

## **Agriculture: Not all that green!**

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According to the Food and Agriculture Organization of the United Nations, between 2000 and 2018, agricultural expansion led to almost 90% of global deforestation, which is one of the leading causes of habitat destruction of numerous species. Besides land clearance, several other activities within the sector — land preparation, production and use of fertilisers and pesticides, use of farm machinery, crop residue burning, yield storage, and transportation — are responsible for the emission of some major air pollutants and greenhouse gases.

Agriculture fulfils our most fundamental need — food; but with a continuously growing population, the sector is under constant pressure to expand. Feeding a population of about 8 billion today demands a massive amount of land and high productivity. For this, more land needs to be cleared, more fertilisers and pesticides need to be produced, the yield needs to be harvested within a short duration, and the harvest needs to reach the customers quickly.

The steps to meet these demands are being taken, but in the process, we are creating tonnes of emissions from the sector, adversely affecting both air quality and climate. For example, animal husbandry — the branch of agriculture dealing with livestock and animal feed — is responsible for approximately 60% of direct global greenhouse gas (GHG) emissions. Fertilisers and pesticides emit major air pollutants during several processes from their manufacture to their usage. These include particulate matter (PM), NH<sub>3</sub>, oxides of nitrogen (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), etc. Further, gasoline- and diesel-oil-based farm machinery used for spraying and tillage, harvesting, strapping, and transportation in the process of crop production emit both particulate matter and gaseous pollutants, including GHGs.

### **The Indian scene**

India's agriculture sector too causes considerable pollution and contributes to climate change. However, while developing the city-level emission inventories and pollution control action plans in India, the agricultural sector is often left behind.

Besides the emissions from the activities mentioned above, India suffers major emissions from crop residue burning. After the harvest in summer and at the onset of winter, in many parts of India like Punjab, Haryana, and Uttar Pradesh, the crop residue is burned to save time and labour. Crop residue burning at the onset of winters is especially bad, since the dispersion of pollutants is slower in winters, leading to higher levels of air pollution and the resultant health hazards. This activity has become a matter of concern not only for the locality but also for all the cities and villages which are in the downwind of these fires.

Punjab crop burning around October is one of the most infamous examples. The impact of the burning is felt from Punjab to the central Indo-Gangetic plain every year. This adds to other sectors' pollution and poor overall metrological conditions, making it episodic and resulting in breathing issues, as well as low visibility on roads. Besides the field operations, the storage and transportation of the yield also cause emissions.

### **CSTEP's work in the agriculture sector**

CSTEP has been working to reduce emissions from the agriculture sector, primarily through its research work in Punjab. Our ongoing [study](#) aims to generate evidence for biomass burning through ground monitoring and satellite data analysis. The study is also analysing air pollution control

strategies that are technically and economically feasible for farmers, in order to provide solutions for the identified issues.

Here are some of the probable solutions:

- Monitoring should be done to identify where crop residue burning is happening.
- Awareness programmes should be regularly carried out for farmers to convince them to not burn the crop residue. [CSTEP has been vocal](#) about the impacts of crop residue burning on farmers' health, air quality, and climate change to [spread awareness](#) among the citizens.
- Farmers should be empowered with information on improved technology for harvesting and best practices for cultivating crops.
- Newer agricultural practices like vertical farming should be encouraged to reduce land stress.
- Use of bio-fertilisers and bio-pesticides should be increased.
- There should be quick transportation of the harvested yield and availability of local markets for selling vegetables to avoid storage wastage and gaseous emissions from perishable items.
- Alternatives like transforming the crop residue into some articles of use should be done on a large scale.

Continuing our efforts towards comprehensive air pollution control, not just in the agricultural sector but in all relevant areas, we bring to you the India Clean Air Summit (ICAS) — our flagship event on air pollution.