Addressing India’s Stubble Burning Issue

For Prelims: **Stubble Burning**, **Minimum Support Price (MSP)**, **Temperature inversion** Mechanised Harvesting, Carbon Monoxide (CO), Smog, Delhi’s Air Pollution, Climate change, Kharif Crop, Rabi Crop.

For Mains: Reasons for Stubble Burning in India, Issues Associated with Stubble Burning in India, Recycling and Reusing Stubble, Way Forward

Source: TH

Why in News?

A 2025 study by IIM Amritsar finds that **stubble burning** in Punjab is driven by **structural market** distortions and **policy incentives** particularly **Minimum Support Price (MSP)**, reflecting how **state-led interventions** can unintentionally reinforce **unsustainable agricultural practices.**

What is Stubble Burning?

Click Here to Read: Stubble Burning

What are the Key Reasons for Persistence of Stubble Burning in India?

- **Policy-Induced Mono-Cropping Patterns:** The **MSP** system prioritizes the production of wheat and rice, providing farmers with **guaranteed income and reducing price risks**, especially in states like **Punjab, Haryana, and Uttar Pradesh.**
    - This **discourages crop diversification** and leads to the **accumulation of paddy stubble,** which farmers often **burn to clear fields quickly** for the next sowing season.
- **Market Distortions and Price Pressures**: The agricultural marketing system in India is distorted, with f**armers being reliant on middlemen (arhtias) who control crop prices,** credit access, and market linkages.
    - Farmers sell their produce at artificially low prices set by these middlemen, often leading to **debt bondage**.
        - A RBI survey (May-July 2024) found that farmers received only **40-67%** of consumer prices for major rabi crops.
    - The **stagnant MSP rates fail to cover rising cultivation costs,** pushing farmers to **adopt cost-effective, albeit harmful, practices like stubble burning.**
- **Deficit of Viable Alternatives**: While the **state penalizes stubble burning,** it **fails to provide affordable and sustainable alternatives** to manage crop residue.
    - The **lack of adequate government support and infrastructure** forces farmers to rely on stubble burning as a **quick and inexpensive solution.**
- **Climate Stress and Yield Volatility: Unpredictable monsoons and rising temperatures** due to climate change have increased farming uncertainty.

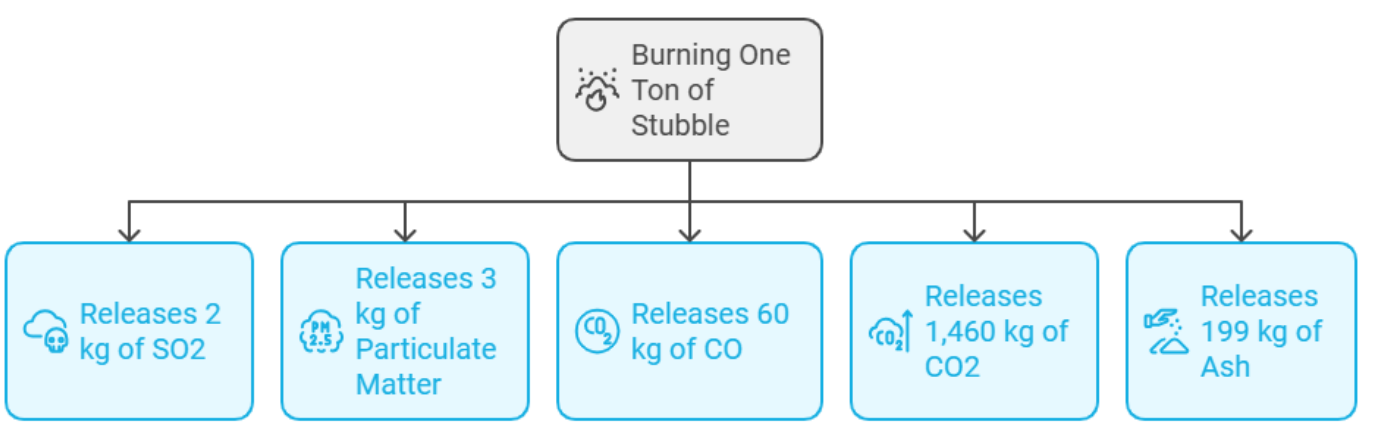
    - **For instance, late rains in October 2023 delayed harvesting**, pushing farmers to resort to stubble burning for quick field clearance amidst overlapping sowing schedules.
- **Ineffective Implementation of Bio-Decomposers:** Bio-decomposers like the **Pusa Decomposer face low field usage due to logistical delay**s, inconsistent results, and lack of follow-up.
    - Without proper training and timely distribution, these eco-friendly solutions remain ineffective at scale.

What is the Impact of Stubble Burning in India?

Click Here to Read: Issues Associated with Stubble Burning

Note:

- **Stubble Burning and Pollution in North India:** Farmers in Punjab, Haryana, and nearby states **burn paddy stubble** in Oct-Nov to clear fields for Rabi crops.
    - A 2023 study by IITs and TERI found it contributed **22–35% to air pollution** during the season.
    - Winds from these regions **raise PM2.5 levels in Delhi NCR,** with each fire linked to a 112.44-unit rise in PM2.5.



Click Here to Read More: Causes of Air Pollution in Northern India

Technological Measures to Tackle Stubble Burning

- **Happy Seeder**: A **tractor-mounted device that sows wheat directly into paddy fields while cutting and lifting straw,** eliminating the need for burning. It saves time, reduces costs, and improves soil health.
- **Pusa Decomposer**: A microbial formulation that decomposes paddy stubble into compost, e**nhancing soil fertility and reducing the need for stubble burning.**
- **Pelletization of Crop Residue**: Crop residues are converted into biomass pellets used for energy generation, reducing stubble burning and generating additional income for farmers.
- **Biochar Production**: **Crop residues are converted into biochar through pyrolysis**, which enhances soil fertility, water retention, and microbial activity, while contributing to carbon sequestration.

How Can India Address the Issue of Stubble Burning?

- **Promote Sustainable Crop Diversification**: Farmers must be encouraged to **shift from paddy to low-residue, water-efficient crops** like millets, maize, or pulses.
    - **Guaranteed MSP, assured procurement, and private sector involvement** are also essential for l**ong-term economic security** and also helping in conserving groundwater.
- **Market & Value Chain for Stubble Products:** There is a need for creating a **market for stubble-based products** like **fodder, pellets, and packaging materials**.
    - **Strengthening the value chain** through **improved infrastructure for collection**, **processing, and distribution** is essential.
    - Link **stubble value chains with MGNREGA** and **promote FPOs for aggregation** and market access, enhancing rural livelihoods.
- **Enhanced Regulatory Interventions**: Regulatory interventions to manage stubble burning can be categorized into three levels:
    - Strict enforcement of laws with penalties for non-compliance.
    - Issuing permits under specific conditions where stubble burning is necessary or unavoidable.
    - Encouraging productive use of stubble by providing incentives like **subsidies, tax breaks, or direct payments for stubble-based products.**
- **Fair Pricing for Farmers**: Fair pricing for farmers should be ensured by **improving price transparency, breaking middlemen control,** and **enhancing direct market linkages.**
    - This would ensure farmers receive better income, reducing the reliance on harmful practices like stubble burning.
- **Promote Biofuels, Fertilizers Production: Incentivize biofuels and bio-based fertilizers** from crop residues by supporting small-scale units, commercializing the supply chain, and p**romoting industrial-scale demand** in bio-CNG, ethanol, and packaging industries.
    - The **Chhattisgarh Gauthans Model** is a community-led initiative where villages set up five-acre plots to collect stubble through **parali daan** and convert it into **organic fertilizer using cow dung and natural enzymes.**
- **Strengthen Custom Hiring Centres (CHCs) and Mechanization Access**: Establish **well-equipped CHCs** at the village level with **booking apps and GPS-enabled fleet trackin**g.
    - **Subsidize rental costs and synchronize them with harvest schedules**, providing **demand-driven mechanization** for small and marginal farmers who cannot afford their own equipment.
- **Establish Joint Task Forces**: Create **joint task forces** involving **agriculture, environment, health, and rural development ministries** across states like Punjab, Haryana, UP, and Delhi.
    - These task forces should ensure **coordinated efforts, with shared accountability,** to address pollution and **align central pollution plan**s with local realities.

Conclusion

Addressing **stubble burning in India necessitates promoting alternative solutions** like subsidizing agricultural implements, developing biomass power plants, and incentivizing biofuels and fertilizers from crop residues. **Strengthening research, improving residue collection infrastructure, and fostering farmer awareness** are key.

Drishti Mains Question:

What are the negative impacts of stubble burning in India and propose innovative solutions to address this issue.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Consider the following agricultural practices: (2012)

1. Contour bunding
2. Relay cropping
3. Zero tillage

In the context of global climate change, which of the above helps/help in carbon sequestration/storage in the soil?

(a) 1 and 2 only
(b) 3 only
(c) 1, 2 and 3
(d) None of them

Ans: (b)

Mains

Q. What are the major factors responsible for making the rice-wheat system a success? In spite of this success, how has this system become bane in India? (2020)