ASSESMENT OF CROP RESIDUE GENERATION IN MAJOR CROPS OF TELANGANA

Abstract

India is one of the key producer of food grains, oilseeds, sugarcane and other agricultural products. Agricultural crops generate considerable amounts of leftover residues, with increase in food production crop residues also increasing. These leftover residues exhibit not only resource loss but also a missed opportunity to improve a farmer's income. Crop residue burning has become a major environmental problem causing health issues as well as contributing to global warming. Composting, biochar production and mechanization are a few effective sustainable techniques that can help to curtail the issue while retaining the nutrients present in the crop residue in the soil. The main aim of this paper is to assess the amount of crop residue generated in four major crops paddy, maize, red gram and cotton. of Telangana in the year 2021. The assessment of crop residue generation is done using the residue production ratio of the above four crops and the total production in the year 2021 in Telangana state. The results shows that the paddy crop generating high amount of crop residue i.e., 15,29,60,297 followed by cotton, maize and redgram. The generated crop residue is needed to be disposed or managed without causing any harm to the environment. The study suggests that the proper management of crop residue by various methods like in-situ incorporation, cattle feed, industrial purpose etc., instead of burning of the crop residue which causing environmental pollution with the emission of harmful gases.

***Key words**: Crop residue, assessment, residue production ratio, Paddy, Maize, Red gram, Cotton, Burning, Environment.*

Introduction

Crop residues are plant's part which are left in the field after harvesting which are good source of nutrients when added to the soil as they contain all the nutrients required for plant growth and they are not waste but a useful natural resource. According to Indian Ministry of New and Renewable Energy (MNRE), India generates on an average 500 million tons of crop residue per year (*Bhuveneshwari et al*., 2019). Recent studies reveal that crop residue burning in India generates nearly 150 million tons of carbon dioxide and other gases which contribute directly to environmental pollution (*Porichha et al., 2021*). In India Telangana state also

contributes maximum share in the crop residue generation. The generation of agriculture residues has been increased due to use of modern cultivation methods and fertilizers. The agriculture residues are of different forms and depend upon the type of crop. The residues are classified as the stalks, stubble (stems), leaves, straw, husk, shells, roots, and cobs etc. The major crops of Telangana i.e., Paddy, Cotton, Maize and Red gram generate large amount of crop residue which may be utilized in many ways, including use as cattle feed, compost with manure, rural roofing, bioenergy, beverage production, packaging materials, wood, paper, and bioethanol, etc. Disposal of these crop residues has turn out to be a huge problem in Telangana state, resulting farmers prefer to burn the residues in-situ. Collection and transportation of voluminous mass of the above crop residues is cumbersome, therefore, ex-situ residue management is still not in practice. The agricultural waste opens many options for its versatile usage and is possible only when residue is collected and managed properly. It is also very important to use surplus residues for conservation agriculture. There is an urge to create awareness among farming communities to direct them to understand importance of crop residues in conservation agriculture for sustainability and resilience in agriculture. The deployment of the crop residue may differ among various districts in Telangana. Few opt to use it as cattle feed, composting, cattle shedding, agriculture crop processing and small industries like brick kilns, mushroom cultivation and even they are burnt in fields causing environmental pollution without contributing any energy. Open residue burning is a common practice in Asia and in other countries as well. Studies show that significant potential exists for crop residue utilization as a fuel for electricity generation through the installation of the biomass-alone-fired steam power plants of up to 100 MW capacity (Kashif et al., 2020). India is an annual gross crop residue producer of 371 million tons (*Lohan et al*., 2017.) of which wheat and paddy residues constitutes 27-36% and 51-57% respectively. Cereal crops contribute 70% residue of which paddy crop is the contributor of 34% of it. The information resulting from this study will serve as a base for further, more detailed site-specific crop residue assessments. The objective of this article is to access the amount of residue generation of the selected major crops in Telangana. In this paper the four agriculture crops have been chosen for assessment, they are Paddy, Maize, Red gram and Cotton.

MATERIALS AND METHODS

Study region

The study was initiated to assess the crop residue generated from selected major crops paddy, maize red gram and cotton in Telangana State. The districts are selected zone wise based on the area of the crop which is referred from Statistical Abstract of Telangana, 2020-2021. Adilabad and Jagitial are selected from Northern Telangana Zone Warangal and Sangareddy from Central Telangana Zone Nagarkurnool and Rangareddy from Southern Telangana Zone. Data from the above districts collected in randomly selected mandals which enabled to find the residue to product ratio. Two Mandals from each district are selected randomly and interviewed 10 farmers from each mandal. The total sample size of the farmers is 120.

Methodology

The assessment of crop residue is done using the total production of crops and the residue production ratio of the above crops for the year 2021. The residue production ratio is calculated by data collected from the farmers in 6 districts of Telangana. The ratio is an average of the residue production ratio data of the crops collected from the farmers of the selected districts. The data collected from the farmers regarding crop yield and crop residue generated per acre and the management practices they follow for residue management. Besides primary data collection through direct interviews, secondary data were also collected from Statistical Abstract of Telangana, 2020-2021. The secondary data include the crop area, production and productivity district wise. Before starting the field survey, a pilot survey was conducted to pre-test the questionnaires for the refinement, wherever necessary. Using both primary and secondary data the total residue generation is calculated by using the following equation (*Singh and Sharma. 2016*).

Residue generation (quintals/year) = Crop yield (quintals) x RPR

RPR = Residue production ratio

Table 1: Area , Production and Productivity.

Crop	Area (Acres)	Productivity (kg/acre)	Crop yield (Quintals)
Paddy	1,04,23,177	2,096	21,85,14,710
Maize	6,39,816	2,744	1,75,53,700
Redgram	10,59,004	314	33,21,790
Cotton	58,27,842	169	5,79,90,520

(source: Statistical Abstract of Telangana, 2020-2021.)

Table 2: Crop residue generation.

Crop	Crop yield (quintals)	RPR	Residue generation in quintals
Paddy	21,85,14,710	0.7	15,29,60,297
Maize	1,75,53,700	0.6	1,05,32,220
Red gram	33,21,790	2	66,43,580
Cotton	5,79,90,520	1.8	10,43,82,936

Results and Discussion

Above analysis shows the crop residue generated from the selected crops in the year 2021 in Telangana state. Residue generation varies with variety but with very insignificant difference which is ignored in the above analysis. Among the selected major crops in Telangana paddy generating the highest amount of crop residue which is very important to manage it without causing any damage to environment. Now a days crop residue management became cumbersome because of the quantity generated. So, burning became the easy method of residue disposal on farm. But this burning of crop residue will generate harmful gases into the environment and also damage the soil fertility. Crop residues are of great economic value as livestock feed, fuel and industrial raw material. However, management challenges of the crop residues are varied across the region and its socio-economic needs.

Conclusion

Crop residue utilisation is very important, since the burning of crop residue generate harmful chemicals and also leads to loss of nutrients from the residue which can be added back to soil through in-situ incorporation. The sustainable management of agricultural waste has become a great challenge, especially for developing countries such as India with an increasing

population, production rates and economic growth. Crop residue management became cumbersome because of high transportation cost and labour requirement for the bulk amount of crop residue generated. Hence, there is a urgent need for the development of environment friendly crop residue management practices with the support of government through new initiatives which can benefit the farmer through the income obtained by proper utilization of generated residues as well as the environment. Proper management of crop residue reduces the environmental damage causing by crop residue burning and also reduces the fertility loss of soil by its potential uses like briquettes, bricks and biofuel etc.

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