



### Ozone pollution can damage wheat crop

**The Hindu, 03 May 2018**

Air pollution is not only injurious to human health, but also to plant life. Scientists from Banaras Hindu University (BHU) have found that most wheat cultivars developed after the year 2000 are more sensitive to damage due to ozone, a byproduct of air pollution. This can affect wheat productivity under field conditions.

On the ground, ozone is produced by reaction of nitrites and volatile organic compounds released in abundance by automobiles and industries. There has been a rise in ozone levels since the industrial revolution and the levels are projected to increase further.

"Once it enters plants, ozone can cause oxidative stress and affect their photosynthetic machinery. Often the leaves start yellowing and lose the ability to fix carbon dioxide into food.

All these changes can decrease crop yield," Dr Shashi Bhushan Agrawal, Professor at the Department of Botany, BHU, who led the study, told India Science Wire. Wheat crop is particularly sensitive to ozone. So researchers assessed the extent of ozone toxicity in 14 varieties of wheat that have been developed over a period of 42 years (1970-2012). Selected wheat cultivars were grown in specially designed open top chambers at BHU campus between December 2014 and March 2015. One group of cultivars was grown in ambient ozone concentration, while the other group was subjected to elevated ozone levels. At the end of the experiment, plants were uprooted and compared in terms of yield, total biomass, growth and functional leaf area. The researchers found that all the plants exposed to higher ozone levels carried greater signs of ozone damage. There were spots on leaves, decreased root and shoot length and reduction in dry weight.

The intensity of ozone toxicity varied highly between all the 14 cultivars. Only 5-8% of leaf area was damaged in old cultivars as opposed to 12-19% non-functional leaf area in new varieties.

### Gas chamber? Rising mercury drives ozone beyond safe limit

**The Times of India, 23 May 2018**

TOI tracked eight-hour averages of O<sub>3</sub> at various locations monitored by both the Delhi Pollution Control Committee and the Central Pollution Control Board. CPCB data, for example, indicated that average O<sub>3</sub> levels peaked to more than 100 micrograms per cubic metres during the day at RK Puram on several days between May 15 and May 23. For example, on May 15, the average between 8 am and 4 pm was 105 µg/m<sup>3</sup>, 118 µg/m<sup>3</sup> on May 20, 111 µg/m<sup>3</sup> on May 21 and 119 µg/m<sup>3</sup> on May 22.

DPCC's line graph shows that at RK Puram, O<sub>3</sub> peaks have been as high as 160 µg/m<sup>3</sup> and 130 µg/m<sup>3</sup>; at Wazirpur—an industrial area — O<sub>3</sub> levels peaked to 124 µg/m<sup>3</sup> on May 16 and 106 µg/m<sup>3</sup> on May 22. At Najafgarh, O<sub>3</sub> crossed 200 µg/m<sup>3</sup> on May 17 and May 22. The 24-hour PM<sub>2.5</sub> averages also hovered between 100 and 150 µg/m<sup>3</sup> at most locations, including RK Puram, Punjabi Bagh and Anand Vihar, as opposed to the safe standard of 60 µg/m<sup>3</sup>.

Ground-level ozone (O<sub>3</sub>) that's currently wreaking havoc in certain parts of Delhi is created due to chemical reactions between oxides of nitrogen (NO<sub>x</sub>), volatile organic compounds (VOC) and carbon monoxide (CO) in the presence of sunlight and heat.

"This only shows that the level of gaseous emissions is high in the city. NO<sub>x</sub> acts as a catalyst in summer to create ozone. In fact, NO<sub>x</sub> emissions dissipate and cause ozone pollution even in areas that are not close to pollution sources, such as low traffic areas," said Anumita Roy Chowdhury, executive director, Centre for Science and Environment. She added that "ozone is a highly reactive gas, which can aggravate health complications even at considerably lower levels. Those with respiratory conditions and chronic obstructive pulmonary disorder are particularly vulnerable. Across the world, both PM<sub>2.5</sub> and O<sub>3</sub> are key pollutants for smog alerts.



### Tips to avoid indoor air pollution

**The Indian Express, 30 May 2018**

Indoor air pollution is very much real and it can be five times or worse than outdoor air pollution. From everyday consumer products and household habits such as paints, pet allergens to cooking gas can be an additional source of air pollution. So, what now and how do we shield ourselves?

Bornali Dutta, Associate Director Respiratory and Sleep Medicine, Medanta – The Medicity, said: "According to the World Health Organization (WHO) global air pollution database released in Geneva, India has 14 out of the 15 most polluted cities in the world in terms of PM 2.5 concentrations. It said 7 million people die every year because of outdoor and household air pollution...Reports like these suggest that the impact of pollution on human health is fatal. Air pollution has impact on most of the organs and systems of human body. The lung is one of the major sites of interaction with environmental particulates that causes and aggravates many respiratory diseases like COPD, asthma, and lung cancer.

"Air pollutants like particulate matter (PM), ozone (O<sub>3</sub>), sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), and lead (Pb) can affect the lung in numerous ways like inflammation, oxidative stress, and cell cycle death. They have been shown to trigger acute episodes in asthma and COPD, other allergic airway diseases, strongly associated with lung cancer."

Arvind Chabra, Country Head, Blueair suggests some tips which will help us avoid indoor air pollution:

Say no to scented incense sticks and candles: After reading this you might think twice before lighting up those decorative candles or using agarbattis. Studies suggest incense sticks and scented candles release undesired chemicals that can cause serious health problems like skin allergies and even heightens risk of respiratory cancer. Say yes to some greenery: Yes! Plants are your best friends.

### Plant physiologist: Use plants to reduce indoor pollution and save energy

**Natural News, 30 May 2018**

The use of plants indoors can reduce pollution and save energy, according to a plant physiologist at the National Research Council of Italy – Institute for Sustainable Plant Protection.

"For most of us plants are just a decorative element, something aesthetic, but they are also something else," plant physiologist Frederico Brilli said.

Plants are so much more than their appearance. The use of plants indoors can improve air quality in different ways. Firstly, they absorb carbon dioxide and release oxygen through photosynthesis. Because of their ability to transpire water vapor through their tiny leaf pores, they also increase humidity. Lastly, they can passively absorb pollutants on the external surfaces of leaves and on the plant root-soil system.

Brilli and his colleagues suggested that a better knowledge of plant physiology, together with the integration of smart-sensor-controlled air cleaning technologies, could enhance indoor air quality in a cost-effective and sustainable way. This was based on their review that was published in the journal *Trends in Plant Science*.

According to the researchers, they do not intend to replace modern heating, ventilation, and air conditioning systems with plants. Instead, they propose combining plants and smart sensors in a network together with other computerized technologies to increase indoor air quality.

This carries a significant implication for those living in industrialized countries, where they spend 80 percent of their lives indoors, more so in air-tight buildings. Even though these structures need less energy for heating, ventilating, and air conditioning, they can be harmful to human health if particulate matter and potentially toxic gases build up indoors. In particular, toxic substances such as carbon monoxide, ozone.

**Govt. has made 'serious' efforts to curb air pollution: Environment Ministry after WHO report****The Indian Express, 30 May 2018**

The Centre has made "serious" efforts to fight air pollution and the 2017 air quality data for fine particulate matter PM2.5 has shown improvement over the previous year, the Environment Ministry said today, after a World Health Organisation (WHO) report listed 14 Indian cities among the world's 20 most polluted.

In a statement, the ministry said as most of the polluted cities lie around Delhi and along the Indo-Gangetic plain, it is critical that the governments of Uttar Pradesh, Bihar and West Bengal are sensitised to take up urgent action on cleaning air. "It is noteworthy that almost one million vehicles are added on the roads of Delhi every year and in spite of increased construction activities and vehicular movement, air quality in Delhi is showing signs of improvement.

"With similar intervention in other polluted cities and active participation of ULBs (urban local bodies) and state governments, air quality is expected to improve further," the ministry said.

It said the improvement in particulate matter concentration in Delhi has happened despite episodic events in two successive years in November 2016 and November 2017.

During these months, in addition to local emissions, there was a substantial contribution from regional sources, including smoke due to stubble burning in neighbouring states and dust from the Gulf countries, it said.

"The WHO report indicates that Delhi is placed at number six with an annual average PM2.5 concentration as 143 micrograms per cubic metre in 2016. However, the government has made serious efforts to deal with air pollution.

"Data for the year 2017 for PM2.5 shows an improvement over 2016 and so far in 2018, it shows a further improvement, as compared to 2017. The government has also taken several bold initiatives, including leap-frogging from BS-IV to BS-VI," it said.

**Researchers are using plants to tackle urban pollution****University Affairs, 16 May 2018**

Plants in their many different forms have yet to reveal all their secrets. For several years now, Michel Labrecque, a botanist and adjunct professor at Université de Montréal – also a member of the university's plant biology research institute (known by its French acronym IRBV) – has been studying the ability of vegetation to filter contaminants. Over the past two years, under his leadership, a multidisciplinary team of researchers has been working on a major phytoremediation project funded by the City of Montreal. This technique makes use of a combination of plants and soil microorganisms to clean up contaminated soil or water. Plants remove pollutants from the soil or water, then absorb them into their tissues where they are stored or broken down.

Although this decontamination technique has been around for years, it's the first time that the City of Montreal has actively invested in it. "This project is the most extensive and the most promising; the site is also the largest in Canada," says Dr. Labrecque. The grant from the city has been used to create a purification garden that will cover four hectares by the project's end in 2019. On this industrial site in Montreal's East End, the multidisciplinary research team is trying various plant groupings to identify and analyze which combinations are the most effective in decontaminating the soil.

"We are also assessing various combined approaches, like seedlings or cuttings, which increase microorganism activity in the soil," notes the researcher. A team of researchers from McGill University and Université de Montréal recently published the results of a genetic analysis of interactions between fungi, bacteria and fast-growing tree roots (such as willow roots) in the *Microbiome* journal. "We were trying to figure out how to make plants and microorganisms more efficient in rejuvenating soils contaminated by oil," explains Dr. Labrecque, who co-authored the article.



### Vimannagar residents to fight indoor pollution with plants

**The Times of India, 23 May 2018**

PUNE: Thanks to the rising pollution levels, harmful pollutants have even started invading our homes. A group of students from Vimannagar, in association with the Climate Reality Project India (CRPI), has decided to put up a fight. Their choice of weapons: Plants.

This World Environment Day, the group is encouraging citizens to adopt plants that can produce more oxygen and clean the air indoors. Special focus is on Vimannagar residential societies.

Col Shashikant Dalvi (Retd), district manager of CRPI, said pollution levels in the Vimannagar area have risen manifold due to the increase in vehicular movement around the Lohegaon airport, Vishrantwadi and Kharadi areas. "With rising pollution in the area, pollutants have entered people's homes. We are encouraging people in Vimannagar to adopt plants. Once a plant is brought home, residents will invariably care for it. These plants generate more oxygen and can purify the air indoors," he said.

According to Shivam Singh, of ExploreIT, which is associated with the initiative, "We are promoting the areca palm which has numerous environmental benefits." He said while all plants have enriching properties that can improve the quality of air, areca palm is considered the most efficient air purifier. "This plant can survive in low light as well as high temperature.

The plant has a great mechanism to absorb harmful gasses like acetone, xylene and toluene emitted from petroleum products and wooden furniture," he added.

He said a week-long initiative — Adopt a Plant — will be organised at parks, schools, colleges and other public places in Vimannagar.

### How to use your garden to fight pollution

**Goldsmiths, 31 May 2018**

The 'Phyto-sensor' toolkit was developed by the Citizen Sense research group that is led by Goldsmiths sociologist, Professor Jennifer Gabrys.

Professor Gabrys said: "Recent news coverage has highlighted the serious issues this country faces both in pollution levels in towns and cities. This report provides timely advice for people who want to know how they can use vegetation to both mitigate and monitor pollutant levels. This is a citizen's toolkit for planting air quality gardens."

The toolkit includes instructions for identifying the best locations for air quality gardens, as well as different planting strategies and maintenance techniques.

The toolkit was tested and refined through a public workshop and walk held at the Museum of London in March to investigate ways in which vegetation can improve air quality. The Museum of London partnered with Citizen Sense to develop the toolkit, and a demonstrator garden of air quality plants was on display during the workshop and walk.

Plants in the toolkit have been selected for their suitability to reduce or 'bioindicate' different types of air pollution in the urban environment. Bioindication refers to plants' changes in appearance when certain pollutants are present.

A number of plants highlighted by the report combat particulate matter, including the wall-flower, or *Erysimum*, which combats particulate matter 2.5 and 10 – air pollutants with different-sized particles comprising dust, sand and soot. The common ivy plant also traps particulates, and is described as 'ideal for air purification' due to the extensive surface area of its leaves. Some of the plants also combat nitrogen dioxide, including *Alchemilla mollis* or 'Lady's Mantle', which has hairy leaves that trap harmful particulates and can reduce nitrogen dioxide levels by up to 40%.