Production of cellulases from agriculture wastes by microorganisms using solid-state fermentation

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wenty nine fungal strains were isolated from agriculture wastes Aspergillus spp. were the predominant genera in these agriculture wastes.The most potent cellulase producers were selected for studying their cellulase productivities on Wheat straw (WS), Wheat bran (WB), Rice straw (RS) and Corn cob (CC), as a cheap and renewable agriculture wastes by solid state fermentation (SSF).Five Aspergillus spp. and standard strain Trichoderma viride were grown on the agriculture wastes and CMCase, FPase, Avicelase and soluble protein were determined.T.viride produced the highest CMCase on WS(555 U/ml), while the highest FPase (141 U/ml) and -Avicelase (46 U/ml) were produced on WB.The isolated strain Aspergillus sp. MAM F35 gave the highest CMCase (487 U/ml), FPase (79 U/ml) and Avicelase (35 U/ml) on WS.However, the isolated strain Aspergillus sp. MAM-F23 gave the highest CMCase (309 U/ml) on RS, the highest FPase (83 U/ml) on CC, while the highest Avicelase (45 U/ml) was on WS.The isolated strain Aspergillus niger MAM-F13 gave the highest CMCase (396 U/ml) and Avicelase (41 U/ml) on WS, while the highest FPase (97 U/ml) was on RS.The isolated strain Aspergillus sp. MAM-F40 gave the highest CMCase (485 U/ml), FPase (95 U/ml) and Avicelase (32 U/ml) on WS.The isolated strain Aspergillus niger MAM-F5 gave the highest CMCase (333 U/ml) on WB, while the highest FPase (65 U/ml) and Avicelase (24 U/ml) were produced on WS.So, the highest cellulase produced on the agriculture wastes was according to the following order: WS>WB>RS>CC.The best two isolates of cellulase producer were isolated from agriculture waste and identified as Aspergillus terreus MAM-F23 and Aspergillus flavus MAM-F35.The results under solid state fermentation of wheat straw revealed that, the optimum pH values for the three cellulases (CMCase, FPase and Avicelase) and soluble protein production by T. viride as standard strain, Aspergillus terreusMAM-F23 and Aspergillus flavus MAM-F35 were ranging from 3.5 to 5.0.And the best inoculums size (level) was 0.5ml spore suspension (~ 2x107spores/ml).Tap water was the best moisting agent in producing CMCase, FPase and Avicelase by A. terreus MAM-F23.But phosphate buffer was the best moisting agent for CMCase and Avicelase by T.viride and CMCase and FPase by A. flavus MAM-F35.The trend for cellulases production as the incubation period increased was almost the same in the three tested strains (T. viride, A. terreus and A. flavus).The maximum CMCase had been reached after 6 days incubation period. Also, soluble protein increased as incubation period increased.On the other hand, Avicelase recorded the highest productivity after 12 hours incubation and

decreased gradually as incubation period increased.However, FPase increased as incubation period increased to reach the maximum productivity after 48-60 hours, then decreased.The most potent strains (Aspergillus terreus MAM-F23 and Aspergillus flavus MAM-F35) were exposed to increasing doses of gamma radiation to determine their dose response curve.Gamma radiation reduced the viable count of A. terreus MAM-F23 and A. flavus MAM-F35 gradually, as the dose increased, the viability decreased. Their D10 values were determined to be 0.6 and 0.5 KGy, respectively.Dose 5.0 and 4.0 kGy reduced the viability of A. terreus MAM-F23 and A. flavus MAM-F35 completely.Mutant No.″4″ of Aspergillus terreus MAM-F23 which exposed to 0.5 kGy, produced higher cellulases (CMCase 372 U/ml, FPase 64 U/ml and Avicelase 39 U/ml) than that of the parent strain (CMCase 305 U/ml, FPase 48 U/ml and Avicelase 29 U/ml).However, mutant No. ″1″ of A. flavus MAM-F35, which exposed also to 0.5 kGy gave the highest cellulases than that of the parent strain