



Carbon emissions linked to rise in hay fever and asthma in Europe

Pollen allergy is a common cause of allergic respiratory diseases such as hay fever and asthma. A recent continent-wide study suggests that rising carbon dioxide (CO₂) emissions over the last 30 years may be increasing pollen counts especially in European cities, which could have serious consequences for public health.

Hay fever and other allergies appear to be rising across Europe. In the UK, doctor's diagnoses of hay fever rose by a third between 2001 and 2005¹. Meanwhile, the number of people with asthma in Europe reached the 30 million mark in 2004, a number greater than the population of the Netherlands and Belgium combined². This rise in respiratory allergies could also be linked to an increase in the amount of allergenic pollen in the air. One assumption is that increasing temperatures caused by climate change is affecting pollen timing and production. Changes in our lifestyles and rising levels of air pollution over the last few decades are also partly to blame, although the exact mechanism is still not fully understood.

Researchers analysed 1221 pollen count series over a 32 year period from 23 species of tree and plant, including species with highly allergenic pollen such as Alder (*Alnus*), Birch (*Betula*) and Hazel (*Corylus*). The data came from 97 monitoring stations in 13 European nations, supplemented by weather data. The study focused on yearly trends of the annual pollen index (API) - the sum of average daily pollen concentrations over a year.

Analysis revealed that 60 per cent of the API series showed an increase in pollen counts, including those related to species known to produce allergenic pollen. After relating pollen counts and trends to mean temperature and temperature trends at the respective stations, researchers concluded that increased temperatures were not the main cause. Instead, the study suggests that man-made increases in atmospheric CO₂ levels could be influential. Previous studies have demonstrated that CO₂ can cause changes in the amount of pollen plants and trees produce and their levels of allergenicity, but this has rarely been shown in a wider context.

Urban sites demonstrated significantly higher trends in APIs compared to rural areas. Not only are urban areas influenced by the so called 'heat island' effect, they also have very high levels of pollutants, including higher levels of CO₂ and nitrous oxides. In recent years, some tree species have been extensively used for ornamental plants in cities, such as the birch (*Betula*) and trees belonging to the cypress family (*Cupressaceae*). It is therefore possible that urban planning has had a direct impact on increasing pollen levels in cities. The pollen season is also getting longer in Europe, partly influenced by climate change, but also the introduction of plants and trees from other continents.

Despite the lack of evidence of a clear cause, the research highlights a trend towards an increase in atmospheric pollen in Europe, which may be influenced by higher levels of CO₂, more pronounced in urban areas. More research is critical – the Intergovernmental Panel on Climate Change (IPCC)³ predicts future global increases in atmospheric CO₂ from fossil fuels, which could lead to even higher pollen levels. The EU requires united action across all sectors to face the potentially serious consequences of CO₂ for future public health, combined with efforts to strengthen health systems towards improved prevention and control⁴.

1. See: http://www.laia.ac.uk/98_3/98_3.htm

2. See: <http://www.ginasthma.org/>

3. See: <http://www.ipcc.ch/>

4. See: http://ec.europa.eu/health/major_chronic_diseases/policy/index_en.htm

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