

## Eco-friendly in-situ CRM Practices - Best Solution to Control Paddy Stubble Burning and Air Pollution

**Virender Singh Lather\***

*Former Principal Scientist, Indian Agricultural Research Institute, New Delhi*

**\*Corresponding Author:** Virender Singh Lather, Former Principal Scientist, Indian Agricultural Research Institute, New Delhi.

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The Green Revolution which ensured Indian food security since 1970 onwards, was accomplished by the introduction of dwarf high-yielding varieties of wheat from CIMMYT and rice varieties from IRRI and further genetic improvement of these crop varieties by Indian researchers, coupled with the application of chemical fertilisers and groundwater based tubewell irrigation, particularly in the north western states of Punjab and Haryana etc.

Consequently, the paddy cultivation areas increased over ten times during 1961 to 2021 in Punjab & Haryana. The total paddy areas in Punjab-Haryana has crossed over 5 million hectares with paddy production of over 25 million metric tonnes, including superior quality scented Basmati rice and over 30 million metric tonnes of paddy straws annually.

After the harvesting of the paddy crop in the months of October and November, the farmers got a short window period of about 15-20 days for the field preparation for the sowing of their next crops: wheat, mustard, potatoes and vegetables, etc. This compelled them to adopted open field burning method for disposal of paddy stubbles. This caused serious air pollution in NW-India, including NCR- Delhi which further compounded by onset of another atmospheric phenomenon of flow in of cool breezes from the neighbouring Himalayan region and low air velocity (less than 4 km per hour).

To tackle this environmental emergency, the Union Govt and various state governments, without consideration of the short window period of just 15 days for the management of over 30 million metric tonnes of paddy stubbles, have opted for impracticable ex-situ CRM solution with distribution of heavy machineries to the farmers by spending over 6,000 crore rupees during the last 6 years. However, these government efforts didn't show any significant improvement in the air quality index (AQI) in NW-India.

### ***Defective design of Paddy Combined Harvesters—Main cause for Paddy Straw Burning***

Paddy crops in these states are mainly harvested by the combined harvesters, which are primarily designed for wheat harvesting, which left large amounts of unchopped straws in the fields after the harvesting. The removal of huge paddy straws from the field needs labour and resources that are not readily available to the farmers and also increased the cost of cultivation substantially. This compelled the farmers to adopt environmentally polluting open field burnings practices of paddy straws for the timely preparation of their fields for sowing of the next crop.

The fact of defective designs of Paddy's combined harvesters was already known to the Haryana government, since year-2018, which made the Straw Management System compulsory for every combined harvester. However, this important eco-friendly decision was not implemented properly by the state administration, which becomes the main cause for paddy straw burnings by the farmers.

### ***In-situ Paddy's straw management is a farmer friendly***

Eco-friendly in-situ CRM practices effectively get rid of crop residues by incorporating it into the deep layers of soils (below at 6 inches) by inverted mould board plough (MB plough) or traditional harrowing while keeping the nutrients of the soil intact. Then sowing of the next crop with the application of additional doses of 50 kg of urea per hectare will decompose the paddy straw into the organic

matter within a month without having any adverse effect on the next crop. However, in-situ CRM practices will become feasible only if paddy is harvested by combined harvesters fitted with a straw management system that chops the paddy's straws into small pieces.

Therefore, the government should legally make it mandatory for the owners of paddy's combined harvesters to get their machines fitted with the Straws Management System (SMS). Then, even the small farmers will easily incorporate the paddy stubbles into the soils with their traditional agricultural implements like harrows, etc., for timely sowing of their next crop, which will effectively control the stubble burning and air pollution in this region and increase the soil fertility, water retention capacity and air porosity, etc., a win-win solution for all the stakeholders.

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