

# Reduce the Rice Residue

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**Abstract** – In this era of science and technology we have developed method by which we can grow any crop easily in any type of environment. The farmer of Punjab and other nearby states are going for the rice wheat crop because there minimum support prices are fixed by the government and the residue burning or the stubble burning at the time is talk of the town. The pollution which caused by the burning is hot topic which needs an immediate solution. Before entering the depth of the topic we should know why the farmer go for burning rather than going for other management practices. There are benefits of burning the stubble it is true at some points but we need look at the cons of the burning as they are both deteriorating the quality of the soil and the environment. In long terms we need to control the stubble burning and it should zero percent in coming years there are many other method by which we can prevent the burning and also reduce and manage the stubble without harming the health of humans well as the environs.

**Key Words:** Residue, stubble, burning, pollution, management.

## 1. INTRODUCTION

In the world of growing population the food demand is increasing day by day to feed these empty stomach large scale food growing is the necessity but it does not come handy with the handling of the waste produce by the crop. The wheat and rice are one of the most preferred food of the world which produce tremendous amount of the residue which has to be get rid of before the planting of the next crop. The wheat residue is mainly used in the chaff production and what is left is burnt, but in the case of the rice crop the same management cannot be used. The large amount the residue which is produced is burnt by the farmer and is not put to any other use because burning is the easiest method to get rid of the stubble in short period of time as there is very less time between the harvesting and sowing of the wheat crop. The air pollution caused by it is the major concern of the environment. The particulate matter which remain suspended in the atmosphere are very harmful both for the environment as well as for the human. The quality standards of the air are reducing because of the burning of the crop stubble. There are many other possible way out by which we can make use of the residue which will have both the short as well as the long term benefits.

## 1.1 Why burning

The farmers goes for the burning of the stubble because they think they are benefits of burning and they are wright up to some extent there are few benefits of the burning like it increase the availability of some of the nutrients. (Erenstien, 2002). The other researches also suggest that it will give some benefits in yield to success to the following crop. (Haider, 2012). The other major reason is that the produce is harvest using combines in which a large amount of the stubble is to produce to save the time and to cut out the cost of labor farmer go for burning of the residue. Sharma et al., (2010). The other reason why farmer burn rice straw is that the think that it will act as breeding ground for the rodents so to eliminate the threat they burn the rice straw. The other reason is that there is very less time between the harvesting and planting of the next crop because of the availability of the high yielding varieties which were of shorter duration, the other reason is that the rice straw causes the problem of land preparation and it is possible with heavy machinery which is costly. The farmer goes for the easiest way to save them from the laborious work which is burning. Mendoza et al., (1999).

## 1.3 Pros of burning

The burning of the residue helps in mitigating the problems related to the pathogenic fungi. The burning also plays a role in the breaking of the dormancy of the seed. Many weed seed germinate after they overcome dormancy and are eliminated from the field a well-known example is the wild oat which is eliminated by this method. Hesammi et al., (2014). The remains of the rice crop after harvesting are burned which have few benefits, the first and the foremost benefit is that it increase the tillage efficiency percentage. The burning also reduces the need of the pesticides to control the weeds, diseases and other pests. The cutting down the cost of the farmer to buy these chemicals and also reduces the pollution which caused due to the application of such pesticides. The burning of the residue leads to increase in the nutrient present in the soil for short period of time namely phosphorus and potassium Ahmed et al., (2015).

## 1.2 Cons of burning

The burning of the biomass is one of the reason which stretches across the globe for emission of the harmful gases and the aerosols present in the atmosphere. The residue burning leads to increase the amount of carbon dioxide, methane and carbon monoxide. The greenhouse gases leads

to increase in the global temperature and also depletes the ozone layer. The burning produce large quantities of smoke which will entrap the short wave radiation which is also a reason for increase in the temperature. Sharma *et al.*, (2010). When the residue is not burnt completely it will leads to the production of the black carbon which at the second number after the carbon dioxide in global warming. The black carbon has properties which makes it a good absorber of the radiations which will increase the temperature not a regional level but also at the global level. The black carbon also form the brown clouds in the atmosphere which entraps most of the heat in the upper atmosphere while there is reduction in the amount of the sunlight reaching the surface of the earth. Ahmed *et al.*, (2015). The burning of the residue also lead to negative effect on the soil and its related properties. The burning leads to increase in the erosion of the soil which depletes the top fertile layer of the soil. There is an increment in the soil pH and the amount of soluble salt while there is decline in the water retaining capacity, aggregate stability of the soil particles, cation exchange process is also hindered. The biological properties of the soil are also effected there is reduction the microbial flora and fauna due to burning of the residue. The studies also revealed that there is 70 percent increment in the population when the residue is mixed in the soil as and when compare to the burning one. The enzymatic activity is also hinder as it is directly or indirectly dependent upon the microbial action. There is decrement in the organic matter content present in the soil which leads to decline in the porosity and permeability of the soil. The force which bind the soil particles called as the force of adhesion is also reduced due to the burning of the residue which leads to lump formation of the soil. The tillage practices are also increased to break these lumps of the soil which increase the erosion and the cost of tillage. The soil compaction also increases due to similar reason. The nutrient present in the soil are also depleted due to burning of the residue, there is decrement in the primary nutrient namely potassium and phosphorus Hesammi *et al.*, (2014). There is reduction in other macro and micro nutrients including nitrogen and sulfur. Ahmed *et al.*, (2015).

## 2. Residue Management

The most important question and the need of the hour is that how we can manage the waste which produced in the bulk every year. The solution should be both easy and economical so that it can be easily adopted by the farmer at the ground zero. There are several ways by which we can manage the stubble or the crop residue. The researchers suggest that the lignin present inside the crop residue which is not effected by biological and chemical degradation and it also repel to fermentation, but the microbes comes handy in this they can degrade the lignin present in the residue which can then be put to multiple uses. The aerobic and anaerobic both the method can be used to tackle the crop residue. The end product of the process is a renewable source of energy called as biogas. The other technique which can be used is

composting the end result of which are fertilizer containing good amount of the nutrients. The degradation the crop waste under anthropogenic conditions. The agriculture sector waste can be converted into bio char which is carbon product which is porous in nature. It is combination of nitrogen, oxygen, sulfur, carbon and hydrogen along with the ash in different proportions. This bio char has many benefits in the soil and can be also used as the soil amendment and also is a source of raw material for many industries like construction, cosmetics, food and in treatment of waste water. The bio char also act as a source of carbon sink. Bhuvaneshwari *et al.*, (2019). the stubble of the crop can also be utilize as feed for animals. The paddy straw can be used to feed the milch animals but the normal rice contains the compounds which are not easily digestible by these animals, on the other hand the straw of the basmati crop can be used as it is more appetizing. The straw can be put to one more usage as it can be used as bedding material for the animal as it is soft in nature it allows the animal to relax which improve the milk yield and quality. It also prevent the animal from the low temperature during the cold weather. Mushroom production is also a profitable business and the straw of the rice can be used as a raw material in the production of the mushroom. In the regular trend wheat straw is used as the raw material in place of rice but the recent studies have claimed that the cost of using wheat straw is more as and when compare to the rice one. The other method used to manage the waste is usage of the machinery. The mulcher and plowing system, happy seeder, sms system, bailers and other equipment's can be used in the mitigating the straw problem. The mulcher and plowing helps to incorporate the residue inside the soil which have positive effects on the soil health. In the case of the happy seeder the wheat crop is sown directly without any previous tillage. It is machine which both rotary tiller and seed drilling machine re-mounted or modified as one. The tiller incorporate the residue into the soil and then wheat seed are seeded with the help of the seed drill. The last but not the least consist of the bailer in which the bailer are used to make bales of the rice straw which are than collected and are used as the raw material for the generation of the power in small scale industries or in the thermal power plant. Lohan *et al.*, (2018).

## 3. PROS OF NON-BURNING

Talking about the facts and benefits related to other management practices rather adopting burning, there are many paybacks which helps us in both social and economical way. The various method used have diverse gains. If the microbial treatment method is used it will reduce the toxic compound from the soil and will also increases availability of the nutrients. Using the microbe also provide us with the biogas a good source of fuel along with natural fertilizer which are enriched with the nutrients. The composting of the residue will also provide the fertilizer and increasing the soil health by the natural source of fertilizers which is rich in the organic matter content. These method also have additional

benefit for farmer as well as the environment it reduces the cost of the farmer which bear for the synthetic fertilizer and environment from the pollution which caused by the use of these synthetic fertilizers. Bio char is also an example of alternative to burning which also have several other benefits like it improve the moisture retaining capacity of the soil along with it increasing the surface area of the soil all these are possible because of the porous nature of the soil. The earthworm population is also enhanced by this and there are n number of benefits of the earthworms and agriculture is not new to them. Bhuvaneshwariet *et al.*, (2019).

#### 4. Conclusion

The burning of the residue is the method followed by the farmer from a long term which needs to be changed. The farmer are burning the stubble because it is the easiest way to tackle it. The issue related to burning is the production of large amount of pollution which is having adverse effect on the human health and environment. The new technique and method which are an alternative burning are developed but are still not adopted by the farmer on the large scale. The major issue is that the farmer need a method which is easy, time saving and is economical. The method which are suggested generally incur more cost on the heads if the farmers. We need a method in which the farmer is benefited with some monetary gains and this can happen only if government take some more relevant steps to make policies which support the famer many policies are made but still required more efforts. The suggestion from my side is that the government is using this residue in the generation of electricity if the make some more efforts and can plant small scale power station for a handful of the villages than the entire stubble can be burnt under controlled conditions and the electricity which is produce can be given to the farmer for free no doubt this method is risky, time consuming and require a huge amount of initial funding but o long term it will be benefiting the entire nation the environment will be free from pollution the farmer will be happy as given free or cheap electricity, the solid waste which Is produce will be taken care off.

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