



STUBBLE BURNING - GS III MAINS

Q. Stubble burning in India is becoming a persistent problem in Indian farming and environmental conditions. Bring out the measures need to taken to eliminate its impacts in India (15 marks, 250 words)

News: *How to solve the problem of stubble burning*

What's in the news?

- Till a few decades ago, crop residue, including stubble, was used as dry fodder for livestock or as fuel for the kitchen or incorporated in-situ in soil.
- But now, stubble burning has become a problem and disaster for entire Northern India especially to the children of Delhi.

Key takeaways:

- Providing market avenues for crop residue and legal backing against polluting practices could end farm fires.

Stubble Burning:

- Stubble burning is a practice of removing agricultural waste from the field by setting on fire the straw stubble (parali) that is left on the land after harvesting of grains like paddy, wheat etc.
- Paddy stubble burning is practised mainly in the Indo-Gangetic plains of Punjab, Haryana, and Uttar Pradesh to clear the fields for rabi crop sowing.
 - The paddy crop is harvested between the first and last weeks of October and wheat is sown from the first week of November until the middle of December.

Reasons for Stubble Burning in India:



Concerns of Stubble Burning:

1. Air Pollution:

- Each year, air pollution levels rise due to stubble burning and the Air Quality Index (AQI) reaches a 'severe' and 'hazardous' level.

2. Heat Penetration:

- Stubble burning generates heat that penetrates the soil, causing an increase in soil erosion, loss of useful microbes and moisture, leading to soil degradation and its fertility.

3. Lack of Political Will:

- As farmers are an important political constituency, the state government adopted a soft approach.

4. Lack of Viable Alternatives:

- Although farmer outfits in Punjab are against the burning of stubble, they would continue it without a viable alternative or financial incentive.



5. Harmful Health Impacts:

- Stubble burning emits toxic pollutants in the atmosphere containing harmful gases like Carbon Monoxide (CO), methane (CH₄), carcinogenic polycyclic aromatic hydrocarbons, and volatile organic compounds (VOC).

6. Global Warming:

- Pollution and greenhouse gas emissions (GHG) lead to global warming. These are also responsible for the haze in Delhi and the melting of Himalayan glaciers.

Government Measures:

1. National Policy for Management of Crop Residues:

- Control of burning of crop residue by promotion of in-situ management (incorporation in soil, mulching) of crop residue.

2. Waste to Energy Programme under the Umbrella scheme of the National Bioenergy Programme:

- It supports the setting up of Waste to Energy projects for the generation of biogas, bioCNG, power, and syngas from urban, industrial and agricultural residues.

3. Promotion of Agricultural Mechanization for in-situ Crop Residue Management in Punjab, Haryana, Uttar Pradesh and NCT of Delhi:

- It aims to address air pollution and subsidize machinery required for in-situ crop residue management.

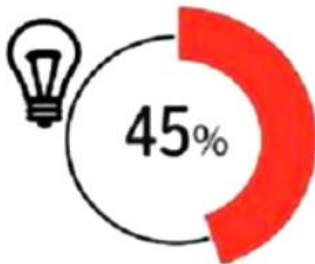
4. Crop Residue Management Guidelines:

- For efficient ex-situ management of paddy straw generated, surplus paddy straw will be collected and biomass collection depots will be built in the States of Punjab, Haryana, Uttar Pradesh and Madhya Pradesh.
- It would generate employment opportunities, reduce air pollution, and would result in new investments in biomass to the biofuel and energy sectors.



EFFICIENT USE OF ENERGY

An IIT-Delhi team is providing technical support to a power plant in Fazilka, Punjab, which uses paddy straw to generate energy



of energy available in biomass is harnessed as thermal energy by this plant; most other processes harness only 15-20% energy



If not burnt, paddy straw in the northern Indian states can be utilised to yield **2.2 million tonnes** of oil equivalent to **25,365 gigaWatt** per year

STEP BY STEP

- Size to paddy straw reduced my mechanical pulverization
- 10 parts straw is then added with 90 parts water
- The material is kept in the plant for 30 days to produce biogas

- **Removal of hydrogen sulfide:** In order to use biogas, in electrical generator it necessary to lower hydrogen sulfide concentration to avoid damage of engine
- Gas is supplied to the engine for power generation

Way Forward:

1. Subsidizing Innovative Farm Technologies:

- Recent innovations like happy seeder, rotavator, baler, paddy straw chopper, etc. are costly but they could help farmers to manage crop residues effectively.

2. New and Improved Seed Varieties:

- Using improved varieties of rice and wheat crops, particularly short-duration crop varieties.
- For example, Pusa Basmati-1509 and PR-126 mature quickly and also improve the quality of the soil.

3. Using Bio-Waste Decomposers:

- These decomposers contain agricultural micro-organisms which increase the Feed Conversion Ratio (FCR).
- For instance, using Pusa-bio-decomposer, developed by the scientists at the Indian Agricultural Research Institute, which turns crop residue into manure in 15-20 days by accelerating the decomposition process.

4. Sustainable Farm Management Practices:

- Such measures include the production of biochar in-situ management with mechanical intensification. These measures could not only manage the crop residues but also help control GHG emissions.



5. Educating and Empowering the Stakeholders:

- It could be an important step to make farmers feel that they are also responsible for the crop residue and empower them to better utilize agricultural waste for financial and environmental gains.

6. Adoption of Best Practices from State Government:

- The Punjab government instructed brick kiln owners to replace at least 20 percent of coal with paddy straw pellets for fuel.
- In Chhattisgarh Gauthans Model, the paddy growers donate the crop residues in thousands of Gauthans (cattle shed premises for conservation and augmenting livestock) where it is used as fodder.

7. Power Generation:

- State governments should incentivize the establishment of biomass-based power plants through fiscal interventions and prioritization, such as biomass co-firing.

8. Research and Development:

- Institutions like Punjab Agricultural University are developing a variant of paddy straw with lower silica content, making it suitable for use in biomass-based power plants.

9. Biofuel Production:

- State governments, with appropriate policy interventions from the Central government, need to incentivize the utilization of biofuels.

10. Industrial Application:

- Biomass pellets can be commercially sold as the main fuel for industrial boilers to replace coal. Incentives should be provided for micro-pelletization and its local usage should be promoted.