



## Bio-Decomposer to Address Stubble Burning

**For Prelims:** [Bio-Decomposer](#) to Address Stubble Burning, [Stubble Burning](#), Air Pollution, [Southwest Monsoon](#), [Indian Council of Agricultural Research \(ICAR\)](#), Commission for Air Quality Management (CAQM).

**For Mains:** Bio-Decomposer to Address Stubble Burning, e-technology in the aid of farmers, Conservation, Environmental Pollution and Degradation.

[Source: IE](#)

### Why in News?

Recently, the Delhi Government has initiated the spraying of a [Bio-Decomposer](#) to tackle [Stubble Burning](#). However, the effectiveness of the microbial solution largely depends on its timing of application, according to farmers.

- Stubble burning in Delhi is not a **major contributor to its pollution levels**, with a minimal number of instances reported in recent years.

### What is the Issue of Stubble Burning?

#### ▪ About:

- **Stubble (parali)** burning is a method of **removing paddy crop residues** from the field to sow wheat from the **last week of September to November**, coinciding with the withdrawal of [Southwest Monsoon](#).
- Stubble burning is a **process of setting on fire the straw stubble**, left after the harvesting of grains, like paddy, wheat, etc. It is usually required in areas that use the combined harvesting method which leaves crop residue behind.
- It is a common **practice in October and November across North West India**, but primarily in Punjab, Haryana, and Uttar Pradesh.

#### ▪ Effects of Stubble Burning:

- **Pollution:** Emits large amounts of toxic pollutants in the atmosphere which contain harmful gases like **methane (CH<sub>4</sub>)**, **Carbon Monoxide (CO)**, **Volatile Organic compounds (VOC)** and carcinogenic polycyclic aromatic hydrocarbons.
  - These pollutants disperse in the surroundings, may undergo a physical and chemical transformation and eventually adversely affect human health by causing a thick blanket of smog.
- **Soil Fertility:** Burning husk on the ground destroys the nutrients in the soil, making it less fertile.
- **Heat Penetration:** The heat generated by stubble burning penetrates into the soil, leading to the loss of moisture and useful microbes.

#### ▪ Alternatives to Stubble Burning:

- **In-Situ Treatment of Stubble:** For example, crop residue management by zero-tiller machine and Use of bio-decomposers.

- **Ex-Situ (off-site) Treatment:** For example, Use of rice straw as cattle fodder.
- **Use of Technology:** For example Turbo Happy Seeder (THS) machine, which can uproot the stubble and also sow seeds in the area cleared. The stubble can then be used as mulch for the field.

## What is Bio-Decomposer to Tackle Stubble Burning?

### ▪ About:

- Biodecomposer is designed to accelerate the **natural decomposition process of crop residues**.
- It is typically a **concoction of various microorganisms like fungi, bacteria, and enzymes** that work together to **break down the plant material** into organic matter that enriches the soil.
- **Examples:**
  - **Bacteria:** Bacillus, Clostridium, E. coli, Salmonella
  - **Fungi:** Mushrooms, Molds, Yeasts
  - **Earthworms**
  - **Insects:** Beetles, Flies, Ants, Maggots
  - **Arthropods:** Millipedes, Woodlice

### ▪ Pusa-Biodecomposer:

- It is a **fungi-based liquid solution** that can soften **hard stubble** to the extent that it can be easily mixed with soil in the field to act as compost.
  - The fungi thrive at 30-32 degree Celsius, which is the temperature prevailing when paddy is harvested and wheat is sown.
- It produces enzymes to digest cellulose, lignin and pectin in paddy straw.
  - It is developed by the [Indian Council of Agricultural Research \(ICAR\)](#) and named after **ICAR's campus at Pusa in Delhi**.
- It rapidly converts crop residues, animal waste, dung and other waste into organic manure.

### ▪ Benefits:

- The decomposer **improves the fertility and productivity** of the soil as the stubble works as manure and compost for the crops and lesser fertiliser consumption is required in the future.
- It is an efficient and **effective, cheaper, doable and practical technique** to stop stubble burning.
- It is an eco-friendly and environmentally useful technology and will contribute to achieving the [Swachh Bharat Mission](#).

### ▪ Efficacy:

- The microbial solution aims to decompose paddy straw left in the field post-harvest. It needs to be sprayed after harvest, ploughed into the soil, and lightly **irrigated for the stubble to decompose over a period of 20-25 days**.
- Farmers have emphasized the importance of aligning the spraying process with the timing of **harvest to maximize the effectiveness of the decomposer**.
- Factors like crop rotation, labor availability, and the type of crop grown **affect the relevance and usability of the decomposer** for farmers.
- The effectiveness of the microbial solution is also **dependent on weather conditions**, with less rain in September and October favoring its application.

## What are the Other Initiatives to Tackle Stubble Burning?

- The State Governments of Punjab, National Capital Region (NCR) States and the Government of National Capital Territory of Delhi (GNCTD) have developed [detailed monitorable action plans](#) based on the framework by the Commission for Air Quality Management (CAQM) to tackle the problem of air pollution.

## Way Forward

- It is important to Encourage farmers to **adopt alternative farming practices** such as zero tillage, direct seeding, and crop diversification. These practices can reduce the generation of crop residue and minimize the need for stubble burning.
- Promote the use of **modern harvesting machinery** like combine harvesters that can cut crops at a lower height, leaving less stubble behind. This can significantly reduce the need for stubble burning.
- Conduct awareness campaigns to educate farmers about the harmful effects of stubble burning and the available alternatives. Engage with farmer groups, agricultural universities, and local communities to disseminate information effectively.

### UPSC Civil Services Examination, Previous Year Question (PYQ)

**Q. Mumbai, Delhi and Kolkata are the three mega cities of the country but the air pollution is much more serious problem in Delhi as compared to the other two. Why is this so? (2015)**

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