

# **PROJECT PROPOSAL**

## **THEME**

**Use of rice straw as a fertilizer material  
& Conversion of Paddy Straws into dust  
powder**



**BY**

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# Use of rice straw as a fertilizer material & Conversion of Paddy Straws into dust powder

## ABSTRACT

Paddy Rice straws are rich in nitrogen, potassium and silicon. The straw produced from rice crops may contain more than a third of the nitrogen and more than four times the potassium annually used as fertilizer by rice. The potassium in the rice straw can get leached by rain water. On burning rice straw large losses of nitrogen and small losses of potassium occur.

As rice straws are used for numerous purposes in India. It is not suggested that the traditional non-agricultural uses must cease and that every bit of straw must be used exclusively as a fertilizer. the emphasis here is that the producer of rice straw, the farmer, must be made fully aware of its value so that he can make the best decision on its utilization. If a farmer does not put back the straw to his fields in a direct or an indirect form he must take note of the fact that he is parting with large amounts of N, K and Si.

Rice straw may be added to the field as straw itself, as compost or as, straw ash depending on the local field conditions. Rice straw is a very valuable fertilizer material which should not be wasted.

Rice is India's largest cereal crop, and it produces large amounts of crop residues such as rice straw. Only about 20% of rice straw is used in the production of ethanol, paper, **fertilizers**, and fodders. Rice straw burning is a common post-harvest practice in India which causes air pollution called the "Black Cloud". Rice straw compost can increase crop yield by 4-9% when applied as mulch it helps maintain soil fertility

## INTRODUCTION

India produces approximately 100 million tonnes of paddy and 150 million tonnes of rice straw a year and the usage of these paddy straws are not effectively used for commercial purposes fully which could be used to benefit the farmers. Paddy straws enriched with urea and molasses is a wonderful animal feed and there could be many uses to convert it into fertilizers or could be processed in a Paddy straw dust forms by farmers itself or to be sent to the processing plants though the paddy straw are seasonal and the transportation costs are not feasible, I have found to work on three way usages to stop wastage of Paddy straws.

Of this paddy straws about half is used as animal fodder. The rest is mostly burned in the fields, though a small amount is also consumed by brick kilns and paper and packaging industry and Biomass power plants. Despite such huge amounts of rice straw generation, farmers in the country are yet to realize the potential of this agro-waste in terms of manure and as a profitable raw material for various industries.

Assuming an average paddy yield of 2.5 t/ha and assuming a ratio of 1 : 1 for paddy to straw, the annual production of Paddy straw in India is about two million tons.

There are different ways in which paddy straws are used in and the recent being used for few Biomass Plants purposes and few for Mushroom farming. Straws wastage and burning could not be solved by only these methods until more options are open for farmers and it becomes a commercial profitable businesses for farmers.

Rice straws could widely be used not only in a sector for Biomass Plants but it could be used for other purposes to feed cattle, manufacture of paper and paper boards industries , packing material boxes , thatching roofs of houses and can be used as a mulch could also be practiced

back to the fields or rice straw to be used for compost making.

In general practice the farmers burn the straw at the threshing site especially when there is no alternate way of disposal. When straw is burnt the ash is very seldom put back to the fields. Farmers decide the usage of Rice straws but majority of farmers are unaware of the value of rice straw as a fertilizer material and that a sizeable quantity of rice straw is wasted in India primarily owing to this unawareness. This value of rice straw should be used as a source of fertilizers

Farmer's burn rice straw mostly because it is unwanted at a particular place at a particular time. Quantitative information on losses of nutrients as a result of burning rice straw is scarce. The total amount of C, N, P and K present in the residue heating straw at a 500°C temperature almost loses all the nitrogen and the loss of potassium. In order to find out the N and K losses under conditions close to those operative when straw is burnt in the fields, a large amount of straw are set on fire. On an average residue the burning results in a 93% loss of N and a 20% loss of K from the straw before burning.

Loss of potassium in rice straw by contact with rain, Paddy straws often come into contact with rain. This happens most commonly during the long periods where it is lying at the threshing floor after the paddy has been threshed and removed. The loss of potassium in rice straw as a result of submergence in rain water for various intervals of time. As much as 25% of the potassium in the straw are lost during the first 15 minutes of submergence. With longer periods of submergence more potassium was lost. It is important to protect the straw from rain to prevent loss of potassium.

## DISCUSSION

Assuming rice straw to contain 0.6%N and 1.8%K, and assuming the annual production of rice straw in India is two hundred million tons, rice straw will contain about 12,00,000 tons N and 36,00,000 tons K. The use of nitrogen and potassium as fertilizer in rice cultivation. Thus straw contains more than a third of the N and more than four times the amount of potassium used on rice. At the current price of fertilizer (for eg Rs. 3 per kg N and Rs. 2 per kg K) the value of the nitrogen and potassium in rice straw is Rs. 30 million and Rs. 55 million respectively. These assumed figures clearly illustrate the value of rice straw as a fertilizer in India and show that rice straw should not be wasted.

There are few basic ways by which rice straw can be returned to the field. They are as straw itself, as straw compost and as straw ash.

### (a) ADDITION TO LOWLAND RICE

Rice straw may be directly added to the rice fields but this must be done sufficiently early so that the straw would have decomposed by the time preparatory tillage commences. Otherwise tillage will be difficult. Straw also often leads to temporary nitrogen immobilization in the soil with adverse effect on early crop growth. All these can be minimised or avoided if straw is fully decomposed by the time rice is planted. For this to be achieved straw must be incorporated to the fields early. As straw decomposition is slower in low temperature areas the incorporation must be done earlier than in high temperature areas. However, owing to several local limitations in getting the fields ready for planting by a given date, the extra time needed for straw to decompose will be an important factor which will determine whether straw can be added without upsetting the cultivation calendar. Thus finding methods for quick decomposition of straw is important. One method is to chop the straw to small pieces prior to addition. Another is to use a bacterial concentrate to quicken the breakdown of the straw.

A way of circumventing the problems associated with the decomposition of straw is to add the straw after planting rice. For this purpose straw will have to be made into small bundles and placed in between rows of rice plants two to three weeks after transplanting. The potassium in the straw will get leached and the potassium requirement will be met quickly, while the nitrogen will be released later after decomposition. A weakness of this method is the labour involved in bundling and placing the straw. The idea needs field investigation.

#### (b) ADDITION TO UPLAND CROPS

Rice straw can be used as mulch on upland crops. The nutrients present in the rice straw will get added to the soil as it decomposes. In addition straw mulch will reduce weeds, conserve soil moisture and is also likely to lower the surface soil temperature. The latter might be advantageous especially in the dry season where high soil temperatures are likely to occur. A disadvantage of adding straw is that it may carry over pests and diseases to the next crop.

Addition of rice straw compost will eliminate most of the problems arising from direct application of straw. Compost can be added without causing problems associated with tillage, with toxic products produced by decomposing straw and with nitrogen immobilization. Further, owing to the high temperatures achieved during composting insects and disease causing organisms present in the straw may have got destroyed.

While compost seems to be the best way to return the straw to the field hardly any farmer in India adopts this practice. This is primarily because there are difficulties in making compost under the conditions prevalent in most parts of the country. One problem is the difficulty in obtaining sufficient quantities of a low C/N source such as cattle manure at the required place and at the inquired time to mix with the straw. Another is the lack of water after the rice harvest at many of the sites where straw is kept. A third problem is the time and labour required for compost making.

#### c) Rice straw ash

Rice straw to ash results in a large loss of nitrogen and a small loss of potassium. Burning straw is indeed wasteful, but burning and addition of ash seem to be a less troublesome way of putting the straw back to a rice crop under the field conditions in most parts of the country.

If a farmer adds rice straw ash to his field he may omit the addition of muriate of potash or he may add a lesser amount depending on the potassium content of the straw, the amount of straw available and the potassium requirement of the crop. In view of the small holdings of rice lands in India owned by farmers it would not be feasible to chemically analyse the K content of rice straw of each farmer intending to return it to the field. A more practical though approximate approach would be to determine the K content of rice straw in different agro-climatic regions in the country and to use this value to estimate the amount of K in rice straw ash. It may be assumed that 20% of the potassium in rice straw is lost in the ashing process.

### CONCLUSION

Rice straw contains a very large amount of plant nutrients. Yet it is hardly used in India as a fertilizer material. It can be added back to the field as straw itself, as straw compost and as straw ash. The best manner in which to use it will depend on several location specific factors depending on cropping system climate, water regime, soil type, tillage practices and availability and cost of labour.

## **New Innovative Paddy straws Powder Grinder Machines**

Paddy straws are available in abundant and Paddy Straws are already collected and baled today in a very few farms, and other areas near biomass power plants. But baled straw is difficult to handle, and bulky to transport and store. Expensive power plants often sit idle for weeks, surrounded by fields of damp straw that cannot be used until dry.

First, paddy straw is compressed into small pellets using Paddy straws dust grinder machines. These powder dust could transform paddy straw into many useful things. The powder dust would contain lots of energy for its size and weight and economical for transportation. It would be easy to handle and store, and less expensive to transport than big bales of straw.

As rice is typically grown in small fields, it also isn't always possible (or affordable) to use the high-powered machinery necessary to till the straw deep into the soil prior to planting wheat. Other solutions like using straw for biomass power or to make paper all require lots of new infrastructure.

Straw is already collected and baled today in a few large farms, and other areas near biomass power plants. But baled straw is difficult to handle, and bulky to transport and store. Expensive power plants often sit idle for weeks, surrounded by fields of damp straw that cannot be used until dry.

The new concept of Proposal is to startup Paddy straw dust grinders is designed for small, medium and large capacities depending on the farmers' interests. The idea is to turn farmers into a business profitable in their farms or selling to it near by farms. To transport the paddy straws into near by Biomass Plants is another challenge where farmers do not feel highly incentivised, and most of the paddy straws are burnt due to the distance of biomass plants from the farming area and transporting it is expensive. This new experiment is to use the maximum amount of paddy straws into a valuable resource in their own farming land or in nearby areas. Mini Paddy straws Grinder machine business model where the farmers would be encouraged to get into a profitable business converting Paddy straws into a dust form which could be used as fertilizers and to sell the dust to biomass companies which would reduce their cost of transportation and profitable.

The idea is a win win situation both for biomass power plants to procure regular supply from many parts and regions, and advantage being there will be less wastage of paddy straws by farmers and it will encourage all farmers to reuse it as resources when the Paddy straws grinders are available in their own farms or at a near by distances. The Paddy straw powders could be stored in bags which could be transported at a high volume to biomass power plants saving costs as every farmer would try collect as much paddy straws making it as a profitable businesses currently farmers ignore as there are sometimes less quantity of paddy straws available and they prefer to burn it as its not economical in terms of resource and transportation.