

Original Research Article

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## Rising Perils of Crop Residue Burning in Punjab during Covid-19 Pandemic

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### ABSTRACT

#### Keywords

Crop residue burning, Covid-19, rice-wheat monoculture, respiratory problems

#### Article Info

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Amid Covid-19 pandemic raging around the world which is known to affect the lungs and cause respiratory distress, reckoning of wheat crop residue burning cases is not quashed in Punjab yet. Crop residue burning (CRB) is a solemn problem in north India especially when burning of stubble not only affects environment pollution but is indeed in present scenario could be detrimental for Covid-19 patients with breathing problems. So, bearing in mind the seriousness of this problem the present study was undertaken to check the status of crop residue burning in Punjab. Study was based on the secondary data from Punjab Remote Sensing Centre, pertaining to years 2016 to 2020. The results of the study depicted that the number of CRB cases during kharif season started declining from 81042 to 55210 in Punjab during the years 2016 to 2019 but the figure of the events was still high. While the instability has been shown in case of rabi season. Around 14081 incidents of open field burning were recorded as per satellite imagery in Punjab during rabi harvest till 26 May, 2020. Study revealed that in light of current labour scarcities during covid-19 the farmers who had earlier adopted good management practices of crop residue could also go for burning of crops in coming season of paddy harvesting due to added problems to their plate which will intensify the problem of CRB plus add to the throbbing pain of Covid 19 patients. Study recommends strict government embargo on CRB, mandatory diversification of the cropping cycle on minimum acreage basis, shift to early-maturing rice varieties as recommended by PAU and making paddy residue management technologies like happy seeder widely available.

### Introduction

Punjab agriculture which was braced by input and output price subsidies and superior yields of rice and wheat compared to other crops has virtually become a rice-wheat monoculture which further led to over exploitation of ecological resources. Use of combined harvester has further exacerbated the problem of crop residue management as it leaves behind a large amount of rice residue to be burnt (Kumar *et al.*, 2015). But the straw

collected from the fields can be of great economic value if used as livestock feed, fuel and industrial raw material.

Traditionally crop residues were used as animal fodder, fuel, roof thatching, packaging and composting. But nowadays the major difficulties come to farmers is disposal of this crop residue from existing field because of discontinuing of its traditional uses. CRB results in extensive impacts both on and off farm, like losses in soil nutrients, soil organic

matter, production and productivity, air quality, biodiversity, and water and energy efficiency (Kumar *et al.*, 2015). These gaseous emissions can result in health risk, aggravating asthma, chronic bronchitis and decreased lung function. It also contributes indirectly to the increased ozone pollution. Punjab's Farmers at present are well aware of the lethal damages of this practices but still, dumping of huge quantity is far reaching trouble for farmers due to additional cost involved of labour and transport. Therefore, CRB is adopted to clear the agricultural field promptly and allocate tillage practices for sowing of next crop (Jain *et al.*, 2014).

In Punjab wheat-straw is a common dry fodder for animals, an estimated 75 per cent of rice straw and 20 per cent of wheat straw is burnt. Where rice and wheat in respective seasons harvested by combines, 20-30 cm high stubbles are left in the field. Also, chaff is thrown and discarded by the combine as it moves forward all over the field (Kumar, 2017). The changing pattern of agriculture and usage of machines at the time of harvesting as less numbers of labourers, and many more reasons are associated with the problem of crop residue burning. Amid, Covid-19 pandemic raging around the world which is known to affect the lungs and cause respiratory distress, cases of wheat crop residue burning are not quashed in Punjab. Crop residue burning (CRB) is solemn problem in north India especially when burning of stubble not only affects environment pollution but is indeed in present scenario could be detrimental for Covid-19 patients with breathing problems. So, bearing in mind the seriousness of this problem the present study was undertaken to check the status of crop residue burning in Punjab. Consequently, there is a need to study the current status of crop residue burning in study area, scrutinize the reasons why farmers of this region burn crop residue.

## **Materials and Methods**

The study is primarily based on secondary data collected from the Punjab Remote Sensing Centre (PRSC), Ludhiana from 2016 to 2020. For effective results, the districts were divided on basis of three agro-climate zones of Punjab i.e. Sub-Mountainous zone (Gurdaspur, Hoshiarpur, SAS Nagar, SBS Nagar, Pathankot and Rupnagar), Central Plain Zone (Amritsar, Jalandhar, Kapurthala, Ludhiana, Patiala, Sangrur, Tarn Taran and Barnala) and South-Western Zone ( Bathinda, Faridkot, Fatehgarh Sahib, Fazilika, Firozpur, Mansa, Moga and Muktsar Sahib). Analysis and interpretations of the results were done through simple tabular analysis, averages and percentage.

## **Results and Discussion**

In Punjab, burning residue from the yearly rice paddy harvest is a timeworn practice that the farmers are doing from many decades. Crop residue burning (CRB) emits particulate matter (both PM10 and PM2.5) and greenhouse gases, which aggravate the poor air quality in Punjab. Many policies have been mandated in the past few years to address this challenge. Yet, alternative technologies and practices have not been adopted widely, and the practice of burning crop waste persists (Gupta N, 2019). Over the years the statistics of crop residue cases during kharif season were declined from 81042 to 55210 in Punjab during the years 2016 to 2019. This declining trend of cases is the decent indicator and it is the reward of untiring initiatives taken by state government as well as state agricultural university. While the instability has been shown in case of rabi season cases for burning in rabi season increased by more than 30 per cent from year 2016 to 2020, cases of CRB has touched almost maximum during last five years and that too in the times of widespread Covid 19 pandemic. At present,

burning of wheat straw means creating an excess of particulate matter in the air, which is quite harmful for the people with respiratory illness (especially with Covid 19). Study elucidates that the residue of wheat crop was far less in quantity as compared to paddy and farmers were still burning it, this trend can intensify in coming paddy harvest season, when farmers have to arrange for sowing of the next crop in a rush in the midst of labour shortage in current scenario of reverse labour migration.

### **Reasons for crop residue burning (CRB)**

The major grown crops in Punjab during the kharif season are paddy, cotton and maize but the paddy is the major crop which leads to the problem of CRB. Study examined various determinants regarding the decision of farmers to burn paddy residue, within them one of the primal came to be usage of a combine harvester. The decision to use a combine harvester is in turn driven by the paddy variety sown by a farmer. Coarse paddy growers are more likely to use a combine harvester than basmati growers. Labour shortages, costly process of ploughing crop residue in the field are another important determinant which leads to crop residue burning cases in the study area.

Another reasons of burning the paddy straw is shortage of time (2-3 weeks) between harvesting of paddy and sowing of wheat which does not allow the farmers to perform time consuming operation of clearing the paddy straw from the field. Moreover, the higher price of diesel, costly farm equipment's and machinery which are used in the process of clearing the field adds to the burden. Whereas, the requirement of dry fodder for livestock is mostly met by the wheat straw and fodder crops. Further sowing of wheat by ploughing the residue of the paddy in the soil also leads to various

problems like high content of silicon dioxide (SiO<sub>2</sub>) in paddy straw resists its decomposition when retained in the soil for next crop. While observing the present situation of Punjab, shortage of labour (especially during Covid-19 times) could another added big cause. Labour shortages due to reverse migration of labour amid present pandemic will further make the process of ploughing crop residue in the field more inflated as in this situation there will be a dearth for available labour and wages are bound to rise to Rs 600-700 from Rs 400-500 presently.

### **Zone wise crop residue burning events in Punjab**

Due to all the above listed reasons crop residue becomes the biggest problem during kharif season in the Punjab state. It was observed from the Table 2 that number of cases of crop residue burning was declining during the kharif season but the highest declining rate was associated with Sub Mountainous Zone (-44.8%) followed by Central Plain Zone (-34.81) and South Western Zone (-27.46). Basically the sub mountainous zone of the Punjab is dominated by wheat-maize rotation. Due to this reason the zone comprised of less sown area under paddy, which further leads to less problem of residue burning. In case of central plain zone of the Punjab which is dominated by wheat-paddy cropping pattern and relatively more responsible in residue burning as compared to another two zones but now the number of cases of crop residue burning is decreased from 38279 in year 2016 to 24954 in year 2019 due to various initiative provided by government and concerned authorities.

On the other side, wheat is the only crop that leads to the farmers towards crop residue burning during rabi season but residue of wheat is not a that big concern as compared to

paddy residue because it is used as dry fodder and it has good economic value. Farmers also earn money by selling it. That is why in Punjab most of the wheat residue is used to make wheat straw. Secondly after making wheat straw it does not take as much efforts to clear the field as paddy field requires. Even if this leftover residue is burned it does not create as much pollution as compared to paddy residue burning due to less quantity of residue and dry weather during the time of harvesting. But still CRB is solemn problem in north India especially when burning of stubble not only affects environment pollution but is indeed in present scenario could be detrimental for Covid-19 patients with breathing problems. Table 2 showed the cases of crop residue burning in the different agro-climatic zones of the Punjab during the rabi season. If the percentage change of burning cases in 2020 studied over 2016 it was concluded that number of crop residue burning cases was increased in all the three zones i.e. Sub Mountainous Zone (19.22%), Central Plain Zone (20.31%) and South Western Zone (50.00%), which still needs more attention of concerned agencies.

The several techniques can be used in order to avoid the problem of crop residue i.e. it can be used as fodder purpose, organic manure, power generation, mushroom cultivation, cattle shed construction, packaging, mat making and straw board etc. Moreover, the Power and paper industries are now

approaching to farmers for crop residue. Further, the stubble can also improve crop yield by 4–9% (Sood 2016) and employed in biofuel generation (Singh *et al.*, 2016).

### **Government initiatives**

In order the overcome the problem of crop residue the government had established custom hiring centers and undertaking Information Education and Communication (IEC) activities. Whereas state government had released funds of Rs 269.38 crores for in 2018-19 and Rs 273.80 crore in 2019-20 distribution of in-situ crop residue management machinery to the farmers on subsidy Anonymous (2018). The burning of crop residue was considered as legal offence under the Air Act of 1981, the Code of Criminal Procedure, 1973 and various appropriate Acts. National Green Tribunal (NGT) funds had released funds within the sanctioned budget for Sub Mission on Agricultural mechanization (SMAM). In order to create awareness about its effects on the environment and human health, the government of Punjab had launched three mobile apps which were developed by Punjab Remote Sensing Centre (PRSC). These are i-Khet Machine for facilitating farmers to have access to the agriculture machinery, e-PEHaL for monitoring tree plantation and e-Prevent to have prompt and accurate information about incidents of crop residue burning (Anonymous, 2020).

**Table.1** Number of crop residue burning events in Punjab during Rabi and Kharif season (Numbers)

<b>Year</b>	<b>Rabi</b>	<b>Kharif</b>
<b>2016</b>	10732	81042
<b>2017</b>	14436	45384
<b>2018</b>	10907	50590
<b>2019</b>	11701	55210
<b>2020</b>	14081 (till 27/5/2020)	-

Source: Punjab Remote Sensing Centre, Ludhiana, (GOP, 2020)

**Table.2** Zone wise crop residue burning events in Punjab during rabi and kharif season, 2016-2020

Zone	Kharif					Rabi					
	2016	2017	2018	2019	% change From 2016 to 2019	2016	2017	2018	2019	2020 (till 26/5/2020)	% change From 2016 to 2020
Sub Mountainous Zone (Zone I)	4399	2535	1702	2428	-44.80	1649	2428	1451	1401	1966	19.22
Central Plain Zone (Zone II)	38279	22299	21315	24954	-34.81	5080	6777	5290	5818	6112	20.31
South Western Zone (Zone III)	38363	20550	27573	27828	-27.46	4002	4871	4166	4482	6003	50.00

Source: Punjab Remote Sensing Centre, Ludhiana(GOP,2020)

Crop residue is a scorching topic at present time besides covid-19 pandemic adds oil to the fire, especially during a time of paddy harvesting. There is no doubt that smoke from burning crop residues affects people’s health, road safety and the environment. This study concluded that in Punjab, the number of crop residue burning cases had declined year to year. But still it matter of consideration that in light of current labour scarcities during covid-19 the farmers who had earlier adopted good management practices of crop residue could also go for burning of crops in coming season of paddy harvesting due to added problems to their plate which will intensify the problem of CRB plus add to the throbbing pain of Covid 19 patients.

Labour shortages due to reverse migration of labour amid present pandemic will further make the process of ploughing crop residue in the field costly as in this situation there will be a dearth for available labour and wages are bound to rise to Rs 600-700 from Rs 400-500 presently. Therefore, there is need for higher authorities to take early precautionary steps to control their menace in coming season plus nudge the awareness among farmers to take anticipatory steps to monitor the burning of

crop residue in coming 2020-21 season. Study recommends strict government embargo on CRB, mandatory diversification of the cropping cycle on minimum acreage basis, shift to early-maturing rice varieties as recommended by PAU and making paddy residue management technologies like happy seeder widely available.

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