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## Microbial Beta Glucanase from *Streptomyces* sp. – An insight into Western Ghats regions

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$\beta$ - Glucanases or  $\beta$ -D- glucan hydrolases, are group of glycosyl hydrolyses involved in the hydrolysis of the beta linked glucose polymers called  $\beta$ -glucans, a major component of plant and fungal cell walls and also incapable to digest by humans easily. The contrary effect of  $\beta$ - glucans affects the poultry, by increasing the energy metabolism when it is used as a supplemental feed mainly in monogastric animals [1]. Its high molecular weight produces severe problems in brewing industry such as high brewer's mash turbidity and viscosity that troubles filtration, reduces yield and finally forms residues like gels and hazes in beer [2]. These complications can be efficiently unraveled by the practical applications of  $\beta$ - glucan hydrolysing enzymes,  $\beta$ - glucanases, are principally active on insoluble  $\beta$ -

glucan substrates [3]. They are found as two groups such as exo and endo hydrolases. Endo-  $\beta$ - glucanases slice  $\beta$ - glucan chain from its inside portion in an unsystematic manner whereas exo-  $\beta$ - glucanase acts on the non-reducing ends and consequently releasing glucose residues. Based on the nature of the action on glycosidic linkage, they are again categorized as 1,4- $\beta$ - glucanases, 1,3- $\beta$ - glucanases, and 1,6- $\beta$ - glucanases [4]. Synergic action of diverse  $\beta$ - glucanases possibly will necessitate the complete hydrolysis of  $\beta$ - glucan chain. The better understanding of  $\beta$ - glucanases mode of action and synergism also will elucidate their roles in depolymerization of  $\beta$ - glucans along with some metabolic processes.

An extensive range of microbial  $\beta$ -glucanases are dynamic on  $\beta$ - glucan substrates and split the

mixed  $\beta$ -glucan linkages with diverse point of action. Their recognized specificity and different kind of action with widerange of substrate lights up to the knowledge that microbial  $\beta$ - glucanases are dissimilar from cellulases. Enzymes comes under in  $\beta$ - glucanases complexes are endo-1,4- $\beta$ - glucanase (EC 3.2.1.4), endo-1,3- $\beta$ - glucanase (EC 3.2.1.39), endo -1,3(4)- $\beta$ - glucanases or laminarinases (EC 3.2.1.6), endo- $\beta$ -1,3-1,4- glucanases or lichenase (EC 3.2.1.73), endo-1,6- $\beta$ - glucanases (EC 3.2.1.75), exo-1,4- $\beta$ - glucanases (EC 3.2.1.91), exo-1,3- $\beta$ - glucanases (EC 3.2.1.58), and exo-1,6- $\beta$ - glucanases (EC 3.2.1.70). Microbial  $\beta$ - glucanases are highly stable with extensive ecological significance have commercial usage in numerous industrial productions [5]. Its application is well recognized in biotechnological industries for the preparation of beer and wine, degradation of  $\beta$ -glucans in animal feed, fungal protoplast preparation, industrial agricultural wastes saccharification, coffee processing, textile industry and also used as biocontrol agents and antifungal agents.

Non-cellulolytic  $\beta$ - glucanases has been broadly described in diverse microorganisms like fungi, bacteria and archaea having different substrate and product specificities. The enzyme is first reported from bacteria [6]. *Streptomyces* are group of Gram positive bacteria with filamentous in nature, are generally scattered in wide ranges of natural habitats, representing a significant constituent of the soil microbial population [7]. It produces a characteristic earthy

smell due to the production of compound "geosmin". *Streptomyces* are the amazing producers of several natural products like enzymes and antibiotics. Production of  $\beta$ -glucanases from various *Streptomyces* sp. are widely studied and characterized.  $\beta$ -1,3- glucanase from *Streptomyces* sp Mo efficiently produce laminaribiose oligosaccharides from curdlan, a 1,3- $\beta$ -glucan used as a food additive, may have significant roles in food industry [8]. 1,3- $\beta$ -Glucanase from *S. sioyaensis* strain showed antagonistic activities to numerous plant pathogenic fungi [3]. Purified  $\beta$ -1,6- glucanase from *Streptomyces rochei* showed the efficiency in production of yeast protoplasts and is suitable for the study of yeast cell wall proteins [9].

Exploration of novel enzymes from a rare ecological niche is very attractive option may leads the improvement of high throughput screening programs. Western Ghats in India is a forested strip of relatively old mountain ranges beginning from Central Maharashtra and extended upto the Southern tip of Kerala, are exclusive, extremely renowned biodiversity hot spot of rich flora and fauna. These are areas with great endemism in the number of taxa, covering species of closely 2000 higher plants, 87 amphibians, 89 reptiles, 15 birds and 12 mammalian species [10]. Besides vigorous rich biodiversity, the regions are enduring unexplored, undisturbed and are tremendously treasured for screening of exclusive enzymes. Microbial strains from these

natural and well treasured habitats have been commercially exploited for the manufacturing of innumerable bioactive compounds. *Streptomyces* sp. from these habitats are outstandingly screened for  $\beta$ -glucanases activities. When compared with other land areas, *Streptomyces* isolates obtained from Western Ghats region exhibited high exo- $\beta$ -1,4-

glucanases activities [11]. According to Nampoothiri et al., [12] the Western Ghats areas are also called as microbial biodiversity treasure house. Hence the exploration of unexploited treasured Western Ghats areas also provides novel unidentified *Streptomyces* strains with diverse  $\beta$ -Glucanase activity.

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