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REVIEW ARTICLE **OPEN ACCESS**

Impact of Rice Husk Biochar on Agriculture

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ABSTRACT
The biochar is made by biomass via pyrolisis under thermal decomposition. It is charcoal which is used as reclamation of soil's physical condition. Apart from this, biochar can also enhance soil fecundity under low pH condition and also expand the agricultural production, provide protection against some foliar and soil-borne diseases. Rice husk not easily degradable to the soil because of higher composition of C:N ratio. Instead of making biochar, rice husk can also use as an organic fertilizer to control environment pollution. Applications of rice husk increase the water holding capacity. This is the only one alternative source of applying essential nutrients to the plant. It is applied to soil in the form of biochar. The main purpose of this review is to give knowledge about biochar and their recommendation for research needs to systematically understand about the biochar Nutrient interaction with soil over a longer period of time.
Keywords: *Biochar, crop, fertility, nutrient, pyrolisis, rice husk, soil.*

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INTRODUCTION

The word "biochar" is a combination of "bio-" which is known as "biomass" and "char" as in "charcoal". It has been used in scientific literature of the 20th and 21st century. Biochar is charcoal which is used as a reclamations of soil physical condition. Physical condition of Biochar is solid which is high in carbon, and can remain in soil for longer period of time. Like most charcoal, biochar is made from biomass via pyrolysis [8]. The current situation says that Biochar is under investigation as an influence to carbon sequestration [14]. Application of Biochar to agriculture soils has been advanced as a means to renovate soil loss and mitigation of climate change . Recently, data has been reported and says that conversion of biomass into Biochar can not only supply renewable energy (synthetic gas and bio oil), but also reduce the content of CO_2 in the atmosphere. It is indicated that application of Biochar into soil improves the structure and properties of soil, such as the water-holding capacity, organic matter content, aeration condition, pH value, cationic exchange capacity (CEC), and the formation of aggregates of soil [9]. The leaching losses of nitrogen and phosphorous in soil and the releases of greenhouse gases (N2O and CH_4) from soil could be reduced in the presence of Biochar. It has porous structure, charged surface, and surface functional groups (such as carboxyl, hydroxyl, phenolic hydroxyl, and carbonyl groups). These properties are play vital role to influence the migration, transformation, and bioavailability of contaminants in soil [21].

BIOCHAR APPLICATION IN AGRICULTURE

Agriculture is the most important segment of Indian economy. Rice is the most important crop all over the world. For cultivation of rice, application of fertilizer is most important to get optimum yield. According to research, organic fertilizer are useful to improve crop yield and soil productivity [23]. About 2000 million tone of straw is produced annually in India. Rice, wheat, sorghum, maize and pearl millet produce 173 million tons of crop residues. After harvesting of rice crop farmers generally pulverize the soil with paddy straw but the problem is that due to high C:N in the rice husk takes lots of time to decompose because it have good elastic capacity so during pulverization the straw are remain same in the field [23]. To solve that problem making of biochar is best solution under pyrolisis. The rice-husk biochar is slightly alkaline , increased the pH of the soil, and contained elevated levels of some trace metals and exchangeable cations

(K, Ca and Mg) in comparison to the soil. The biochar treatments were found to increase the final biomass, root biomass, plant height and number of leaves in all the cropping cycles in comparison to no biochar treatments [11]. When biochar applied at rates between 50–150 g/kg/pot trials which shows highly positive effect on lettuce and cabbage growth both with and without organic fertilizers in a sandy, acidic soil. Which prove that it useful for commercial agriculture [11].

IMPACT OF BIOCHAR ON SOIL PROPERTIES

Soil is the back bone of agriculture. It has following properties like physical, Chemical, Biological. Physical properties like soil structure, soil texture, Bulk densty, porosity etc. Chemical properties such as pH, Electrical Conductivit (EC), Cation exchange capacity (CEC), micro and macro nutrient in soil. And Biological Properties such as Soil microbial biomass. Biochar is applied in the soil to modify the soil qualities on the basis of soil properties. Soil porosity will helps to hold water as well as nutrients. Overall porosity will increase by applying biochar but it is depend upon which type of biochar and in which soil biochar will be added [6]. Biochar is applied in soil to increase the Nitrogen quantity, improve pH, Cation exchange capacity, Carbon sequestration for crop growth and development. This amendment also reduce the effect of green house gases which is depends on soil properties [20]. The improvement quality of biochar is depend upon which type of biomass is used for thermal decomposition. Making of biochar through woody biomass is coarser and more rebellious as compare to making of biochar through agronomic residue. Apart from that if biochar are produce at high temperature it has fewer nutrients and high micro spore as compare to that produce at low temperature that has higher nutrient and low microspore. A specific type of biochar abe specific type of improvement quality [6].

BIOCHAR IS CARRIER FOR NITROGEN FERTILIZER

Nitrogen is the essential macro primary nutrient for plant growth and development. Without this nutrient plant cannot complete there life cycle. So, to improve the nitrogen use efficiency biochar is the best source of these nutrient. Bio-char increase biological N fixation (BNF) amendments in soil. This is mainly due to the N availability in soil is lower due to the high C/N ratio of the bio-char and as a result of N immobilization [17]. Biochar play important role in binding of anions and cations in soil by micro organisms because it have higher porosity and more surface area which will give more space to micro organisms [18]. If biochar is mixed with liquid dairy manure and shaking it for 24 hrs after that oven dry it. After application of that mixed biochar manure will increase Nitrogen content in soil. When that Nitrogen enhancing biochar applied in soil it will reduce the net nitrification and net ammonification rate [13] thus concluded that it can be use as a slow release fertilizer.

BIOCHAR IMPACT IN AGRONOMICAL PARAMETRS

Agronomical parameter are those parameter which gives results after applying of any treatment to field. The parameters includes plant height, leaf length, no. of tillars, no. Of panicle, panicle length, test weight, Dry matter etc. After application of biochar increase germination percentages (GP in different treatments but the statistical analysis revealed that it is not statistically significant differences . Similarly, other parameters such as mean germination time (MGT) and germination index (GI) were also affected by different rate of biochar as compared to the control [16]**.**The application of rice husk biochar in different concentration in wheat pots experiment sowing different plant height in every treatment. Significantly plant height were increased upto 45-75 days after sowing. As well as no. of tillers also more in case of biochar treated plants. Rich husk biochar also increased the shoot and root biomass as compare to untreated biochar plan [11]. Apart from these number of seed per pod at physiological maturity was significantly affected by different rate of biochar. The higher number of seeds were recorded in biochar applied plants .This signifies that if the no. of seeds per panicle are increased then grain yield also increase . Similar to the present study, high seed numbers per pod were reported for soybean sown in low pH soil that was amended with biochar [6]. Many researches gives proof that by the application of biochar the growth rate of crop increased, reduction in nutrient leaching, reduction in acidity of soil, more water retention, and decrease in fertilizer use [22].

CONCLUSION

The review emphasize an overview of specific knowledge about biochar interaction in soil. The application of biochar will increase the water holding capacity in soil, improve the soil texture , as well as increase Nitrogen use efficiency, reduce the use of fertilizer which helps to reduce the environment pollution. The major benefit of biochar is it helps in changing of climate by sequestering carbon dioxide from atmosphere. The opportunities for carbon sequestration and the reduction of greenhouse gas emissions have not been analyzed yet, but they are potentially significant. It can also use for reclamation

of acidic soil. Biochar also improve plant height, leaf length, no. of tillars, no. Of panicle, panicle length, test weight, Dry matter etc. The main purpose of this review is to gives a knowledge about biochar , and to recommend for research needs to systematically understand about the biochar Nutrient interaction with soil over a longer period of time.

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