

Effects of *Fusarium* strains of different aggressivity on macroelement composition in kernels of maize genotypes



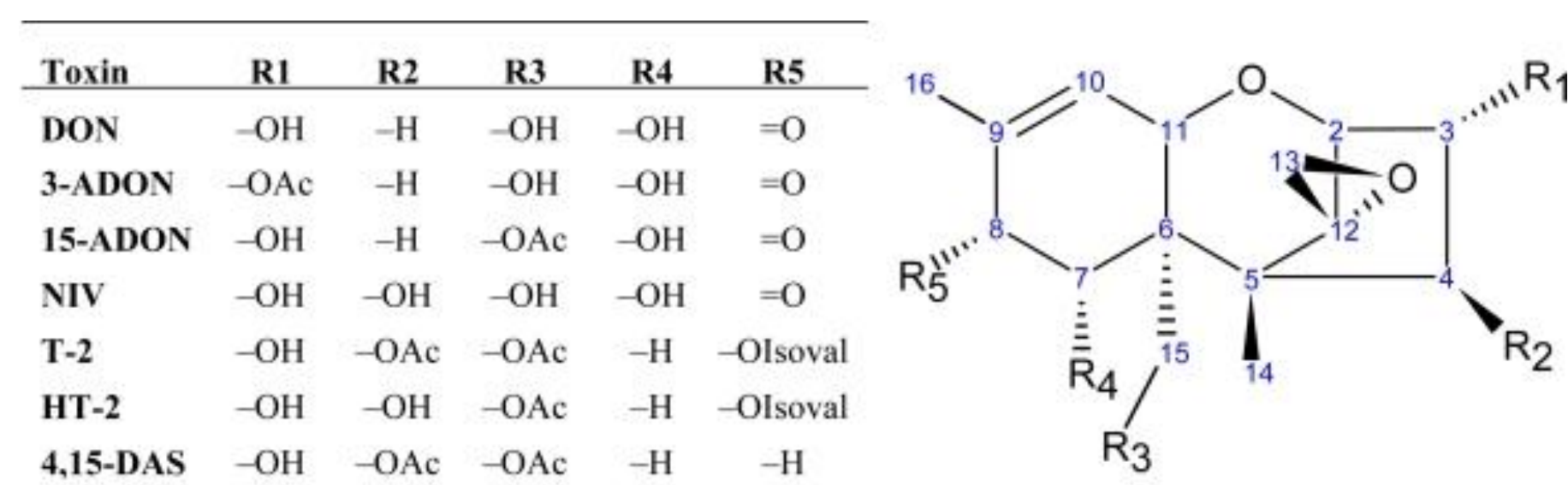
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Introduction

Fusarium toxins, mostly trichothecenes produced by different *Fusarium* species, accumulate in kernels of cereals rendering them unsuitable for consumption. Contaminated grains cause a number of diseases both in mammals and plants. Mycotoxins can be abundant in the kernels in wet years when high humidity is advantageous for the epidemic of *Fusarium* head blight.



The main types of the *Fusarium* toxin trichothecenes (Foroud and Eudes 2009).

Methods of study

Plant material:

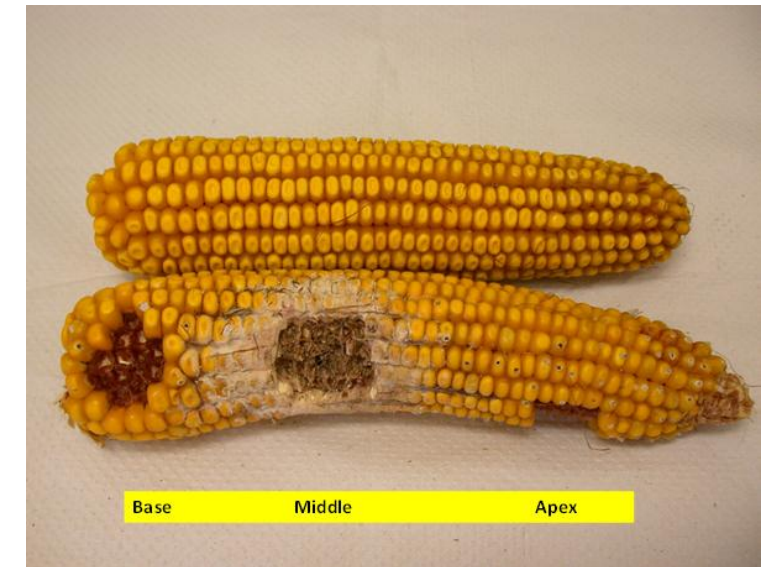
- Zea mays* L. cv. Sarolta - *Fusarium* resistant
- Zea mays* L. cv. Boglár - *Fusarium* sensitive

Treatments: infected with

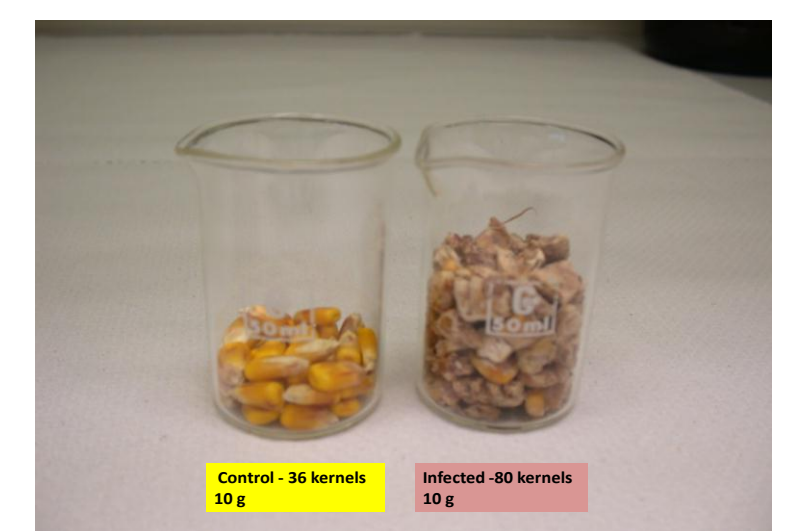
- Fusarium graminearum*
- Fusarium culmorum*
- Fusarium verticillioides*

Detection of macroelement (K^+ , Ca^{2+} and Mg^{2+}): quantified by polarized Zeeman atomic absorption spectrophotometer

Statistical analysis: means \pm SD.,



Control and *Fusarium graminearum* - infected maize genotype „Sarolta”



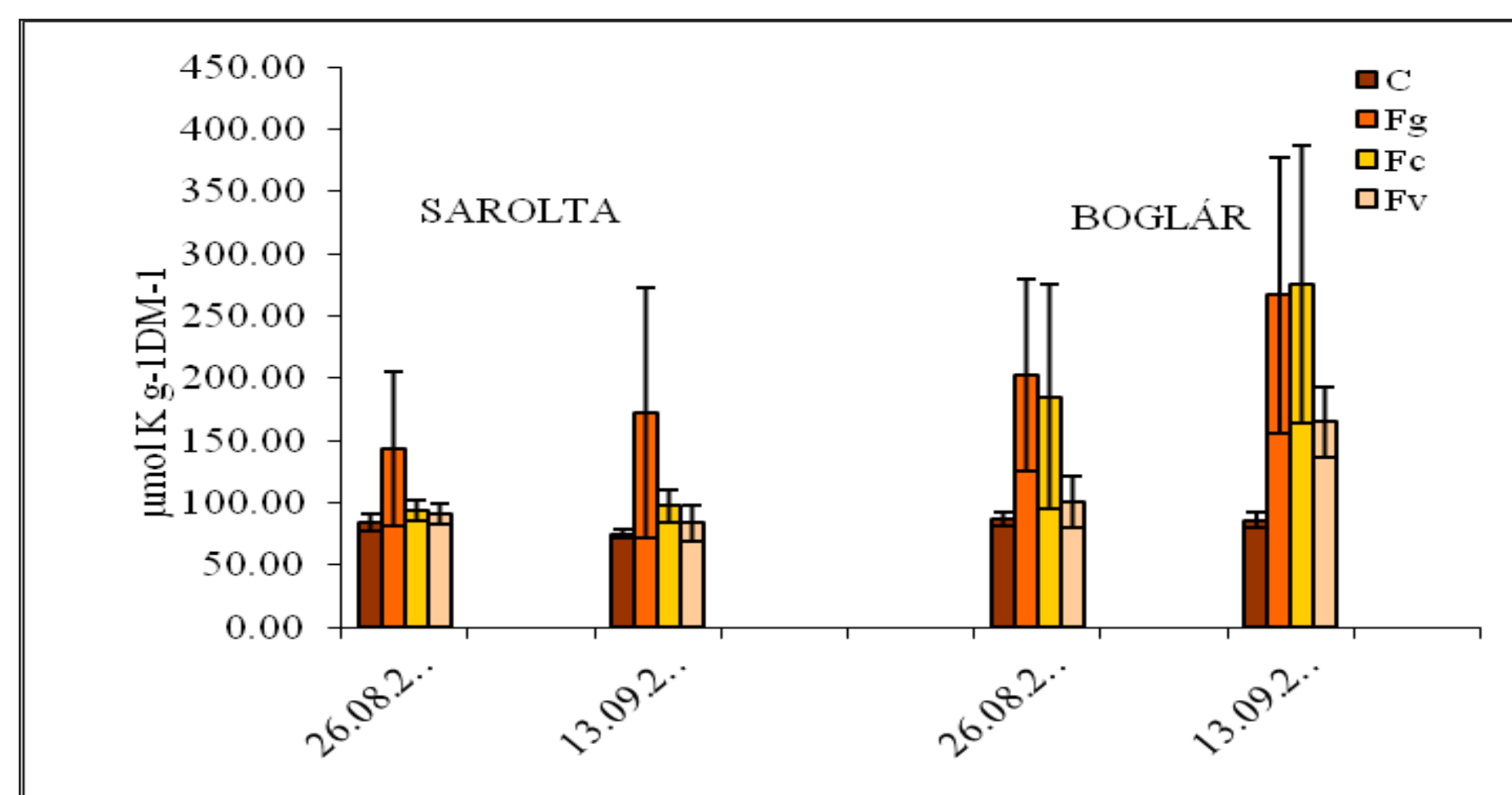
Volume (and surface) relations of control and *Fusarium*-infected maize kernels

Aim

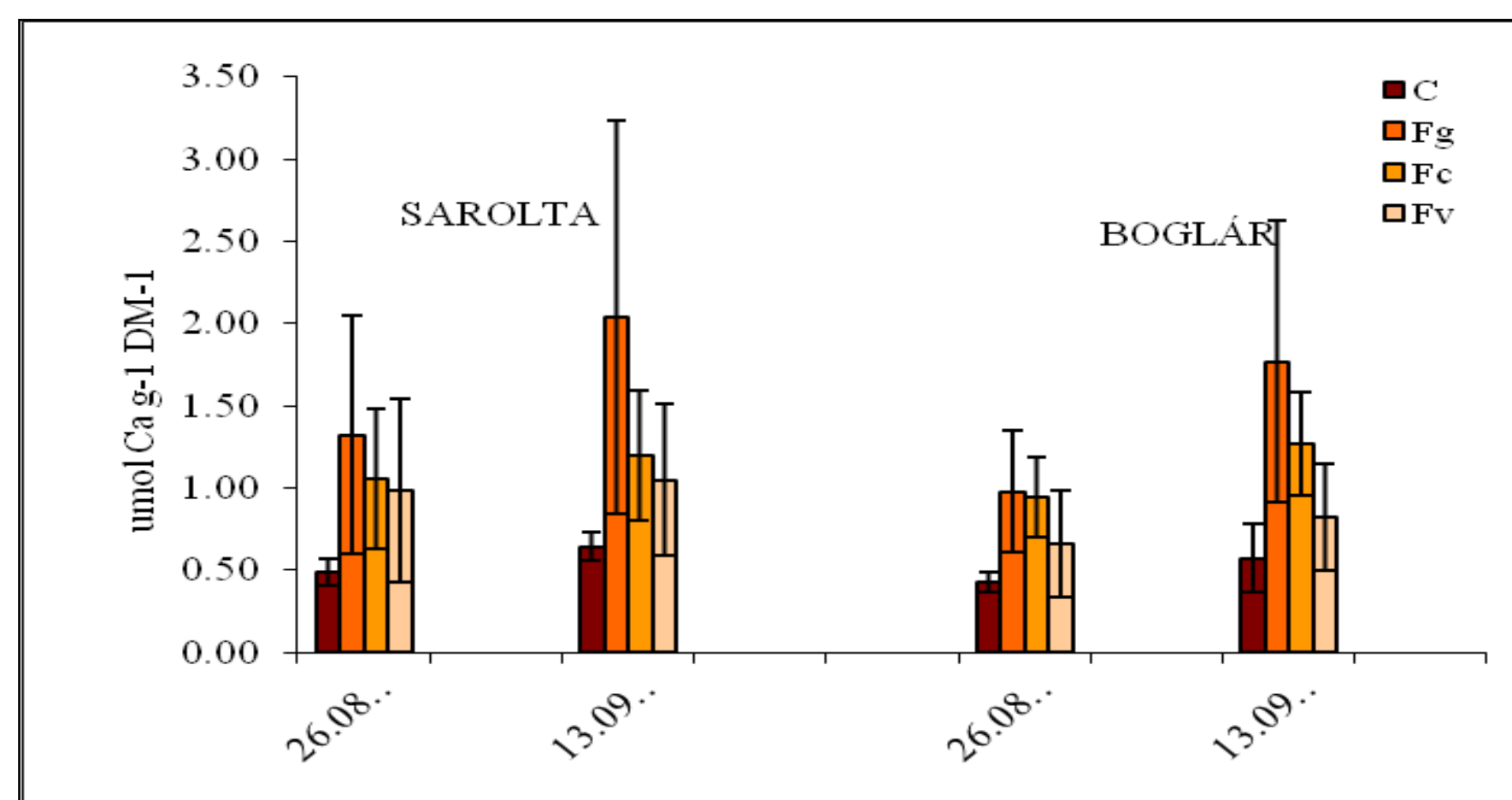
Here we describe the effects of *Fusarium*-infection on the accumulation of three macroelements in the kernels of two maize genotypes of different sensitivity.

Results

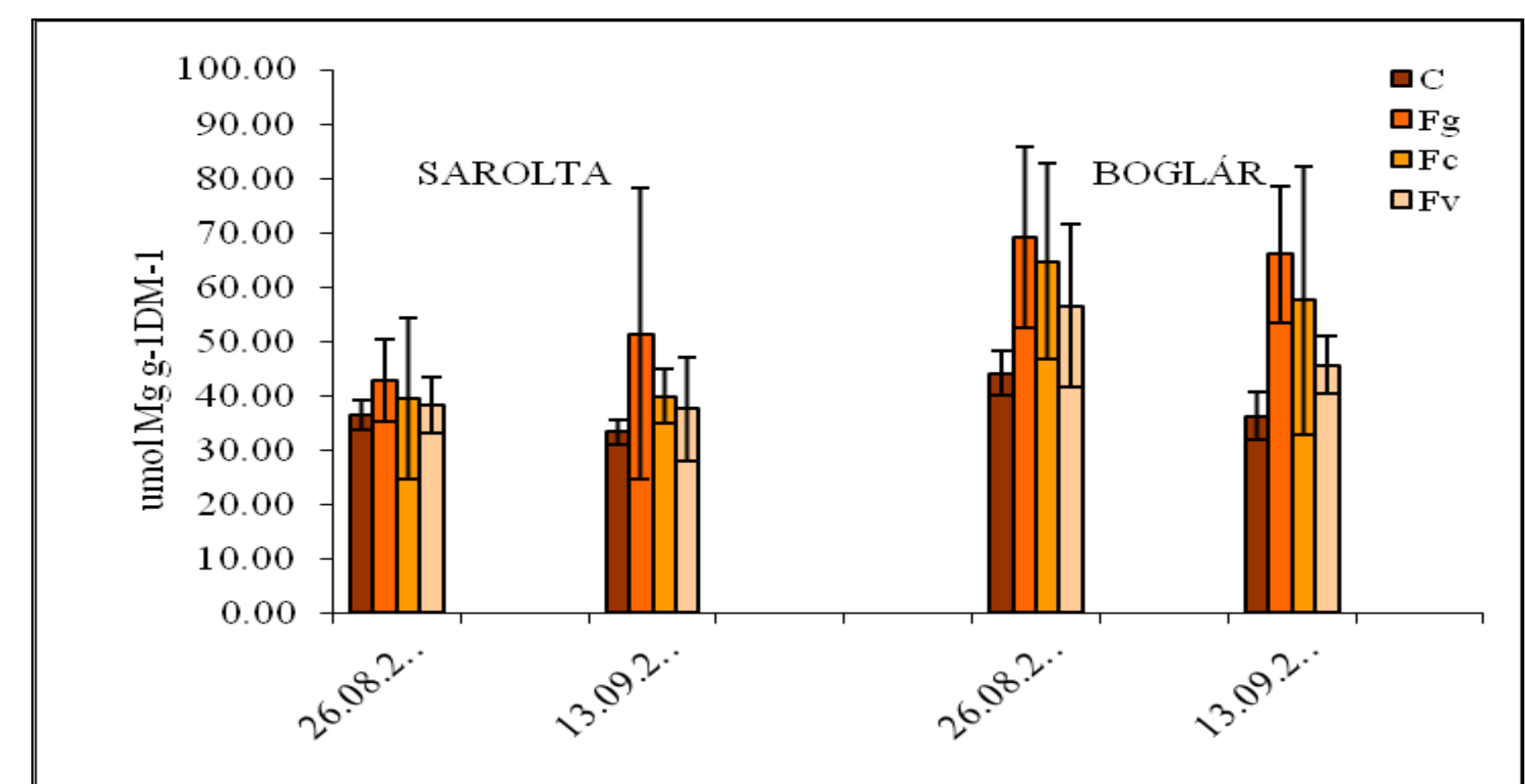
The element concentrations of K^+ , Ca^{2+} and Mg^{2+} were higher in the infected kernels compared to the control ones, probably due to the difference in tissue composition of the related kernels: in the infected ones the surface and possibly aleuron layers compose higher proportion while containing less endosperm.



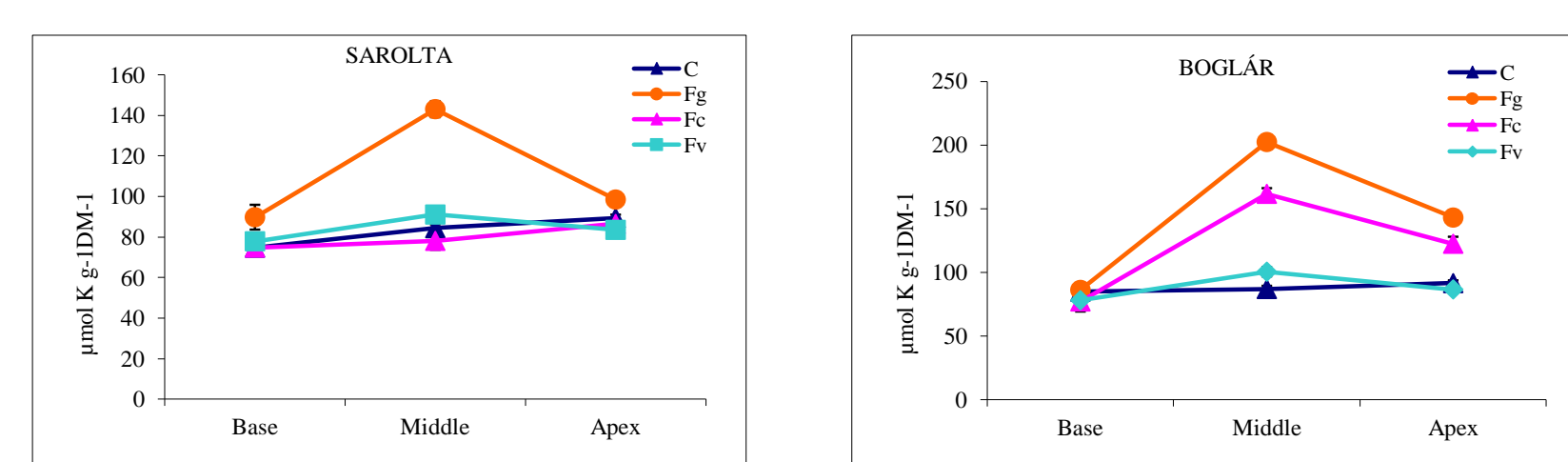
Effects of *Fusarium* infection on K^+ concentration in maize kernels (from the middle part of the cob). Comparison of two sampling dates and 3 *Fusarium* species (Fg, Fc, Fv) in 2 maize genotypes. Mean \pm S.D., n = 9.



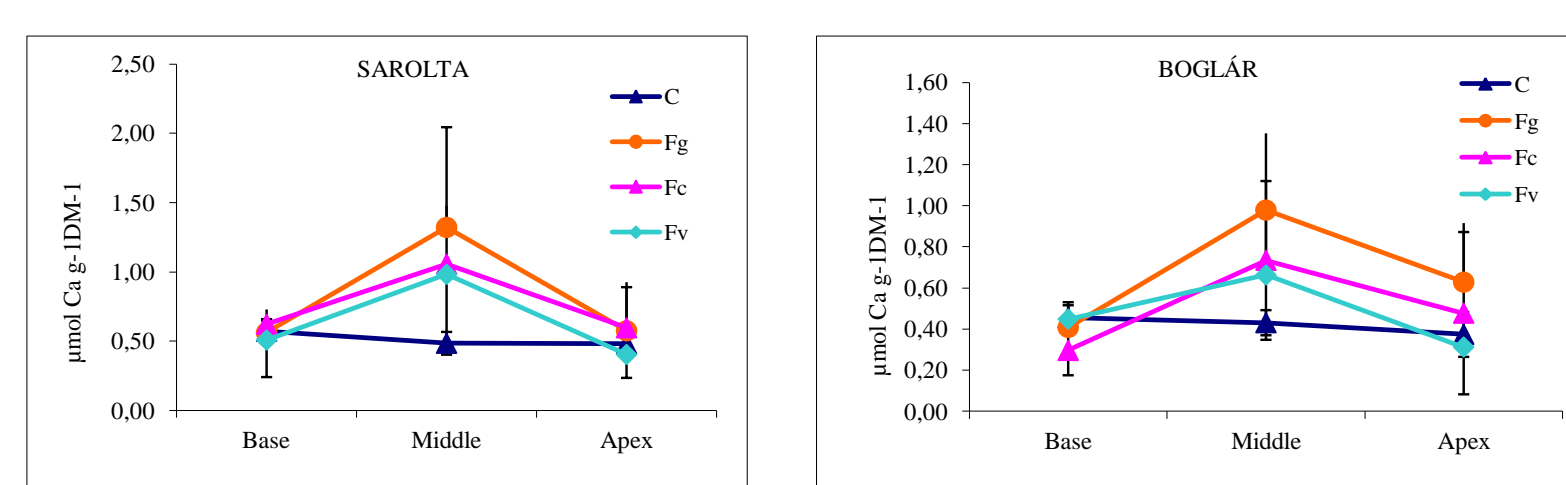
Effects of *Fusarium* infection on Ca^{2+} concentration in maize kernels (from the middle part of the cob). Comparison of two sampling dates and 3 *Fusarium* species (Fg, Fc, Fv) in 2 maize genotypes. Mean \pm S.D., n=9



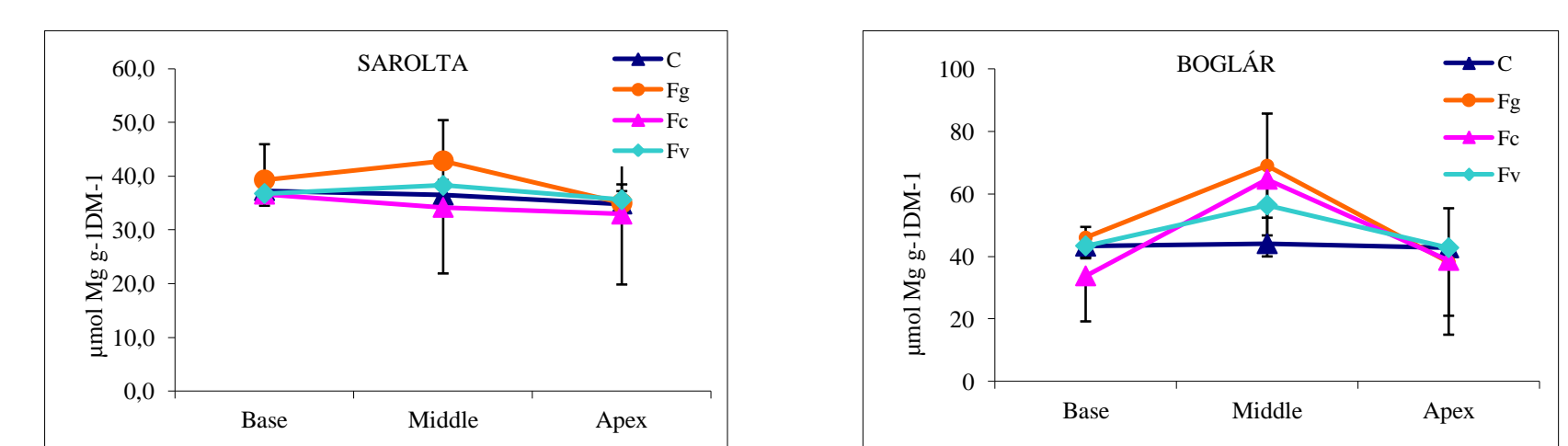
Effects of *Fusarium* infection on Mg^{2+} concentration in maize kernels (from the middle part of the cob). Comparison of two sampling dates and 3 *Fusarium* species (Fg, Fc, Fv) in 2 maize genotypes. Mean \pm S.D., n= 9.



K^+ concentration gradients along the maize ear as affected by *Fusarium* strains Upper row: samples at 26 August, lower row: samples at 13 September, 2011.



Ca^{2+} concentration gradients along the maize ear as affected by *Fusarium* strains Upper row: samples at 26 August, lower row: samples at 13 September, 2011.



Mg^{2+} concentration gradients along the maize ear as affected by *Fusarium* strains Upper row: samples at 26 August, lower row: samples at 13 September, 2011.

Conclusions

These results indicate for the first time that intensity of infection depended on the *Fusarium* species. Most aggressive was *F. graminearum*, followed by *F. culmorum* and *F. verticillioides*. Intensive changes in concentrations were observed for K^+ , and Ca^{2+} , but Mg^{2+} levels were more stable.