Stubble Burning

Published On: 04-10-2023

Why is in news? With the paddy harvest and instances of stubble burning having picked up pace in the northern districts of Punjab, and winter around the corner, how is Delhi's air quality likely to fare this winter?

According to experts, the meteorological factors that helped keep Delhi's air cleaner than usual last winter may not extend into the upcoming winter.

Reasons for Air pollution in Delhi:

Location of Delhi: It lies to the northeast of the Thar Desert, to the northwest of the central plains and to the southwest of the Himalayas. As winds arrive from the coasts, bringing with them pollutants picked up along the way, they get 'trapped' right before the Himalayas.

Cold temperature during winter: During summer hotter air rises higher above the surface and takes the pollutants along with it. However, during October-November, the air is not that hot. The pollutants are trapped and tend to get concentrated at lower levels of the atmosphere, resulting in the smoke and haze situation.

Lack of wind especially after the end of the monsoon: Average wind speed in winter in the Delhi NCR region is one-third of the summer months. This makes the pollutant concentration in the region.

Dust Storm: According to SAFAR (System of Air Quality and Weather Forecasting And Research), 40% of the particulate pollution in Delhi on those specific days could be sourced to a "multi-day dust storm" that originated in the Middle East.

Stubble burning: The root cause of stubble burning can be traced back to the 1960s-70s when India introduced several measures as part of its Green Revolution to feed its rising population.

Governmental policy: In an attempt to address the growing water crisis, the Punjab and Haryana governments introduced laws, which delayed Kharif cropping and thus worsened the pollution due to stubble burning.

Manufacturing activity, Power Generation, Construction, and Transport: The Central Pollution Control Board (CPCB) and the National Environmental Engineering Research Institute (NEERI) have declared vehicular emission as a major contributor to Delhi's increasing air pollution.

Minimum Citizen Participation: Unlike in other parts of the world, there is little citizens' movement for controlling pollution.

Poor Regulations: Regulation is most often seen as imposing bans, not hand-holding and persuading industry – most of them small factories – into adopting environment-friendly measures

India has not recognised in policy and law that air pollution is a killer.

Stubble burning:

Stubble (parali) burning is a **method of removing paddy crop residues** from the field to sow wheat from the last week of September to November, coinciding with the withdrawal of southwest monsoon.

Stubble burning is the **practice of intentionally setting fire to the straw stubble** that remains after grains, such as rice and wheat, have been harvested.

Farmers resort to the practice due to the limited time they have between the harvesting of kharif paddy and sowing of the rabi wheat. They find it cost-effective and quick.

Reasons for Stubble Burning:

The main problem behind crop burning is the **rotational cropping system** of rice and wheat where farmers burn stubble as they have to quickly clear the fields for the next crop.

Due to a **shortage of labour and time**, when paddy is harvested by a **combined harvester and thresher**, particularly by large farmers in Punjab, the machine leaves behind a significant length of straw and stubble on the field.

This prevents other machines from sowing wheat seeds and thus farmers often burn the stubble to quickly eliminate the paddy stubble.

Farmers **do not have alternatives** for utilising them effectively.

The farmers are **ill-equipped to deal with waste** because they **cannot afford the new technology** that is available to handle the waste material.

With **less income due to crop damage**, farmers are likely to be inclined to light up their fields to cut costs and not spend on scientific ways of stubble management.

Impact of Stubble Burning:

The major problems of the burning of crop residues are **pollution and greenhouse gas emissions** that lead to global warming.

Pollution from stubble burning has significantly **reduced lung function** and was particularly harmful to women.

The **concentrations of PM2.5** (category of unburnt carbon particles considered most harmful to respiratory health) were found to **increase more than twice** between the two-time frames.

During the crop residue burning period, a **two to three-fold increase was noted in most of the respiratory symptoms**. The highest number of respiratory complaints were reported by the elderly population (>40-60) and the lowest in the younger age group (>10-18).

Soil degradation is another problem due to the burning of crop residues. Burning paddy straw radiates heat that kills fungus and bacteria which is essential for soil fertility.

Steps taken by the government:

Establishment of a Marketplace:

Efforts are being made to **increase the avenues for the alternate usage of paddy straw and other crop residue**.

For instance, paddy straw has a considerable calorific value, making it suitable for use as a fuel in biomass based power plants.

Similarly, it can be utilised for the preparation of bio-fuels, organic fertilisers and in paper and cardboard making industries.

The strategy, broadly, is to assign a real economic and commercial value to the agricultural residue and making burning it an economic loss to the farmer.

Graded Response Action Plan (GRAP):

In pursuant to the Supreme Court's order in the matter of **C. Mehta vs. Union of India (2016)** regarding air quality in the National Capital Region of Delhi, a Graded Response Action Plan has been **prepared for implementation under different Air Quality Index (AQI) categories** namely, Moderate & Poor, Very Poor, and Severe.

National Clean Air Programme (NCAP):

It has the **goal of reducing the concentration of coarse (PM10) and fine particles (PM2.5)** in the atmosphere by at least 20% by the year 2024, with 2017 as the base year for comparison.

Banning Crop Residue Burning:

Crop residue burning was notified as an offence **under the Air Act of 1981**, the **Code of Criminal Procedure, 1973 and various appropriate Acts.**

In addition, a penalty is being imposed on any offending farmer. Village and block-level administrative officials are being used for enforcement.

Crop Diversification:

There are various ongoing, long-term efforts at diversification of cropping techniques, such that crop residue burning can be effectively prevented.

This is being attempted through cultivation of alternate crops (apart from rice/paddy and wheat) that produce less crop residue and have greater gap periods between cropping cycles.

To mitigate stubble burning:

A **Series of short-term ex-situ and in-situ solutions** have been rolled out by the Union and State governments.

In-situ solutions include Turbo happy seeders and bio-decomposers, etc.

Ex-situ solutions include collecting and using stubble as fuel in boilers, to produce ethanol, or simply burning away alongside coal in thermal power plants.

Pusa Decomposer:

Pusa Decomposer, a **microbial consortium of fungal species** (both in liquid and capsule forms) developed by ICAR, has been found **effective for rapid in-situ decomposition** of paddy straw.

The decomposers are in the form of capsules made by extracting fungi strains that help the paddy straw to decompose at a much faster rate than usual.

It involves making a liquid formulation using decomposer capsules and fermenting it over 8-10 days and then spraying the mixture on fields with crop stubble to ensure speedy bio-decomposition of the stubble.

Crop Residue Management:

The Centre introduced the **Crop Residue Management (CRM) scheme** in 2018-19, under which financial assistance at 50 per cent is provided to the farmers for purchase of CRM machinery andat 80 per cent to Cooperative Societies, FPOs and Panchayats for establishment of CHCs.

The scheme **promotes usage of machines** such as Super Straw Management Systems, Happy Seeder, Super Seeder, Smart Seeder, zero till seed-cum-fertiliser drill, Mulcher, Paddy Straw Chopper, hydraulically reversible mould board plough, crop reapers and reaper binders.

Other measures:

Mobile enforcement teams to check vehicular pollution, public awareness campaigns, investment in mass rapid transport systems, and phasing out old commercial vehicles.

Delhi's **"Green War Room" signalling** the fight against the smog, is analyzing satellite data on farm fires from Punjab and Haryana to identify and deal with the culprits.

The government's recent **push for electric vehicles** shows promise, while the response of industry and the buy-in from customers will be key.

Better farming practices - Needed is the political will to act, as poor farmers complain that they receive no financial support to dispose of post-harvest stubble properly.

The **Indian Agricultural Research Institute** has **proposed a low-cost way** to deal with the problem of stubble burning by **spraying a chemical solution** to decompose the crop residue and turn it into manure. Better coordination is needed.

Smog Towers are large-scale air purifiers usually fitted with multiple layers of air filters which cleans the air of pollutants as it passes through them.

Way forward:

Small and marginal farmers **need support for adoption of in-situ strategies**, to mulch the straw into the soil and not burn it.

Imposing a fine is not going to work in our socio-economic conditions for curbing stubble burning. We need to focus on alternative solutions.

A **holistic approach** is required to address crop residue burning. This includes a multi-disciplinary and multi-agency setting involving technical agencies, market-based economic tools, supporting agricultural and environmental policies, and awareness and capacity building for farmers.

There also needs to be a central coordinating mechanism for paddy stubble management and crop diversification with adequate resources, and a clear assignment of responsibilities between national and sub-national agencies.