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Agrotechnol 2018, Volume 7
DOI: 10.4172/2168-9881-C1-031

Sustainable land resource management for agriculture in Indian dry tropics by regulating decomposition of organic material

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Imbalanced nutrient management and decreased soil organic matter are the main factors responsible for yield decline. Leaves of multipurpose trees constitute valuable resources which are potential source of green manure. The decomposition rate of green manure is related to its quality, often expressed with an index, such as the C/N ratio, lignin/N ratio and lignin+polyphenol/N ratio. Present experiment was designed with leaves from three tree species *Dalbergia sissoo, Cassia fistula, Azadirachta indica* either alone or in combination with wheat straw. High N containing tree leaf materials resulted in increased N- mineralization or available-N, but this effect was lowered in presence of high concentration of polyphenols and lignin in the decomposing material. Among tree leaf treatments, maximum value of RE (87%) and AE (15 kg grain kg N applied-1) was observed in Dalbergia sissoo and lower value in *Azadirachta indica* tree leaf treatment. In case of Physiological Efficiency (PE) reverse was true. When high quality tree leaves mix with wheat straw, it reduces the RE (11-25%) and AE (5-7 kg grain kg N applied-1) but increase PE. Among tree leaf treatments, in this study, *Dalbergia sissoo* showed higher increase in mean microbial biomass C (2 times) and N (2.5 times) over control. The addition of tree leaf alone increases mean microbial biomass N (32 µg g-1) 129% higher of control; increased was 50% greater in case of tree leaf+wheat straw treatment. Chemical fertilizer increases microbial biomass C and N only by 18% and 14% over control. The N rich species leaf treatment, TNP was 68-161% greater than control whereas in combination treatments, this increase was 23-48%. Among tree leaf treatment, decomposition was very rapid initially in *Dalbergia sissoo* and in other treatments it started little late. Decomposition of materials regulates N-mineralization and N-uptake in different plants. Decomposition of materials depends on its quality like C, N, lignin and polyphenol content. High quality tree leaf was more effective during rice crop period with respect to soil fertility and crop productivity parameter. For assessing the tree leaves effect on soil quality and crop productivity LIG+PPL/N ratio can be used as index for screening of large number of multipurpose tree species and other materials used as soil amendment.

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