Popular scientific article

Prebiotics, the non-digestible carbohydrate compounds, play an important role to selectively stimulate the growth and activity of health promoting gut microorganisms. Previous research findings have proved that the consumption of prebiotics improves the reduction of blood glucose and cholesterol, enhances mineral absorption from the colon, deactivates pro-carcinogenic enzymes in the gastrointestinal tract as well as their stimulation of the immune system.

By definition, any non-digestible carbohydrates can be considered as prebiotics. Some of the commercially available prebiotics nowadays are inulin, fructooligosaccharide, galactooligosaccharide and guar-gum. Also, products containing xylooligosaccharides (XOS) and arabinoxylooligosaccharides (AXOS) are considered as the potential future prebiotics in the market. This XOS and AXOS are the hydrolysis products of xylan and xylan is the most abundantly available cell wall component of lignocellulosic biomass. Agricultural wastes such as straw, husk, stalk, cob, hull, bagasse and pulp of hard wood have become a major source of xylan. Productions of XOS and AXOS from agricultural residues offer an excellent prospect to the nutraceutical industries owing to the low price and abundant availability of the raw materials.

Brewer's spent grain (BSG) is the production residue from the process of malts (cereal grains) and the separation of wort (fermentation medium to produce beer) during the beer production. BSG is the most abundant by-product generated by brewing industry and accounts for ca. 85% of total by-products. Arabinoxylan, lignin and cellulose are the most abundant compounds in BSG where they weigh roughly 28%, 28% and 17%, respectively. The most common applications of BSG are being used as animal feed and dumping into landfills. This research study was carried out as an attempt to produce AXOS from BSG which is believed to be a source of great potential for making prebiotics. A new technique was developed and presented in this study to extract arabinoxylan from BSG. This technique is compatible to be used in the large scale production of arabinoxylan. Different xylanases were used to hydrolyze the extracted arabinoxylan fractions and to produce short-chain AXOS. Also, *in-vitro* fermentation experiment was carried out to assess the capability of extracted BSG AXOS to be used by health promoting gut bacteria *Lactobacillus*. *In-vitro* fermentation of extracted BSG AXOS fractions using well-known probiotic strain *Lactobacillus* showed the production of short-chain fatty acids.

This study showed that AXOS from BSG have the potential to be utilized by probiotic bacteria and to produce short-chain fatty acids. The technique developed in this study to extract arabinoxylan from BSG can be applied for large scale production of arabinoxylan. Furthermore, the production residues after arabinoxylan extraction can be used as animal feed.