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ENVIRONMENTAL IMPACT: BURDWAN DISTRICT'S OPEN BURNING OF RICE INDUSTRY RESIDUE

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ABSTRACT

Among the majority of individuals in West Bengal, rice is one of the most important and beloved staple foods. the Burdwan district of West Bengal's greatest rice-producing area. The primary crop grown in this region is paddy, which is farmed in the Damodar Valley region. The rice industry is one of the most advanced agro-industries there. Then, a lot of area is used to produce this paddy in order to advance the development of this sector. This rice was harvested about 10 years ago, and the leftover grain was used for a variety of things, like calf feed, compost manure, roofing in rural regions, paper manufacturing, packing material, and more. Nevertheless, farmers today have a practice of burning the leftover rice in the open after the grain is removed during the harvesting process. Air pollution from this technique contributes significantly to climate change (smoke, fog, greenhouse effect, etc.) and human health. It releases gases such as NO2 (0.07 million tons), CO (9 million tons), CO2 (149.24 million tons), line dust, and black clouds. (For example, wheezing, a sore throat, and torn, stinging eyes)Then, government environmental affairs began this practice that is harmful to both human health and the environment. In 2014, the Union government installed machinery, persuaded farmers to recycle residue into a variety of products, and provided machinery to investigate agro-industrial potential for products such domestic fuel, cattle bedding, papers, fertilizer, and construction. By improving air quality, this act lessens its detrimental effects on the environment and public health.

Keywords: Damodar, Manufacturing, Environmental, Machinery, Agro-industrial, Fertilizer, Construction, Human, Detrimental, Effects.

1. INTRODUCTION

The majority of Egypt's population depends mostly on rice for their food, making it the country's largest crop. According to a report by the Food and Agriculture Organization of the United Nations (FAO) (Food and Agriculture Organization of the United Nations., 2008), rice accounts for the second-largest share of any harvest on Earth. Although rice is primarily grown in tropical and subtropical climates, it can also be produced in Mediterranean settings. As shown in Figure A1a, Burdwan is a horticulture zone where rice is planted spatially throughout the country as a vitally important financial harvest. The total area of the rice estate is approximately 9.73 million hectares (Mha), of which 15.1% are in the focal district, 60.9% are in the north eastern region, 22.6% are in the northern region, and 1.4% are in the southern region. When compared to other districts, the focus location has the highest rate of rice manor recurrence, with 23 adjustments every year, as well as the best return because of the relatively high abundance of water resources and soil additives.

2. REVIEW OF THE LITERATURE

In the area where equipment gathering and disseminating manor are typically employed to shorten the development period, the characteristics of rice development are mediocre. With the exception of the six southern regions, where the developing season runs from mid-June to February of the following year, the significant crop (in-season rice) is produced from May to October. During the slow season, which runs from November to April in the northern regions and from March to mid-June in the southern ones, rice is usually harvested. Rice is brought to the focal location, which has a water system architecture designed specifically for rice production, for the most part of the slow season. The Office of Agricultural Economics (OAE) 2017 Agricultural Statistics of Thailand show that the total amount of rice produced in Thailand in 2017 was 31.95 million tons (Mt), comprising 24.07 Mt of in-season rice items and 6.62 Mt of slow-growing rice items. The patterns of established region and rice creation in Thailand between 2010 and 2017, as shown in (AMK 2020), from in-season rice to slow-growing rice manor.

The fact that the rice development or produce revolution occurs in a very short time, particularly in Thailand's central and lower northern regions, rice building is therefore a common board practice among Thai ranchers. Many ranchers acknowledge that buildup consumption has an impact on yields, according to Singh and Arya (2020), and they essentially support practices that remove waste buildup, manage weeds, and provide supplements for the upcoming harvest cycle. Whatever the case, horticultural buildup consumption has a negative impact on the climate, specifically on air pollution and environmental change.

The second largest contributor to an artificial climate change, after the emission of carbon dioxide, is BC, which is the result of insufficient biomass burning. Furthermore, earthy-colored mists are caused by the outflows of BC and various types of vapor sprayers in Southeast Asia, especially in the northern peninsula of the region. The formation of barometrically earthy colored mists and their interactions with substances that damage the ozone layer can have a combined effect on the environment, farming, icy regions, hydrological cycle, and human health. Consuming rice straw is unquestionably a major source of spray particles, such as fine particles (PM2.5, streamlined measurements 2.5 m) and coarse particles (PM10, streamlined distances across 10 microns (m)) (Verma et al. 2021).

In accordance to the Pollution Control Department (PCD), the expert responsible for evaluating Thailand's air quality, the PM10 fixation in 2017 was, all things considered, in the range of 3268 micrograms per cubic meter (g/m3) for the 24-hour period (day-by-day standard 120 g/m3) and 20103 g/m3 for the annual time frame, carrying the cross-country normal to 41 g/m3 (normal standard 50 g/m3). There has been a downward trend in PM10 levels in all Thai locations since about 2012. Also, the focus for PM2.5 is estimated to be between 2166 g/m3 overall for the 24 hour period (every day standard 50 g/m3) and between 936 g/m3 for the annual normal, which carries the cross-country normal to 22 g/m3 (normal standard 25 g/m3). Furthermore, it is reported that in Chiang Mai, a region located in northern Thailand where a significant number of open-air biomass burning activities are observed during the summer, the number of days on which the concentration of PM2.5 exceeded the daily standard was reduced from 57 to 29 days when compared to 2016. (Prasad and Shivay 2018).

The annual average for PM2.5 in 2017 was 30 g/m3. In reference to the previous effects of rice straw consumption on the environment and human health, open-field straw consumption is completely regulated in Thailand and has been outlawed in some areas. In an effort to reduce fog pollution in Southeast Asia, the member states of the Association of Southeast Asian Nations (ASEAN) approved the Transboundary Haze Pollution Agreement in 2002. This legally restricting natural understanding. According to Chakraborty and Mondal (2018), the Pollution Management Plan 2012–2016 was recommended by Thailand's public authority in 2012 to advance elective strategies for agrarian buildup and to serve as a stand-in for open consumption. This natural quality management plan will be implemented by the Pollution Control Department (PCD) in collaboration with the local authority associations. Additionally, in an effort to reduce crop buildup, the public authority sponsors ranchers to encourage the adoption of soil hardware and cultivate innovation. In essence, the sustainable power initiative has been carried out by the Department of Alternative Energy Development and Efficiency (DEDE) with the goal of promoting the use of agricultural deposits as a natural resource for heat and power generation.

The covering on a rice seed or grain is known as rice husks, or rice hull (RH). It is produced during the main stage of rice processing, when unpalatable rice or paddy rice is husked. Twenty percent of the paddy's weight is attributed to the layer of rice husk. To keep the seed safe during the growing season, it is framed with hard materials like lignin and silica. As a result of rice creation during processing by rubbing, every kg of processed white rice typically yields 0.28 kg of rice husk; this cycle is known as de-husking or de-hulling. In any case, dehusking was traditionally accomplished with mortar and pestles; in modern rice plants, it is accomplished by transferring the paddy grains between two grating surfaces that move at different speeds. After the husk is separated from the paddy, it is removed by attractions and transported to a capacity dump outside the processing facility (Kumar et al. 2018).

The term "rice straw" (RS) refers to the dry, high-in-inorganic mixture-containing stalks of the oat crop, rice. The endosperm, wheat layer, and outer husk layer make up a rice grain. When paddy is collected, rice straw is produced when the grains are separated. During the grain collection process, the stalks remain after the grain is expelled. Rice straw is arranged in a sinewy manner with a high silicon dioxide (SO2) content, which prevents it from rotting when it fuses into the soil and may cause a decrease in yield the following season due to the development of poisonous gases that increase driving mortality. After the main rice crop is harvested, the unappetizing, stringy plant known as rice straw (RS) is left in the field. It is a lignocellulose biomass produced as a horticultural side product. According to the Standards and Industrial Research Institute of Malaysia (1983), rice husk and straw have a high silica content. According to Singh and colleagues (2021), rice straw is biochemically composed of lignocellulose derived from horticulture, with a minor amount of natural mixtures and 30–45% cellulose, 25–25% hemicellulose, and 15–20% lignin remaining.

The requirement for a quick turnover time between rice and the resulting crops is what leads to the act of openly consuming rice straw. Rice straw should be handled or ended as soon as possible to avoid actually impeding the process of establishing a seedbed for the subsequent harvest. There are different ways to consume rice straw (such as heaping it up or using straw that is consistently dispersed across the field). Open field consumption is advantageous in many ways, including being reliable, successful, and reasonable. Similar to the uncommon need for hardware, dependability, and work in a variety of field and climate conditions (Phairuang et al. 2019).

The context of overall, supplement balance and long-term soil ripeness are remembered when using optional methods for open consumption of rice straw. Rice straw is increasingly seen as a valuable regular asset rather than a waste. Each of these exercises has a unique effect on the balance of supplements or the ripeness of the soil. Reusing harvest deposits has the advantage of converting excess waste into a useful resource for meeting yield requirements, maintaining the physical and synthetic properties of the soil, and promoting the environmental balance of the yield creation framework. Critical quantities of ozone depleting substances, such as methane and N2O, are produced when rice straw becomes contaminated in the field.

Start specialists have undertaken extensive efforts to look into potential uses of crop buildup in the area, animal feed, soil treatment/improvement, and elective uses (such as household fuel, bedding for domesticated animals, and so on). These off-ranch modern uses have gone unnoticed, and rice straw continues to be burned. According to the IEEP (2012), the Egyptian government looked into agro-modern freedoms related to using rice stacks for feed for domesticated animals, energy development, use as a soil substrate (to produce a variety of high-value harvests), and inside a small group of assembly operations (for board, paper, energizes, blocks for development and administration materials, and so forth). Roughly 12.33 million tons of agricultural yield deposits are added to dry biomass annually, with rice straw accounting for 63.75% of this total.

3. METHOD

In a similar vein rice straw may provide an endless supply of fuel with the benefits of replacing petroleum products; lowering CO2 emissions; and foreseeing contamination from openly copied straw (https://english.rvo.nl/destinations/default/documents/2013/12/Straw%20report%20 AgNL%20June%202013.pdf). In 2013, Bakker and his colleagues focused on the relationship between the warm change cycle of rice straw, thermos gravimetric analysis (TGA), and differential scanning calorimetry (DSC). They deduced that this could lead to certain problems because the natural substance contains high amounts of silicon, potassium, and chlorine. This was attributed to a large number of cinders that had strong propensities for sintering and slugging, which have the opposite effect on warm transformation frameworks (Junpen et al. 2018). As a pretreatment step before the ignition process, they suggested washing rice straw with water. This demonstrated an improvement in undesired inorganic mixtures linked to debris issues of assembling adventures (for board, paper, powers, blocks for development and administration materials, and so forth). Roughly 12.33 million tons of agricultural yield deposits are added to dry biomass annually, with rice straw providing 63.75% of this all together.

Whenever used appropriately, rice straw has the potential to be an endless supply of fuel that has the benefits of replacing non renewable energy sources, reducing CO2 emissions, and preventing contamination from straw consumption in the open. In 2013, Bakker and his colleagues focused on the relationship between the warm change cycle of rice straw, thermos gravimetric analysis (TGA), and differential scanning calorimetry (DSC). They deduced that this could result in certain problems due to the high concentrations of silicon, potassium, and chlorine in the unrefined material. This was attributed to a large concentration of cinders that have strong sintering and slugging tendencies, which have the opposite effect on the warm transformation frameworks. Before starting the ignition process, they suggested pre-treating rice straw with water, which improved the unlucky inorganic mixtures that were found to have debris problems.

In the above a very long time, Egyptian ranchers would gather rice straw and consume it outdoors in the field as a fast removal method. Hippies have criticized the training in the past, and in many countries, laws prohibiting open consumption that results in environmental contamination have been enforced. The consumption of rice straw in the open has been attributed by hippies to the improvement of a thick layer of dark, hazy clouds. These clouds first appeared over Cairo and the Nile Delta in 1997, and two years later they became clearly visible to the unaided eye (http://english. ahram.org.eg/News/281781.aspx). Numerous studies evaluate the ecological impact of eating rice straw in the open, which is known to result in significant air pollution, a real deterioration of the local air quality, changes in the climate, and a collapse in public welfare. Le (2020) reported that the assessment evaluated the outflows of air pollutants (NOx, CO, CO2, fine residue, and ozone-harming substances) from Egypt's open consumption of rice straw. Over nine tons of rice are delivered per hectare.

4. SUGGESTION

Cairo has been named the most polluted city on Earth by a review conducted by The Eco Experts Company and cited by the Forbes website. Cairo was named the most polluted city in the universe by the English energy company Eco Experts in 2018, which examined data from 48 selected urban communities worldwide. Out of the concentrated urban communities, Cairo recorded the highest level of contamination, followed by Delhi, Beijing, Moscow, Istanbul, Guangzhou, Shanghai, Buenos Aires, Paris, and Los Angeles. According to a theory, people breathe in air stacked with particulate matter (PM) < 2.5m on a typical day, which is 11.7 times higher than the safe level established by the World Health Organization. Regarding PM10 m, the level reached a normal of 284g/m3, making it the second most notable city and 14.2 times higher than the maximum allowable limit.

5. CONCLUSION

As soon as rice straw was consumed, 11 tons of CO2 were released, which was equal to the amount of NOx and PM2.5 fine residue particles per hectare of land. The rice straw harvesting season occurs during the hour when the odds of a reversal and the air bowls' incapacity to evenly distribute discharges are highest. When compared to other agricultural buildups, rice straw has a very low biodegradability due to its high carbon to nitrogen content. In the event that rice straw is used for anaerobic processing to produce biogas, this will be especially important. Horticultural deposits should be added to ensure that the natural components of straw are not compromised. Because rice straw contains large amounts of potassium and chlorine and has debris centralizations of 18 to 20 weight percent (based on dry matter), there is a significant risk of debris slugging and fouling in ignition frameworks.

6. REFERENCES

[1] AMK, E.S., 2020. Environmental and Health Impact of Open Burning Rice Straw. Egyptian Journal of Occupational Medicine, 44(3), pp.679-708.

[2] Chakraborty, D. and Mondal, N.K., 2018. Hypertensive and toxicological health risk among women exposed to biomass smoke: a rural Indian scenario. Ecotoxicology and environmental safety, 161, pp.706-714.

[3] Junpen, A., Pansuk, J., Kamnoet, O., Cheewaphongphan, P. and Garivait, S., 2018. Emission of air pollutants from rice residue open burning in Thailand, 2018. Atmosphere, 9(11), p.449.

[4] Kumar, M.K., Sreekanth, V., Salmon, M., Tonne, C. and Marshall, J.D., 2018. Use of spatiotemporal characteristics of ambient PM2. 5 in rural South India to infer local versus regional contributions. Environmental Pollution, 239, pp.803-811.

[5] Le, H.A., 2020. Emission inventories of rice straw open burning in the Red River Delta of Vietnam: evaluation of the potential of satellite data. Environmental Pollution, 260, p.113972.

[6] Phairuang, W., Suwattiga, P., Chetiyanukornkul, T., Hongtieab, S., Limpaseni, W., Ikemori, F., Hata, M. and Furuuchi, M., 2019. The influence of the open burning of agricultural biomass and forest fires in Thailand on the carbonaceous components in size-fractionated particles. Environmental Pollution, 247, pp.238-247.

[7] Prasad, R. and Shivay, Y.S., 2018. Management options to alleviate the menace of rice (Oryza sativa) strawburning–An overview. Indian Journal Of Agricultural Sciences, 88(11), pp.3-12.

[8] Singh, G. and Arya, S.K., 2020. A review on management of rice straw by use of cleaner technologies: abundant opportunities and expectations for Indian farming. Journal of Cleaner Production, p.125278.

[9] Singh, R.P., Singh, P., Kothari, R., Gautam, K. and Singh, A., 2021. Application of Wastewater in Irrigation and Its Regulation with Special Reference to Agriculture Residues. In Water Pollution and Management Practices (pp. 177-199). Springer, Singapore.

[10] Verma, M., Pervez, S., Chow, J.C., Majumdar, D., Watson, J.G., Pervez, Y.F., Deb, M.K., Shrivas, K., Jain, V.K., Khan, N.A. and Mandal, P., 2021. Assessing the magnitude of PM2. 5 polycyclic aromatic hydrocarbon emissions from residential solid fuel combustion and associated health hazards in South Asia. Atmospheric Pollution Research, 12(8), p.101142.

[11] Mondal NK., Bhaumik R., Das CR., Assessment of indoor pollutants generated from bio and synthetic fuels in selected villages of Burdwan, West Bengal, 2013, of Environmental.