

Phosphorus Recovery with Carbonized Sewage Sludge by PYREG[®]-Technology

K. Friedrich, B. Mindermann, M. Mertens and T. Appel

University of applied sciences Bingen, Germany



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Introduction

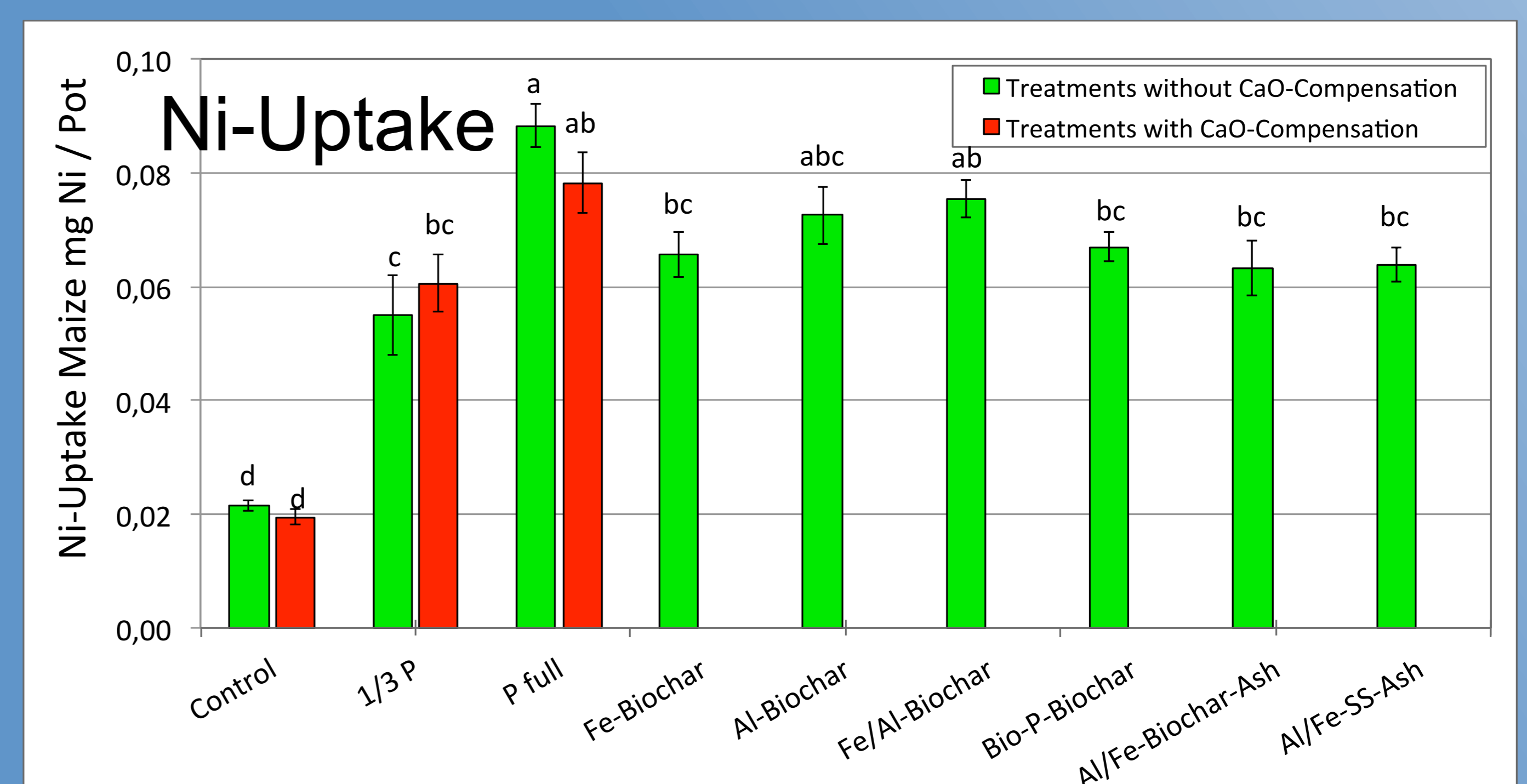
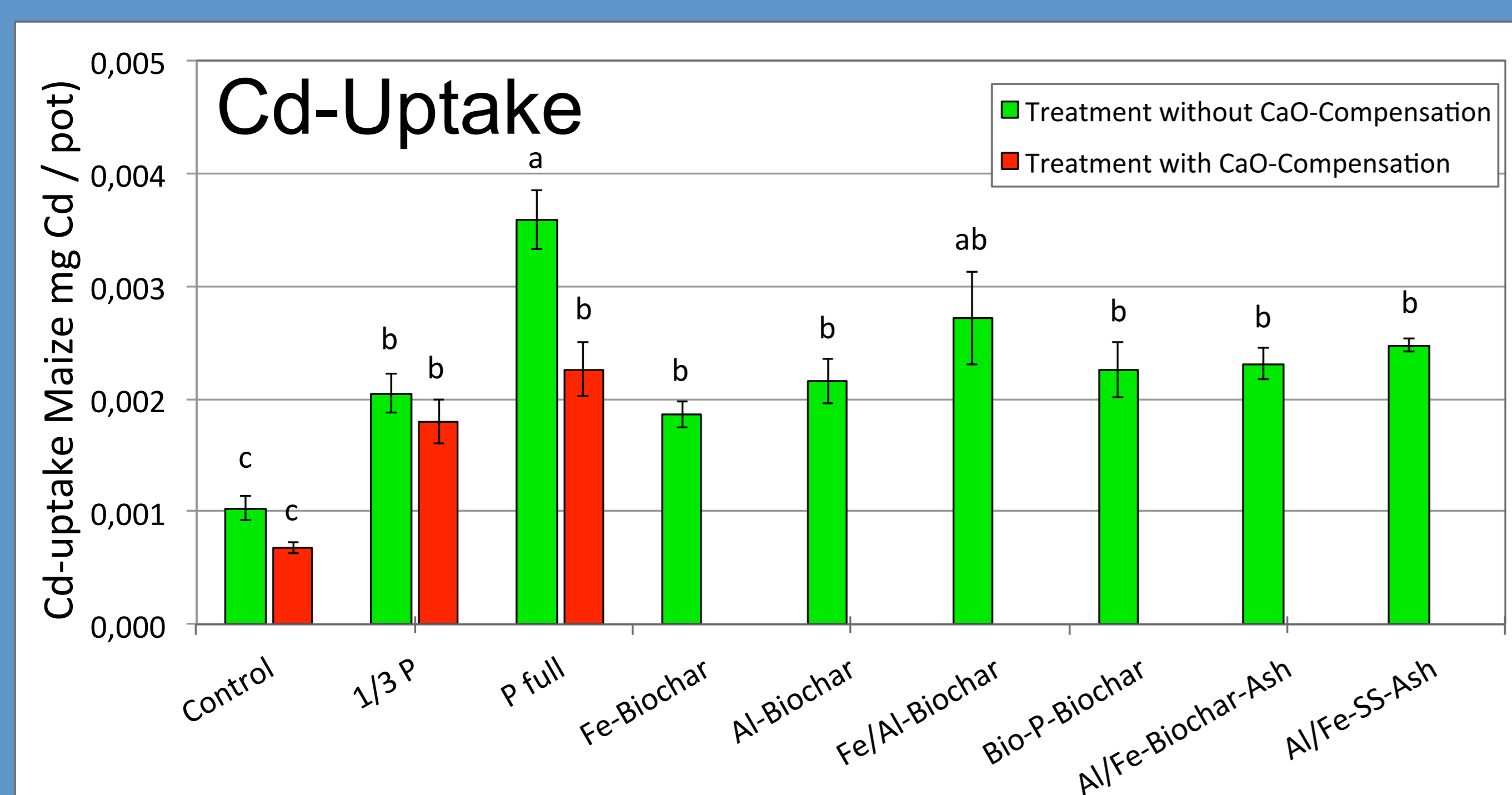
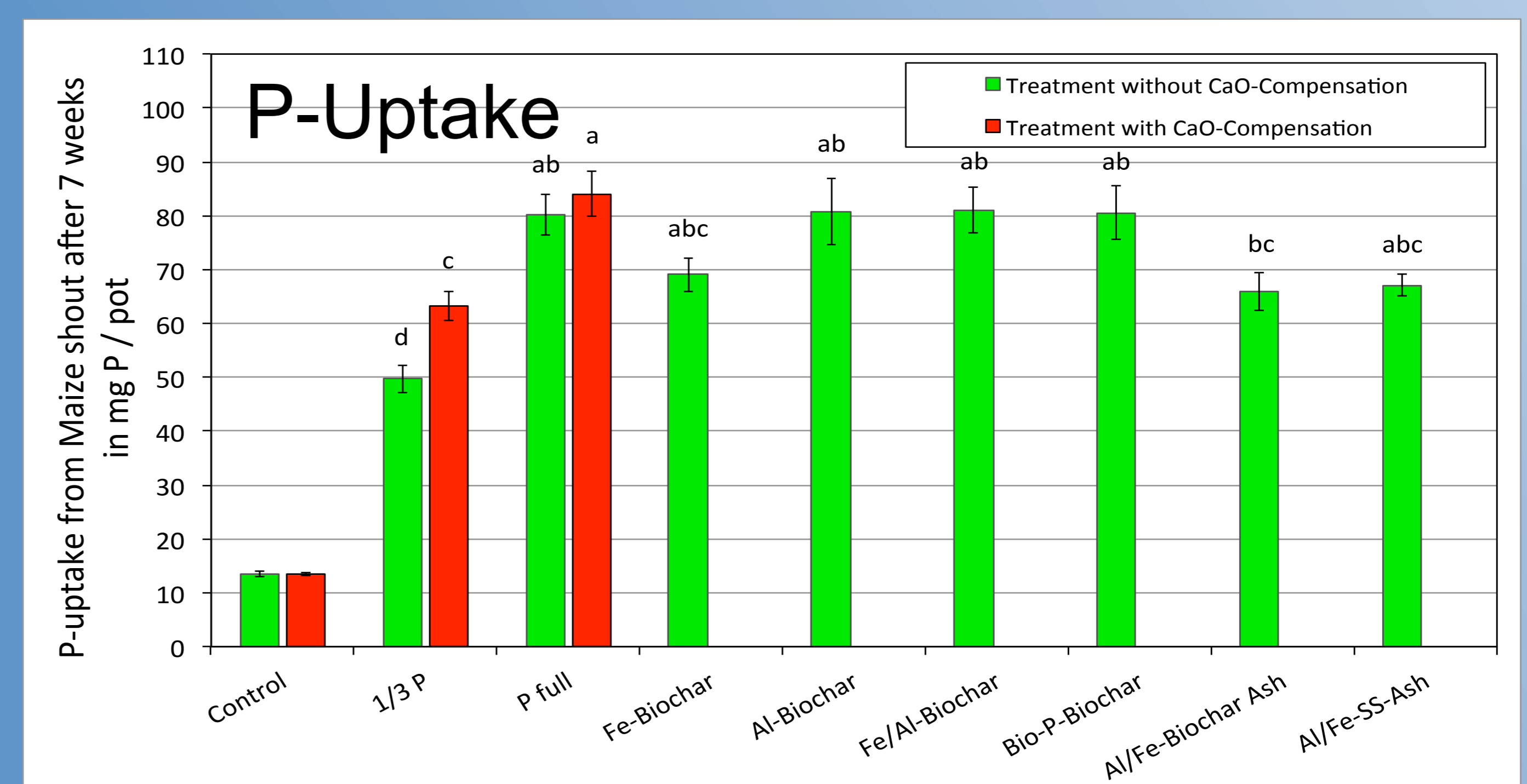
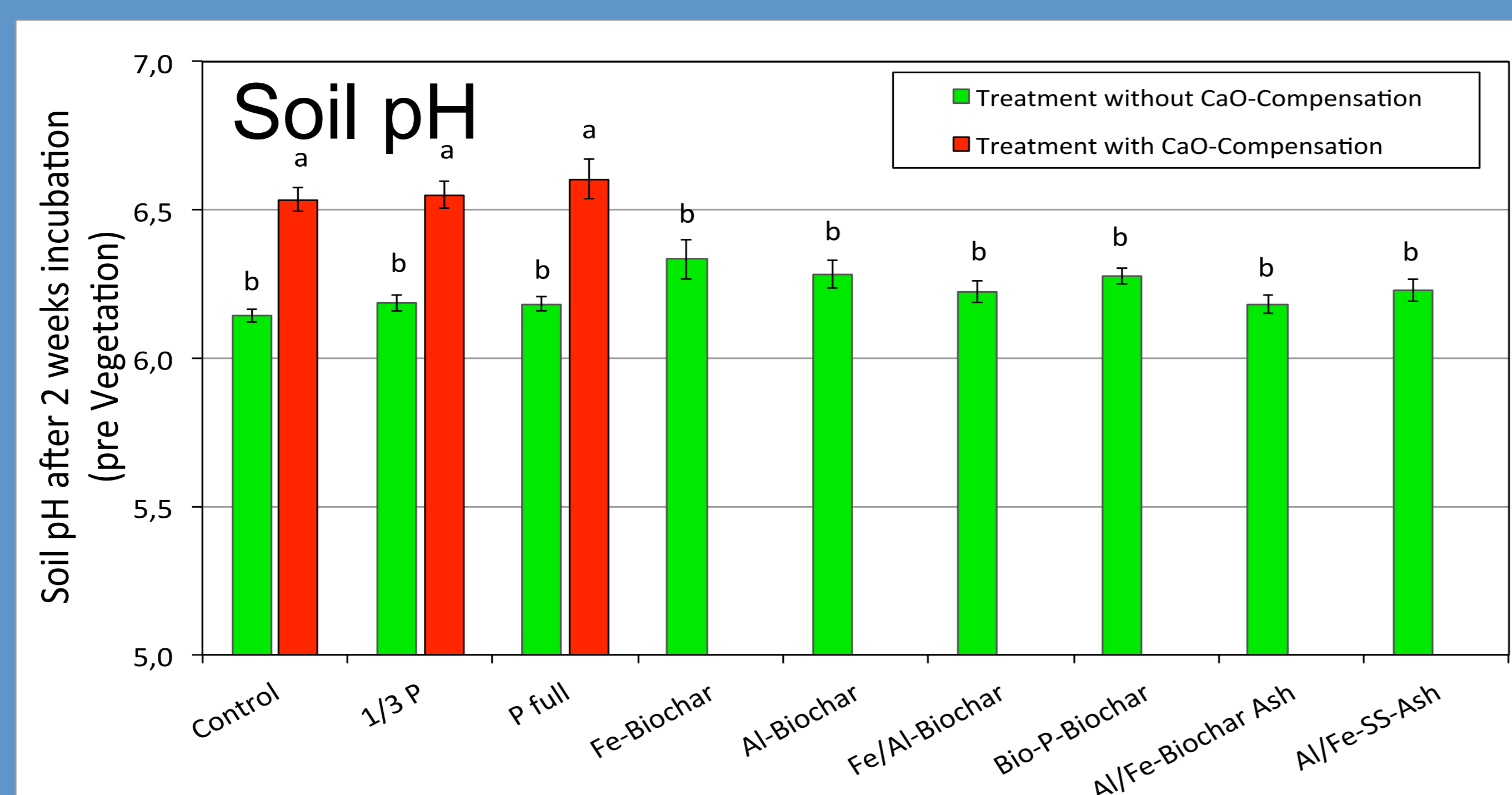
Thermal treatment of sewage sludge (SS) with PYREG[®]-Technology produces high ash biochar with a high P-content. Respectively to all other thermal conversion systems for sewage sludge the PYREG[®]-Process treat in a low temperature range from 500 °C – 700 °C under anoxic conditions. Tested biochars and ashes showed a high P-plant-availability in relation to a water-soluble Ca-Dihydrogenphosphate (Mindermann et al. 2014). Additional we investigated the heavy metal uptake with maize (Friedrich et al. 2014). The experiment was carried out as a greenhouse pot trial with 4 different biochars and 2 ashes.

Material and Methods

- Pot trial (Kick-Brauckmann) with maize (silt loam) (pH: 6,1; CAL-P: 0,378 mg P / 100 g), 6 Replications
- 12 Treatments:
 - 4 Biochars (Al-, Fe-, Al/Fe- und Bio-P-precipitation technics)
 - 2 Ashes (Al/Fe-SS incinerated and Al/Fe-Biochar incinerated)
 - 2 Controls (without P and ± CaO Compensation)
 - 4 Ca-Dihydrogenphosphate: „1/3 P“ und „P_{full}“ (5 mg P and with 15 mg P per 100 g soil as water-soluble Ca(H₂PO₄)₂ fertilized, ± CaO Compensation)



Results



Summary and Conclusion

- Lime effect from the biochars and ashes on soil pH was low and shows no significance.
- High and fast plant available P-fraction in all sewage sludge treatments (P-uptake more than 90 % in relation to P_{full}).
- Different precipitation technics are less crucial to P-availability.
- Sewage sludge biochars and ashes showed a decreased mobility of toxic Cd in the maize shoot!
- Zn-uptake increased in the sewage sludge biochars and ashes treatments (Data not shown).