Best management and utilization of biomass and wastes

Abstract:

Pakistan is the 14th largest producer of rice. A large amount of the produce is wasted during post harvest handling, processing and storage. Fungal attack during the storage is also a major issue of Pakistani rice industry. We have valorized the wasted rice grains with the help of a newly discovered thermostable pullalanase from *Thermococcus kodakarensis* (TK-PUL). This novel enzyme was found to complete liquefaction and saccharification of corn starch in a single step in the absence of any other enzyme. Moreover, the enzyme did not require any metal ion for its activity and thermal stability. During current studies, we have hydrolyzed waste rice grains (broken, insect infested etc) with TK-PUL. Rice was ground into fine powder, suspended in 50 mM Sodium citrate buffer pH 4.2 at 30 % w/v concentration. Liquefaction and saccharification of rice slurry was carried out with TK-PUL in single step at 90 °C for 48 hrs. HPLC analysis of the hydrolysates revealed that after 48 hours hydrolysis major proportion of the rice starch was converted into fermentable sugars. Hydrolysis was further continued at 60 °C in the presences of amylogucosidase from *Aspergillus niger* without changing pH. In the end (24 hours after addition of amylogucosidase) rice hydrolysates contained more than 96 percent glucose as determined by HPLC analysis. These rice hydrolysates (rice syrups) can serve as raw materials for several industries like food, pharmaceuticals and biotechnology.