

Harmful Products from Disposals in Vogue Vis-A-Vis Innovative Products from Agricultural Tissues

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Abstract

Agrarian countries produce tremendous volume of agricultural dry tissues which are also called crop residues. In the Indo Genetic belt of India food crops viz paddy and wheat which produce large volume of agricultural tissues. A fraction of the tissues, which is also called residues is used as cattle feed and some fractions for allied uses. These residues find no other use and their disposal becomes a problem. The surplus volume of residues get rotten under rain and waterlogged condition or get burnt in field, site of piling or dumped in field and burnt. Under both the situations of disposals viz burning it creates hell of smoke and under waterlogged condition it produce hydrogen sulphide, which causes bad odor in the surrounding and become killer gas in caves, water tanks or in sewer lines.

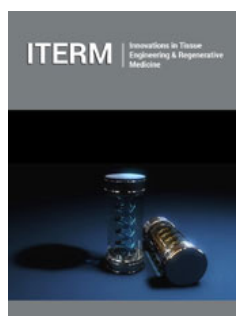
While lot of engineering research and developments of product and processes development might have come but the agricultural residues disposals have received less care that cause environmental pollution and health hazards than it should have in due perspective. It needs some scientific solutions to circumvent problems of air pollution and health hazard and produce wealth from the wastes. Studies on these aspects revealed that aerobic decomposition produces organic manure that can eliminate external addition of sulphur and zink. Thus, large requirement of country's zink and sulphur can get met with the natural processes, and environment problem and health hazards get eliminated. In addition, aerobically composted tissues eliminate burning of biomass that avoids air pollution and health hazards. The study taking stakes of scientific principles devised practice for elimination of vagaries that develop due to burning of tissues. New products of biochar are easy to make from paddy and wheat tissues which has multiple uses and enables creating industrial venture from waste products. The tissue engineering is poised to make further advancement in agriculture and many other sectors.

Keywords: Aerobic and anaerobic reaction; Air pollution; Agricultural crop tissues; Cattle fodder; Residue burning; Smoke

Introduction

Plant tissues develop from nitrogen and hydrogen protein compound and plasticization to provide framing structures of formation to grow and perform necessary phenomena of photosynthesis and produce grain and fruits the ratio of grain/ straw component is called harvest index dried tissues as residues and display desirable index of productivity. The tissue part of crop is used as cattle feed and used for allied purposes. The remaining part in general, the dried tissue part of agricultural crop commodities is disposed of largely in two forms by decomposition or by burning. The disposal by burning leads to environmental pollution of smoke carbon monoxide, carbon-dioxide nitrogen oxide etc. Suraly J [1], Times of India [2,3] and Hindustan [4]. For the process of creating condition for better livings, understanding the scientific process of tissue burning and decomposition will enable eliminate air pollution and health hazard. Scientific man oeuvre creates good product which are useful.

The practices for disposal of dried tissues in vogue cause environmental pollution and under anaerobic decomposition cause hydrogen sulphide gas which is highly toxic and act as slow poison and fatal when in concentration Yadav RC [5]. The hydrogen sulphide is the main cause of death of young children as it leads to nasal sensory nerve disorder and that causes mental fever. This problem is an annual recurring calamity in Gorakhpur Tarai region of Uttar Pradesh and in Bihar state. This fatal epidemic has damaged lot of health and caused death of young children. National Green Tribunal (NG) a legislative authority on environmental issues of India have shown lot of concern and been admonishing states and union territories to submit effective systematic action plans for eliminating agricultural biomass burning. This has been



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a regular yearly exercise for controlling air pollution. But as such there had been lack of any other effective measures for tackling the epidemic of encephalitis. There is no such legislative move for overcoming problem of encephalitis. It requires development of fast and effective preventive and control measures to get rid of problem that emerge due to disposal of organic tissues. Objective of the presentation is to show complete picture of problems and prospects of residue i.e. agricultural tissues.

Material and Method

The materials and Methods are presented under different sub heads.

Natural process of formation of tissues

Tissues formation is fixed and essential process. There will be variation of quantum and types of product formation. Process knowledge is essential for enabling creation of any innovation. Result and following discussion will be further taken up in the study.

Quantum of problem of tissues

India being an agrarian country produces lot of agricultural tissues. Indo -Gangetic belt known to be food basket, under the cropping pattern. The timeliness in sowing of the wheat after paddy puts farmers, the main producer of wheat and rice cropping pattern supporting staple food under stress of fast action and burn residues to get rid of. The cropping pattern involves huge volume of tissues for various uses. Biomass burning is creating hell of problem in surrounding four states of NCR Delhi, where air pollution has become a regional disaster. On the other hand, high humidity, temperature and wet surrounding prompts the residues to undergo decomposition that emits the hydrogen sulphide. The hydrogen sulphide is main cause of encephalitis, an epidemic of death of large no of children. This situation prompted the study to find innovative solution to overcome problem and at the same time develop some entrepreneurial enterprise to convert waste into gold.

Uses of crop tissues

The agricultural tissues viz residues are used for various purposes viz as cattle feed. Inappropriate use of agricultural tissues which are nomenclature as wastes create several problems leading to development of harmful fumes, smoke and gases. and bedding in animal and bird shelters. Based on scientific principles of nitrogen cycle and sulphur cycle many useful natural products develop which help prosper agriculture. But these principles are new application which had resulted promising results and enable charter several innovative practice. Then bad effects get suppressed. The lucrative products will be taken up in result part of the study.

Disposals of excess volume of tissues in piles etc. This water poss huge problem for environment in NCR

The paddy residues are abundant especially when harvesting is done by combine. The stubble is cleared by burning and collected straw as pile burning. The data perspective will be taken up in result part of the study.

Disposal by burning: Paddy straw burning in Punjab, Haryana, Rajasthan and Uttar Pradesh. in the states pose major problem in NCR Delhi.

Disposal by composting: The tissues decomposition occurs in tarai region where encephalitis develops.

Result

Study by Yadav et al. [6] 2018 focused on green chemistry prudent plant physiology and process of building CO₂, Photosynthesis, carbohydrate buildup, its trans location and development of tissues by polymerization, grain and fruit yields. The process are carbon, hydrogen and water supported and revolve in irrotational dynamics Ramamrutham S [7], all are interlinked. The process components are strongly modified by climate change. It reveals that the production of agricultural tissues can be smothered by scientific maneuver of transforming these inputs, which will be taken up in discussion part of present study.

Menace of burning of tissues

Agricultural biomass burning is a universal problem for various compulsory and voluntary actions. Whatever is the case, the menace from the biomass burning and its harmful effects on health and environment needs a brief review of the situation? Figure 1 depicts horrifying and huge smoke releasing source emanating from on site in field and pile burning. The paddy cultivation has extended as precursor in the paddy-wheat cropping system in the Indo - Gangetic -zone, hence it reveals need and likely devastating situations.



Figure 1: A giant Problem of yearly agricultural tissue (stubble) burning in Punjab and Haryana in October.

The burning huge mass left as stubble in field as well as in piles etc. cause air pollution which cause onsite as well as offsite problems. This is causing tremendous health hazard, which imply that burning should not be resorted to. There should be some other approach to manage the paddy stubble in particular and any residue in general. Media also reported that burning causes equally worst problems of health hazards at site and that in NCR Delhi. But the lack of any effect, perfect lucrative technological solution leaves them to resort to open biomass burning, which create endless problem of air pollution and health hazards.

It will be matter of curiosity to know the byproducts that develop from the biomass burning. major portion is formation of carbon mono oxide, carbon dioxide and total particulate matter-aerosol (Table 1). These byproducts give some clue for developing ameliorative measures. The author has several innovative remedial

measures on air pollution. Equally well and perfect solution to eliminate stubble burning, which causes the problem as presented in the following

Table 1: Emission factors of interest in open biomass burning.

Compound	Tropical Forest	Crop Residue
	Emission factors (g/kg)	
CO ₂	1580 ± 90 Largely accidental fire	1515 ± 177 Resorted purposefully done
CO	104 ± 20	92 ± 84
CH ₄	4 6.8 ± 2.0	2.7
N ₂ O	0.200-.07	-
NO _x	1.6 ± 0.7 0	2.5 ± 1
TPM*	20b	10b

*Total Particulate Matter (TPM) or aerosols.

N Cycle management-based manifestation of practices: As revealed in the (Figure 2) De AK [8], Yadav RC [9,10] and Chaudhary MP [11] when the residue is being burnt the microorganisms also get burnt, hence the important cycles, which are chartered by microorganisms will not function. Nitrogen cycle a major source for providing organic N supply in soil is operated by microorganism. Thus, stubble burning has been bringing set back in agriculture in so claimed food basket i.e. north west part of Indo-Gangetic zone viz Punjab and Haryana. This situation will counter act for productivity of the region. This will bring negative impact on the productivity of the crops. Therefore, the harm to the green microorganism will be a very strong convincing justification to make the farmers stop residue burning that will help the governance ensure healthy breath for all gentry. For this gain the governance should make some provision for creating organizational facilitation for adoption of this important debatable issue.

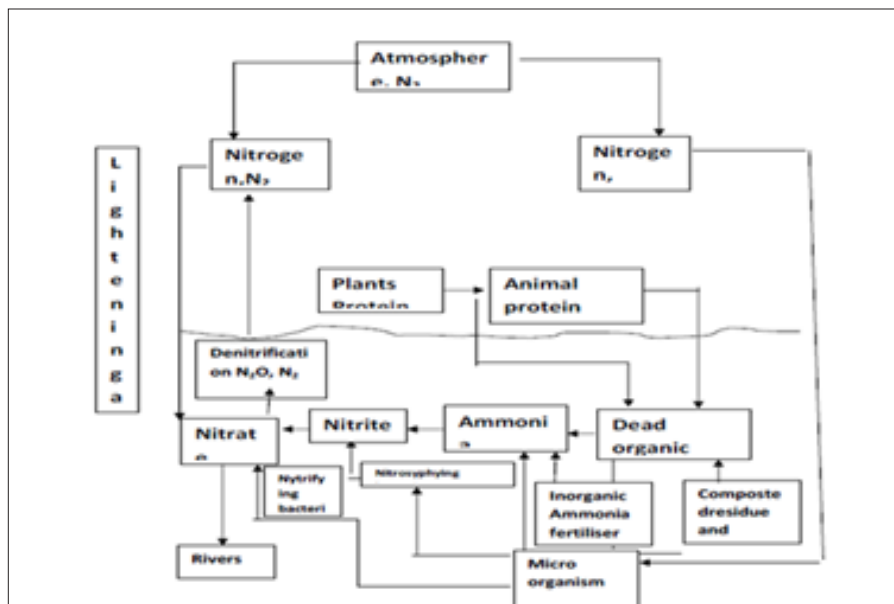


Figure 2: Nitrogen cycle (After De AK [8] and subsequent modification by this author Yadav [10,11]).

Sulphur cycle-based manifestation of practices: Like the N cycle the sulphur cycle (Figure 3) is equally operated by sulphur bacteria. To follow the sulphur cycle the ground condition should permit aerobic decomposition, which will convert the residue chopped in soil to get converted in to sulphate. Most of soils show sulphur deficiency and when aerobic decomposition takes place it will overcome the deficiency and there will be automatic buildup of sulphur. In paddy sulphur is applied which makes it unsuitable when the water is from pumped ground water. This brings crop loss whereas farmers expect gain. It is clear cut gap, of knowledge of sulphur cycle Yadav RC [12-14]. Therefore, farmers should be bringing crop loss whereas farmers expect gain. It is clear cut gap, of knowledge of sulphur cycle. Therefore, farmers should be convinced to leave the residue burning as first priority. The role of bacteria viz microorganism in this practice smart alive and enthusiastic (RACY) nature agriculture which has created new niche in science of agriculture Yadav RC [9,10] & Chaudhary [11].

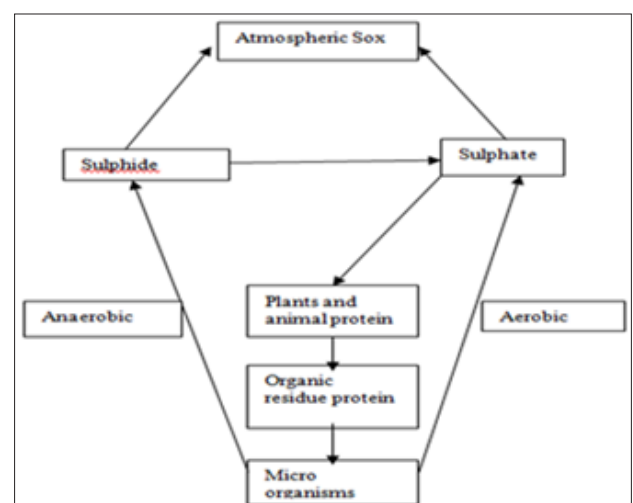


Figure 3: Sulphur cycle (After De AK [8]).

New innovative practices conducive for no residue burning

The author has sufficient and plentiful researches that substantiated worthiness of the measures listed in Table 2. Hence, they are working beyond doubts and the practices will bring immense benefits to the farmers when they incorporate the residues and adopt accompanying operations. The last column (Table 3) is showing very conservative estimate and in practice they get almost

double. In addition, the practices bring conservation of resources for present and posterity. The eliminate drudgery of agriculture and bring sustainability. Anyone who does not follow these practices will be looser of economic prosperity as residue burning destroy microbiological organism, hence natural processes do not flourish in full swing. Therefore, it is sufficiently justifiable to go for no burning of residue. How to convince farmers for no residue burning will be taken up in the following sub sections. The crop yields will also get doubled, as established by previous researches (Table 2).

Table 2: Gray and black chemistry involved in organic manure; elemental composition of organic manures, average values.

Organic Manures	GHG Emission Chemistry	Macronutrients			Some Selected Heavy Metals			
		N	P	K	Fe	Mn	Cu	Zn
		% wet weight basis			Mg/kg dry weight basis			
Farmyard manure	CO ₂ and CH ₄ , gray and black	0.54	0.31	0.51	440	155	10	78
NADEP	CO ₂ Gray	0.93	0.52	1.15	215	96	25	56
Vermin compost	CO ₂ Gray	1.36	0.48	0.65	619	245	16	45

Chemical analysis data based on reference Biswas et al. [16].

Note: There was no visualization of building of S sulphur in the organic manures, supporting lack of visualization of working of sulphur cycle.

Nutrient quality of NADEP in contrast with other types of composts

Table 2 presents nutrient quality of NADEP aerobic composting, which highly useful and less care demanding. It is a good organic manure which can be prepared with biomass and low availability of cow dung. When urine will be added in the NADEP formation it will become still more nutrient containing than so far known and practiced. However, this aspect needs additional research work. With all these developments it is apparent who will burn the wonderful biomass with unimaginable prosperity building capability in it. Thus, all types of biomass burning will get totally stopped and a new success stories will be coming up in country.

The practices brought out in Table 2 and Table 3 will prosper agriculture viz paddy cultivation and to eliminate environmental

and health hazard problems. Thus, productivity will get enhanced to produce more staple food viz rice and bring so called poor nations to new niche of prosperity. All departments of academic institution of higher learning should add new department of agricultural tissue engineering that should take research and development for prospecting agriculture into black gold agriculture. 3.5 Conversion of agricultural tissues into black gold Researchers (http is cover: 'Black Gold of the Amazon) [15]. argued that adding charcoal to soil may provide more benefits for long-term soil quality than compost or manure. It could also be used to sequester carbon captured from carbon dioxide emissions. Mingxin Guo discussed new applications for the technique, used more than 1,500 years ago in the Amazon basin. Old farming practice traced back at least 1,500 years to tribes in the Amazon basin, can give new life to nutrient-poor dirt. It is called "black gold agriculture."

Table 3: Scientific facts-based measures for leaving practice of residue burning.

S. No	Sci Fact-Based Manifestation	What is Effect	What to do	What to get	Likely Increase in Yield, %
1	N Cycle based				
2	N fixation	N fixation	Sow leguminous crop	Saving in N	15
3	Intercropping	Nation fix	Legume cropping	Saving in N	25
4	Eco-zero	N fixation	N fixing crop	Saving in N and weed control	25
5	Eco nursing	N fixation	N fixing crop	Crop to grow with n fixation	15
6	S cycle based	Building sulphate	Residue chaffing and incorporation in soil	Sulphur supplement	15
7	Super micro irriga.	Reduce irrigation water	Raised bed and furrow sprinkler and furrow irrigation	Saving in irrigation water and high-water use efficiency	15
8	Post-harvest cultivation and N fixation	Eliminate need of excessive tillage and inter culture	After first cultivation sow a legume crop to build nitrogen	Saving in and reduction in carbon footprint	5
	Total gain				115%

Control of commercial biomass burning.

Once the biomass is converted into charcoal, at least 50 percent of the carbon will be permanently fixed into that material, it is resistant to microbial and chemical degradation. So that part of carbon will stay in the organic form and it won't be released as carbon dioxide to the atmosphere. The burning process in making the charcoal, actually is not a real burning process because the materials are packed in a closed container and are heated at a relatively high temperature, say 750 degree F or 450 degree C. One can take all the tree leaves and the corn stalks and the wood chips and turn them into charcoal and lock up a lot of that carbon in the charcoal, and create a great fertilizer at the same time. Theoretically, all organic residues and wastes, including the grass leaves, crop residues, animal manure and yard trimmings, and even, some leftover from the kitchen. Now, only a tiny amount, a fraction, only about ten percent of the carbon will be converted to carbon dioxide. remaining 50 percent of the carbon will be charcoal. Remaining 40 percent will be a byproduct called bio oil, which can be harvested and used as another renewable energy source. The biochar acts as deactivating agent for toxic salts and toxic gases Yadav RC [9]. Lot of environmental improvements are activated.

Actually, this lesson was learnt from the pre-Amazon people. An archeological event disclosed the fertile, charcoal carbon-rich and highly productive soil in the central Amazon basin. Later scientific studies revealed that this fertile soil was fertilized by the Amazon people 1,500 years ago with char produced by smothering plant debris and annual bulbs.

The ideal technology

Different innovative practices developed for good functioning of various aspects in the RACY nature, quantum agriculture is presented with likely enhancement in yields. There might be some variation in the individual factors-based estimates; the composite effect on enhancement will be more than the values arrived in this Table 3. These values have been getting established for varying situations. The actual experimentally harvested yields on farmer's field surpassed the estimated values of conservative estimates in Table 2, which adds strength to the innovative RACY nature agriculture. Now based on need and innovations a stage has come to chart out the tissue management in a depicted figure below. The Figure 4 reveals that prevalent open biomass i.e. agricultural tissues burning in vogue should be transformed into char making and again converted as activated biochar. The used biomass and cattle urine and dung as well dropping laden biomass should be composted aerobic composting i.e. NADEP Biswas et al. [16]. This transformation will fulfill cherished dream of father of Nation Mahatma Gandhi which has revived in ongoing sanitation mission of present Indian Government. Thus, environment is totally made problem free and agriculture also made sustainable, stable and efficient.

The sequential operations for ameliorative solution to this problem is close chaffing of paddy stubble and collection in moving trolley for onward use as cattle feed or bedding for dairy barn, hog house or poultry houses, which can be used for preparation of aerobically decomposed compost (popularly known as NADEP. This NADEP is highly effective for agriculture for enhancing NPK and

water use efficiency in agriculture and other environmental areas. The harvested parali should be similarly utilized for building plant nutrient in field and eliminating need of application of Sulphur. Any other method of elimination of burning are un plausible solutions. Thus, the two types of situations of burning can be effectively controlled and problems of air pollution overcome. Many new idea-based solutions of generating electricity by biomass burning can be equipped with aforesaid any of two innovative solutions. Economic return and sustainability will be deciding factor about how to go and where to reach.

Uses of activated biochar

Saha et al. [17] reported 10 areas of uses of bio-chars viz. drinking water treatment, pharmacy industries, storage of gas and electric energy, waste water treatments Mark et al. [18], chemical and smelting industries, atmospheric pollution control, catalyst and catalyst carrier, automobile industries, indoor air decontamination and food industries. In addition to this, the biochar is useable in environment and agriculture that will be an ocean like open field Yadav et al. [6]. Its application in the soil quality and water quality improvement will be always opened. The agriculture will be more stable and sustainable as revealed from the knowledge from the Amazon basin. Lot of chemicals have been dumped in reclamation of alkaline and saline soil. There has been no study on reclaiming such land by de activation by activated bio charcoal. Now time has come to conduct systematic studies on known as well as new applications. The biochar so produced by using the biomass of wheat and paddy will bring impacting influence on agriculture, which will be simple means of saving the planet Earth.

Discussion

This study has produced problem that arise due to wrong use of tissues particularly which are abundant in the Indo -Gangetic region of India as a result of open biomass burning and causing hell of air pollution problem. On the other hand, rotting and anaerobic decomposition of the residue under hot humid condition of Gorakhpur Tarai had been prone to fatal yearly occurring epidemic of encephalitis. In Bihar too this has been problem I at the present time. Both the environmental problems are very crucial that develop due to inappropriate use and handling of agriculture tissues. In the industrial efforts there might have been altogether different approach and development.

This study has demonstrated innovative application of scientific facts to tackle the problem those emerge from biomass burning and unsuitable decomposition that cause hell of environmental problem. Rice and wheat are the staple food of most of Indian people and depending on the techno economic based agriculture different type of environment problem emerge which create death of young children who have tender nasal systems. Both the environmental problem takes shape of state level and become difficult to tackle them. These two problems pose severe conflicts in political governance, besides bringing huge economic and health hazards. This study has brought out solution to combat the problem emerging from agricultural tissues on one hand. Further, transforma-

tions as depicted in Figure 4 have created avenue for creating new venture which eliminates problem from the root cause of biomass burning and composting as aerobic which is termed as NADEP compost. This study has gone one step ahead and produced innovative product. This development has resulted to create gauge prosperity, living condition due to innovative use of agricultural tissues.

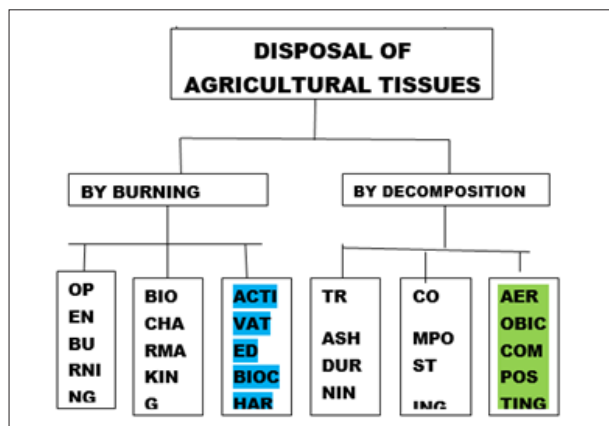


Figure 4: Agricultural tissues disposal management types and perspectives.

Entire South East Asia where paddy is the main staple crop is having surplus volume of paddy straw which are prone to burning and promoters of the first fire leading to great problem of some environment in the south East Asian countries Andreae MO et al. [19] & Savitri et al. [20]. Although for the aforesaid problem of paddy straw decomposition it cannot be assigned a definite reason, the biomass burning, and environment problem is certainly due to paddy-based tissues. This research thus will eliminate huge environmental problem for which there had been no solution [21]. The waste and problems have been brought to create to huge wealth and opportunities. The paddy growing regions and countries have been regarded as poor and underdeveloped one, but this research has opened Pandora of wealth. It gives tremendous opportunities for nation and world building full of prosperities [22].

The utility of the information that emerged from the Amazon basin has indicated that charcoal has stood effective for more than 1500 years ago [23]. This information fortified by current science will prove effective in various domains of application. Thus, the research emphasis presented here has sufficiency of validity of the research. This is an excellent case of transferring knowledge from one basin to the other. Since the information presented here is based on universal facts, applicability of innovations developed in the present study will find applications in entire globe and basins [24].

Conclusion

This study was conducted on problems that emerge due to inappropriate use of agricultural tissues, which cause air pollution in NCR Delhi due to open biomass burning on one hand and decomposition as it happens in Gorakhpur Tarai Region. This research has brought out solution effective, practical solution to the problems which emerge due to agricultural tissues. The innovation converts the waste tissues into black gold which has capability to brings global prosperity in paddy growing regions. The research

will elevate socio-economic status of so-called paddy growing poor countries to wealthy and livable environment countries.

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