



Cairo University

# **Studies on Microbial Degradation of Some Agricultural Wastes**

**Presented by**

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# Approval sheet

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June 2009	BM627	Soil Microbiology	62	1.2	Passed
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## Abstract

**Student Name:** Akram Hassan Mohamed

**Title:** Studies on microbial degradation of some Agricultural wastes

**Degree:** The master of science (Microbiology)

Biodegradation of agricultural wastes by microorganisms is an acceptable method which results in useful end product and reduces environmental pollution. Two agricultural wastes (sugar cane bagasse and rice straw) were subjected to biodegradation. One hundred and forty microbial isolates (fungi, actinomycetes and bacteria) were isolated from different sources, were screened for cellulase production on carboxymethylcellulose (CMC) agar. The most active (67) selected isolates were secondary screened for their ability for production of cellulolytic enzymes using alkali pretreated sugar cane bagasse and rice straw as sole carbon sources. Three enzymatic activities namely, (FPase, CMCase and xylanase) were determined. Microbial isolates exhibited high variation in their cellulolytic activity. Based on the results of secondary screening experiment, the highly active seven microbial strains (3 fungi, 2 actinomycetes and 2 bacteria) were further investigated for their ability to degrade the untreated as well as alkali pretreated sugar cane bagasse and rice straw through solid state fermentation (SSF) experiment. After 15-30 days of fermentation, cellulolytic activity and Physicochemical parameters (EC, pH, weight loss %, N% and C/N ratio) of fermented substrates were evaluated. The 7 microbial strains showed variation in their ability for degradation of agricultural wastes depending on the type of agricultural wastes and the duration of fermentation. F14 (*Aspergillus terreus*) gave the highest FPase activity on both agricultural wastes. While, the highest CMCase activities were obtained by F53 (*penicillium chrysogenum*) to be 4.99 and 5.97 U/g on alkali pretreated sugar cane bagasse and rice straw, respectively. On the other hand, A15 (*streptomyces* sp.) exhibited high xylanase activities by 44.65 and 46.56 U/g on untreated and alkali pretreated sugar cane bagasse, respectively. While, the highest xylanase activity 62.66 U/g was recorded by B8 (*Bacillus subtilis*) on untreated rice straw after 30 days. Regarding to the C/N ratio, which is considered as a determining factor for degradation and maturity of agricultural wastes. The C/N ratio of alkali pretreated sugar cane bagasse, were reduced to 44:1 by F53 (*penicillium chrysogenum*), while the untreated rice straw was reduced to 36:1. On the other hand, C/N ratio of alkali pretreated rice straw reduced to (18:1), (25:1), (26:1) and (22:1) by local strains F14 (*Aspergillus terreus*), F53 (*penicillium chrysogenum*), F61 (*Scopulariopsis halophilica*) and A15 (*streptomyces* sp.) respectively, after 30 days of fermentation.

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