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Burning of Crop Residues: A Global Problem

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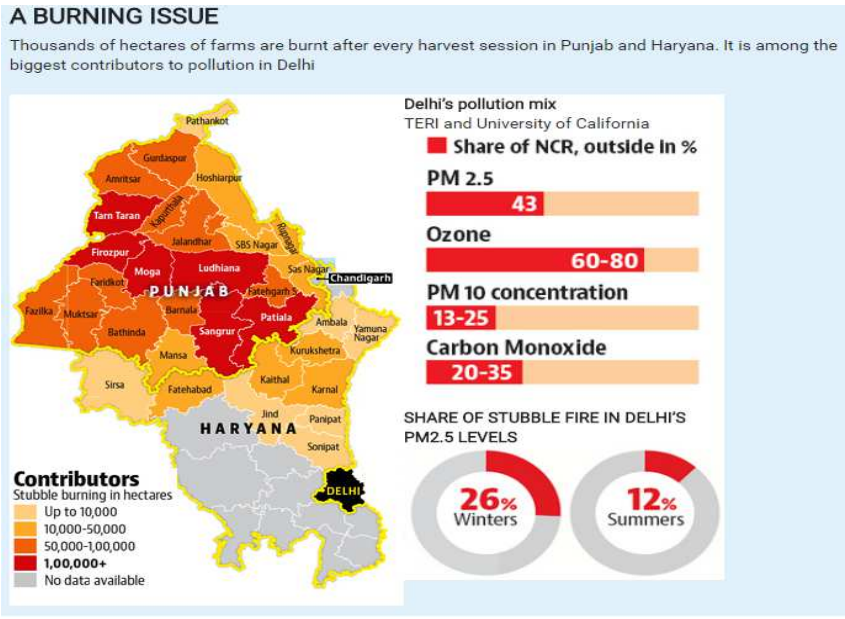
Introduction

Residue burning is the deliberate setting fire of the straw stubble that remains after wheat and other grains have been harvested. The burning of crop residues in fields is one of the most significant activities of global biomass burning (excluding biofuels), and contributes substantially to air pollution. The emissions of CH4, CO, N2O, and NOx have been estimated to be about 110, 2306, 2 and 84 Gg respectively, from rice and wheat straw burning in India in the year 2000 (Gupta, *et. al.*, 2004). The carbon (C) component in stubbles is lost by burning and that the process of burning stubbles even occasionally, seriously affects the organic carbon levels of the soil. Around 80 per cent of the C in standing stubble will return to the atmosphere as CO_2. Losses of carbon as CO_2 to the atmosphere through burning are often only slightly greater than through natural decomposition, but they are of course immediate. Various studies have been published dealing with the amount of biomass burned from various sources such as deforestation, shifting cultivation, savanna fires, fuel wood and the burning of agricultural residues mainly in tropical regions (Wang et al., 2007, Cao et al., 2008, Zhang et al., 2011). On a global basis, forest burning is the major source of the fire emissions due to its high carbon density and burning of agricultural waste is the second major



source, representing nearly 2020 Tg (approx 25% of total biomass burned) (Crutzen and Andreae, 1990; Andreae et al., 2001; Chang et al., 2010).

Global Dimension

- Global agricultural byproduct availibilty-2500 million tonnes
- Even using 10% of available byproduct for fibre production and assuming that about 20% of byproduct by weight can be obtained as high-quality fibre more than 50 million tonnes fibre can be obtained from this byproduct every year
- It may contribute nearly 50%current total annual world consumption of fibre
- So agricultural byproduct is a sustainable source of fibre which can be used as a raw material for textile industry.

Reasons of burning

- The area where a lot of residues is produced, this makes it more difficult to incorporate the straw into the soil. For this, it is the traditional practice for farmer to burn the straw in some area
- Farmers believe that rice straw serves as hiding and breeding place for rats. Field rat is most damaging vertebrate in rice fields.
- Yellowing of seedling. Partially decomposed straw lead to yellowing of newly transplanted seedling. Farmers do not realize that its merely temporary. (Mendoza and Samson, 1999).
- Spreading rice straw is perceived to be laborious. There is a shortage of man power to deal with the leftover residue of straw. A farmer burns it to save money as well as time.
- After harvesting of rice, there is very less time for land preparation for the sowing of wheat. Farmer burn residue for timely sowing of next crop.
- It is believed that after heating operation most of the larva of insect pest and disease die. There attack to next crop will be less due to the killing of most of the top larvae of the pathogen by heating of the top surface.

Impact of Residue Burning

Environment impacts:

- Air pollution (particulates, greenhouse gases) and nutrient loss of soil.
- One tonne of crop residue on burning releases:
- The burning of rice residue emits GHG emissions as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), pollutants as carbon monoxide (CO), particulate matter (PM), and toxic as polycyclic aromatic hydrocarbons (PAHs) due to the incomplete combustion process (Yadav *et al*, 2014). .
- Global climate change

Human impacts:

Direct

- carcinogenic and lung infections.eyes irritation, asthma
- Suffocation, dizziness, headaches, fatigue,
- chest pain, difficulty in breathing
- Highest asthmatic patients are found in of North West India's hospitals due to the annual burning of rice residue in fields. (Yadvinder-Singh *et al., 2010b).*

Indirect

- Traumatic road accidents due to restricted visibility.

Management Options for Crop Residue

- The pattern of crop residue usage is different in different regions in India.
- Cereal residues can be used as a cattle feed and animal bedding, cooking and heating, composting, housing material and in industries.
- After baling, crop residues can also be used for textile, paper and ethanol production, and engineering applications.

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