

Impact on the air quality in Córdoba México by sugar cane burning

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Mexico is the sixth larger producer of sugarcane in the world, and the City of Córdoba located in Veracruz, Mexico is surrounded by 13 sugar mills and hundreds of hectares of sugarcane fields. Nevertheless, large plumes of smoke are observed due to the burning of sugarcane fields with the purpose to make easy the manual harvest, protecting the workers from leaves, insects and snakes. In addition, after harvest, straw and other wastes are burned to prepare the land. The air pollution has an important impact to the health of inhabitants due to the presence of toxics such as polycyclic aromatic hydrocarbons, but also has an impact to global warming since has been published that black carbon emitted due to incomplete combustion has a high warming potency and that is the second climatic forcer after CO₂.

In order to determine the impact of these agriculture practices, a monitoring campaign of PM_{2.5} was carried out every six days from April to August 2015 in the City of Córdoba and a rural place close to the fields. Particle concentrations were determined and organic and black carbon were analyzed with thermo-optic equipment (TOT-Niosh, Sunset Lab) and an ethalometer (Sootscanner). In addition the concentration levels of 17 polycyclic aromatic hydrocarbons (PAHs) were measured using GC-MS. PM_{2.5} average concentrations during harvesting in the urban and the rural zone were $138.3 \pm 43.6 \mu\text{g}/\text{m}^3$ and $147.4 \pm 27.3 \mu\text{g}/\text{m}^3$ respectively, whereas the concentrations during the no-harvesting period were $63.7 \pm 7.6 \mu\text{g}/\text{m}^3$ and $44.9 \pm 7.0 \mu\text{g}/\text{m}^3$ for the same places, showing that during harvesting the PM_{2.5} concentrations increase up to 3 times presenting most of the days bad air quality. The sum of PAHs in the urban and the rural locations were $3.36 \pm 0.72 \text{ ng}/\text{m}^3$ and $1.58 \pm 0.49 \text{ ng}/\text{m}^3$ during harvesting; these values are 43% and 54% greater than during the no-harvesting period. The most abundant PAHs were in all cases indene[1,2,3-c,d]pyrene, benzo[b]fluoranthene, benzo[a]pyrene, and benzo[g,h,i]perylene, all of them classified as carcinogenic compounds meaning that this is an important health issue which should be attended. Concentrations of organic and black carbon were higher by 31% and 39% in the urban site than in the rural one respectively reaching concentrations of $9.3 \mu\text{g}/\text{m}^3$ and $5.9 \mu\text{g}/\text{m}^3$ respectively during harvesting. The control of these emissions would mitigate the presence of black carbon that is an important short-lived climatic pollutant.