

Stubble Waste Management

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Introduction:

Air pollution has emerged as a key challenge today and in India's north-west region reaches alarmingly high levels in certain pockets during winter. The start of every winter season in northern India is marked by the unsettling reports of hazardous air pollution levels brought on by the burning of paddy stubble. This is due to the enormous amount of agriculture waste and the extremely short window for disposal.

The state and federal governments created commercial models to discourage stubble burning and support farm waste to energy projects due to the regularity of air pollution caused by stubble burning. Stubble management should therefore be primarily focused on field management, alternate cropping, processing to biofuels, and proper implementation of existing schemes. Nevertheless, despite these interventions, the farmers have less incentive to collect the stubble, and as a result, the stubble burning issue largely remains unsolved.

Reason for Stubble Burning:

- Stubble burning is the act of setting fire to crop residue to remove them from the field to sow the next crop.
- In order to plant next winter crop (Rabi crop), farmers in Northern India have to move in a very short interval and if they are late, due to short winters these days, they might face considerable losses.
- Therefore, burning is the cheapest and fastest way to get rid of the stubble.
- Further, if stubble is left in the field, pests like termites may attack the upcoming crop.
- Also, the precarious economic condition of farmers doesn't allow them to use expensive mechanised methods to remove stubble.

Issues in Stubble Waste to Energy:

- Lax Implementation: In 2019, the governments of Punjab and Haryana announced Rs 2,500/acre as a bonus to small farmers who avoid burning stubble but there has been the negligible

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implementation of this scheme.

- Adverse Impact of Laws: Implementation of the Punjab Preservation of Subsoil Water Act (2009) made the time period of stubble burning coincident with the onset of winter in Northern India.
- ✓ Late transplanting of paddy during Kharif season to prevent water loss as directed by PPSW Act (2009) had left farmers with little time between harvesting and preparing the field for the next crop and hence farmers are resorting to the burning of stubble.
- Inadequate Supply as Raw Material: The costs of establishing a year-round “bankable” supply chain for paddy straw bales is another deterrent.
- ✓ Albeit with limitations related to off take agreements, the National Policy on Biofuels was not able to achieve intended targets.
- Increasing Competition With Solar & Wind Energy: The government has actively supported the biomass power sector by provisioning for a high feed-in tariff.
- ✓ However, tariff orders for biomass gasifier/biogas power became inconsequential with solar and wind power tariffs declining to 33% of that of biomass power.

Benefits from retaining stubble

Soil properties in Victoria’s crop growing regions have improved due to increased stubble retention. The main impacts are less erosion and moisture conservation.

Lower erosion risk

Stubble provides ground cover, which protects soil from wind and water erosion by slowing wind speed at the soil surface and reducing runoff. To protect soil:

- ❖ Stubble needs to be at least partially anchored
- ❖ At least 70 per cent ground cover minimises water erosion risk and at least 50 per cent ground cover minimises wind erosion risk
- ❖ Stubble height should be at least one-third of the width of crop rows. In general, the shelter provided by a barrier is approximately three times its height; 10 cm tall stubble will protect the adjacent 30 cm of topsoil
- ❖ Maintain sufficient stubble for six to eight weeks after sowing.

Improved water use efficiency and soil health

Retaining crop stubble can improve soil moisture content by reducing evaporation and increasing rainfall infiltration rates. Saving more surface soil moisture after autumn rains helps farmers to sow crops on time. This maximises grain yield potential and water use efficiency.

Other benefits of retaining stubble

- ❖ Promotes nutrient recycling. It can contribute to a very gradual improvement in soil organic carbon and the soils' microbial biomass
- ❖ Significantly lower fuel costs and less labour
- ❖ Lentil crops sown between cereal stubble rows are more easily harvested; plants grow taller and pods are higher

Disadvantages of burning

- ❖ Drier surface soils
- ❖ Increased risk of topsoil loss from erosion
- ❖ Loss of nutrients
- ❖ A faster decline of soil organic carbon and soil microbes and fauna, with repeated burning
- ❖ Poorer soil structure, e.g. Reduced soil aggregate stability and hydraulic conductivity and higher bulk density
- ❖ Risk of escaped fire
- ❖ The potential, or perceived, impact of smoke as an air pollutant and its impacts on rural communities and industries.

from the guaranteed supply of sustainable energy.

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Conclusion

The public's health is at risk from stubble burning. However, the production of compost and biofuels from agricultural waste will help a great deal more farmer households, with several additional advantages resulting