



Isolation, Identification and Molecular Characterization of Tannase Producing *Klebsiella* sp., from the Rumen of Migratory Goats and Sheep

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ABSTRACT

Tannase, so called Tannin Acyl Hydrolase (TAH) (E.C.3.1.1.20) is one of the versatile biocatalyst with several industrial applications. It is solely responsible for the degradation of hydrolysable tannin thus surpassing the untoward effects of high concentration of tannin consumption in the gut of small ruminants. In the locality of Palampur the migratory goats and sheep have the unique property to resist excess amount of tannin consumed by them. This is because of their ruminal microflora. The concept of ruminal microflora can be used as Direct Fed Microbial (DFM) gaining momentum now-a-days. Thus in the present study attempts were made to explore new source of tannase producing microbes from the rumen of goats and sheep. Rumen samples were collected over several places of Palampur, then processed and finally the most tannin tolerable cultures were selected. Their genomic DNA were isolated and subjected for 16S rRNA sequencing to characterize the isolates. From the molecular characterization we identified *Klebsiella* sp. as a novel source of tannase from the rumen of these migratory animals. This is the first report of a *Klebsiella* sp. from the rumen of migratory small ruminants capable of degrading forage tannin.

Key words: Hydrolysable tannin, tannase enzyme, direct fed microbial, 16S rRNA amplification, molecular characterization

INTRODUCTION

Tannins are the one of the most abundant plant polyphenolics distributed widely among vascular plants as well as in pteridophytes, angiosperms and gymnosperms (Singh *et al.*, 2003; Mueller-Harvey, 2006). Tannins being capable of forming reversible and irreversible complexes with proteins, often limits the use of nutritionally important forage trees, shrubs, legumes etc., as feeds for livestock (Chavez-Gonzalez *et al.*, 2012). Structurally tannins can be grouped as Condensed Tannins (CT) and Hydrolysable Tannins (HT). The HTs are made up of a carbohydrate core whose hydroxyl groups, are esterified with phenolic acids (mainly gallic acid and hexahydroxydiphenic acid). The CTs or proanthocyanidins (PAs) are non-branched polymers of flavonoids units (flavan-3-ol, flavan-3,4-diol) and usually have a higher molecular weight. The