



PROBLEM OF STUBBLE BURNING IN PUNJAB - A REVIEW

Gurpreet Singh¹ and Anamika Verma²

^{1&2}School of Agriculture, Lovely Professional University Phagwara, Punjab, India

Abstract

About 16.3 million tons of paddy stubble is produced in Punjab in every year out of which 40.4% was burnt illegal in open fields in months of October&November while 59% was successfully utilized by farmers by mixing it in soil and in other ways. The main reason behind this burning is less time gap between harvesting of paddy crop and sowing of wheat crop.In order to sow the wheat crop early, farmers remove the stubble by setting fire to it. Migrant labor shortages induced by the MNREGA scheme in their home states; increased mechanization of crop harvesting and a lack of govt.planning to handle this stubble are also reasons behind this problem. Burning paddy crop residues in fields on a wide scale produces thick smog, which is responsible for an 80 percent rise in road injuries and a 60 percent increase in patients having asthma, allergy and other respiratory problems.This burning causes damage to ozone layer by producing greenhouse gases, aerosols, smoke and other toxic gases. It is the responsibility of state government to provide subsidy to farmers so that they can purchase new modernized tools to harvest paddy crop residue and use them in effective way. Government should organize the training, fairs, campus to bring awareness among the farmers. If the stubble burning reduced then there will be more rainfall, quality of ground water and ecofriendly environment can be developed.

Keywords: Crop Residue, Health Hazards,Paddy Stubble, Pollution, Respiratory Problems.

Introduction

Stubble burning puts a fire on the straw stubble, which is quite literally the act of extracting the residue of paddy crops from the field to sow wheat.Most of the people in Punjab are dependent on agriculture. Punjab is known as the principal granary of the country, contributing nearly 1/4th of rice and more than 1/3rd of wheat to the central pool. The major issue in the rice-wheat cropping system is the short time available between rice harvesting and wheat sowing, and the delay in sowing has a major impact on the wheat crop. In the early Rabi season, the stubble of paddy crop is burnt every year in the fields of Punjab because there is a burden on the farmer to sow the next crop in time for high yield with disease resistant. While this practice is a cheaper way for farmers to clear waste and weed fields, it emits enormous quantities of dense smog that causes health problems and environmental degradation (kumar et al.,2015). Particulate matter in smoke has adverse effect on lungs of children (Alder, 2010). Paddy straw has many uses such as animal fodder, composting, bedding for mushrooms, etc., and it is also incorporated in soil as nitrogen mineral (Singh et al., 1992). It is estimated that in Punjab alone, 20 million tonnes of rice stubble are produced each year, 80 per cent of which is burned. The reason behind paddy straw burning is also the urbanization of agriculture and the unavailability of farm labour. The heat from the burning paddy straw penetrates the soil by 1 centimeter, raising the temperature to between 33.8 and 42.2 degrees Celsius. This kills the populations of bacteria and fungi critical for fertile soil. Burning of crop residue causes damage to other micro-organisms present in the upper layer of soil. The wrath of 'enemy' pests has increased due to the loss of 'friendly' pests and, as a consequence, crops are more prone to disease. The solubility potential of the upper soil layers has also been decreased. The number of cases of paddy straw burning has decreased to 50 per cent in Punjab since 2016, according to the NASA Maps Survey. While straw burning cases have decreased in the last four years, the issue of paddy stubble burning needs to be resolved urgently to decrease the level of pollution and fire cases in Punjab.

Reasons of paddy stubble burning by farmers: Farmers of Punjab burn around 50% paddy straw in their fields. One of the most important reason is that the farmers want to save labour cost and also to save their time for further sowing of wheat crop because there is very less time gap between harvesting of paddy crop and wheat sowing.If the farmers will wait for the decomposing of stubble in soil naturally, it will take more time so they prefer burning because it is a quick and cheap process to make their field free from stubble.Because of its high silica content, rice straw is considered useless as fodder for non-basmati rice.Farmers thinks that the burning will kill all the harmful insects, weeds so that the use of insecticide will also reduce and their expenses on crop will also reduce.Some farmers also relaized that stubble burning in field reduced fuel cost of tractor. The ash made from stubble burning act as source of potassium and it can also reduce the acidity of soil. (singh et al., 2006). Another reason behind this stubble burning is the less income of farmers so they are not able to buy the costly implements like rotavator which helps to mix these stubbles in the soil very deeply. These types of tools require tractors of large horse power for their working. The agriculture is not possible without labour because labour can help farmers to perform various field activities which cannot be possible with machines. Earlier there were number of labour in Punjab which helps farmers in harvesting by hand. Manually they harvest the crop from the ground and no stubble will left but now farmers are using combine harvester to save their time and this will leave the stubble on ground. In Punjab state, the no. workers who come from other states like UP,MP, Bihar has been reduced because of MNREGA scheme these workers are getting



employment in their home states and they are getting more wages for the whole year rather than to come to Punjab during season. The avg. percentage of agricultural workers have been reduced from 62.67% to 35.96% in the year 2012-13 (Lohan et al., 2015).

Effects of paddy stubble burning

In Punjab, Haryana, and Delhi, paddy stubble burning is a serious problem (Mittal et al., 2009). Open stubble burning releases a lot of harmful contaminants into the environment, including methane (CH₄), carbon monoxide (CO), volatile organic compounds (VOC), and carcinogenic polycyclic aromatic hydrocarbons. After their release into the atmosphere, these contaminants spread in the environment, can undergo physical and chemical transformations, and eventually produce a thick blanket of smog, which is harmful to human health. These harmful air pollutants can also cause severe health problems such as heart and lung diseases, effecting respiratory system and causes problems like asthma, allergies, bronchitis and eye irritation, coughing, genetics problems in pregnant women (Urmila, 2017). Straw burning raises the soil temperature to such a high degree that C: N equilibrium in soil changes quickly (Singh et al., 2010). Stubble burning adversely affects the soil quality. Carbon & Nitrogen loss is almost 100% while phosphorus (25%), Potassium (20%) and Sulphur (50%) also destroyed significantly (Yadav et al., 2017). The nutrients in the soil are lost when stubble is burned on the ground, rendering the soil less fertile. Due to stubble burning, about 79.38 kg ha⁻¹ N, 183.71 kg ha⁻¹ P and 108.86 kg ha⁻¹ K is lost every year (Jat et al., 2013). The heat produced by stubble burning penetrates the soil, causing moisture and beneficial microbes to be lost. Sparrows, eagles, vultures are becoming extinct due stubble burning (Kaur & Rani 2016). As a result of the decreased visibility caused by thick smog, the number of road accidents has increased. In several cases, fires spread to surrounding areas, resulting in substantial property and life loss. Uncontrolled fire flames in the field can cause damage to electrical and electronic equipment.

Efforts to reduce paddy stubble burning

Crop residue burning is banned by Govt. of India as it is an offence under the Air Act of 1981 and the code of Criminal Procedure, 1973. With the help of remote sensing for monitoring, govt. can control the crop residue burning. It is the responsibility of state government to give subsidies to farmers to purchase the machines like rotavators, happy seeders, super seeders etc. for deep tillage and collection of crop residue. The government should buy paddy stubble from farmers and develop a demand for crop residue sales. Govt. can help farmers by organizing training, kisan fair and workshops at KVK's for farmers to make them aware about the harmful effects of stubble burning. Farmers should also adopt crop rotation system and should be motivated to grow alternate crops to reduce the crop residue in the fields. Recently Punjab government invested Rs 250 crores to provide 25,000 machines, of which 15,367 have been delivered and the rest will be delivered by the end of October 2018. (Ishani Duttgupta, THE ECONOMIC TIMES, 2018). PAU has developed the following major equipment: (i) Happy Seeder Machine for planting in standing paddy stubbles; (ii) Tractor Operated Paddy Straw Chopper; (iii) Straw Collector and Baler; (iv) Residue Incorporation in Soil; (v) Compositing Techniques using Paddy Straw (P. Kumar et al., 2015)

Wealth from stubble

By combining parali (stubble) with cow dung and a few natural enzymes, high-grade organic fertilizers can be made. Another profitable way to generate wealth from waste is to use straw to generate electricity. First Plant in India is established at Jalkheri (Punjab) and producing 100 MW electricity. New Generation Power International, based in the United States, has proposed building 1000 MW biomass energy generating plants in Punjab to tackle stubble burning. Paddy bed content aids in the improvement of milking ability in terms of quality and quantity, as well as cattle sleep comfort, udder health, and leg health. Furthermore, the straw content provides a hygienic, comfortable, greasy atmosphere, as well as reducing the risk of injury (Kumar et al., 2015). By providing labor to collect paddy in order to avoid stubble generation and it also provide employment to the labor force. Govt. can also get income by inviting the packaging industry to collect stubble in order to create environmentally friendly packaging boxes. Straw can be used in manufacturing of paper board, pulp board and as a cushioning material which can be used during transportation of fruits and vegetables (Sangeet, 2016). Paddy stubble is mixed with clay soil to make bricks. Bio-oil is made from paddy straw using rapid pyrolysis technology. It's a liquid that looks like petroleum and can be used in boilers and gas turbines (Mohammad et al., 2012). 300m³ of biogas can be obtained from one tonne of paddy through anaerobic digestion (Koopman & Koppejan 1997). Paddy stubble can be added to the soil to improve fertility and aid in soil recycling. Paddy straw can be used as raw material for mushroom culture.

Conclusion

Paddy stubble is the major problem in agriculture. This concern occurs particularly in the month of October and November every year. Due to the government strictness, the number of cases has decreased in the last 3-4 years but still farmers in many districts follows this method of removing stubble from their field quickly which is becoming very serious issue for health. This pollution causes damage to environment, human and animal health and many road accidents occurs due to the smog. If we use this stubble effectively, it has many uses. The awareness among farmers about its benefit and side effects is very less. Though, Indian govt. and state govt. both are performing actions to reduce the stubble burning problems and we should also take this responsibility to prevent



this problem so that we will make our environment safe to survive. Government should give subsidies and loans to farmers to buy the advanced and modern agricultural tools so that they will manage this stubble problem at their own by mixing them in soil.

References

1. Alder, T. (2010). Respiratory Health: Measuring the health effects of crop burning 118(11), A475.
2. Choudhary, M., Dhanda, S., Kapoor, S., Soni, G. (2009). Lignocellulolytic enzyme activities and substrate degradation by *Volvarellavolvacea*, The paddy straw mushroom/ Chinese mushroom. *Indian J Agric Res* ;43(3):223–6.
3. Jahirul, M.I., Rasul, M.G., Chowdhury, A.A., & Ashwath, N. (2012). Biofuels production through biomass pyrolysis- a technological review. *Energies*, 5(12), 4952-5001.
4. Jat, M.L., Kamboj, B.R., Sidhu, H.S., Singh, M., Bana, A., Bishnoi, D.K., Gathala, M.K. (2013). Operational manual for turbo happy seeder-Technology for managing crop residues with environmental stewardship. CIMMYT.
5. Kaur, A., Rani, J. (2016). An approach to detect stubble burned areas in Punjab by digitally analyzing satellite images. *J Res*; 02:06.
6. Koopman, A., Koppejan, J. (1997). Agricultural and forest residues generation, utilization and availability. Paper presented at the regional consultation on modern applications of biomass energy, Kuala Lumpur, Malaysia.
7. Kumar, P., Kumar, S., & Joshi, L. (2015). Socio economic and environmental implications of agricultural residue burning. A Case study of Punjab, India, 137.
8. Lohan, S.K., Narang, M.K., Manes, G.S., Grover, N. (2015). Farm power availability for sustainable agriculture development in Punjab state of India. *Agric Eng Int: CIGR J* ;17(3):196–207.
9. Mittal, S. K., Singh, N., Agarwal, R., Awasthi, A., & Gupta, P. K. (2009). Ambient air quality during wheat and rice crop stubble burning episodes in Patiala. *Atmospheric Environment*, 43(2), 238-244.
10. Sangeet Kumar R. (2016). crop residue generation and management in Punjab state. *Indian J Econ Dev* ;12(1a):477–83.
11. Singh, S., Batra, R., Mishra, M.M., Kapoor, K.K., & Goyal, S. (1992). Decomposition of paddy straw in soil and effect of straw incorporation in the field on the yield of wheat. *Journal of plant nutrition and plant sciences*, 155(4), 307-311.
12. Singh, K.K., Lohan, S.K., Jat, A.S., Rani, T. (2006). New Technologies of growing rice for higher production. *Res Crops* ;7(2):369–71.
13. Singh, Y., Gupta, R.K., Singh, J., Singh, G., Singh, G., Ladha, J.K. (2010). Placement effects on paddy residue decomposition and nutrient dynamics on two soil types during wheat cropping in paddy-wheat system in north western India. *Nutr Cycl Agroecosyst* ;88:471–80.
14. Urmila. (2017). Crop burning against the environment. *International Journal of Humanities and Social Science Research*, 3(8), 16-19.
15. Yadav, S., Koli, P., Mina, S., & Devi, S. (2017). Crop residue burning and air pollution. *Popular Kheti*, 5(2), 105- 109.

Filename: 11
Directory: C:\Users\DELL\Documents
Template: C:\Users\DELL\AppData\Roaming\Microsoft\Templates\Normal.dotm
Title:
Subject:
Author: Windows User
Keywords:
Comments:
Creation Date: 4/16/2021 4:41:00 PM
Change Number: 5
Last Saved On: 5/1/2021 4:34:00 PM
Last Saved By: Murali Korada
Total Editing Time: 16 Minutes
Last Printed On: 5/3/2021 11:29:00 PM
As of Last Complete Printing
Number of Pages: 3
Number of Words: 2,602 (approx.)
Number of Characters: 14,834 (approx.)