

Oligosaccharides from Agro-Biomass are Potential Prebiotics

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Introduction

Biomass is the organic matter derived from living organisms and bioprocess is a process for production of desirable compounds using whole living cells or their components such as enzymes, chloroplast and microorganisms. Agriculture is done primarily to obtain the primary products and a significant amount of agro-waste is left. Such waste can be effectively used for production of useful compounds for animals and human beings. Lignocellulosic material of agro-waste is explored for the production of energy as biofuels.

Such biomass is recently considered to be useful for the formation of oligosaccharides. Different nature of agro-waste like rice straw, wheat straw, corncob, guar gum can be used for the production of different oligosaccharides. Oligosaccharides are saccharide polymers of size ranging from three to ten units of monosaccharides or simple sugars.

In hemicellulose oligosaccharides, various sugars such as xylose, mannose, arabinose, glucose, fructose are present in various composition and concentrations in different agro-biomass. In the times of health problems, increasing interests are attracting towards the use of oligosaccharides in functional foods. Agro-biomass can be explored as a potential source of oligosaccharides production through

chemical methods and enzymatic hydrolysis method. For safe use of oligosaccharides in functional foods, enzymatic method is preferred as chemical methods produce several other side compounds along with oligosaccharides which may sometimes be toxic for human consumption. Among oligosaccharides, manno-oligosaccharides, xylo-oligosaccharides and arabinooligosaccharides are the major one and useful as prebiotics. Their use facilitates the nutritional utilization by animals. To obtain the oligosaccharides from agro-biomass, hemicellulose part of the cell wall is treated with mannanase, xylanase type of enzymes. The beneficial effects of prebiotics are their non-digestible nature, bacterial growth stimulating response in colon. Bacteria in the colon utilizes oligosaccharides and plays very important role in the regulation of cellular activities. Bifidobacterium is the major genus of bacteria influenced by oligosaccharides.

Oligosaccharides are also involved in the utilization of vitamins by the host. Overall, oligosaccharides improve the immunity of the host animal taking them. Additionally, non-digestible nature of oligosaccharides is very useful property for their use in functional foods or as nutraceutical products. Hence the process of obtaining oligosaccharides from agro-waste or agro-biomass could be a very strong strategy for waste management and environment improvement.