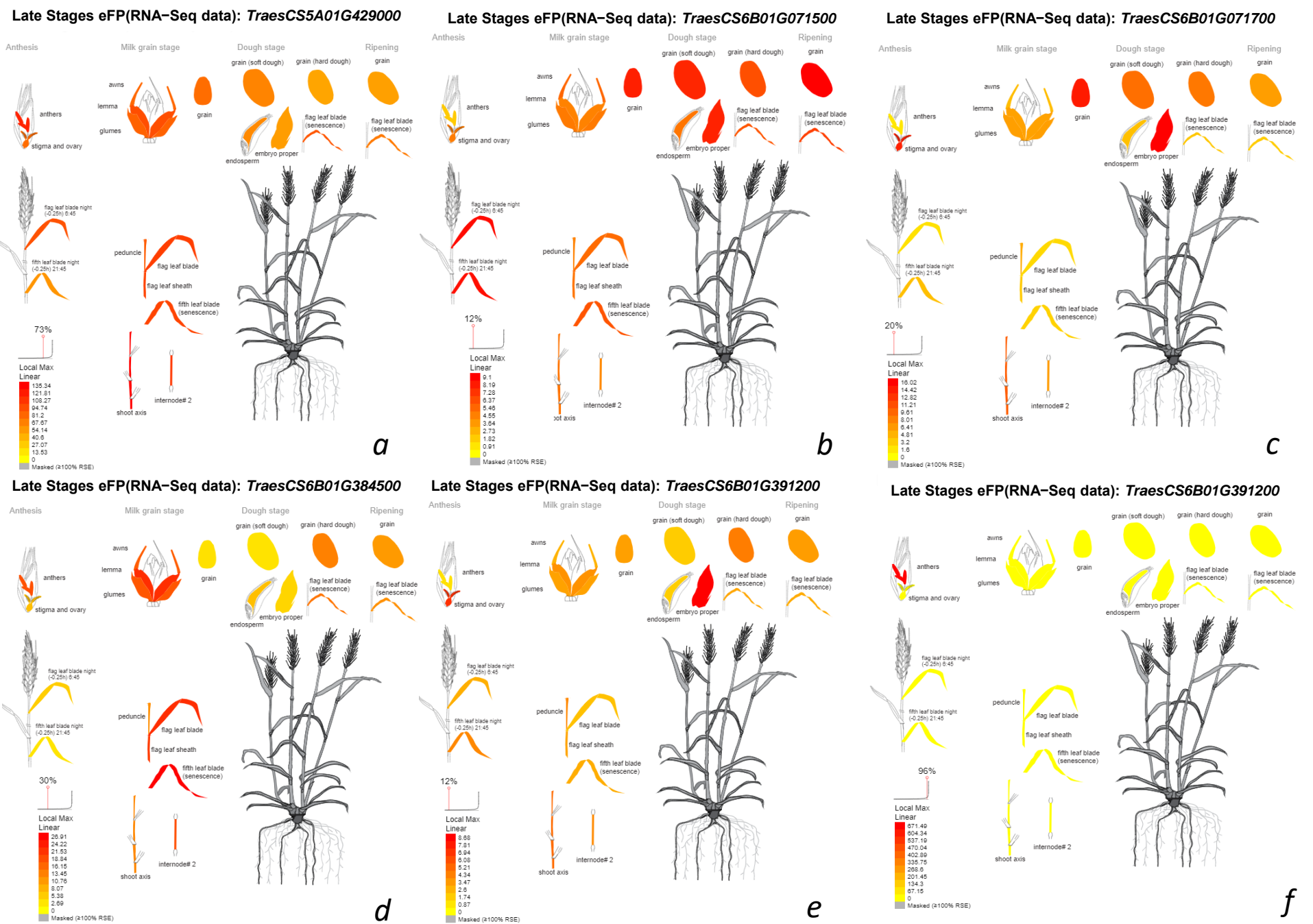


Figure S1. Expression value TPM (Transcripts Per Kilobase Million) of candidate genes in flag leaf (during milk grain stage) and grain development (Milk grain stage, dough stage, endosperm in dough stage, embryo proper in dough stage and grain hard dough)



**Figure S2.** Gene structure and significant QTNs reported (*TraesCS5A02G429000* (a), *TraesCS6B02G071500* (b), *TraesCS6B02G071700* (c), *TraesCS6B02G384500* (d), *TraesCS6B02G391200* (e), *TraesCS7B02G047600* (f) associated with grain protein content in European winter wheat accessions.



**Figure S3. Expression map of the identified gene models (*TraesCS5A02G429000* (a), *TraesCS6B02G071500* (b), *TraesCS6B02G071700* (c), *TraesCS6B02G384500* (d), *TraesCS6B02G391200* (e), *TraesCS7B02G047600* (f) associated with grain protein content in European winter wheat accessions. Adapted from Waese et al. [72]**

