



Pusa bio-decomposer: A promising option to stop crop residue burning

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Introduction

Disposal of crop residue is a major concern that Indian farmers are facing today, especially after the harvest of paddy. To catch the next season on time, the land needs to be vacated and prepared in a short period of time for sowing of the subsequent crop. In a short span of time, it seems extremely difficult to clear the bulk crop residues. Some uses of crop residues like as feeding and/or bedding materials for the livestock and poultry, as ingredients in manure preparation, as raw materials in biochar preparation, as substrates for mushroom cultivation, as mulching materials, as roof thatching materials etc. can hold good promise, but these have proved themselves insufficient in complete disposal of crop residues resulting in open incineration of the residues. On-farm crop residue burning is dominant in Punjab, Haryana, Uttar Pradesh, and West Bengal. A consortium of micro-organisms (Pusa-bio-decomposer) is showing a good prospect in this regard to stop the crop residue burning issue.

Crop residues in India

These are the plant parts left after collecting the economic product (grain/seed) of the crop. India is an agriculture dominated country. Annually around 500 Mt of crop residues or straw or stover are produced in India. In terms of crop residue generation, Uttar Pradesh tops the chart (60 Mt), followed by Punjab (51 Mt) and Maharashtra (46 Mt). Cereals (specially, 70% generation from rice, wheat, corn, and millets and 34% from rice alone) generate around 352 Mt crop residues, followed by fibres (66 Mt), oilseeds (29 Mt), pulses (13 Mt) and sugarcane (12 Mt).

Harmful effects of crop residue burning

Open burning of crop residues causes release of harmful gases (GHGs like methane, CO₂, CO, N₂O etc.) leading to air pollution and global warming (**Fig 1**). Delhi air pollution is a prominent result of crop residue burning in Punjab.

1. The smog created due to crop residue burning restricts or blocks the visibility leading to accident, hindrance in traffic movement, navigation, railways.
2. The heat generated during crop residue burning can make the soil beneficial micro-organisms die.
3. It reduces soil biodiversity, fertility, and organic carbon contents.
4. The crop residues are rich source of nutrients. Burning them leads to nutrient losses.
5. The smoke released due to crop residue burning can create serious health issues like blindness, coughing, breathing issues, suffocation, asthma, bronchitis, cancer etc.



Fig 1: Crop residue burning (source: <https://www.teriin.org/article/paddy-residue-burning-drivers-challenges-and-potential-solutions>)

Pusa bio-decomposer

Pusa bio-decomposer is a microbial spray (consortium of 7 different micro-organisms) which helps to decompose the crop residues in short span of time and thereby, clear the land for next crop. It has been developed by researchers of Indian Agricultural Research Institute (IARI), Delhi, India. It is available in the form of capsules (1 packet containing 4 capsules) prepared using fungal strains (Fig 2). The micro-organisms thrive at 30-32 degree Celsius which is prevalent during harvest of paddy.



The fungal activities synthesize essential enzymes responsible for decomposition of crop residues quickly than the normal. The Pusa bio-decomposer solution is prepared by mixing these capsules with water, jaggery and besan (pulse flour) (Fig 3). 4 capsules can be used to prepare 25 litres of solution which is sufficient to cover 1 ha area. Generally, after spray, it requires around 20-25 days for degradation of crop residues completely which is quicker than the normal. Recently, Delhi Government has taken the initiative to use it and also suggested other states to adopt it.

Advantages of Pusa bio-decomposer

1. It takes comparatively less time to degrade the crop residues than usual rate and vacate the land for next crop cultivation.
2. It reduces cost of cultivation as need of using fertilizers is less.
3. It can check open incineration of crop residues resulting in curbing the negative impacts of burning on health, soil, air and overall, environment.
4. As the crop residues get decomposed, they release nutrients and improve soil fertility and productivity resulting in high nutrient availability and uptake for plant's growth and development.
5. It helps in improvement of soil physical, chemical, and biological properties for sustainable crop production.
6. It is an eco-friendly and cost-effective way to check crop residue burning. 1 packet of Pusa bio-decomposer capsules costs only INR. 20.
7. It cleans the environment by reducing the bulk of crop residues and helps in Swachh Bharat Abhiyan of Govt. of India.
8. Pusa bio-decomposer can be used for preparation of nutrient enriched compost quickly in pit or windrow methods.



Fig 2: Pusa bio-decomposer capsules

(Source: <https://www.sanskritis.com/current-affairs/pusa-decomposer-a-solution-for-stubble-burning>)



Making process of Pusa bio-decomposer solution

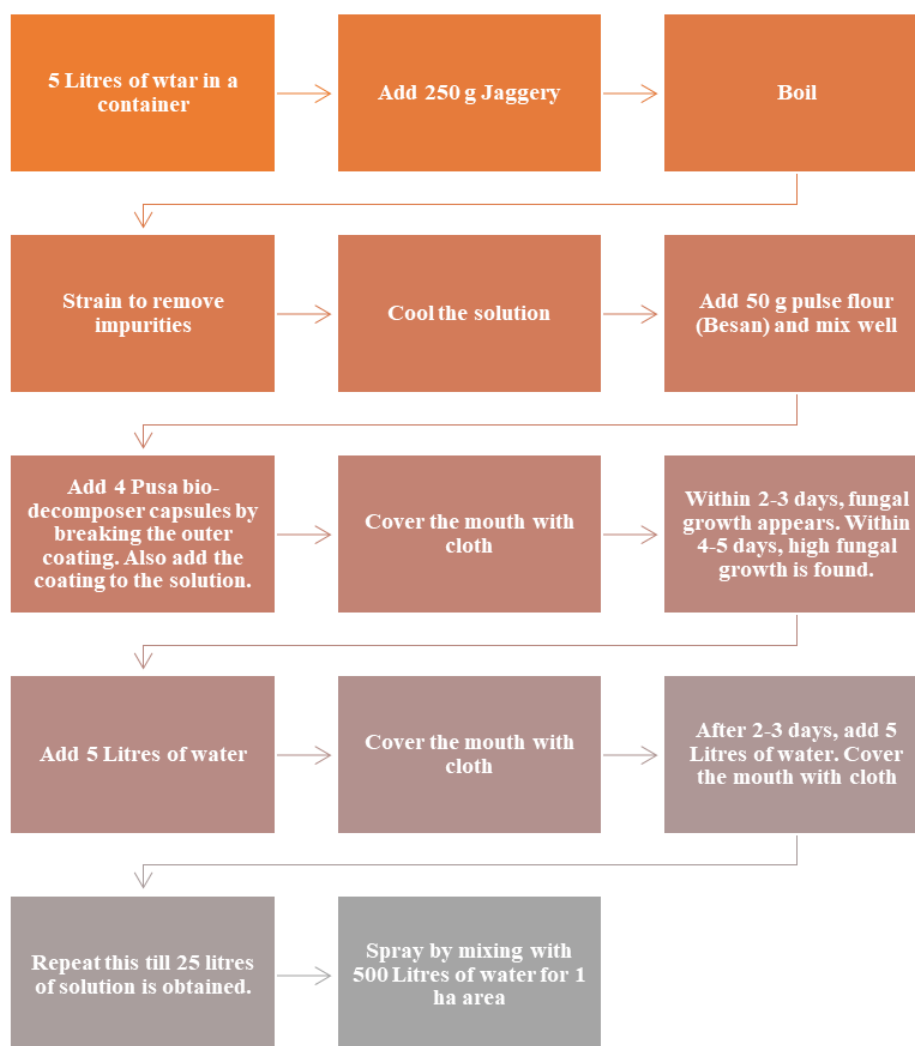


Fig 3: Preparation process of Pusa bio-decomposer solution

Conclusion

Although this microbial consortium has showed promising result in many farmers' field, many farmers have pointed out that it is not the quicker to clear land in comparison with crop residue burning. Adequate awareness regarding the product and its use is very less resulting in continuation of crop residue burning. Further, it requires multilocational trials to prove its efficacy. Government and private organisations should come forward to popularize this product and make it available to the farmers. Extension service should be strong enough to help this technology reach the farmers for the sake of environment safety.