

## AN ANALYTICAL STUDY OF VARIOUS ASPECTS OF PADDY STRAW BURNING IN HANUMANGARH DISTRICT

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### ABSTRACT

*Due to the technological upgradation in agriculture in the study area in recent years, the problem of burning of paddy straw has become very complicated here. Under the year 2020-21, paddy cultivation was done on about 35000 hectares of land in the study area, due to which about 22 lakh quintals of paddy straw was produced. Most of the farmers burnt this stubble in the fields itself, due to which many harmful gases were emitted in the atmosphere, as well as it also increased the problem of soil degradation. The purpose of this research paper is to study various dimensions of paddy straw burning in the study area Hanumangarh district, such as production of paddy straw, reasons for burning paddy straw and measures taken by the government to prevent farmers from burning paddy straw. Other alternative techniques of straw management have to be studied. This research paper is based on descriptive research method. Secondary data has been used in this research paper, which has been collected from the official website of various government offices, research papers-journals and various newspapers. It is clear from this study that there has been a significant increase in the paddy area in the study area in the past years, as a result of which paddy straw has also increased here. Farmers burn paddy straw in the fields to save their labor and time. It has become clear from the research done in recent years that there are many alternative methods of burning paddy straw, which are environment-friendly, as well as they will provide an alternative source of income to the farmers.*

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**Keywords:** *Paddy Cultivation, Burning of Paddy Straw, Air Pollution, Soil Pollution and Management of Paddy Straw.*

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### Introduction

Technology is developed to save human time and labor. But sometimes, along with the benefits that result from technological development, as a product of technological development, humans also have to face some such disadvantages, which not only limit the quality of human life, but also harm the environment. also causes serious problems. One of these problems is the burning of paddy straw by the farmers. As soon as October-November comes, harvesting of paddy crop starts in the study area. The residue left after harvesting the crop is known as 'Parali'. Most of the farmers burn the stubble. Due to which pollution reaches its peak in the study area as well as in many states of North India. To deal with this, the government has imposed several statutory shutdowns, as well as various measures have been given to the farmers as an alternative to stubble burning. But even after this, farmers consider burning stubble in their fields as credit. Stubble burning is also a threat to the environment. That's why it is absolutely necessary to stop stubble burning in the study area. But before stopping the stubble burning, it is necessary to study the various dimensions of this system so that it cannot be known why the farmers consider stubble burning more creditable even after the availability of various options, as well as the rules

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made by the government. Why stubble burning is not being stopped even after Keeping this objective in view, the researcher has studied various dimensions of paddy straw burning in Hanumangarh district, under which the number of incidents of straw burning in the study area in recent years and their trend, straw Various causes of burning, study of adverse effects on the environment as a result of stubble burning, provisions made by the government to prevent stubble burning by farmers, expected efforts to stop stubble burning and study of alternatives to stubble burning are included.

**Image 1: View of Paddy Straw Burning in the Study Area**



#### **Objectives of Present Study**

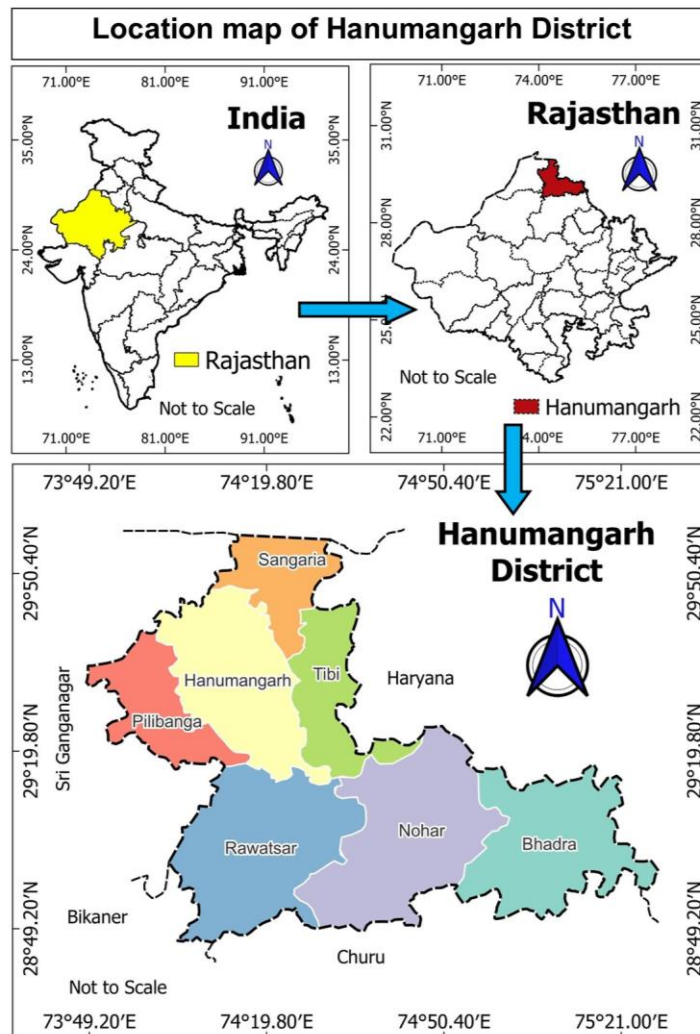
- The main objectives of this research paper are as follows-
- To assess the trend of paddy straw burning in the study area.
- To find out the causes of paddy straw burning in the study area.
- To study the impact of paddy straw burning on human health and environment in the study area.
- Exploring alternative methods for management of paddy straw

#### **Study Area**

Hanumangarh district is the northernmost district of Rajasthan state in India. This Ghagghar district is situated on the banks of the river, which is also recognized as the ancient Saraswati River. The district is located about 400 km from the national capital Delhi and 405 km from the state capital. The geographical coordinates of the district are 29° 5' to 30° 6' north latitude and 74° 3' to 75° 3' east

longitude. The total geographical area of the district is 12,645 km<sup>2</sup> and it has an average elevation of 177 m (580 ft) above sea level. The district is bounded by Punjab State to the north, Haryana State to the north-east, Churu District and Bikaner District to the east and south, and Ganganagar District to the west. According to the 2011 census, the total population of the district is 1,774,692 and the population density is 184 persons/km. Hanumangarh District population in 2023 is 2,466,822 (estimates as per aadhaar uidai.gov.in Dec 2023 data). Hanumangarh district also has an important place in ancient history. The remains found in Kalibanga (Pilibanga) in the year 1951 suggest that this area was part of the Indus Valley Civilization about 5000 years old. Remains of human skeletons, unknown scripts, seals, coins, utensils, ornaments, toys, idols, wells, baths, forts, streets, markets etc. found in excavations tell the story of the well-developed lifestyle of our ancestors.

Map 1



**Research Methodology**

This research paper is based on descriptive research method. In this research work, an analytical description has been presented on the basis of collecting the actual facts regarding the burning of paddy straw by the farmers in Hanumangarh district. This research paper is mainly based on secondary data. The data required for the present research paper has been compiled from various government offices and departmental websites, newspapers and magazines. It is notable that most of the facts used in this research paper are qualitative, after analysis of which conclusions have been obtained.

### Findings and Discussions

After the construction of the Indira Gandhi Canal in the study area Hanuman, there has been extensive development of agriculture. At present, the study area is included in the most agriculturally developed districts in the state of Rajasthan. Among the crops sown here, the main Rabi crops are gram, mustard, wheat, castor and taramira etc., while the main Kharif crops are paddy, cotton, guar, moong, moth, bajra and jowar etc.

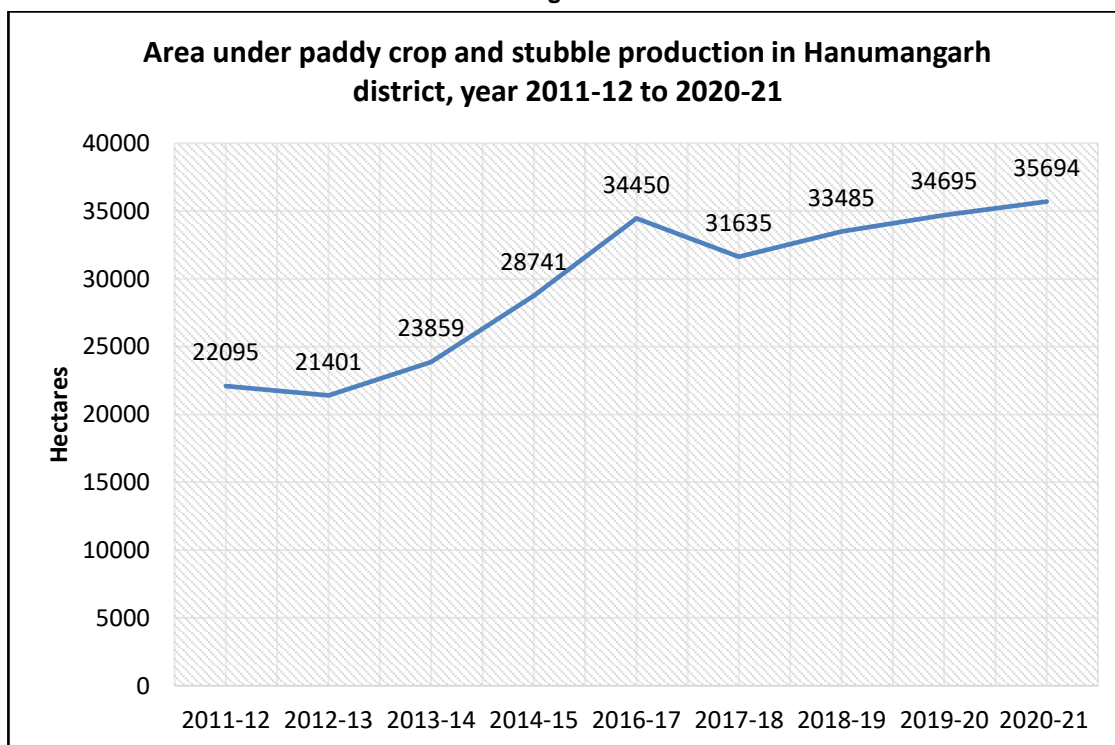
Paddy is sown mainly in Hanumangarh, Tibbi, Pilibanga and Rawatsar tehsil areas of the district. As soon as the rainy season starts in the district, the work of transplanting paddy starts. Parmal and Basmati varieties are the main paddy crops sown here. As soon as the rainy season starts (June 15) in the district, the work of transplanting paddy starts on a war footing. However, in many places, farmers fill the fields with water from tubewells and sow paddy. The average production of Parmal and Basmati paddy is 60 quintals per hectare. Although the yield of Parmal is also 70 to 80 quintals in one hectare. The amount of paddy that is produced in one hectare, the same amount of straw comes out. Farmers sow paddy in 15 villages of Hanumangarh tehsil, 12 in Pilibanga, 20 in Tibbi and 5 in Rawatsar tehsil.

**Table 1: Area Under Paddy Crop and Stubble Production in Hanumangarh District, Year 2011-12 to 2020-21**

Year	Area Under Paddy Crop (In Hectares)	Paddy Straw Production (Lakh Quintals)
2011-12	22095	13699
2012-13	21401	13269
2013-14	23859	14793
2014-15	28741	17819
2016-17	34450	21359
2017-18	31635	19614
2018-19	33485	20761
2019-20	34695	21511
2020-21	35694	22130

Source: Agricultural Statistics at a Glance Year 2010-11 to 2020-21

**Diagram 1**



In Hanumangarh district, the smoke produced by stubble burning has become a major problem of environmental pollution. In the year 2020-21, paddy crop has been sown in about 35000 hectare area in the district. About 22 lakh quintals of stubble was produced from this and most of the farmers disposed of that stubble by burning it. It is noteworthy that Parali is called the remaining part after harvesting the paddy crop. Earlier farmers used to harvest their crops themselves, then only a small part of the crop was left in the fields, which did not need to be burnt, but for the last few years, harvesting of paddy crop is done with harvester machines. This machine cuts only the upper part of the crop, the rest part remains in the ground, which saves a lot. Farmers have less time to sow other crops, so they burn this stubble instead of cutting it. Every year the stubble is burnt in the months of October and November, so that the rabi crop can be sown on time.

#### **Impact of Stubble Burning on Human Health**

Stubble burning not only affects human health negatively, but it also adversely affects the environment, because burning of stubble emits many harmful toxic gases like carbon dioxide and carbon monoxide etc. in the air. When a healthy person is exposed to these gases, it not only exposes the population to Asthma, Chronic Obstructive Pulmonary Disease (COPD), Bronchitis, Reduced Lung Capacity, Emphysema, Cancer, Eye Irritation and Skin Infections problems like this have to be faced. Similarly, the harmful effects of these gases are seen in more severe form in children, elderly, women and sick people.

#### **Impact of Stubble Burning on Soil Fertility**

On the other hand, according to scientists, the ash of straw has a bad effect on the Rhizobia bacteria found in the soil of the field. It is through these bacteria that nitrogen reaches the ground, which increases the yield potential. The damage done to the soil due to stubble burning reduces the yield of crops. By burning 10 quintals of paddy straw, 5.5 kg Nitrogen, 2.3 kg Phosphorus, 25 kg Potash, 1.2 kg Sulfur major nutrients and 400 kg Organic Carbon and Micronutrients are also destroyed.

#### **Impact of Stubble Burning on Air Quality**

Stubble burning has been counted among the major contributors to air pollution in the study area. It is an important source of gaseous pollutants such as carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), and methane (CH<sub>4</sub>) as well as particulate matter (PM 10 and PM 2.5). It was reported that the burning of 63 Mt of crop stubble releases 3.4 Mt of CO, 0.1 Mt of NO<sub>x</sub>, 91 Mt of CO<sub>2</sub>, 0.6 Mt of CH<sub>4</sub> and 1.2 Mt of PM into the atmosphere. Destructive smog observed in India during winter season has been linked to stubble burning as it coincides with the burning period (October–November). During this time, most Indian cities, especially those within the National Capital Region (NCR), experience harsh pollution that often reaches severe levels of the Air Quality Index (AQI). In November 2019, Delhi recorded a peak AQI of 487, Ghaziabad reported an AQI as high as 493, and Greater Noida recorded 480.

#### **Provisions made by the Government to Prevent Burning of Paddy Straw in the Fields**

In India, burning stubble in the field is considered illegal under section 188 of the Indian Penal Code (IPC 188). Under this section, if found guilty, there can be imprisonment of 6 months or a fine of 15 thousand rupees. Environment Department of the State Government and the National Green Tribunal Board, for burning crop residues up to two acres, Rs 5,000 for 2 to 5 acres and Rs 15,000 for burning crop residues above 5 acres as environmental compensation. Provision has been made for installation. But even after this, farmers in the study area consider stubble burning in the fields as creditable. In December 2020, the Hanumangarh district administration imposed a fine of one lakh rupees on 9 farmers here for burning stubble in the fields. Similarly, in the year 2021 also, Hanumangarh district administration identified 50 farmers who burn stubble in their fields.

#### **Management Practices of Paddy Straw**

There are many options available for the management of paddy straw. Wheat can be easily sown with a zero tillage machine by chopping the paddy straw into pieces and plowing it with a rotavator with the chopper machine available in the market. In case of sowing with Happy Seeder machine, there is no need for plowing with rotavator. Similarly, square bales of straw are made by the baler machine. These bales can be used in card board making factories, packing factories, as animal feed and in power generating units. As a third option for the management of stubble, by mixing 4 cow dung in 12 quintals of paddy straw through the biogas plant, about 4 to 5 cubic meters of gas can be generated per day from the dung gas plant, which is sufficient for domestic purposes for three months. can be used. The straw of paddy crop can be melted by pouring water into the pits, so that Compost manure can be made, which can be used as manure in the fields.

## Conclusion

Paddy is cultivated on about 35000 hectares of land in the study area. The way the support price of paddy crops has increased in the study area in recent years, further increase in area under paddy cultivation is expected in future. In the study area, the currently prevalent process of disposal of straw generated from paddy crops is seen as a serious problem. Most of the farmers burn the paddy straw in the field itself, which has a serious impact on human health and the environment. Burning of paddy straw emits toxic gases like carbon monoxide and carbon dioxide in the atmosphere, as a result of which these gases not only increase the greenhouse effect, but humans also suffer from many serious diseases. Along with this, burning of paddy straw also reduces the fertility of the land. The government and the National Green Tribunal have declared the burning of paddy straw as illegal and have also imposed imprisonment and fine for doing so, but even after this, burning of paddy straw is practiced in the study area. In fact, there are many options for the management of paddy straw, but due to lack of awareness, farmers prefer burning of straw in the fields instead of adopting these options. That's why it is expected by the government to make the farmers aware for better management of paddy straw.

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