

Stubble Burning Seeding Air Pollution In Northern India

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Abstract

Every year, people in and around Delhi suffer from deadly winter air pollution, a phenomenon in which smog's toxic clouds cover the area every year during the winter months. Burning stubble in neighbouring Punjab, Haryana and Uttar Pradesh accounts for nearly 30% of Delhi's winter air pollution and is a major factor in the presence and increase of air pollution in this region during the winter months. The Supreme Court of India took note of this issue and issued statements and instructions on the threat of air pollution and burning of stubble. State and law enforcement agencies continue to adhere to the same approach, even though traditional approaches have proven to be inadequate. The inability of government-sponsored solutions to reach targeted beneficiaries is another factor that makes it possible to continue the practice of burning stubble.

Keywords: Air pollution, AQI, Northern India, Stubble burning

Introduction

The global issue of air pollution has been a significant threat to India. India ranks 3rd having the worst air quality in the year 2020 (Figure 1, IQAir, 2022). National Pollution Control Day is being celebrated on 2nd of December every year with slogan raise awareness about the importance of pollution control and to educate people on how to prevent pollution. The utter sarcasm is that the air we breathe in most Indian cities is so polluted that it becomes equivalent to smoking 40 cigarettes per day. A twist in seasonal wind factors and human activities like crop fires, burning of stubbles etc. has been rigorously affecting air

quality in Northern India. In current scenario a lion's share of urban population i.e. 75% and cryptic world's population is being exposed to polluted air which has crossed threshold limits of WHO Air Quality Index (AQI) severely affecting the population (IQAir, 2022).

Annual onset of autumn is corroborating with heavy air toxicity in maximum of areas of Northern India. This is why, most of the Indian cities are under the top twenty most polluted cities in the world (Figure 2). Age old custom of burning stubbles ignites the Diwali festive season during October and November. Stubbles of Kharif crops are burnt every year to prepare the land for next cropping season. The fifth leading risk factor hovering in atmosphere is particulate matter of 2.5 size causing fatal health problems. Death due to toxic air in India during 2017 has been recorded to be 1.2 million. The particulate matter is mixture of solid and liquid droplets in atmosphere. Northern Indian states namely Haryana, Punjab, Rajasthan, Uttar Pradesh and Punjab have primarily been infested with toxic air owing to crop burning. Annual economic loss of Rs. 200,000/- has been estimated in these areas due to air pollution.

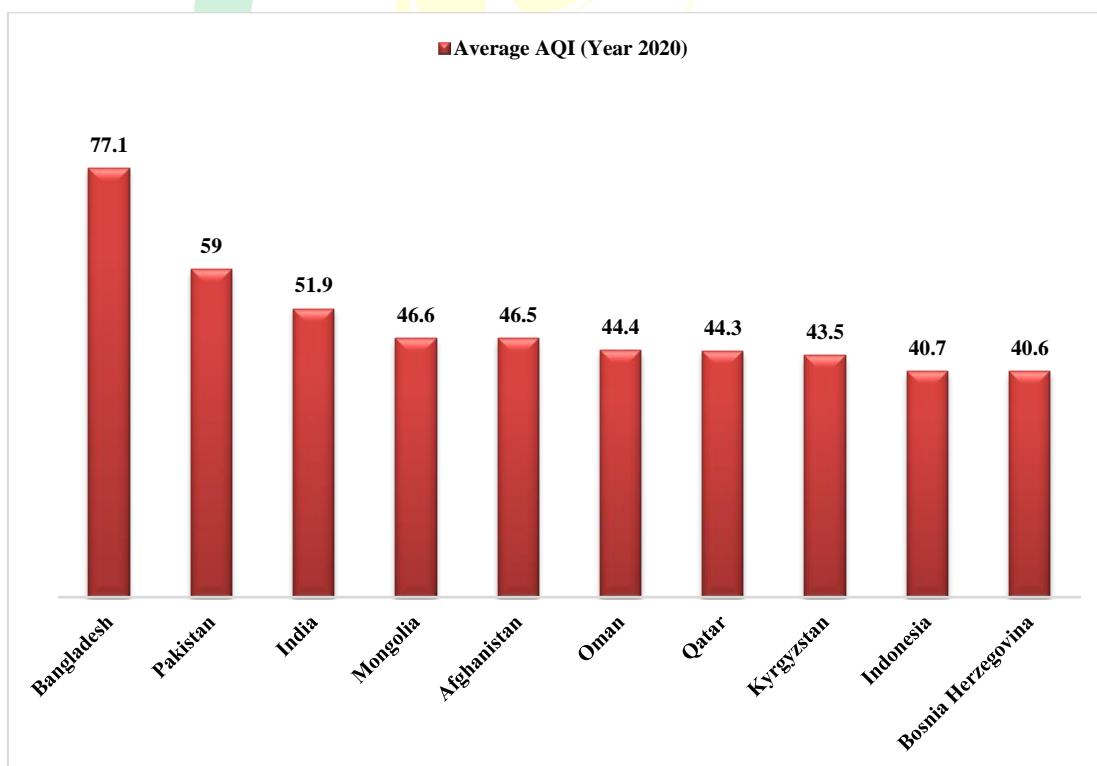


Figure 1. Top ten countries having the worst air quality in the year 2020 (Source: IQAir, 2022)

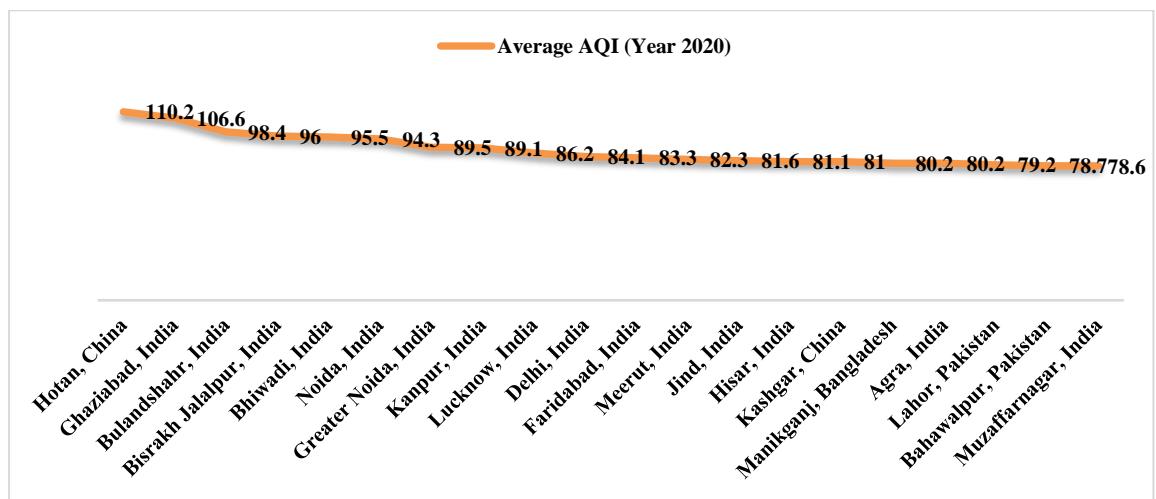


Figure 2. Air quality index (AQI): Most polluted city of India (Source: IQAir, 2022;

22nd Jan, 2022)

The stubble burning has been stealthily sucking life of children and adults. Risk of acute respiratory infections, irritation of eyes, skin allergies are creating havoc. Chronic Obstructive Pulmonary Disease (COPD), pneumonia, ischemic heart disease, lung cancer, laryngeal cancers, nasopharyngeal carcinoma, stroke and tuberculosis are some of the diseases caused due to air pollution. Low birth rate and cataract has also been enlisted under harmful impacts of air pollution. In India, policies never fail to get sanctioned but get restricted to pen and paper. Stubble burning is an offence under several acts including Air Act of 1981. A farmer caught doing so can be punished with an amount of Rs2500 per acre by Pollution Control Board as ‘Environment compensation cess’. Such an act has reduced the burning activities by 25% in Haryana and Uttar Pradesh by farmers of Punjab are too rigid and prefer to pay penalty than to stop burning crop residues (TERI, 2022). A sincere address to the problem is required for curbing such activities from root. The State Government should be more vigilant regarding the issue, should charge hefty penalty on no cooperation with the sanctioned polices and administration should be stricter while imposing such rules and regulations. The National Green Tribunal issued a show cause notice slamming a sanction on Delhi, Haryana, Punjab and Uttar Pradesh governments for not being seriously regulating and assisting farmers (TERI, 2022).

Burning crop stubble

As winter begins, agricultural fires are rampant in northern India, especially in western Punjab, Haryana and Uttar Pradesh. The problem of poor air quality is exacerbated in

the inland Delhi, where pollutants are trapped, unlike coastal cities where pollutants are washed away by the sea. Over the years, parts of Punjab, Haryana and Uttar Pradesh have switched to a special short-duration rice-wheat farming system. However, this cultivation system, which is perceived as "efficient," entails enormous environmental and health costs. The main reason for burning stubble in paddy fields is the short time from harvesting rice to sowing wheat. Delayed sowing of wheat adversely affects wheat harvesting. The short time frame available between rice and wheat may be partly due to the Punjab Underground Soil Conservation Act of 2009 (TERI, 2022). The law sets the date for rice transplanters on June 20th, thereby promoting rice harvesting. As a result, farmers have less days between two harvests. Therefore, the quickest and easiest solution is to burn crop residues. It is estimated that Punjab produces 20 million tonnes of rice stubble each year, 80% of which is burned on farms. Figure 3 shows the stubble drilling incidents in North India in 2020 and 2021 (BS, 2022). This date has been moved up to June 10, 2020, in response to farmers' concerns about labor shortages during the COVID 19 paddy transplant. This is unlikely to suppress the burning of stubble. Burning stubble not only affects climate change and medical costs for people in the affected areas, but also emits with disruption of economic activity i.e., airplane and train cancellations or delays, road traffic and accident delays. Burning stubble releases particulate matter PM2.5 (TERI, 2022).

It is an air pollutant that causes human health problems at high concentrations in the air. Particles are trapped in the lungs and can increase the risk of lung cancer by 36%. The cost of air pollution that burns stubble in India is estimated at US \$ 30 billion annually. Burning a ton of rice loses nitrogen (5.5 kg), phosphorus (2.3 kg), potassium (25 kg) and sulfur (1.2 kg) in the soil. In addition, the heat that burns crop residues kills important bacterial and fungal populations in the soil, in addition to organic carbon. Since good air quality is a public need, intensive coordination to address this issue is even more important. In other words, the government must share compensation costs, mitigation costs (stubble reduction), or both in separate actions. In general, applying incentive-based regulations can be a potentially cost-effective way to control air pollution (ORF, 2022).

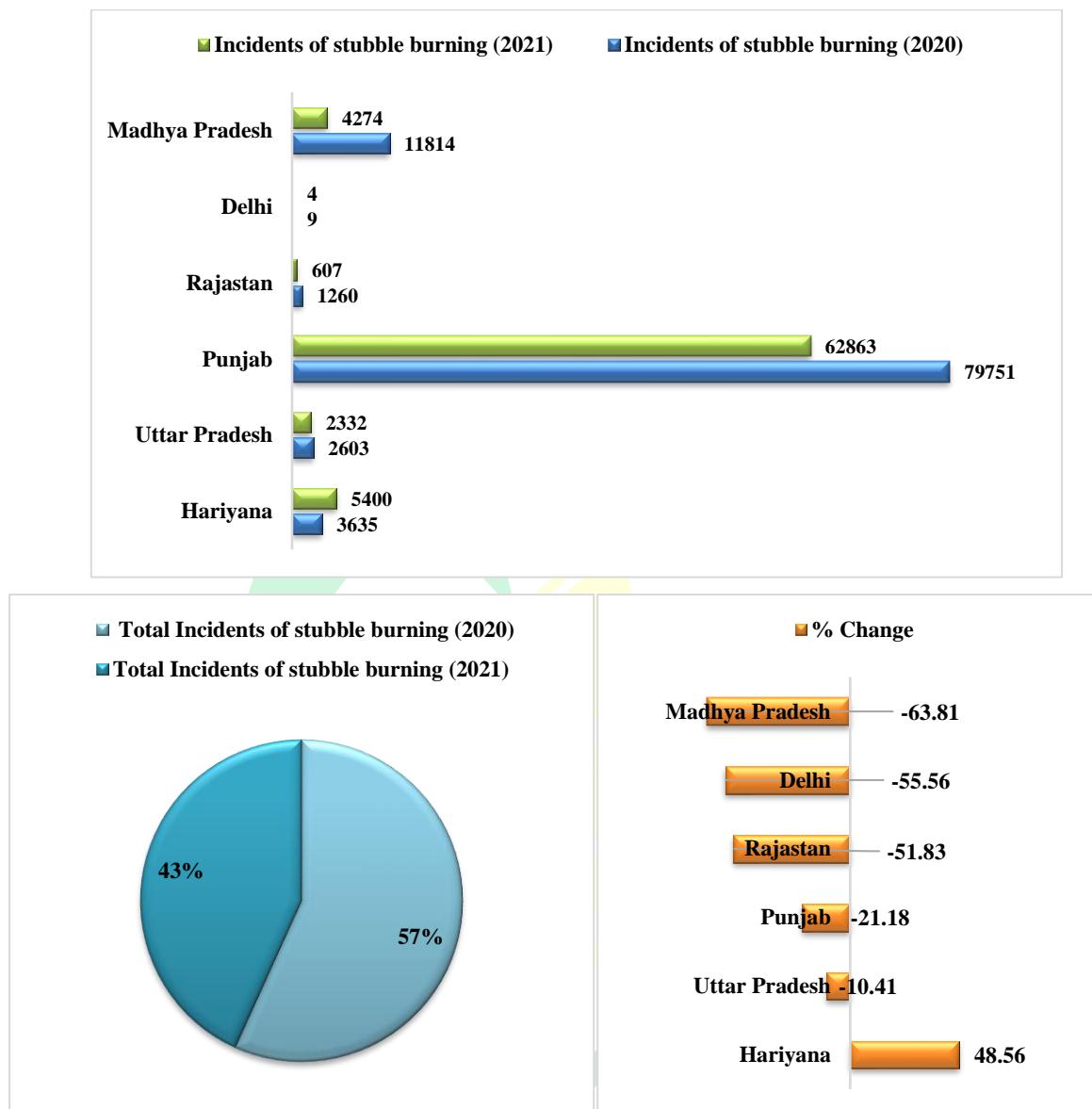


Figure 3. Incidents of stubble buring in Northen India for the year 2020 and 2021

(Source: BS, 2022)

Effective policy measures, management and incentives

Various policies at the national and local levels are trying to solve India's stubble burning problem. Along with the crop diversification program, national crop residue management policies are being implemented. Under the law, violators may be prosecuted for failing to comply with air pollution prevention and control laws. There are also programs that promote out-of-habitat management of crop residues through farm tools such as, Rotators and Balers. However, there are many gaps in policy design, implementation and awareness raising (TERI, 2022). With regard to policymaking, the national crop diversification program

does not include clear public relations provisions to inform farmers about alternative crop options. It also lacks convergence with other programs such as the National Rural Employment Guarantee System, the National Rural Livelihood Mission, and the agribusiness program that may help with rice stubble management and crop diversification. In terms of implementation, despite subsidy regulations, urgently needed equipment is still not affordable for many farmers. Supply chain and rental market constraints are other issues that affect the adoption of farm equipment (Outlook, 2022).

ICAR-IARI's Department of Microbiology has developed Pusa Decomposer (both liquid and capsule), an effective microbial solution for promoting the breakdown of rice straw. This allows the field to handle wheat sowing in 25 days. The four capsules of this product can be scaled up to 25 liters of liquid formulation and can be applied in the field to 1.0 hectares of paddy fields with 56 tonnes of rice straw. In the field management, rice was harvested using a chopper and a mulch following the combine, sprayed on the Pusa decomposer, and the field was moistened with a tiller and light irrigation. The farmer will eventually able to sow the seeds. This has been demonstrated in Punjab, Haryana, UP and NCR Delhi. After the Biofuel Directive came into force in 2018, the pace of industrial recycling of agricultural waste has accelerated (TERI, 2022). The policy stipulates the use of agricultural products for power generation and energy production, including second-generation ethanol production from rice straw, while ensuring reductions in greenhouse gas emissions.

Bioenergy process solution are currently helping several companies to build biofuel plants, including Indian Oil Corporation. At Indian Oil's Panipat Refinery, Praj Industries is helping to build a second-generation 10,000-liter ethanol plant. In addition to producing biofuels, rice straw is also used for cogeneration to power the boiler (Outlook, 2022). In 2019, the central government announced a comprehensive biogas program to help promote the technology developed to convert rice straw to biogas and then to compressed biogas after removing methane and sulfur(ORF, 2022).Under Pradhan Mantri JIVAN (JaivIndhanVatavarAnukoolfasalawasheshNivaran) Yojana, financial support is available for 12 integrated bioethanol projects using lignocellulosic biomass and other renewable sources, from 2018-19 to 2023-24(Outlook, 2022). Various models for collecting bio-waste,

including rice straw, from farmers are being considered to make these and other projects feasible (ORF, 2022).

Conclusion

Researchers have been exploring various options that would way to an alternate path to sow for their next season. Pacing up along with scientists *NitiAayog* and other start-ups have come to rescue farmers for management of crop residue by fertilizer productions from those residues. Stubble burning has been faster, easier and cost-effective practice to farmers for preparation of their land. The ill-informed farmers' attitude towards environment epitomes and careless attitudes becomes a bit sensitive to environmental concerns. Volunteers and civil society emphasize the importance and inculcate a better sense of responsibility in farmers. Major nutrient loss of 1.4 million from top soil has been noticed because of stubble and crop residue burnings. An effective cognizance must be created by the governments, NGOs, and other societies and mostly from responsible citizens regarding ill effects and financial loss to farmers and farm lands. A strict plan of action with cordial and easy to do regulations must be implemented with enlightening the farmers with management methods of handling crop stubbles. No-tillage concept must be adopted along with that they ought to be well educated about its cost and benefits.

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