

## *Supplementary Material*

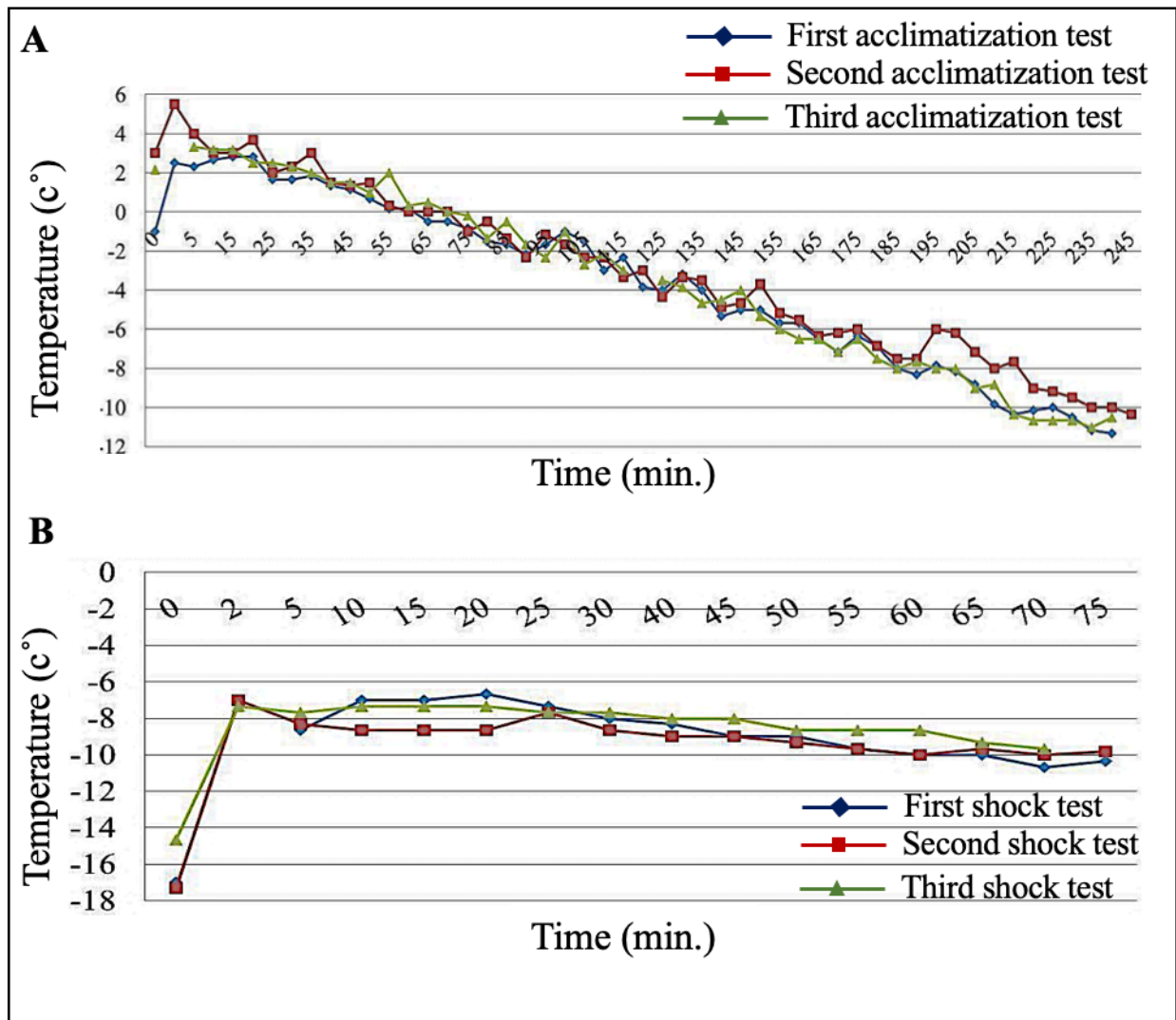
# **Genome-wide association analysis provides insights into the genetic basis of photosynthetic responses to low-temperature stress in spring barley**

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Ammar Elakhdar

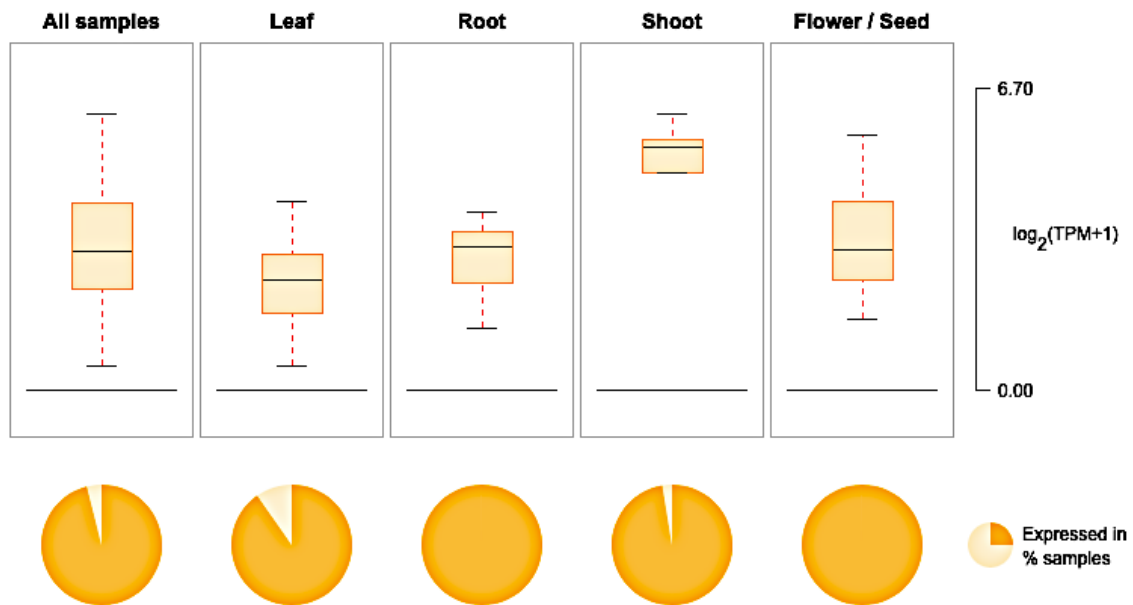
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**Supplementary Figure 1:** Temperature variation during cold acclimation treatment (A) and freezing shock (B) of 96 spring barley lines and 4 winter barley lines at the three-leaf stage.

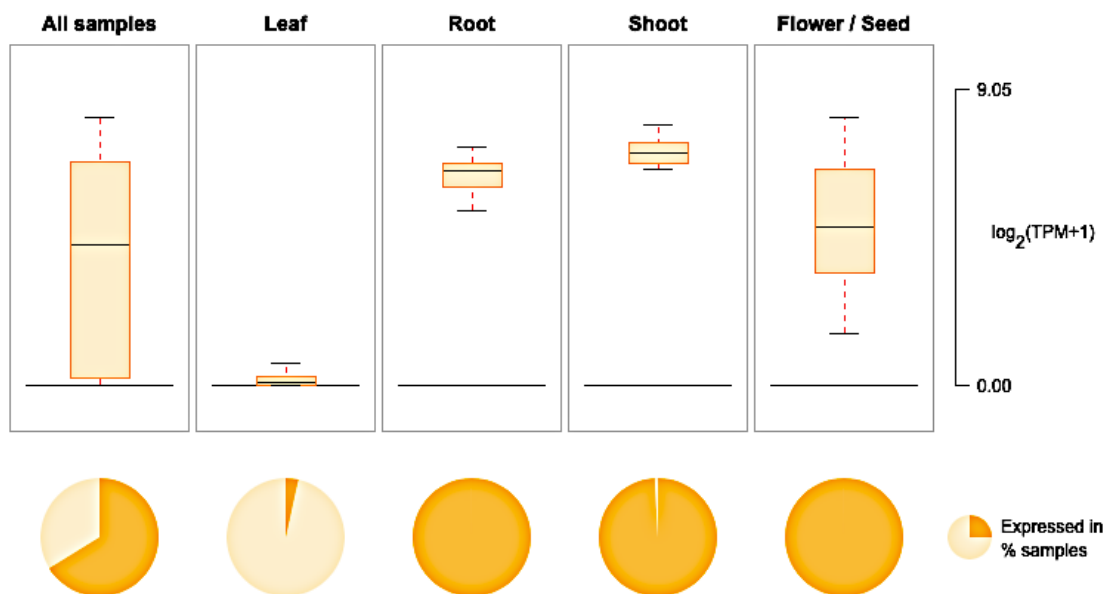
## HORVU1Hr1G087520

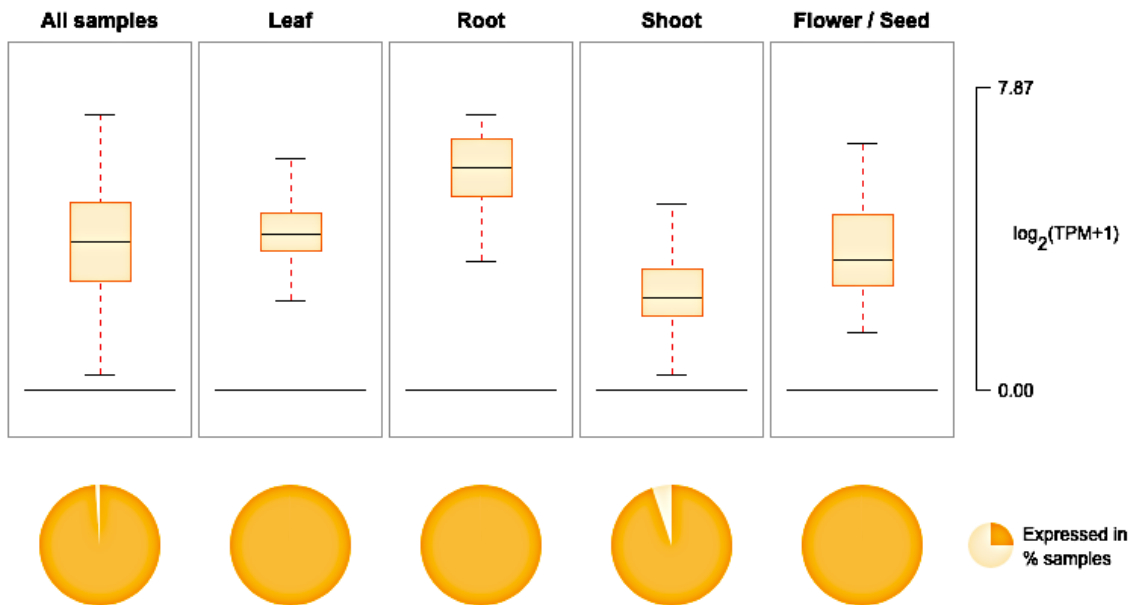
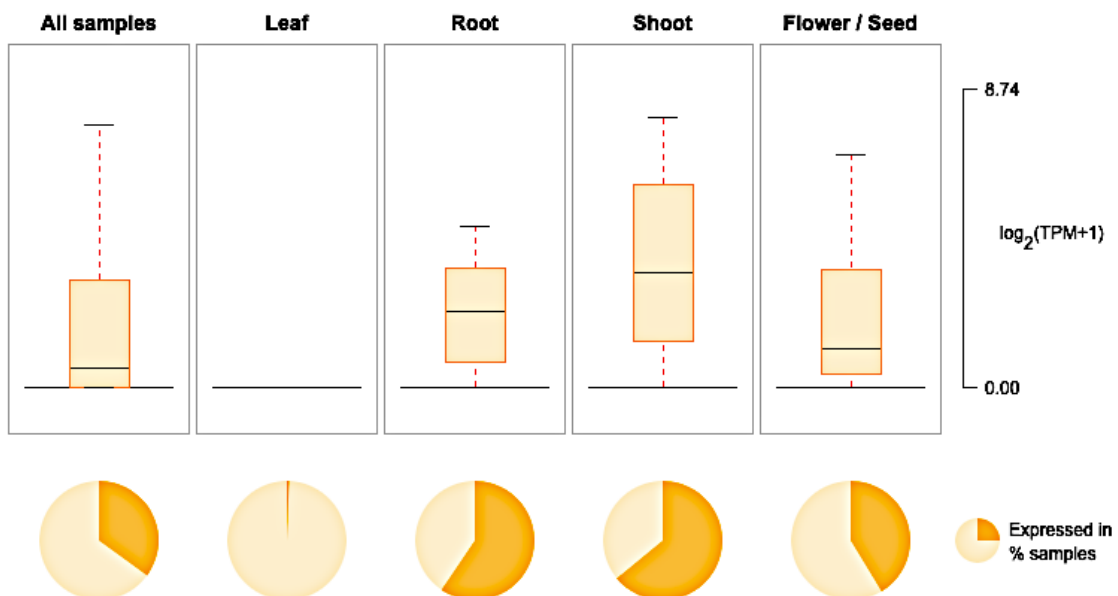
SUMO transferase activity [GO:0019789] | zinc ion binding [GO:0008270]



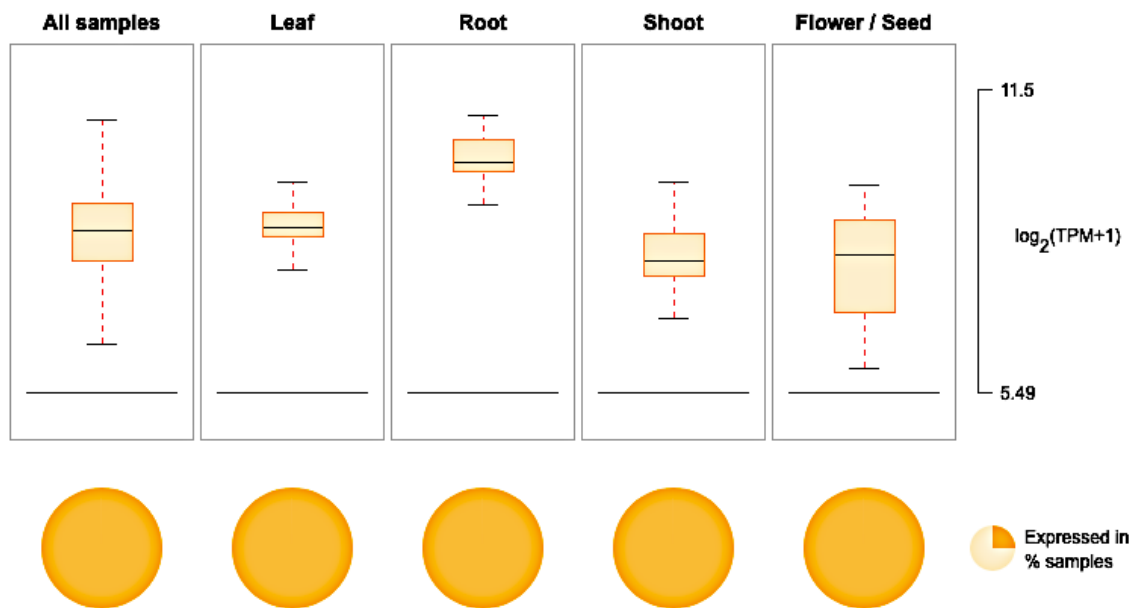
## HORVU3Hr1G071210

hydrolase activity, hydrolyzing O-glycosyl compounds [GO:0004553]

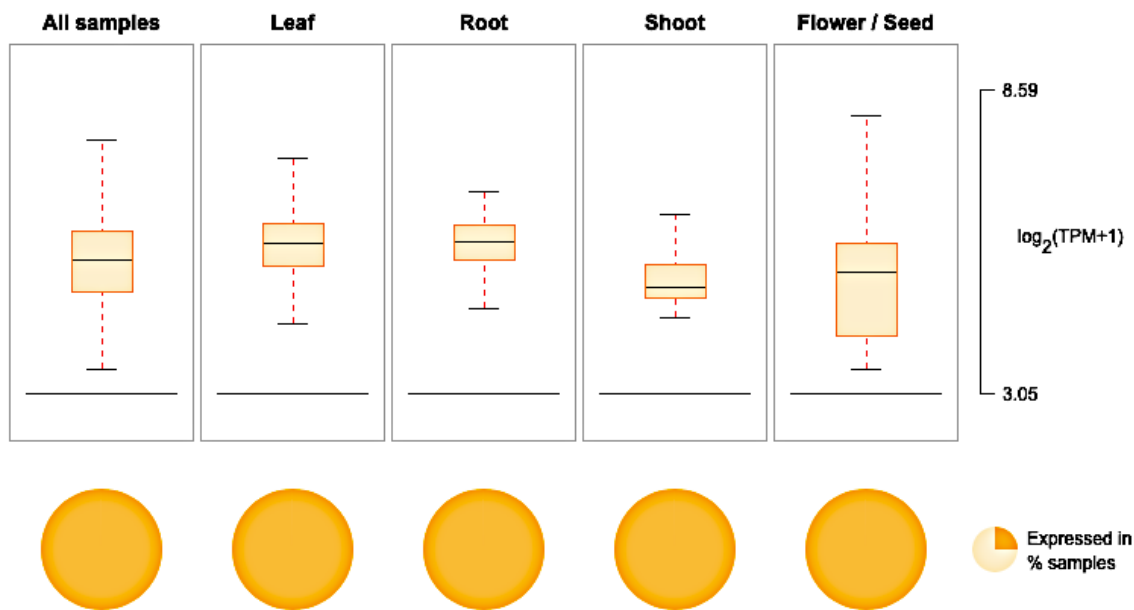


**HORVU3Hr1G071240****ATP binding [GO:0005524] | protein kinase activity [GO:0004672]****HORVU6Hr1G005960****DNA binding [GO:0003677] | protein heterodimerization activity [GO:0046982]**

**HORVU3Hr1G059320**  
**ATP hydrolysis coupled proton transport [GO:0015991]**

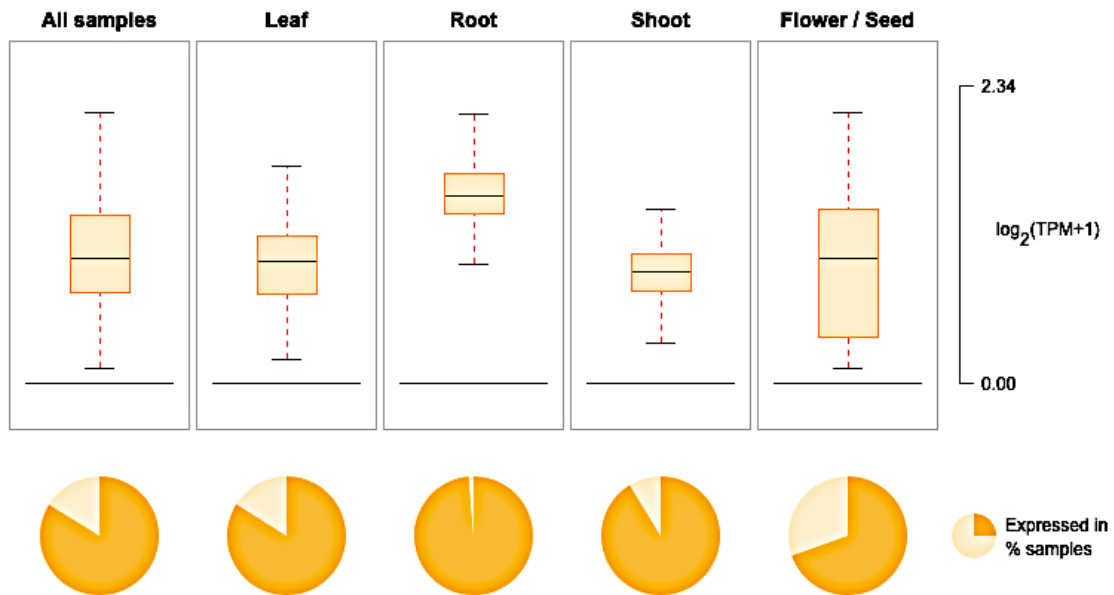


**HORVU3Hr1G061690**  
**Protein DEHYDRATION-INDUCED 19 homolog 3**



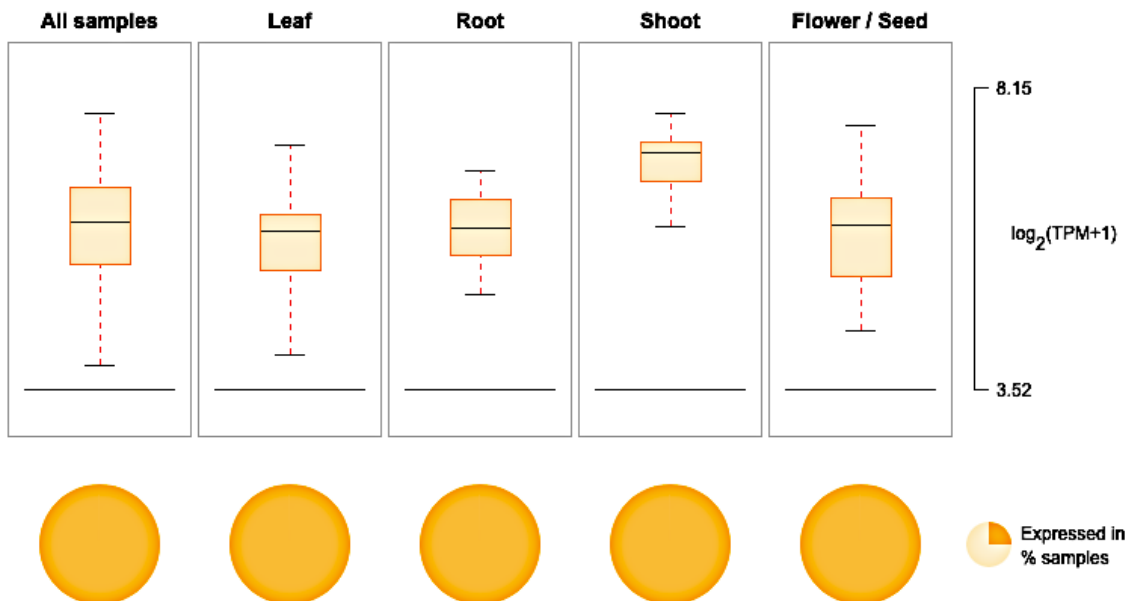
**HORVU3Hr1G062030**

**Rho guanyl-nucleotide exchange factor activity [GO:0005089]**

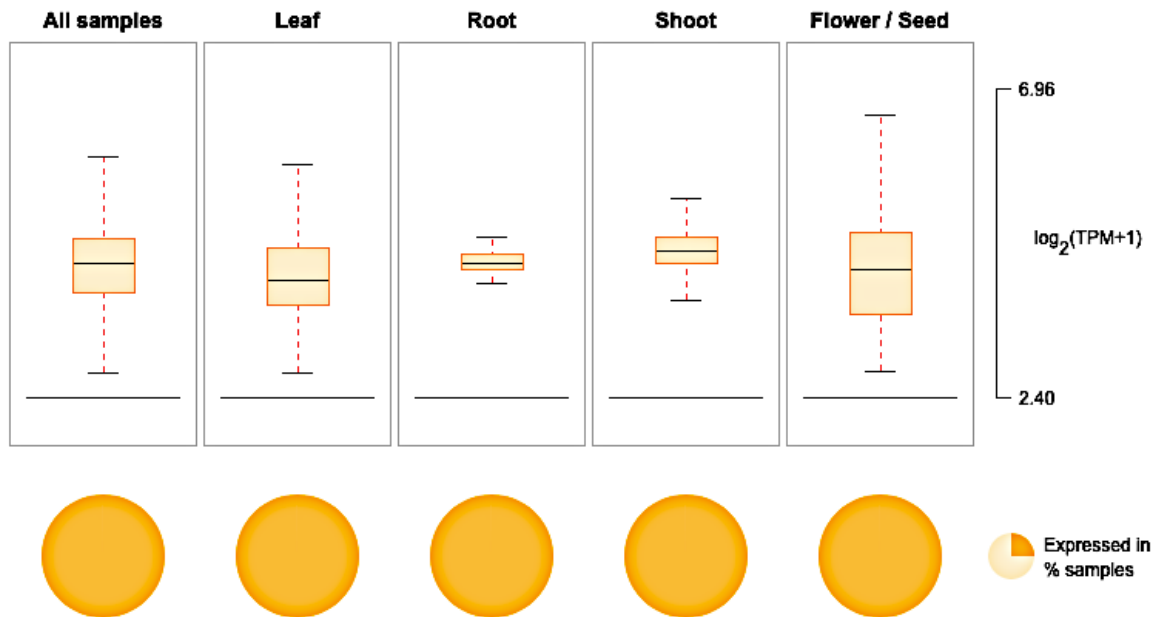


**HORVU3Hr1G063220**

**mRNA splicing, via spliceosome [GO:0000398] | regulation of embryo sac egg cell differentiation [GO:0045694]**



**HORVU1Hr1G085880**  
**signal transduction [GO:0007165]**



**Supplementary Figure 2:** Gene co-expression for the identified genes was revealed from the Global gene co-expression networks (GCNs) database PlantNexus (<https://plantnexus.ohio.edu>).

**Supplementary Table 1.** List of crosses made between spring and winter barley types.

Cross		Spring genotypes		Winter genotypes
3	♀	Meredith	♂	02Ab431
4	♀	AC Metcalfe	♂	02Ab08-X05W061-208
5	♀	TR643	♂	02Ab671
6	♀	TR990	♂	02Ab431
11	♀	TR162	♂	02Ab671
12	♀	TR490	♂	02Ab671
13	♀	TR05912	♂	02Ab08-X05W061-208
14	♀	CDC Reserve	♂	02Ab431
15	♀	Meredith	♂	02Ab08-X05W061-208
16	♀	TR643	♂	02Ab08-X05W061-208
17	♀	TR490	♂	02Ab08-X05W061-208
18	♀	AC Metcalfe	♂	02Ab431
		Winter genotypes		Spring genotypes
1	♀	02Ab669	♂	TR990
2	♀	02Ab431	♂	TR5287
7	♀	02Ab08-X05W061	♂	CDC Reserve
8	♀	02Ab431	♂	AC Metcalfe
9	♀	02Ab431	♂	Benthey
10	♀	02Ab08-X05W061	♂	AC Metcalfe

