

The impact of aphids' herbivory on the expression of subtilisin-like protease genes in maize (*Zea mays* L.) seedlings

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The objective of performed studies was to evaluate the influence of bird cherry-oat aphid (*Rhopalosiphum padi* L.) infestation on the transcriptional responses of subtilisin-like protease genes (LOC100285183, LOC103629592) in the maize (*Zea mays* L.) seedlings.

Materials and methods

The experiments were carried out on 14-day-old seedlings of two maize cultivars (Tasty sweet - susceptible and Ambrozja - relatively resistant) that were artificially infested by 0 (control), 30, 60 and 90 apterous females of *R.padi* per plant. Expression of subtilisin-like protease genes (LOC100285183, LOC103629592) in the leaves of the maize seedlings were monitored at 3, 6, 24, 48, 72 and 96 hrs post initial infestation (hpi). Gene expression quantification was performed using the real-time qRT-PCR technique. The obtained results were normalized to the actin-2 gene, and the relative expression of the subtilisin-like protease gene was assessed by the comparative Ct ($\Delta\Delta Ct$) method.

Results

The accomplished biotests elucidated that the bird cherry-oat aphid infestation resulted in a significant enhancement in the examined subtilisin-like protease (LOC100285183, LOC103629592) transcript levels in the seedling leaves of both examined maize cultivars. However, the aphid-relatively resistant (Ambrozja cv.) maize seedlings characterized with up to 2.5-fold higher upregulation of the tested genes compared with the aphid-susceptible (Tasty Sweet cv.) plants. In addition, the magnitude of the gene expression increases was dependent on the insect abundance and duration of infestation time. The performed survey unveiled the crucial involvement of subtilisin-like protease genes in perception of biotic stress signal linked to the bird cherry-oat aphids' feeding in tissues of maize host plants. (Fig.1-2).



Phot. Infestation of maize seedling leaves by *R.padi* aphids.

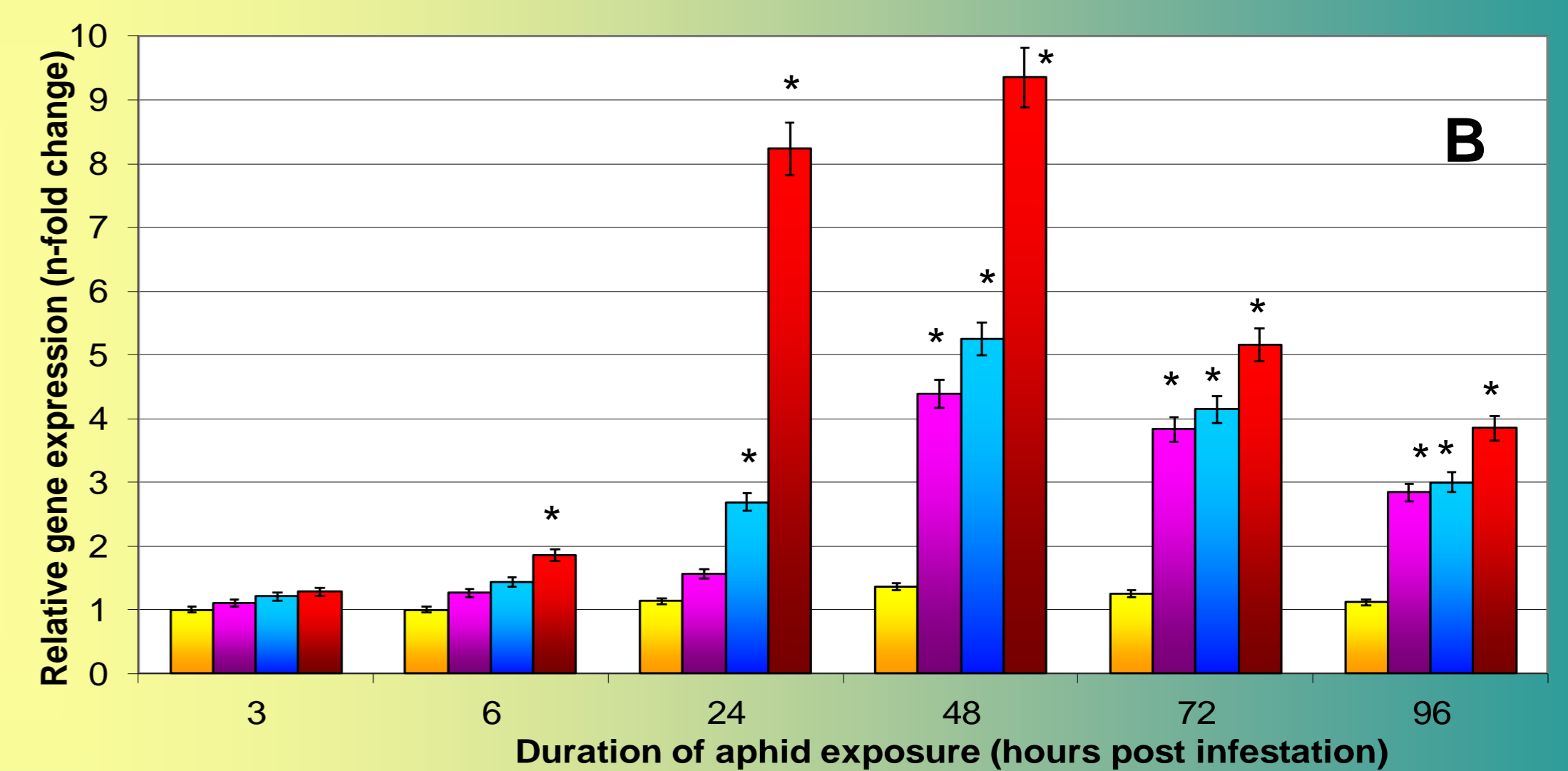
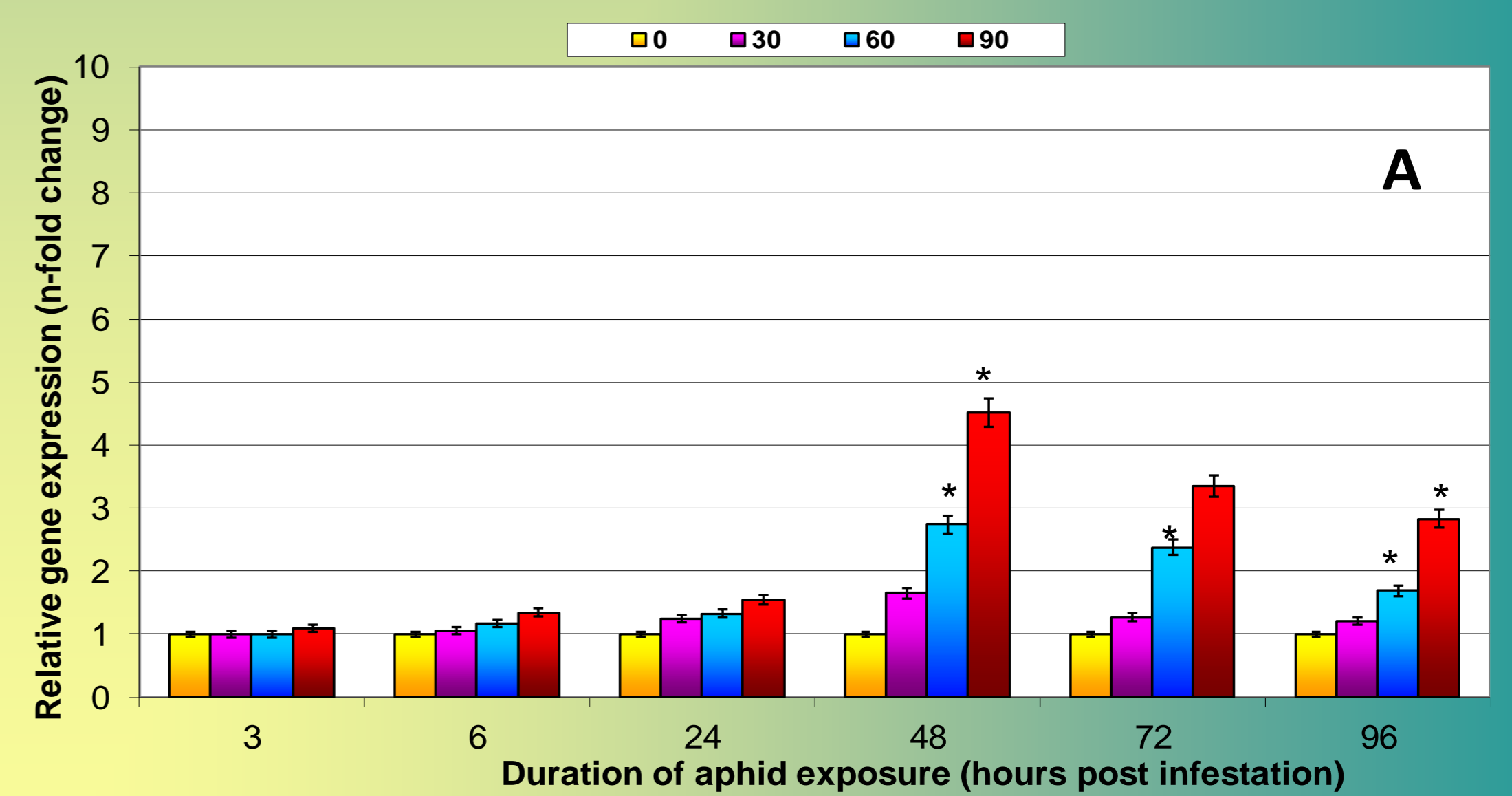


Fig.1. Aphid-induced changes (\pm SD) in levels of relative expression of subtilisin-like protease LOC100285183 gene within the leaves of infested maize seedlings in comparison to the control. A – *R.padi*-susceptible Tasty Sweet cv., B – *R.padi*-resistant Ambrozja cv., * $p < 0.05$ (Student's *t*-test).

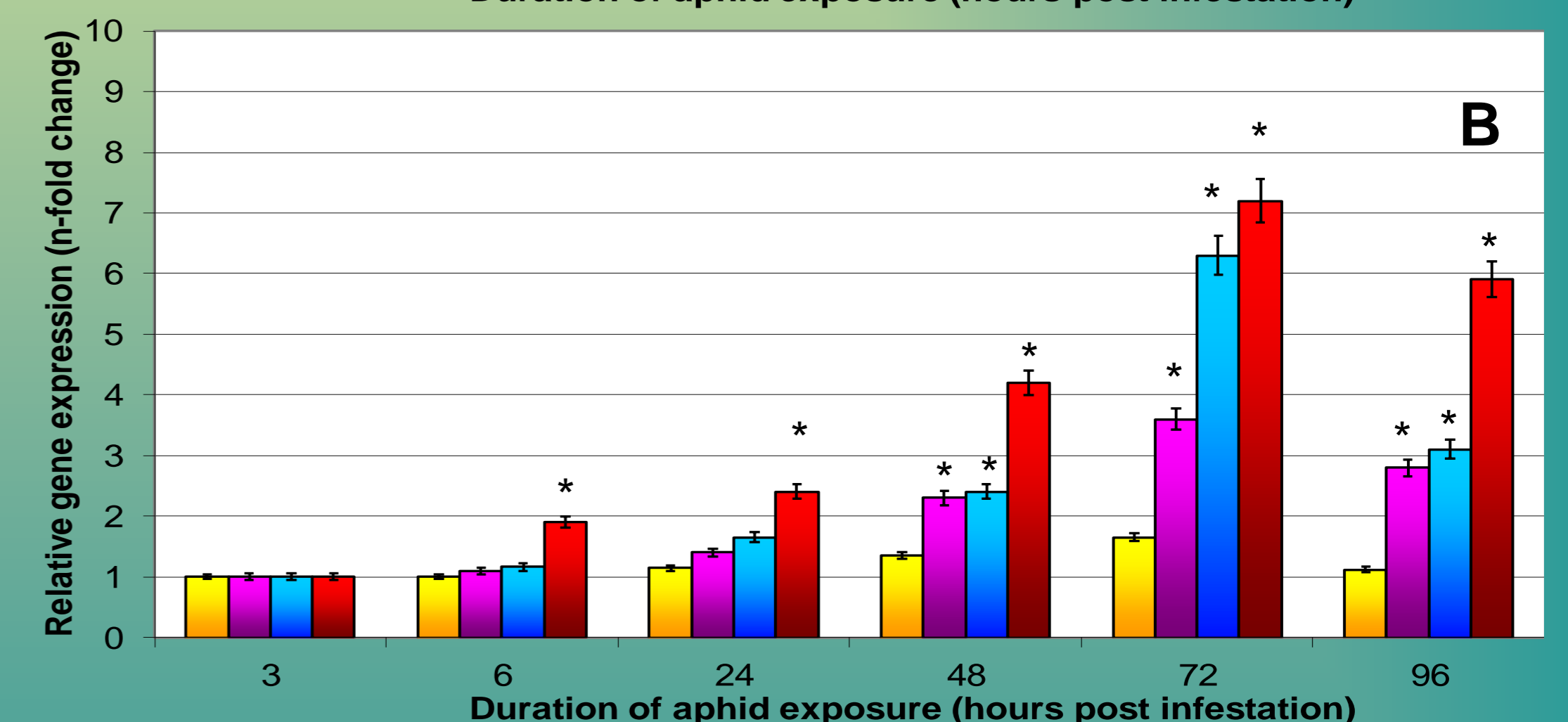
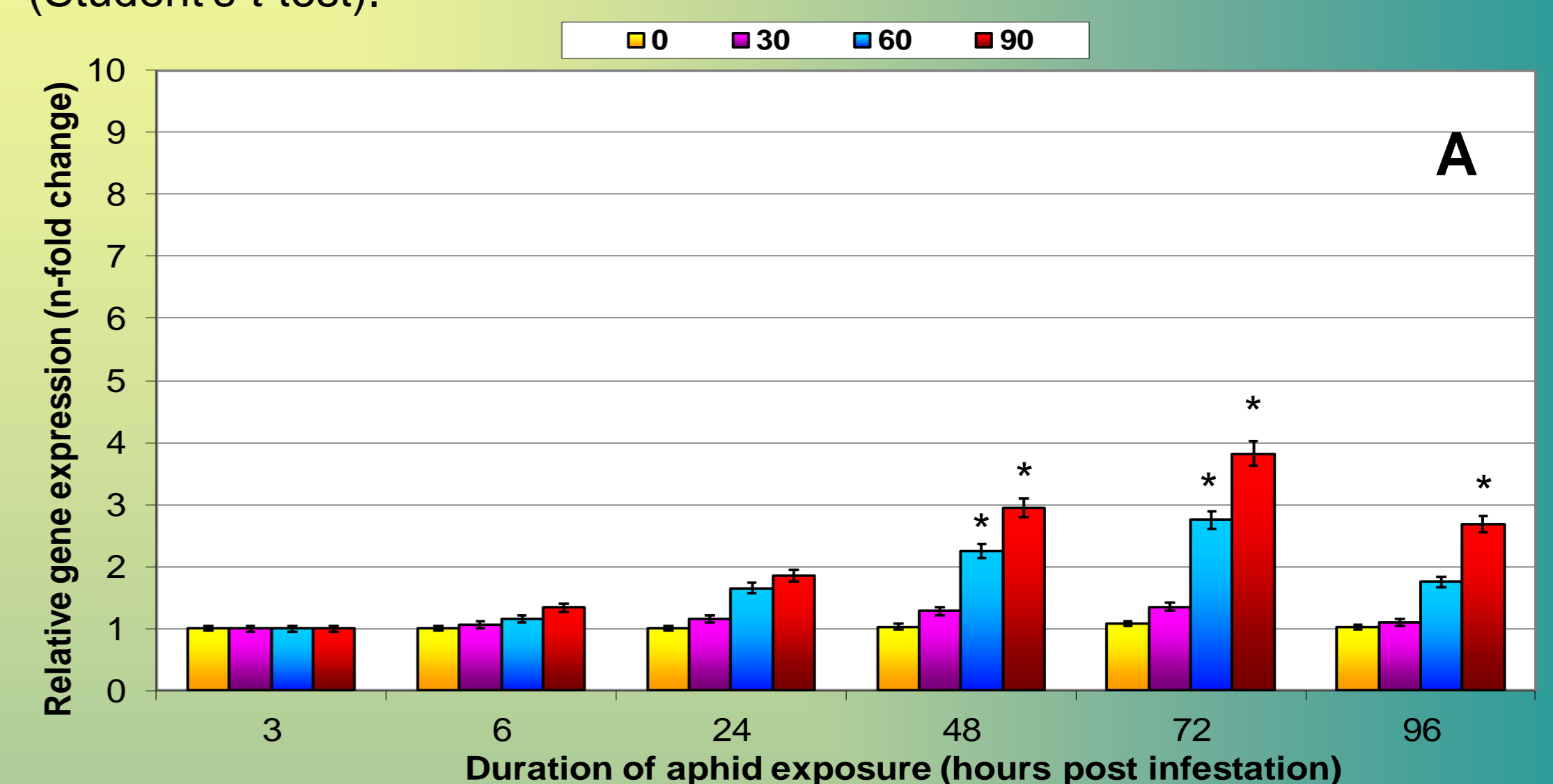


Fig.2. Aphid-induced changes (\pm SD) in levels of relative expression of subtilisin-like protease LOC103629592 gene within the leaves of infested maize seedlings in comparison to the control. A – *R.padi*-susceptible Tasty Sweet cv., B – *R.padi*-resistant Ambrozja cv., * $p < 0.05$ (Student's *t*-test).

Acknowledgments

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