Alternative to Crop Stubble Burning

This article is based on the article **From Waste To Wealth: An alternative to Punjab's crop stubble burning** which was published in The Hindu BusinessLine on 09/09/2021. It talks about the issues of stubble burning and the alternative ways to deal with it.

In the monsoon months, paddy cultivation is in full swing in the Indo-Gangetic plains, which cover the Indian States of Punjab, Haryana, and Uttar Pradesh. The same farmers who are toiling hard to bring food to our plates will soon engage in the highly unhealthy practice of stubble burning, a common sight in Indian paddy waste management.

Though cheaper and faster in the interim, stubble burning is incredibly unsustainable for the environment – it fills the air with soot, dispels nutrients out of the soil, and leads to several other ecological complications.

In this context, it is of utmost importance to find out the alternate solution to deal with the issue of stubble warming.

Hazards of stubble burning

- **Contribution to Atmospheric Pollution:** Stubble burning is a significant contributor to atmospheric pollution, coming in 3rd after industrial and vehicular emissions.
    - In Asian countries such as China, around 60% of total biomass emissions come from stubble burning. At the same time, globally, it constitutes about one-fourth of the total biomass burning (inclusive of forest fires).
    - The awful haze surrounding India's **national capital region (NCR)** has been directly linked to stubble burning, coinciding with burning periods in October-November.
- **Human Health Impacts:** Several health effects have been noticed that arise from the resultant air pollution, ranging from skin and eyes irritation to severe neurological, cardiovascular, and respiratory diseases.
    - Prolonged exposure to high pollution also leads to an increase in mortality rates – as per research, the life expectancy of Delhi inhabitants has decreased by about 6.4 years due to their exposure to high levels of pollution.
- **Detrimental to the Soil's Health:** It strips soil of its essential nutrients such as nitrogen, phosphorus, and potassium **(NPK)**.
    - It raises soil temperature to about 42°C, thus displacing or killing important microorganisms up to a depth of about 2.5 cm.
    - It hampers agriculture productivity because pollutants in the atmosphere lead to acid rain and prolonged exposure to particulate pollution favours growths of pests or diseases.
    - The **ground-level ozone** produced by stubble burning affects the plant's metabolism, and penetrates and destroys its leaves, causing severe damage to crops in northern parts of India.

- **Costs to the Economy:** As per reports, tourists' inflow has decreased in Delhi by about 25-30% due to the increase in air pollution.
    - It is estimated that air pollution has a USD 2.9 trillion economic cost, equating to 3.3% of the world's GDP.
    - 14 of the 20 most polluted cities in the world are from India (mostly from Delhi, UP, and other northern States), and the issue costs the country USD 150 billion per year on average.

Challenges in Adoption of Alternative Method

- **Lack of Alternatives:** Despite being aware of the ill effects of stubble burning, it continues to be the modus operandi for farmers regarding post-harvest waste management.Closer-to-ground interaction reveals that the farmers do not have much choice.
- **Lack of Capacity:** Let us take the example of Punjab, where farmers harvest almost 80% of the rice crop using combine harvesters which leave stubble stalks around 15 cm high. For paddy and wheat, the stubble generated is 1.5 times the grain.
    - These are difficult to either remove or incorporate into the soil through manual labour or using farm equipment, both of which are economically not viable for an average farmer.
    - Markets for other methods of paddy residue management are fragmented; for instance, together, the seven biomass power plants in Punjab consume 1 million metric tons of paddy straw annually.
- **Lack of Stubble Management Infrastructure:** As a result of the lack of infrastructure for waste management, farmers set almost 15.4 million metric tons (out of the 19.7 MMT) on fire in open fields (Punjab government 2017).
    - This method is sought after as it is cheaper and faster for the farmer, helping them clear the land in time before the next cropping cycle.

Alternative to Stubble Burning

- **Bio Enzyme-PUSA:** The **Indian Agriculture Research Institute** has devised a radical solution for stubble burning in the form of a bio-enzyme called PUSA.
    - When sprayed, this enzyme decomposes the stubble in 20-25 days, turning it into manure, further improving the soil quality.
    - It leads to an increase in organic carbon and soil health while significantly reducing the fertiliser expense for the next cropping cycle.
    - Being a sustainable agriculture practice, it also cuts back on the emission of greenhouse gases and prevents the release of toxins and soot into the air.
    - When practised over a while, it considerably increases the soil's nutrient health and microbial activity, both of which ensure better yield at reduced input costs for the farmers as well as organic produce for the consumers.
- **Grassroot Participation with Public Private Partnership:** This calls for active public-private partnerships, where resources are moved to the grassroots and solutions are deployed in time to benefit society.
    - Farmers should be onboarded into the scheme developed for them.
- **Technology Enabled Smart Revolution:** Stubble burning is one of the many ramifications of the green revolution. It is time to correct it and give our farmers a new and sustainable impetus: A Smart Revolution!
    - Technology will be the primary enabler here, helping to scale, reach and extend the benefits of a shared economy to the farmers.
    - With **digitisation** and a commitment to enabling sustainable practices and outcomes, we can seed the benefits of sustainable agriculture in farmers' minds.
    - If done well, the soil and air will be healthier, water tables replenished, and farmers will be earning more.

- **In-situ treatment, Ex-situ treatment of stubble and Changing Cropping Pattern:**
    - For in-situ management (eg. crop residue management by zero-tiller machines and use of bio-decomposers) the government is currently giving equipment to farmers to mix the stubble back into the soil, so that they do not have to burn it, but everyone is not getting these machines.
        - The government should ensure their availability to everyone.
    - Similarly, in ex-situ management (eg. use of rice straw as cattle fodder), some companies have started collecting stubble for their use, but we need more action on this front
    - There is also a need to change the cropping pattern as the current pattern (Paddy in drier North west India) is not suitable for the declining water table.
- **Other Alternative Use:** Instead of burning the stubble, it can be used in different ways like **cattle feed, compost manure, roofing in rural areas,** biomass energy, mushroom cultivation, **packing materials,** fuel, paper, **bio-ethanol** and industrial production, etc.

Drishti Mains Question

Though a cheaper and faster way to get rid of stubble waste, stubble burning is incredibly unsustainable for the environment. Discuss.