Tropentag, September 17-19, 2013, Stuttgart-Hohenheim

"Agricultural development within the rural-urban continuum"

Elevation of Soil Temperature Might Change N-Cycling of an Agricultural Cropping System

Khin Latt Yadana[1], Christian Poll[1], Sven Marhan[1], Petra Hoegy[2], Ellen Kandeler[1]

[1] *University of Hohenheim, Inst. of Soil Science and Land Evaluation, Germany*
[2] *University of Hohenheim, Inst. of Landscape and Plant Ecology, Germany*

Abstract

It is predicted that air and soil temperatures will be increased by climate change. Although effects of temperature elevation on soil N cycling are mediated by various interactions with plants, such effects are poorly documented. In this regard, we focused on the impacts of elevated soil temperature on microbial N cycling in soil and N uptake by plants. The hypothesis was that elevated soil temperature would increase N mineralisation, N uptake and wheat growth. The field experiment was conducted in the Hohenheim Climate Change (HoCC) experimental site in Stuttgart, Germany. In this HoCC experiment, soil temperature is elevated by 2.5°C at 4 cm depth by the use of heating cables placed on the soil surface. In 2012, winter wheat (*Triticum aestivum*) was planted. C and N concentrations in soil and aboveground plant fractions, soil microbial biomass C and N (Cmic and Nmic), mineral N content (NH_4-N and NO_3N), potential nitrification and enzymes involved in nitrogen cycling (protease, tyrosine peptidase, alanine peptidase, leucine peptidase and N-acetyl-glucosaminidase) were analysed at soil depths of 0–15 and 15–30 cm from five sampling dates. Sampling dates were between March and July 2012 according to the distinct phenological growth stages of wheat (BBCH-code 22, 31, 49, 65 and 89). The plants were rated weekly for their phenological development and senescence behaviour.

We found that plant growth did not respond to increased soil temperature. Generally, microbial biomass and some enzyme activities (leucine and tyrosine peptidase) were slightly increased by elevated soil temperature treatment. Soil NH_4-N content and protease activities were significantly increased in response to elevated soil temperature. The results partly supported the hypothesis that climate warming will affect N cycling in soils in an agricultural cropping system.

Keywords: Climate change, elevated soil temperature, enzyme activities, microbial biomass, nitrogen cycle, winter wheat

Contact Address: Khin Latt Yadana, University of Hohenheim, Institute of Soil Science and Land Evaluation, 70593 Stuttgart, Germany, e-mail: ydnklatt@gmail.com