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Crop burning against the environment

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Abstract
Residue burning crops is the major problem in northern states of India which is causing air pollution. In the month of October it is very high in Punjab and Haryana where high level of burning starts of remaining paddy straws left in the field after cutting. It causes air pollution which results so many breathing problems. No doubt this phenomenon quickly clears the fields and it is not very much expensive that's why adopted by the farmers but having serious health problem due to this stubble burning. There is no specific laws for this, only some states has taken steps to resolves with this problem. A law should be there to protect the environment from this residue burning.so in this paper I am going to discuss far and cons of crop burning and what are the steps taken by the government to resolve with this problem.

Keywords: crop residue, stubble burning, pollutants, air pollution, health hazards, policy makers, residue management

Introduction
Each year, crop burning in the region is the start of the annual escalation of pollutant concentrations in the air, leading to massive winter pollution in the region. The states of India with the largest areas under rice-wheat cropping systems are Uttar Pradesh, Punjab, Haryana, Bihar, Madhya Pradesh, and Himachal Pradesh [1]. Every year around this time, farmers in Haryana and Punjab set paddy stubble ablaze to prepare ground for the next crop. In the process, they damage soil quality and cause heavy pollution but they say they have no alternative. Plumes of smoke are rising from the fields on National Highway 1. By the end of October or sooner, the smoke will be a thick blanket in the air over Haryana, extending all the way to the national capital. It's the season for paddy stubble burning. In this district of Kurukshetra, harvested paddy fields are now black with ash. In between the wheat-paddy cycle, some farmers grow potatoes or mustard. The sowing of these crops has already started at some places [2].

"Hazy weather was witnessed recently which could have been due to the pollution levels caused post-Diwali and smoke generated from burning of stubble," stubble burning not only affects the soil fertility resulting from loss of essential nutrients but also causes serious threat to human health including breathing problems, allergies and asthma attacks [3]. In a December 2015 order, the National Green Tribunal had called for a curb on straw burning, and had recommended that satellite-based monitoring mechanisms be adopted and local government officers engaged to take action against stubble burning [4].

Crop residues
Agricultural burning is the practice of using fire to reduce or dispose of vegetative debris from an agricultural activity. Some common practices include field burning, large areas of crop residues after harvest to reduce excess plant material, to control crop diseases, weeds or pests, or to maintain crop yields; disposing of piles of agricultural debris, such as orchard trees, limbs, or haystacks; and clearing vegetation out of irrigation ditches and canals [5]. The burning of stubble, contrasted with alternatives such as ploughing the stubble back into the ground has a number of consequences and effects on the environment [6].
Stubble burning is the deliberate setting fire of the straw stubble that remains after wheat and other grains have been harvested.

Effects: The burning of stubble, contrasted with alternatives such as ploughing the stubble back into the ground has a number of consequences and effects on the environment.

- Quickly clears the field and is cheap.
- Kills weeds, including those resistant to herbicide.
- Kills slugs and other pests.
- Can reduce nitrogen tie-up

However, it has a number of harmful effects on the environment:

- Loss of nutrients.
- Pollution from smoke.
- Damage to electrical and electronic equipment from floating threads of conducting waste.
- Risk of fires spreading out of control [7].

Causes of crop residue burning
The main causes of crop residue burning are two-fold. Firstly, there is a very short window of time between harvesting of paddy and cultivation of wheat, at the end of the Kharif season. Paddy, or rice, is a water-intensive crop. The high usage of water in its cultivation has resulted in the central and various state governments restricting the cultivation of paddy in the summer months. In order to prevent diversion of scarce water resources in the summer, paddy cultivation can legally begin only around mid-June, when the monsoons typically arrive over North India. 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 rise in incomes and the subsequent availability of mechanical implements in Punjab

and Haryana lead to increased mechanization of agriculture over the past 10-15 years.

Traditionally, farm labour in these states was in the form of seasonal, migrant workers from the states of Uttar Pradesh and Bihar. Since 2005, the demand for these workers saw a reduction, and accordingly, the availability of assured income from farm labour has declined. The launch of an assured rural income scheme in the form of the NREGA further led to income opportunities in their home states. As a result, agricultural labour has become a scarce commodity in parts of Punjab and Haryana.

The removal of the paddy stalk that remains on the field is a labour-intensive process. With labour being unavailable and the time window for preparing the field for wheat cultivation being limited, the options that the farmer has are either investing in expensive and rarely used agricultural implements, or burning the residue right on the field. Of the two, the latter is both cheaper and requires less effort [8].

Data vise information

During the 2015 harvest, the Haryana State Pollution Control Board did a survey in 10 paddy growing districts in the state with the help of Haryana Space Application Centre (HARSAC), an agency of Department of Science and Technology. The districts surveyed were Ambala, Fatehabad, Jind, Kaithal, Karnal, Kurukshetra, Panipat, Sirsa Sonipat and Yamunanagar.

The survey showed a decline of around 21 per cent in crop burning practice in the past three years. In the year 2015, stubble burning took place in 163 thousand hectares, which was 14.4 per cent of the total rice cropped area. A year earlier, in 2014, stubble burning was witnessed in 168.9 thousand hectares or 15.7 percent of the rice cropped area. The figure was 208.3 thousand hectares or 20.3 per cent of the rice cropped area in 2013.

The survey said the total paddy stubble burning area in the 10 districts had come down by 3.5 percentage points as compared to 2014 and 21.8 percentage points as compared to 2013.

In eight districts, there was a marked reduction in stubble burning. In Kurukshetra and Yamunanagar alone, there was an increase. The decline appears to have not made a significant impact on the air quality in those two years. The report also indicated that early rice stubble burning in major area takes place during second to fourth week of October in Karnal, Kaithal, Kurukshetra, Ambala and Panipat. While late burning in major areas takes place during first week to third week of November in rest of the districts [9].

Impact on Environment

The problem of pollution caused by rice and wheat crop stubble burning has not received much attention by the policymakers and the various pollution authorities till recently. This could be partially due to the fact that the rice burning (the major source agri waste burning pollution) takes place only during selected months of October, November and December. The pollution is restricted only during these months. However even during these months there is considerable loss to human health and environment degradation [10]. Air pollution contributes to the respiratory diseases like eye irritation, bronchitis, emphysema, asthma etc., 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. The crop residues also contain some percentage of organic pesticides and which adversely affect the environment. The environmental impact of pesticides is often greater than what is intended by those who use them. Over 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, including non target species, air, water, bottom sediments, and food. Though there can be benefits using pesticides, inappropriate use can counterproductively increase pest resistance and kill the natural enemies of pests. Many users are inadequately informed about potential short and long-term risks, and the necessary precautions in the correct application of such toxic chemicals are not always made. 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. Pesticides can contribute to air pollution. Pesticide drift occurs when pesticides suspended in the air as particles are carried by wind to other areas, potentially contaminating them.

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. New research now shows the smoke produced by crop burning could have a lasting effect on children's lung function [11].

Role of States for Ban on Crop Residue Burning

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. Like Punjab Preservation of Subsoil Act of 2009, which was enacted to save depleting groundwater and under which no farmer can sow paddy before June 10 or June 15, a similar law is needed to ban paddy straw burning.

Meanwhile 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. Till date, prosecution action has been filed against 32 farmers in the special environment courts in Kurukshetra and Faridabad by the Haryana Pollution Control Board for burning paddy in the open fields [12].

In terms of efforts being made to reduce crop residue burning, the following approaches have been used by various state and central administrations and regulatory bodies so far:

While fireworks associated with the Hindu holiday of Diwali were blamed for a particularly bad smog problem in recent days, smoke from the crop fires blowing across the northern plains into New Delhi accounts for about one-quarter of the most dangerous air pollution in the winter months. In the

growing metropolis of nearly 20 million people, pollution soared well above hazardous levels in the past week [13].

The Haryana State Pollution Control Board has prepared a strategy to tackle the problem. 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 [14].

All DCs have also been advised to direct the gram sachivs and patwaris to bring all the incidents of burning of wheat stubble or paddy straw and other agricultural waste in the open fields to his notice within 30 minutes of the occurrence of such incidents. In case they fail to do so, it shall be treated as dereliction of duty and disciplinary action would be initiated against them.

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 government has decided to launch a pilot project for paddy straw based biomass power project. An official said government or panchayat land would be explored for setting up of the project and storage of biomass.

Further, power utilities will buy power from the biomass power projects on the HERC tariff or better tariff. The agriculture department will support the setting up of bio-fertilizer plants using biomass and would devise a scheme to provide subsidy and to buy the fertilizer from such plants.

Haryana Agriculture Minister O P Dhankar said awareness is being created among the farmers. He added once a biomass power project is set up, the farmers will have an incentive not to burn the stubble [15].

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 [16].

Punjab Government, its various Departments and other institutions like Punjab Agricultural University, Punjab Farmers Commission are all making efforts to devise some alternate economic uses of rice stubble. These include the stubble treated with urea as a fodder for animals, its use in biothermal energy production, paper manufacturing, mushroom cultivation, bedding for animals, etc. Punjab government is also providing subsidy to the farmers to promote the use of equipments which help in checking the burning of crop residues, like rotavators, happy seeders, zero–till-drills and straw reapers. While on the one hand, there is an urgent need to revitalize the research in agriculture and related activities, on the other hand, 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. An eco friendly technology will be beneficial to the farmer community and the state by providing them a tool for improving soil health and environment for sustainable agriculture [17].

An example, the District Magistrate Amritsar banned the burning of crop stubble (the Tribune dated 19th May 2009). However the practice still continues in the rural belt of Amritsar district, including Attari, Ajnala and Majitha. Thus the problem of agri waste burning still remains unresolved. While on the one hand, there is an urgent need to revitalize the research in agriculture and related activities, on the other hand, 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 undertaken. Heavy investments are required to be made for rejuvenation of these resources [18].

The Rashtriya Krishi Vikas Yojana (RKVY) is a welcome initiative in that direction. There is a requirement for an eco-friendly technology that will be beneficial to the farmer community and the State by providing them a tool for improving soil health and environment for sustainable agriculture [19].

Conclusion and Suggestions

In summing up we can say that crop burning is illegal in most states in India but this practice continues despite the ban. Burning of farm waste causes severe pollution of land and water on local as well as regional scales. It is estimated that burning of paddy straw results in nutrient losses. Inciative should be taken to reduce the use of fire in agriculture. The problem of pollution caused by rice and wheat crop stubble burning has not received much attention by the policymakers and the various pollution authorities. The stubble treated with urea as a fodder for animals, its use in biothermal energy production, paper manufacturing, mushroom cultivation, bedding for animals, etc.

Suggestions to Reduce the Crop Burning

- To help find and support non-burning alternatives, economic incentives, and agricultural.
- To develop a regional approach involving local, state, and central level to Institutionalize.
- Development and implementation of enhanced Smoke Management Programs and banning on burning in night.
- Support straw utilization efforts e.g. Fiberboard Plants [20].
- The burning problem is rampant in Punjab, Haryana and Uttar Pradesh and data about air pollution in rural areas is too scarce as most of the pollution monitoring stations are setup in urban areas. Therefore, it is necessary to have a proper idea of real amount of air pollution generated by the burning of crop residuals. It is also necessary to have exact measurement of RSPM, black carbon (soot) in the ambient air, measurement of meteorological parameters like wind velocity, temperature profile and humidity etc., in the rural areas to initiate policy actions to avoid the same.
- Imposing ban on burning legally may not succeed unless farmers are properly educated and made aware about its adverse implications for human and animal health and its undesirable impact on soil, biodiversity etc. To educate farmers, extension 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.
- Alternatives to burning agricultural residue like collection and transportation of agricultural residues, gasification as

a fuel for the boilers, converting into briquettes and designing of suitable harvester should be promoted.

- Free electricity should not be promoted as the same policy has led to installation of high powered tube wells that are responsible for over draw water from deep inside the earth.
- In-situ management in the field, composting by chemical means and straw mulching by mechanical means should be promoted. The machines like the use of disc plough, disc harrow, rotavator, zero tillage and happy seeder can help in mulching the crop stubble.
- Wastes/residue should be collected from the fields and should be disposed off or used for making useful products like making compost, organic manure to improve soil fertility, and gasification for use as a fuel or for power generation; night soil to produce biogas and manure.
- 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.

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