

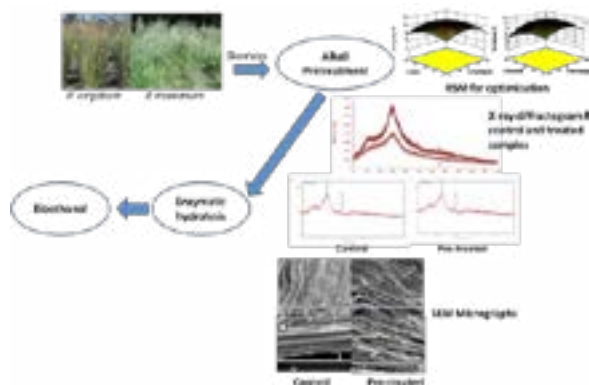
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Bioethanol Production from Perennial Grasses

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In the present demand for renewable and sustainable sources of energy to overcome the burden of world energy crisis, perennial grasses present exciting options. *Panicum virgatum* (Switchgrass) the ligno-cellulosic perennial grass, being considered as a cheaper and efficient feedstock for bioethanol production in Europe and USA, could also be utilized in India for same purpose. The present work focuses on cultivation of *P. virgatum* (very first time in India) and *P. maximum*, for bioethanol production. The seeds of the Switch grass were obtained from Univ. of Bologna, Italy, while of guinea grass from IGFR, Jhansi, UP, India. Both the grasses were cultivated in Micromodel (an experimental field site), IIT Delhi. The harvested grass biomass was analyzed for various parameters including reducing sugars for subsequent bioethanol production. Among different pretreatment methods (Acid pretreatment, Alkali pretreatment and Microwave pretreatment) tested, alkali method showed maximum reducing sugars (280 mg/g for *P. virgatum* and 262 mg/g for *P. maximum*) with 15% reduction in crystallinity of cellulose in *P. virgatum* and 12% in *P. maximum*. It was further optimized with RSM and CCD was applied. Joint effects of four independent variables: NaOH (1-5%), temp. (60-100 °C), substrate loading (1-3%), and reaction time (30-150 min), were investigated to increase in reducing sugar content. The combined optimum conditions for maximum reducing sugar (68.3%) were: 2.5% substrate, 5% NaOH, a reaction time 120 min at 100 °C. The result analyzed (ANOVA) with a second order polynomial equation, showed 62 - 68% significant increase in reducing sugars. The calculated theoretical ethanol production from switch grass was found to be 26.72%, while for *P. maximum* it was 25.24%. This study reveals that under optimized pretreatment conditions, sugar yield is significantly increased and promises the use of both *P. virgatum* and *P. maximum* grasses as feedstock for bioethanol production in India also. All the findings pertaining to all steps in cultivation, characterization, pretreatment and hydrolysis methods and bioethanol from these grasses will be presented at conference.



Recent Publications

1. Adak, A., Tiwari, R., Singh, S., Sharma, S., & Nain, L. (2016) Laccase Production by a Novel White-Rot Fungus, *Pseudolarobasidium acaciicola* LA 1 Through Solid-State Fermentation of *Parthenium* Biomass and Its Application in Dyes Decolorization. *Waste and Biomass Valorization*, 7, 1427-1435.
2. Arora, K., Sharma, S., & Monti, A. (2016) Bio- remediation of Pb and Cd polluted soils by switchgrass: A case study in India. *International Journal of Phytoremediation*, 7(18), 704-709.
3. Arora, K.; Kumar, A., & Sharma, S. (2012) Energy from Waste: Present Scenario, Challenges and Future Prospects towards Sustainable Development. IGI Global, 271-296.

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13th Global Summit and Expo on **Biomass and Bioenergy**
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4. Tiwari, G., Shivangi, Sharma, S., & Prasad, R. (2015) Bioethanol production: Future prospects from non-traditional sources in India. *International Journal of Research in Biosciences*, 4, 1-15.
5. Kumar, A., & Sharma, S. (2011) Non-edible oil seeds as biodiesel feedstock for meeting energy demands in India, *Renewable and Sustainable Energy Reviews*, 15, 1791-1800.

Biography

Dr. Satyawati Sharma is Professor at CRDT, IIT Delhi. She did her post graduation from Agra University and Ph.D. from IIT Delhi. She has more than 140 publications in reputed international and national journals. She has executed 15 sponsored projects and filed four formulations (termite and nematode control and rapid composting) for patenting. She has guided 21 Ph.D. students and 12 are pursuing their Ph.D. She has guided 4 PDFs and 3 PDFs are continuing. She is awarded 'Iraj Zandi award' in 2013 in Solid Waste Technology and Management by Widener University, USA and also honored by Royal Society of Chemistry, UK, for 'Energy Crops' book. Recipient of 'Golden Jubilee Award' for excellence in the field of Khadi and Village Industries" to IIT Delhi by KVIC for MGIRI project jointly. Research areas are Biopesticides and Biofertilizer, Waste management, Tissue culture, Wasteland Reclamation, Mushroom technology, Biogas slurry management.

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