

# Brown coal-urea blend: a green option for improving nitrogen use efficiency, yield and soil health

Mr Biplob Kumar Saha<sup>1</sup>, Dr Michael T. Rose<sup>2</sup>, Dr Vanessa Wong<sup>1</sup>, A/Prof. Timothy R. Cavagnaro<sup>3</sup>, A/Prof. Antonio Frank Patti<sup>1</sup>

<sup>1</sup>Monash University, <sup>2</sup>, <sup>3</sup>The University of Adelaide

Increasing crop yield via minimum application of nitrogenous fertilisers is becoming more important due to the detrimental effects on the environment. Addition of humic rich brown coal (BC) as an organic amendment can alter N cycling and its availability to crops. However, the effect of brown coal-urea (BCU) blends on the dynamics and mineralisation of N, biomass yield and N uptake by plant is unknown. Therefore, a field trial was undertaken to assess the effects of BCU blends on the growth, biomass yield and N uptake by sweet corn. Blending of urea with BC decreased losses of N fertiliser in the soil system. Compared to urea, BCU blends generally suppressed total N<sub>2</sub>O and NH<sub>3</sub> emissions by 31% and 43%, respectively. Incorporation of BCU blends in soil maintained significantly higher amounts of ammonium and nitrate-N in soil compared to urea only application. As a result, greater amounts of fertiliser N will be available to sweet corn over a longer time period, increasing the fertiliser N uptake and use efficiency. The increased N uptake resulted in 13% and 19% more biomass yield and cob yield of sweet corn, respectively. The blends with higher BC had higher biomass yield, maximum N uptake and maintained higher mineral N in soil compared to the blends with lower BC. Moreover, addition of BCU blends increased the organic carbon content of soil. The overall results suggest that blending of urea with BC could be a potential green option for increasing crop yield, nitrogen use efficiency and soil health.

Keywords: Brown coal-urea blend, cob yield, N uptake, fertiliser N use efficiency, soil health