

STUBBLE BURNING:

IT'S MAJOR CONSEQUENCES ON HUMAN HEALTH, ENVIRONMENT AND GOVERNMENT INITIATIVES

Kirti Verma, Nikhil B. Lothe

Ph.D. Research Scholar, CSIR-CIMAP, Lucknow

A GENERAL INTRODUCTION OF THE STUBBLE BURNING:

Stubble burning is the process to burn crop residue (*Parali*) after the harvesting of staple food crops Rice/Paddy (*Oryza sativa*), Wheat (*Triticum aestivum*) etc. Stubble burning, in a nutshell, is a repercussion of the technology developed for the Green Revolution. Although, stubble burning have many advantages like it is cheaper method which can practised, simply easy and quickly done by the farmers, it can also help to control weed, insect and diseases, reduced nitrogen tie-up etc., that is why farmers practising it since long years. But with respect to the environment and human health it is a concerning issues for the government. Burning crop residue now a serious problem, this contributes to raising the atmospheric pollution, particulate matters and pollutants that have a severe threat on human health and the environmental conditions.

In India, especially during winters the northern region of the country, majorly affected due to stubble burning pollution. Stubble burning has potential source of volatile organic carbon, hydrocarbon, carbon dioxide and nitrogen dioxide, which alone contributes about 10% of the total emission in the world. According to some sources, Indian Agricultural Research Institute (IARI) Pusa, New Delhi, approximately 14 million tons out of 22 million tons that is about 63.6% generated each year in India is set to fire, in which two states-Haryana and Punjab contributes around 48% alone.



FARMERS' PERSPECTIVE:

According to the farmers, it is easy to burn the crop residue just after harvesting because of the pressure for preparing the land for the next cropping season. It requires minimum labour, at zero cost and take less time. The eagerness behind the quick burning of stubble is the lack of time between the harvesting of standing crop and the sowing of the next season crop. The average time period was reported of about 15 days; therefore, farmers do not have sufficient time to manage the farmland in an appropriate way. Agricultural machinery like- Happy Seeder (used for sowing of crop in standing stubble), Rotavator (used for land preparation and incorporation of crop stubble in the soil), Zero tillage seed drill (used for land preparations directly sowing of seeds in the previous crop stubble), Baler (used for collection of straw and making bales of the paddy stubble), Paddy Straw Chopper (cutting of paddy stubble for easily mixing with the soil), Reaper Binder (used for harvesting paddy stubble and making into bundles), are also available to manage the crop residue burning but the machines cost are too high that farmers cannot afford these to use into practise.



MAJOR CONSEQUENCES OF STUBBLE BURNING:

Major consequences of stubble burning:

1. IN CARBON CONTENT:

Generally, farmer's community perception that the carbon component is the crop residue is lost by burning. Eventually this process is into a practise occasionally since long and that pose seriously affects the soil's organic carbon. Researches indicated that around 80% of the carbon in the standing stubble will return to the atmosphere as carbon dioxide. The pollutant content rises in the atmosphere only through burning of crop residue. Losses of carbon as carbon dioxide to the atmosphere through burning are often only slightly greater than through natural decomposition, but they are of course immediate.

2. IN AIR QUALITY OF ATMOSPHERE:

The emission of stubble burning was going through wide range of the areas, and air quality index increasing drastically due to increment in the pollutant contents which travels across the state. Particulate matters (PM_{2.5} and PM₁₀) are reported to have the highest effect on the health of the exposed population. Particulate matters (PM_{2.5}): 9-28%, 23-29%, 24%, 34-70% in the areas of Delhi, Mumbai, Chandigarh and Kolkata respectively, increased due to the stubble burning. Usually, during the coming winters and occasion of Diwali, the air quality of the cities is worsening each year. Urban population suffers a lot during this period, due to accumulation of vehicular exhaust, release of industrial pollutants and emission through stubble burning conjointly form a smog that risen the air quality index beyond the safety limit. Here, the table represent the limits of air quality index:

Table: Air Quality Index (AQI) and Particulate matters standards by Central Pollution Control Board (CPCB)

| Sr. No. | AQI Limits | PM ₁₀ (24-hrs) | PM _{2.5} (24-hrs) | Category |
|---------|------------|---------------------------|----------------------------|--------------|
| 1. | 0-50 | 0-50 | 0-30 | Good |
| 2. | 51-100 | 51-100 | 31-60 | Satisfactory |
| 3. | 101-200 | 101-250 | 61-90 | Moderate |
| 4. | 201-300 | 251-350 | 91-120 | Poor |
| 5. | 301-400 | 351-430 | 121-250 | Very Poor |
| 6. | 401-500 | 430+ | 250+ | Severe |

*Source: Central Pollution Control Board (CPCB)

3. IN SOIL NUTRIENTS:

Stubble burning not only affects the air quality but it also decreases the essential macronutrients (Nitrogen, phosphorous and potassium) as well as other micronutrients levels in the soil, and affects the productivity of soil. During burning the field crop residue, the temperature was rises up to 42°C that is harmful to useful micro-organisms present in the soil, thus killing and destroying them. Due to which, the extra expense of fertilizer doses, vermicompost and essential nutrients cost also increases for the farmers to regain the fertility of soil through additional application. According to a report, one tonne stubble burning leads to a loss of 5.5-kilogram nitrogen, 2.3 kg phosphorus, 25 kg potassium and more than 1 kg of sulphur - all soil nutrients, besides organic carbon.

4. RISK TO HUMAN HEALTH:

There are many health issues of stubble burning that seriously pose threat to human health especially those who have respiratory problem, lung diseases, asthma patients, bronchitis, pulmonary diseases, emphysema, lung capacity loss etc. The long-time exposure to



the air pollution especially when AQI increases up to lethal range, it creates problems like skin rashes and eyes irritation, cardiovascular and respiratory problems frequently occurred, cases of whooping, coughing increases during that period. A study showed that PM2.5 pollution alone accounts 21% of the total deaths in southern part of Asia.

5. EFFECT ON CLIMATIC CONDITIONS:

Stubble burning directly effects on weather and climatic conditions through increasing greenhouse gases like Carbon dioxide (CO₂) and Methane (CH₄), which leads to global warming. Agriculture sector contributes annually about 17% to 32% greenhouse gas emissions in the world. Due to this, weather pattern change, and it affects the cropping system and leads to loss in the yield productivity that directly affects the economy of the country.

Delhi high court against stubble burning and Punjab government imposed a penalty of Rs 73.2 lakh farmers. Although the actual penalty amount was not known, and burning of crop residues continues for several years.

Government of Delhi along with the Indian Agriculture Research Institute (IARI), PUSA have found the solution i.e. "Pusa bio-decomposer" to curb the problem of stubble burning at low-cost, cheaper than machinery use and a very effective way to use. The 'Pusa bio-decomposer' capsules are used to prepare liquid formulation. The solution use to sprayed in the farmers field, that will turn crop residue into manures by decomposing it. For the preparation of solution, chickpea flour and jaggery is used as an ingredient. After spraying the solution in the field, it will increase the soil fertility and also cuts the cost of fertilizers used for next cropping season.



GOVERNMENT INITIATIVES TO CURB WITH STUBBLE BURNING ISSUES:

With increasing the population in the country, there were tremendous increments in the pollution level due to vehicular, industrial pollution. Therefore, in winter's stubble burning along with the pollutants creates hazardous smog which is injurious to human health as well as environment. However, seeing these scenarios in a repeated year the Union government in the year 2014, released the National policy for management of crop residue to curb the problem. With this policy management, the soil will be more fertile and save up to Rs. 2000 / hectare from the farmers manure cost. The state government not taking this into consideration and not implemented the policy management. Therefore, the National Green Tribunal (NGT), on December 2015, took the action and completely banned the stubble burning especially in the states of Haryana, Punjab, Rajasthan and Uttar Pradesh. According to the Air and Pollution Control Act of 1981, stubble burning is a crime under section 188 of the Indian Penal Code (IPC). There seems lacking in the implementation from the government. In 2016, ordered released from the

