International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Stubble Burning in Punjab: Problems and Issues

Richa Bansal

Assistant Professor, Environmental Studies, Patiala, India

Abstract: ***Punjab, being the Bread Basket of India, is facing many agricultural problems too. Stubble burning is one of the major concerns of environmentalists of the state. The main reasons for the above said activity is the poor economic condition of farmers due to which they want economically cheap methods to prepare their fields for next crop. Another reasons for the practice being It quickly clears the field and is the cheapest alternative and kills weeds, including those resistant to herbicide. It kills slugs and other pests and can reduce nitrogen tie-up. The practice leads to huge amounts of air pollution in the states of Punjab, Haryana and Delhi NCR. It also causes loss of soil fertility and moisture. Various sustainable models and alternating methods of using plant stubble have been mentioned in the paper which if adopted can prevent stubble burning and hence, avoid pollution of the air.***

Keywords: Stubble, Burning, Air Pollution, Punjab, Soils, Sustainable, Fertility

1. Introduction

Punjab is an agriculture dominated state. The state has been called the Bread Basket of India. Farming being the main occupation of the masses, the problems arising due to the same are a major concern. Stubble Burning, being one of them, tops the charts. Stubble burning is the act of setting fire to crop residue to remove them from the field to sow the next crop.

Recently, the Supreme Court had ordered the Centre to prepare a comprehensive national scheme, in consultation with the States, to wean small and marginal farmers away from stubble burning. Air pollution in Delhi NCR has now become a familiar story, repeated with minor variations every year, mainly aggravated by stubble burning in Punjab and Harayana.

Garg et al., conducted a study in 2008 in which they estimated that the contribution of rice and wheat stubble loads in the total stubble was 36 and 41 %, respectively in the year 2000, while the contribution of Punjab in the total burnt stubble of rice and wheat was 11 and 36 %, respectively during the same time period. Mandal et al. (2004), estimated the total amount of crop residue generated in India and found that wheat residue constitutes about 27 % and rice residue about 51 % of the total 350 × 106 kg /year.

Concern of Farmers: Need for Stubble Burning

After harvesting the old Kharif crop, before planting the new Rabi crop, farmers have to move in a very short interval and if they are late, due to short winters, they might face considerable losses. Therefore, burning is the cheapest and fastest way to get rid of the stubble.

- If stubble is left in the field, pests like termites may attack the upcoming crop.
- The poor economic condition of farmers doesn't allow them to use expensive mechanised methods to remove stubble.

Causes of the Stubble Burning

1) The main reason of the problem is the use of mechanised harvesting which leaves several inches of stubble in the fields. Earlier, this excess crop was used by farmers for cooking, as hay to keep their animals warm or even as extra insulation for homes. But now the stubble use for such purposes has become outdated.
2) High Silica Content: Rice straw is considered useless as fodder in the case of non-basmati rice, because of its high silica content.
3) Late transplanting of paddy during Kharif season to prevent water loss as directed by PPSW Act (2009) had left farmers with little time between harvesting and preparing the field for the next crop and hence farmers are resorting to the burning of stubble.
4) Experts say that with *less income* due to crop damage, farmers are likely to be inclined to light up their fields to cut costs and not spend on scientific ways of stubble management.

Advantages of stubble burning

1) It quickly clears the field and is the cheapest alternative.
2) Kills weeds, including those resistant to herbicide.
3) Kills slugs and other pests.
4) Can reduce nitrogen tie-up.

Effects of Stubble Burning

1) Pollution: Open stubble burning emits large amounts of toxic pollutants in the atmosphere which contain harmful gases like methane (CH_4), Carbon Monoxide (CO), Volatile organic compound (VOC) and carcinogenic polycyclic aromatic hydrocarbons.
   - After the release in the atmosphere, these pollutants disperse in the surroundings, may undergo a physical and chemical transformation and eventually adversely affect human health by causing a thick blanket of smog.
   - Open crop stubble burning events were observed in and around Patiala. A ground level was deliberated to analyse the contribution of Wheat (*Triticum aestivum*) and Rice (Oryza sativa) crop stubble burning practices on concentration levels of aerosol, SO_2 and NO_2 in ambient air at five different sites in and around Patiala city covering agricultural, commercial and residential areas. Aerosols were collected on GMF/A and QMF/A (Whatman) sheets for a 24 h period throughout the year in 2007. Simultaneously, sampling of SO_2 and NO_2 was conducted and results obtained during stubble burning periods were compared to the non-stubble burning periods (Mittal et al., 2009).

2) Soil Fertility: Burning husk on ground destroys the nutrients in the soil, making it less fertile.
3) Heat Penetration: Heat generated by stubble burning penetrates into the soil, leading to the loss of moisture and useful microbes.

Innovative Models for reducing stubble burning

1) Chhattisgarh Model
   a) An innovative experiment has been undertaken by the Chhattisgarh government by setting up gauthans.
      - A gauthan is a dedicated five-acre plot, held in common by each village, where all the unused parali is collected through parali daan (people's donations) and is converted into organic fertiliser by mixing with cow dung and few natural enzymes.
   b) The scheme also generates employment among rural youth.
   c) The government supports the transportation of parali from the farm to the nearest gauthan.
   d) The state has successfully developed 2,000 gauthans
2) An expansion of schemes like the MGNREGA for harvesting and composting of parali.
   - An integrated regenerative rural development model of narwa (rivulet regeneration), garuwa (cattle conservation), ghuruwa (composting) and baari (kitchen garden) through a participatory process using MGNREGA.
3) The most efficient technology to counter stubble burning at the moment is Turbo Happy Seeder (THS).It not only cuts and uproots the stubble but can also drill wheat seeds in the soil that have just been cleared up. The straw is simultaneously thrown over the sown seeds to form a mulch cover.
4) Establishing Farm Machinery Banks for custom hiring of in-situ crop residue management machinery.
   - Co-operative societies of farmers, self-help groups, registered farmers societies/farmers groups, private entrepreneurs for establishment of farm machinery banks or custom hiring centres.
5) Financial incentives to small and marginal farmers to engage in the management of the residue of their non-basmati variety rice crop in Punjab, Haryana and Uttar Pradesh.
6) However, in the longer time span, shifting cropping pattern away from paddy to maize, cotton, fruits or vegetables in Punjab, Haryana and UP.
7) From stubble, high-grade organic fertilizers can be prepared by mixing with cow dung and few natural enzymes.
8) These nutrients, if successfully utilized in organic manures, can also reduce the risk of cancer in Punjab by reducing the levels of carcinogens caused by chemical fertilizers in soil.
9) Using straw for electricity generation is another productive way of generating wealth from residue.

Bio-Char

PAU, Ludhiana has come up with an innovation to convert stubble into 'biochar' which would help in reducing the environmental pollution upto a great extent and would also help in increasing the fertility of the soil. Dr. RK Gupta, a senior soil chemist, Department of Soil Sciences at the PAU, said the burning of the rice and wheat stubble leads to a loss of nutrients and the smoke caused by leads to air pollution. "We have been working on this project for the past three years and the experiments conducted have given a positive result. We found that making 'biochar' from stubble, instead of burning it will help in reducing the environmental pollution caused by it by 70 percent," said Dr. Gupta. "After successful experimentation for three years now, we will be asking the KVK of the PAU to make biochar and disseminate knowledge about it to the farmers so that they can also adopt this method," he said. He said apart from curbing the pollution, using biochar as manure would help in improving the soil health, along with 10 percent increase in the grain yield. It also leads to the improvement in the infiltration rate and water-holding capacity of the soil. Bio-char will help in improving the grain yield indirectly by improving the soil health (infiltration rate and water holding capacity of soil).

2. Need of the hour

- Unless Financial assistance is to be provided by the Centre for boosting farm mechanisation, it is difficult to completely stop stubble burning.
- States needs to make alternative arrangements for consumption of paddy straw into the soil as per the directions of the NGT.

References

[1] Mittal, S.K., Singh, N., Agarwal, R., Gupta, P.K., 2009. Ambient air quality during wheat and rice crop stubble burning episodes in Patiala. *Atmospheric Environment*, 43(2), pp.238-244.
[2] Garg, S.C., 2008. Trace gases emission from field burning of crop residues. *Indian Journal of Air Pollution Control*, 8(1), pp.76-86.
[3] Gupta, P.K., Sahai, S., Singh, N., Dixit, C.K., Singh, D.P., Sharma, C., Tiwari, M.K., Gupta, R.K. and Garg, S.C., 2004. Residue burning in rice-wheat cropping system: Causes and implications. *Current Science*, pp.1713-1717.
[4] Mandal, K.G., Misra, A.K., Hati, K.M., Bandyopadhyay, K.K., Ghosh, P.K. and Mohanty, M., 2004. Rice residue-management options and effects on soil properties and crop productivity. *Journal of Food Agriculture and Environment*, 2, pp.224-231.
[5] Sidhu, B.S. and Beri, V., 2005. Experience with managing rice residues in intensive rice wheat cropping system in Punjab. *Conservation agriculture: Status and prospects*, p.55e63.
[6] Sidhu, H. S., Singh, M., Humphreys, E., Singh, Y., Singh, B., Dhillon, S. S., Blackwell J., Bector V., Singh M., & Singh S. (2007). The Happy Seeder enables direct drilling of wheat into rice stubble. *Australian Journal of Experimental Agriculture*, 47, 844–854.