

Management of rice straw by using Trichoderma for plant growth promotion and stress tolerance

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Abstract:

India produces 98 million tons of paddy with roughly 250 million tons of straw as crop residue. The rice straw is mainly used for thatching of clay houses in rural areas and as a fodder for domestic animals, which is very less in compare to production. The rest is mostly burned in the fields, though a small amount is also consumed by brick kilns, paper and packaging industry. In the present scenario huge production of rice straw becomes menace, because its disposal is time consuming, constitutes an extra cost and lower use of clay house. Currently, rice straw has no commercial value. Ploughing it into soils is time and energy consuming, and the residues take a long time to decompose. So, without effective use, farmers burnt the rice straw which is obviously not by choice but by compulsion. The reason is the lack of a market for the resource. In every year during winter the educational institutes closed for entire one-two weeks in Delhi due to huge burning of straw in Punjab, Haryana and surrounding areas. These open burning of straw in the field not only cause environment pollution but we lose a very viable amount of nutrients present in the straw.

Paddy straw which contains good quality of Carbon and Nitrogen can be used as biofertilizer if effectively decomposed by microorganism. Trichoderma species are well known for their ability to deconstruct lignocellulosic biomass. In the present investigation we have evaluated the decomposing capacity of Trichoderma isolates in in-vitro conditions according to the expression of various straw degrading enzymes like laccase, cellulase, endoglucanase, xylanase both qualitatively and quantitatively. Besides these we have tried to fill the gap between decomposed rice straw and its use as a biofertilizer for rice health management. For this we validated the decomposed rice straw not only for biofertilizer but also for management of soilborne and seed borne rice pathogens. This work is a new innovative idea which managed the decomposition of paddy straw in one hand and management of rice diseases on other hand by using novel Trichoderma strains isolated from above ground part. However, for the benefit of farmers it must be tested in larger scale under in-vivo condition.

Key words: Rice straw; Trichoderma; decomposition; biofertilizer; rice health management.