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Nitrogen management is essential to prevent tropical oil palm plantations from causing ground-level ozone pollution

Nick Hewitt (1), James Lee (2), and the OP3 Team

(1) Lancaster Environment Centre, Lancaster University, Lancaster, LA1 4YQ, United Kingdom;, (2) National Centre for Atmospheric Science, University of York, York, YO10 5DD, United Kingdom.

More than half the world's rainforest has been lost to agriculture since the Industrial Revolution. Among the most widespread tropical crops is oil palm (Elaeis guineensis): global production now exceeds 35 million tonnes per year. In Malaysia, for example, 13% of land area is now oil palm plantation, compared with 1% in 1974. There are enormous pressures to increase palm oil production for food, domestic products, and, especially, biofuels. Greater use of palm oil for biofuel production is predicated on the assumption that palm oil is an "environmentally friendly" fuel feedstock. Here we show, using measurements and models, that oil palm plantations in Malaysia directly emit more oxides of nitrogen and volatile organic compounds than rainforest. These compounds lead to the production of ground-level ozone (O3), an air pollutant that damages human health, plants, and materials, reduces crop productivity, and has effects on the Earth's climate. Our measurements show that, at present, O3 concentrations do not differ significantly over rainforest and adjacent oil palm plantation landscapes. However, our model calculations predict that if concentrations of oxides of nitrogen in Borneo are allowed to reach those currently seen over rural North America and Europe, ground-level O3 concentrations will reach 100 parts per billion (109) volume (ppbv) and exceed levels known to be harmful to human health. Our study provides an early warning of the urgent need to develop policies that manage nitrogen emissions if the detrimental effects of palm oil production on air quality and climate are to be avoided.