

Recycling of Rice Residues Using Mechanical cum Microbial Interventions for Its Sustainable In-situ and Ex-situ Management



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ICAR-Indian Agricultural Research Institute, New Delhi has developed various mechanical cum microbial interventions for rice residue management. Mechanical interventions such as windrow composting using compost turner cum mixer, paddy straw collector cum chopper, sensor based microbial inoculum spraying system and integrated seeder cum microbial inoculum applicator were developed for rapid and efficient decomposition of rice residues using fungal microbial consortium. It was found that spraying of microbial inoculum showed significant variations in after 20 days of decomposition of rice residue for selected spray parameters. The rapid residue decomposition were observed by maintaining VMD of 347 to 243 μ m, NMD of 87.08 to 75.41 μ m and droplet density of 250.2 to 403.9 droplets/cm². A systematic protocol for rapid decomposition developed using compost turner cum mixer through windrow composting. Three number of turning at interval of minimum 15 days were required for enhanced decomposition were optimized. A paddy straw collector-cum chopper was designed for in-situ straw management. Straw load ranging between 5-10 T/ha was suitable for collection of more than 90% of straw with chopping efficiency of 60 % to maintain straw size < 5 cm in order to enhance in-situ decomposition. An integrated seeder cum microbial inoculum applicator was developed for in-situ residue management. The machine carries different operations like cutting, roto-tilling, inoculum application and seeding in one go. These integrated mechanical cum microbial interventions are not only recycle agricultural residues like rice but provided economical and eco-friendly solution for sustainable agricultural waste management.

Biography:

13 years' experience in research, teaching and extension activities in the field of Agricultural Engineering and associated with different research projects for design and development of different agricultural machines required for Compost mechanization, Vegetable mechanization like Multi crop small vegetable seed planter, Carrot harvesting machines also machineries for animal feed block making, machineries for dry-land agricultural like customization of Aqua Ferti Seed Drill, Resource conservation technologies like Planter for direct seeded Rice (DSR), machineries for in-situ paddy straw management etc. and Urea Ammonium Nitrate Applicator and powered integral equipment for small farm mechanization for which patent has been granted.