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Stubble Burning Against the Environment

Robert Kitto[1]

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Abstract:

The most common farming practice is burning of agriculture straw before or after harvest. India is an agrarian country and generates a large quantity of agricultural wastes. The states of India like Uttar Pradesh, Punjab, Haryana, Bihar, Madhya Pradesh, and Himachal Pradesh have the largest areas under rice-wheat cropping systems. Every year farmers in Haryana and Punjab set paddy stubble ablaze to prepare ground for the next crop. Farmer adopted this phenomenon because it is very inexpensive and quickly clears the fields. But straw burning or stubble burning can cause serious environmental problems. Burning of these residues emit gases like sulphur dioxide, oxides of nitrogen, carbon dioxide, carbon monoxide, black carbon, and aerosols etc. which directly affect the global atmospheric climate. This review paper covers the effects of stubble burning, also suggested some management options for crop residues and what are the steps taken by the government to resolve this problem.

Keywords: *Residues, Stubble Burning, Environment, Pollution*

Authors:

1. *King Abdulaziz University, SAUDI ARABIA.*

Introduction

The act of removing dry stubble or crop residue after harvest by setting fire is known as stubble burning or Stubble burning is the practice of using the fire to reduce or dispose of vegetative debris. As Burning is an easiest and economical option for management of crop residues. Burning of crop residues not only degrade the atmospheric quality but also affect the climate and ultimate the human health. These residues are consider as the major source of gaseous pollution such as carbon dioxide, carbon monoxide, methane and other Halogen compounds. It is also a significant source of aerosol in the atmosphere, having potential impact on global air quality and chemistry of climate. According to IPCC the 25% of the crop residues are burnt on farm. In the present study the fraction of crop residue subjected to burning ranged from 8–80% for rice paddies across the states. 80% of rice straw was burnt in its original position in the states of Punjab, Haryana and Himachal Pradesh (Jain, 2014)

Impacts of stubble burning:

- Stubble burning is inexpensive and quickly clears the fields.
- Stubble burning kills slugs, other pests, weeds, including those resistant to herbicide.

Harmful effects:

- Stubble burning removes the large portion of organic material which cause loss to cultivation.
- Emission of greenhouse gases (GHGs) such as carbon dioxide, methane and nitrous oxide causing global warming
- It cause large amount of air pollution from smoke.
- It cause damage to electrical and electronic equipment from floating threads of conducting waste.
- Fire spreading out of control is another main effect of stubble burning.

Cause of Stubble Burning:

The rice and wheat system (RWS) is one of the widely practiced cropping systems in northern India. The time between harvesting of paddy and cultivation of wheat, at the end of kharif season is very short. On the other side the large amount of water are used to cultivate the paddy crop and the central and various state governments restricting the cultivation of paddy in the summer months. When the monsoons typically arrive over North India the cultivation of paddy can legally begin. This further delays the cut short to the root with a knife, the large units of harvesters leave 6-10 cm of paddy stalk on the field. The subsequent availability of mechanical implements and rise of income in Punjab and Haryana lead to increased mechanization of agriculture. Removal of the paddy stalk on the field is a labor-intensive process. The time window for preparing the field for wheat cultivation being limited and the labor is being unavailable, the options that the farmer has are either investing in expensive or burning the residue right on the field. And the burning of residue is both cheaper and requires less effort.

Impact on Environment

The burning of stubble in fields has an adverse impact on the fertility of soil. Stubble burning removes the large portion of organic material which cause loss to cultivation. The nutrients like nitrogen, phosphorous, sulphur and potassium, etc. uptake from soil and are retained in the crop residues. Burning also kills soil borne deleterious pest and pathogens. The crop residues contain some percentage of organic pesticides, which adversely affect the environment. Pesticides can contaminate unintended land and water when they are sprayed aerially or allowed to run off fields, or when they escape from production sites and storage tanks or are inappropriately discarded. Epidemiological studies show that the contamination of air quality increases adverse health impacts. Air pollution contributes to the respiratory diseases like eye irritation, bronchitis, emphysema, asthma and skin diseases. At the time of stubble burning also causes poor visibility and increases the incidences of road accidents which not only increases individuals' diseases mitigation expense but also affect their productivity at work. Though health consequences from burning of agricultural residues are not fully understood, relative short exposure may be more of a nuisance rather than a real health hazard. Many of the components of agricultural smoke cause health problem because of crop residues burning. Some farmers prefer the inexpensive approach of setting the stubble ablaze, but repeated burning is not good for the soil, and the resulting smoke is a health hazard. Although many studies have measured the particles released into the air by crop burning, fewer have isolated the effect of the smoke on lung function. Some research also shows the smoke produced by crop burning could have a lasting effect on children's lung function

Role of Government for Ban on Stubble Burning

In Haryana, the environment department had banned the burning of agriculture waste in the open fields under the Air (Prevention and Control of Pollution) Act 1981. To tackle the problem Haryana State Pollution Control Board prepared the strategy. All Deputy Commissioners have been advised to issue necessary directions to all the revenue field officials like BDPOs, tehsildars and patwaris to instruct the sarpanchs and panchs in the villages for persuading and educating the farmers on the ban and on the harmful effects of such acts.

Apart from HARSAC being asked to monitor stubble burning in the 10 districts, Central Pollution Control Board has also been requested to share the satellite imagery reports / data obtained from ISRO on a daily basis.

The High Court of Punjab and Haryana in a civil writ petition Captain Sarbjeet Singh v. State of Punjab and others, directed the State Government to take immediate remedial measures to stop burning of wheat/paddy stubble in the field.

There is no specific law in Punjab to ban straw stubble burning, but every Deputy Commissioner (DC) in Punjab has the power to ban this under section 144 of the CrPC. The practice, however, continues right under their nose. The DC also has the power under 188 of the IPC to punish violators but that rarely happens. Under the law, a violator may be punished for up to six months jail and imposed a fine of Rs 1,000.

Review of Literature

Lohan, *et al*. (2017) the economic value of residues are important as livestock feed, fuel and industrial raw material. The farmers are aware of the adverse effects of paddy straw burning at the farm level but they are constrained by the lack of economically viable and acceptable machineries and alternatives for disposal of paddy residues. Utmost significance to manage the paddy residues in-situ is the timely availability of conservation agriculture (CA) machinery and the Ex-situ residue management is still not an economically viable option.

Vats, (2012) stubble burning impacts to public health, safety, and the environment have led to stronger regulation, mandated phase-downs, and even bans on some types of field burning. A large amount of smoke can produce in a short time from stubble burning. To reduce impacts, permits are usually required before burns can be conducted, which can restrict the type and amount of agricultural materials to be burned.

Jain, *et al.* (2014) burning of crop residues from rice-wheat system of Punjab, Haryana and western Uttar Pradesh is a matter of serious concern for the problems of pollution, health hazards and loss of nutrients. For the farming communities Awareness must be created about the negative impacts of crop biomass burning and importance of crop residues incorporation in soil for maintaining sustainable agricultural productivity.

Satyendra, *et al.* (2013) Researchers agreed that burning of crop residue significantly increases the level of particulate matter, gaseous pollutants in atmosphere. But by adopting different biochemically, thermo-chemically induced techniques burning of crop residue can be avoided. Which will not be only reducing the atmospheric pollution and climate problem but also helpful to fulfil the energy demand with improve the economic condition of the country.

Urmila, (2017) in most states in India crop burning is illegal but it is continues in spite of the ban. The problem of pollution caused by stubble burning has not received much attention by the policymakers and the various pollution authorities. The stubble should be treated with urea as a fodder for animals, its use in biothermal energy production, paper manufacturing, mushroom cultivation, bedding for animals, etc.

Conclusion

India is a large agricultural country and agricultural burning is a common practice. Burning of stubble from rice-wheat system of Punjab, Haryana and western Uttar Pradesh is a matter of serious concern not only for Greenhouse gas emission, but it also causes severe environmental problems. The problem of pollution caused by stubble burning has not received much attention by the policymakers and the various pollution authorities. This review of stubble burning and regional haze is needed to bring the issue to the attention of governments and other researchers. Government needs to take some serious steps to solve his issue.

Suggestion to reduce stubble burning

Proper education and awareness must be needed about the adverse effects of stubble burning for human and animal health and its undesirable impact on soil, biodiversity etc. To educate farmers, addition activities like Documentary on environment and climate change may be made. In the documentary emphasis should be put on how burning adversely impact the climate change and educate the farmers about the economics of not burning the agricultural residues.

- Collection and transportation of agricultural residues, gasification as a fuel for the boilers,

converting into briquettes and designing of suitable harvester should be promoted as an alternatives to burning.

- Inviting packaging industries to collect stubble to make packaging boxes which are more environment friendly than other non-disposable materials like thermo Cole and plastic.
- Crop residue would be collected and then for utilization of it, by different technologies available both at the national and international level. Setting up Bio-mass fuel plants to generate fuel using paddy husk.
- The stem may be cut from the root level itself. The same would require a suitable thresher cum harvester that should be developed using indigenous techniques. Use high power tractor for deep cutting. For small farmers it can be followed on cooperative basis.
- Make the small farmers to understand that making chaff out of the agricultural residues is to their advantage.
- Decomposing stubble in the farm field and turning it into the useful manure.
- To tackle the problem of soil degradation and water depletion, a dedicated programme for promoting resource conservation technologies, such as zero tillage, deep ploughing, raised bed planting, laser land leveling etc., should be promoted.

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