
Review on Wheat Straw as Agricultural Waste to Wealth: A Way of Sustainable Micro Entrepreneurship

Neha Agarwal¹, Madhulika Gautam²

ABSTRACT

Wheat is one of the major cereal crops of India. The higher production of wheat also produces its residue also in higher amounts. Approximately 110, Mt. of wheat residue is produced every year, which is less than rice residue but higher than all other types of residue production. Crop residue is mainly burnt in the field, which released harmful smoke and creates many drastic situations. The wheat residue is mainly used as fodder for animals and the marketing value of this is not so high. During COVID- 19 pandemic, the wheat residue was also burnt because of the mechanical harvesting method. The present study reviewed the problems because of the burning residue and focused on the solutions in which wheat straw can be used as raw material and it can help produce different economical aspects by which farmers can take initiative not to burn fields and can support in making a healthy environment. Raw material and rural women may start their micro-entrepreneurship by using innovative techniques. Different types of handicraft items can be developed by using wheat straws. There are lots of opportunities for making sustainable eco-friendly products. The products made by using various types of weaving styles and which fulfill various purposes can open the opportunity for starting a micro-enterprise. Rural youth can also start their time in the growth of their family income by making eco-friendly papers with paddy and wheat residue. Today, eco-friendly paper making has wider scope in the international market. Various art forms of wheat residue are in use in modern times. So, it can be said that the eco-friendly market of wheat residue is one of the sustainable resources for a wealthy start-up from waste.

Keywords: Wheat Straw, Micro Entrepreneurship, Rural Development, Handicraft, Papermaking

Introduction

Agriculture is the major contributor to the total economy of India. Various varieties of crops are produced in different regions of the country. The majority

1 Research Scholar, Dayalbagh Educational Institute (Deemed University), Dayalbagh, Agra, UP

2 Associate Professor, Dayalbagh Educational Institute (Deemed University), Dayalbagh, Agra

Corresponding Author: neha95agrawal@gmail.com

Article Received Date: 05.10.2022

Article Accepted Date: 01.04.2023

is for food grain crops like rice, wheat and maize, which also produce a large portion of crop residue (Devi et al., 2017). The leftover parts from the plants after harvesting like leaves, stems, husks and roots are called crop residue. Govt. of India (2016) and The National Policy for Management of Crop Residue in 2019 revealed from the report of the Indian Ministry of New and Renewable Energy (MNRE) that approximately 500 Mt of crop residue is generated per year in India, in which approximately 110 Mt is of wheat residue Devi et al (2017). A large amount of wheat straw is mainly used for animal feed, fodder, soil mulching, bio-manure and fuel (Grover et al., 2015). but still, these are not proper sustainable management practices. Presently, about 92 Mt wheat crop residue is burned annually, which is the cause of environmental problems, health issues and contributes to global warming as well (Bhuvaneshwari et al., 2019). Burning of residue will release toxic gases like CO₂, PM₁₀, PM_{2.5}, CO, NO₂ and other global warming gases, which are responsible for respiratory and cardiovascular diseases (Bimbraw, 2019).

According to the various news reports like Hindustan Times, Indian Express, and Times of India, (2021) retrieved that the drastic situation of burning wheat residue becomes more critical during the period of COVID- 19. Because of the lockdown, farmers did not hire labour and burnt the fields; and the smoke generated was more dangerous for the patients, who were already suffering from COVID- 19. Micro-entrepreneurship is the key point to motivating farmers not to burn residue and properly manage this residue. Modern technologies in the field of development made it possible to use different crop residues for biogas generation and five million small biogas plants were constructed in rural areas by MNRE (Bhuvaneshwari et al., 2019). This paper helps to know many more sustainable strategies of wheat straw by which farmers can earn money and also different aged people can involve in different activities and can start their small enterprise. It will help in the development of the rural areas and also will contribute to reducing the wheat residue burning. The objective of this study is to find the solutions to use wheat residue in sustainable micro-enterprises.

Methodology

A combinatory review of the literature was carried out before December 2021. The relevant studies were found by using six different academic electronic databases such as Science Direct, PubMed, Springer, Scopus, Google Scholar, Sage Journals and some other websites for relevant recent data. National and international studies were included in this paper. The papers were used after being reviewed and screened completely.

Inclusion/ Exclusion Criteria:

Originally observed studies, valuable reviewed papers and news reports were included for the latest update. Publications are used only in the English language. Referred publications were taken, which were fulfilling the need of the present study. On other hand, non-referred publications were excluded and other articles presented in conferences as abstracts and papers, editorials, and unofficial reports were excluded.

Results and Discussion

The burning of wheat residue creates serious issues for the atmosphere and the living creatures. After reviewing the selected papers, the researcher found major results, which can help in the use of wheat residue towards a sustainable move and for the economic growth by utilising residue in a more efficient way.

The Burning Status of Wheat Residue During COVID- 19

Previous studies show that farmers have lack of awareness about the benefits of wheat residue, so they did not use residue properly for economic purposes and burnt residue in the field. During the period of COVID-19, this situation becomes more drastic. In a few newspaper articles, the status of wheat residue burning was given during the COVID pandemic situation. Majorly, the problem was in districts of Punjab like Malwa district, Sangrur, Patiala, Bathinda, Ferozpur, Barnala, Moga, and Mansa (Hindustan Times, Indian Express, Times of India, 2021).

Impact of Residue Burning on Human Life

Burning residue created a very crucial situation during the pandemic for the patients who were suffering from respiratory diseases because the smoke affects the throat and lungs (Indian Express, 2021). Wheat straws release particulate matter and Green House Gases after burning. Many other gases are also released by burning and it contributes to forming black clouds (Chandramauli, (2020) and Ravindra et al., (2019). Pollution is responsible for respiratory problems, heart and lungs problems, eye irritation, skin irritation, blood problems, etc. (P. Kumar & Singh, 2021). Burning of residues also affects soil fertility, loss of nutrients, reduces worms and microbes, etc.

Wheat Straw for Handicraft Products

Wheat straws are lustrous, shiny, smooth, flexible and yellowish in colour (Liu et al., 2013; Rani & Brar, 2020), this can be moved in a cylindrical shape; and these straws have woven kinds of abilities, so that different products can be developed (Liu et.al, 2013). This idea can help in a start-up of a micro-enterprise for rural women as the local solution (S. Kumar et al., 2019). Innovative and

environmental-friendly products can be developed with wheat residuem which will have much economic value and is comfortable to use in each type of weather (Yan et al., 2020).

Wheat Straws for Making Paintings

The shiny and smooth texture of wheat straw is proved to be an advantageous, because the straws can be used in making paintings by cut and pasting method. Attractive paintings can be developed and also all the ages of people can involve in this craft activity (Liu, 2016). So, it can be proved as a beautiful and innovative micro-enterprise for all types of aged people (Liu et al., 2013).

Wheat Straws Convert into the Papermaking

It is possible to prepare wheat straw pulp after using various processes. The bleached wheat straw pulp can be characterized by good strength properties, reasonable brightness, good printability, etc (Fang & Shen, 2018). After proper pulping, cleaning and screening, pulps from it can be used for manufacturing various writing and printing papers, such as light-weighted printing paper, letterpress printing paper, typing paper, writing paper, tissue and sanitary papers, and almost all grades of paper and paperboard grades (Pandita et al., 2015). Wheat straw pulp furnishes must be mixed with some portion of bleached wood pulps or bamboo pulps occasionally (Fang & Shen, 2018). Rural youth can involve in this type of activity, so that income can be generated and residue can be used in an eco-friendly way (Devi et al., 2018; Verma, 2014).

Sell Wheat Residue

Wheat residue gives lots of benefits and opportunities to everyone for income generation. This residue gives a chance to start own micro-enterprise basis on the interest. So, farmers also have an opportunity to deal with these entrepreneurs directly to sell wheat residue in the form of raw material. They need some awareness, knowledge and patience to crack a good deal. Threshing the entire crop is not the right way in direction of selling crop residue. Chopped residue can not be used in all the activities, so farmers must know all the benefits which can be reaped by wheat residue.

Conclusion

All studies have shown that there is no need to burn residue, and it can be a potential source of a sustainable micro-enterprise. Awareness of farmers regarding the modern solutions, technologies, and production by residue can be an outstanding response. Burning of wheat straws is the easiest method to save labour costs and prepare the field for the next crop in a short period. This

burning practice by farmers creates many serious health issues and environment problems. The review of studies suggests some major environmental-friendly solutions, which can help in reducing the environmental issues that are created because of residue burning. The government of India and people in every sector like social, agricultural, environmental, etc. should work on this area. Straws can be used for different purposes by utilising various processes. Research has suggested that creatively all types of aged rural people can involve in these activities by which rural development can be possible. To provide knowledge and awareness about the benefits of residue, extension education should be involved for the farmers and other rural people, who can participate in these activities. Extension workers can easily teach in the rural areas by involving Gram Panchayat through various methodologies like speeches, group discussions, presentations, demonstrations, etc.

References

- Bhuvaneshwari, S., Hettiarachchi, H., & Meegoda, J. N. (2019). Crop residue burning in India: Policy challenges and potential solutions. *International Journal of Environmental Research and Public Health*, 16(5). <https://doi.org/10.3390/ijerph16050832>
- Bimbraw, A. S. (2019). Generation and Impact of Crop Residue and its Management. *Current Agriculture Research Journal*. 7(3), 5–10. www.agriculturejournal.org
- Devi, S., Gupta, C., Jat, S. L., & Parmar, M. S. (2017). Crop residue recycling for economic and environmental sustainability : The case of India. *Open Agriculture*. 2017; Published by De Gruyter Open. 2: 486–494
- Devi, M.V., Devarani, L., Singh, R. J., Hemochandra, L. (2018) Rice Straw Management in Manipur: Challenges and Finding a Way Forward. *Indian Journal of Hill Farming. Identity*, 30(2), 181–185. http://www.kiran.nic.in/pdf/IJHF/Vol_30-2/1.pdf
- Fatima, N., Chandramauli, A. Chaddha. N. (2020). Analyzing Disposal Methods of Crop Residue (Parali). *International Journal of Innovative Science and Research Technology*. Vol. 5, Iss. 5, May – 2020. 2456-2165
- Fang, G., & Shen, K. (2018). Wheat Straw Pulping for Paper and Paperboard Production. *Global Wheat Production*. <https://doi.org/10.5772/intechopen.77274>
- Grover, D., Kaur, P., & Sharma, H. R. (2015). Possible Reasons and Farmers

Awareness Towards Crop Residue Burning : an Overview and a Case Study from Mirzapur Village of Kurukshetra District, India. Environment & We An International Journal of Science & Technology. September. 0975-7112; 0975-7120. 75-85.

Huge spike in Punjab stubble burning cases after wheat harvest <https://timesofindia.indiatimes.com/city/chandigarh/huge-spike-in-punjab-stubble-burning-cases-after-wheat-harvest/articleshow/82441945.cms>
Neel Kamal / TNN / May 7, 2021, 04. Retrieved on March 17, 2022

<https://www.hindustantimes.com/cities/others/wheat-stubble-burning-starts-in-malwa-experts-warn-covid-scenario-could-worsen-101619552012424.html> By HT Correspondent Published on Apr 28, 2021. Retrieved on March 17, 2022

<https://indianexpress.com/article/cities/chandigarh/a-silent-contribution-by-farmers-in-covid-fight-no-stubble-burning-6386895/>. Written by Anju Agnihotri Chaba Updated: April 30, 2020. Retrieved on March 17, 2022

Kumar, P., & Singh, R. K. (2021). Selection of sustainable solutions for crop residue burning: an environmental issue in northwestern states of India. In Environment, Development and Sustainability (Vol. 23, Issue 3). Springer Netherlands. <https://doi.org/10.1007/s10668-020-00741-x>

Kumar, S., Sharma, D. K., Singh, D. R., Biswas, H., Praveen, K. V., & Sharma, V. (2019). Estimating loss of ecosystem services due to paddy straw burning in North-west India. International Journal of Agricultural Sustainability, 17(2), 146–157. <https://doi.org/10.1080/14735903.2019.1581474>

Liu, B. (2016). The Research on Culture Inheritance and Development of Straw Art in Northeast China. Advances in Social Science, Education and Humanities Research (ASSEHR), 2016 International Seminar on Education, Innovation and Economic Management (SEIEM 2016) 75(Seiem), 55–58.

Liu, B., Wang, F., Liu, F., & Sun, J. (2013). Study of wheat straw weaving process and decorative effect. Advanced Materials Research, 605–607, 179–182. <https://doi.org/10.4028/www.scientific.net/AMR.605-607.179>

NPMCR. Available online: http://agricoop.nic.in/sites/default/files/NPMCR_1.pdf. Retrieved on Dec. 20, 2020

-
- Pandita, S., Kaula, B., & Passey, S. (2015). Use of Weeds and Agro-Based Raw Materials and their Blends for Handmade Paper Making. *DU Journal of Undergraduate Research and Innovation*, 1(3), 169–179. <http://journals.du.ac.in/ugresearch/pdf-vol3/U17.pdf>
- Rani, L., & Brar, K. (2020). Physical and tactile properties of woven textile textures from plant and agro-waste materials. *The Pharma Innovation Journal* 2020; SP-9(4): 104-1099(4), 104–109. 2277- 7695; 2349-8242
- Ravindra, K., Singh, T., & Mor, S. (2019). Emissions of air pollutants from primary crop residue burning in India and their mitigation strategies for cleaner emissions. *Journal of Cleaner Production*, 208, 261–273. <https://doi.org/10.1016/j.jclepro.2018.10.031>
- Verma, S. S. (2014). Technologies for Stubble Use. *Journal of Agriculture and Life Sciences*. Vol. 1, No. 2; December 2014 1(2), 106–110. 2375-4214, 2375-4222
- Yan, X. C., Wang, X. L., & Zhao, D. L. (2020). Research on 3R design of straw woven living products based on green design concept. *E3S Web of Conferences*, 179. <https://doi.org/10.1051/e3sconf/202017901023>