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Heterologous Expression of *Streptomyces* Cellulase Genes for the Molecular Breeding of Antibiotic Producing Streptomycetes from Cellulosic Biomass

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Cellulosic biomass such as wood waste and rice straw remains unexploited despite its high cellulose content. *Streptomyces thermocarboxydus* C42, which grows on cellulosic compounds including microcrystalline cellulose, was isolated from soil for genetic breeding of streptomycetes that produce antibiotics from cellulosic biomass. Draft genome sequencing revealed putative genes encoding nine cellulases and one xyloglucanase dispersed on the chromosome. All these genes were isolated and rearranged on a chromosome-integration vector for streptomycetes pTYM19 to construct cellulase-expression plasmids pBOM51 and pBOM66 for streptomycete host strains. The cellulase gene cluster on pBOM66 was further introduced into pTYM18, another *Streptomyces* integration vector, to yield pBOM67. To investigate cellulase secretion and antibiotic production, the resulting plasmids were introduced into *Streptomyces avermitilis* K139, the producer of avermectin and oligomycin. Remarkable cellulose-degrading activity for filter paper was observed by pBOM66-carrying transformants. Oligomycin alone was produced by the transformed strain with pBOM67 only when cultivated in a medium containing glucose: not in a medium containing microcrystalline cellulose as a carbon source. Using antibiotic-producing streptomycetes for antibiotic production from cellulosic biomass therefore appears to be infeasible, even when transformed with cellulase genes of *Streptomyces* origin.

Keywords : cellulase, streptomycetes, cellulosic biomass