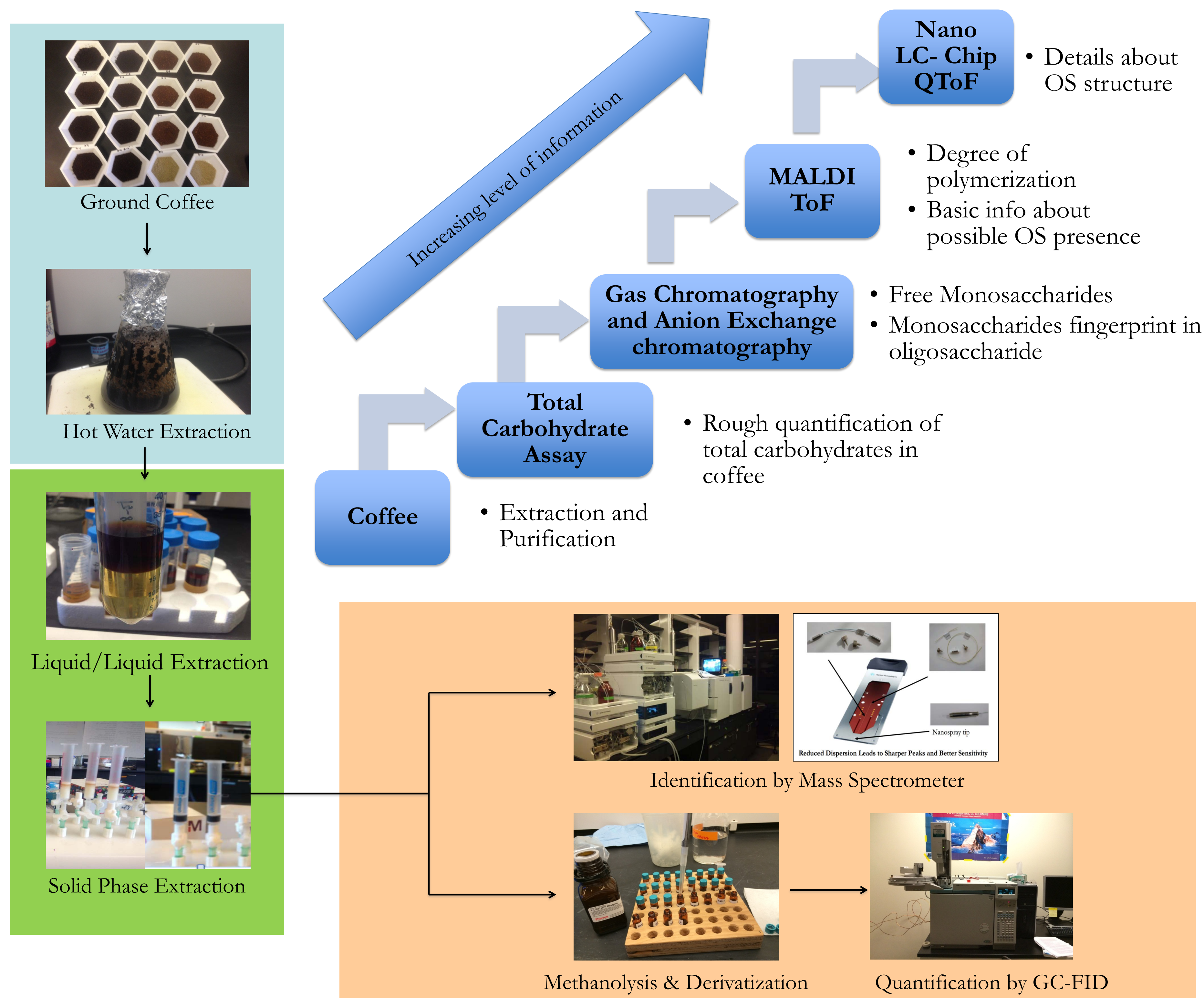


Introduction

Oligosaccharides (OS) are functional carbohydrates polymers widely studied in human milk and dairy products. They are also found in plants; however there is no oligosaccharides present in green coffee beans other than sucrose and only a handful of oligosaccharides have been described in roasted coffee beans. The presence or potential bioactivities of oligosaccharides in coffee has not been deeply investigated. In this work we studied the overall distribution of oligosaccharides in brewed coffee by using an advanced analytical platform. We propose that coffee infusions contain complex oligosaccharides structures that are potential prebiotics. The formation of prebiotic oligosaccharides-rich fractions can be induced via processing and brewing. The objective is to extract, purify, identify and quantify coffee oligosaccharides with combination of analytical platforms and then evaluate their potential prebiotic activity.

Materials and Method



Results: Identification and Quantification Of Coffee OS

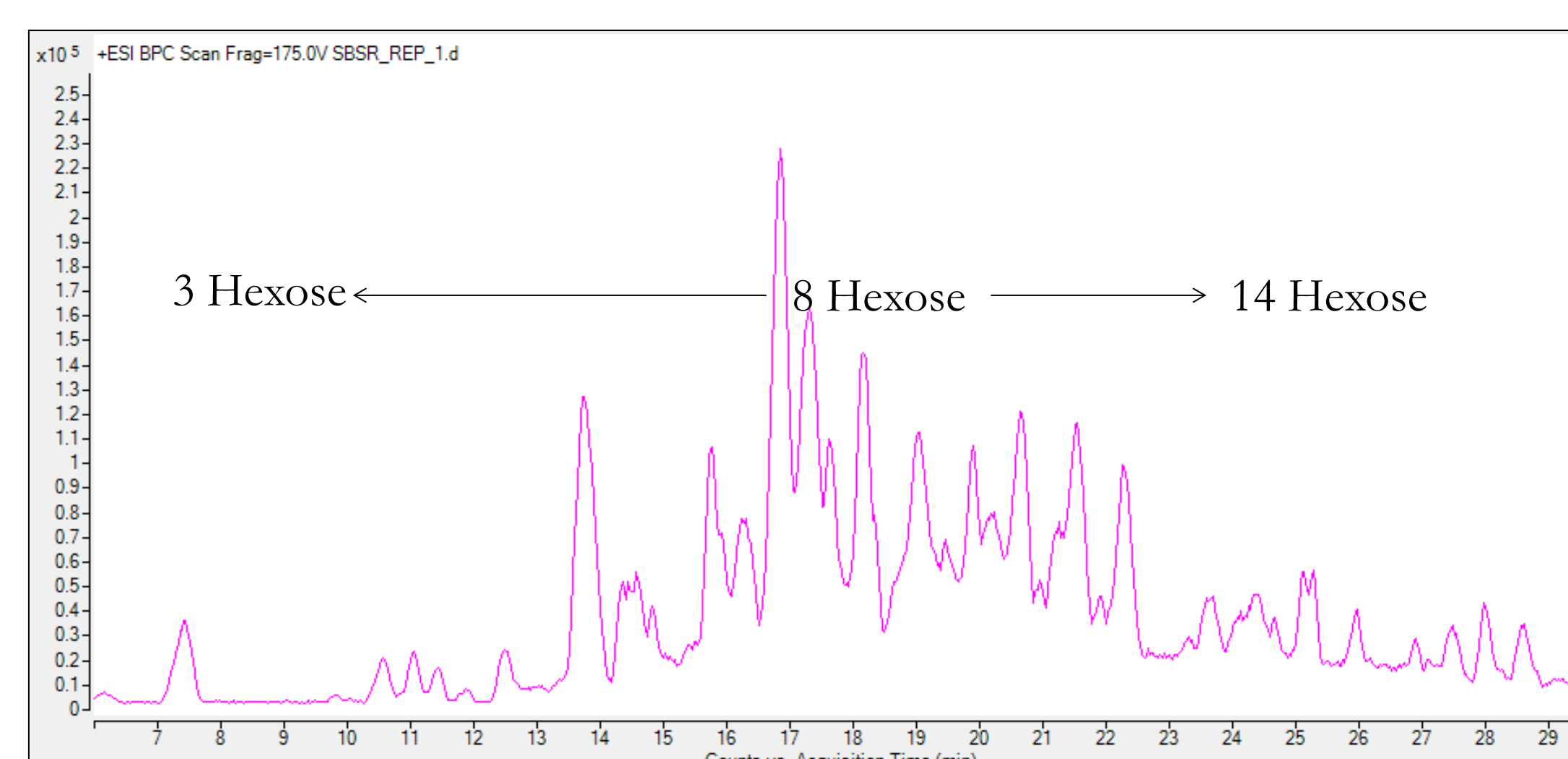


Figure 1: nanoLC-Chip-QToF Base Peak Chromatogram of Coffee Oligosaccharides (DP range: 3 to 14 of Hexose or Hexose-Pentose)

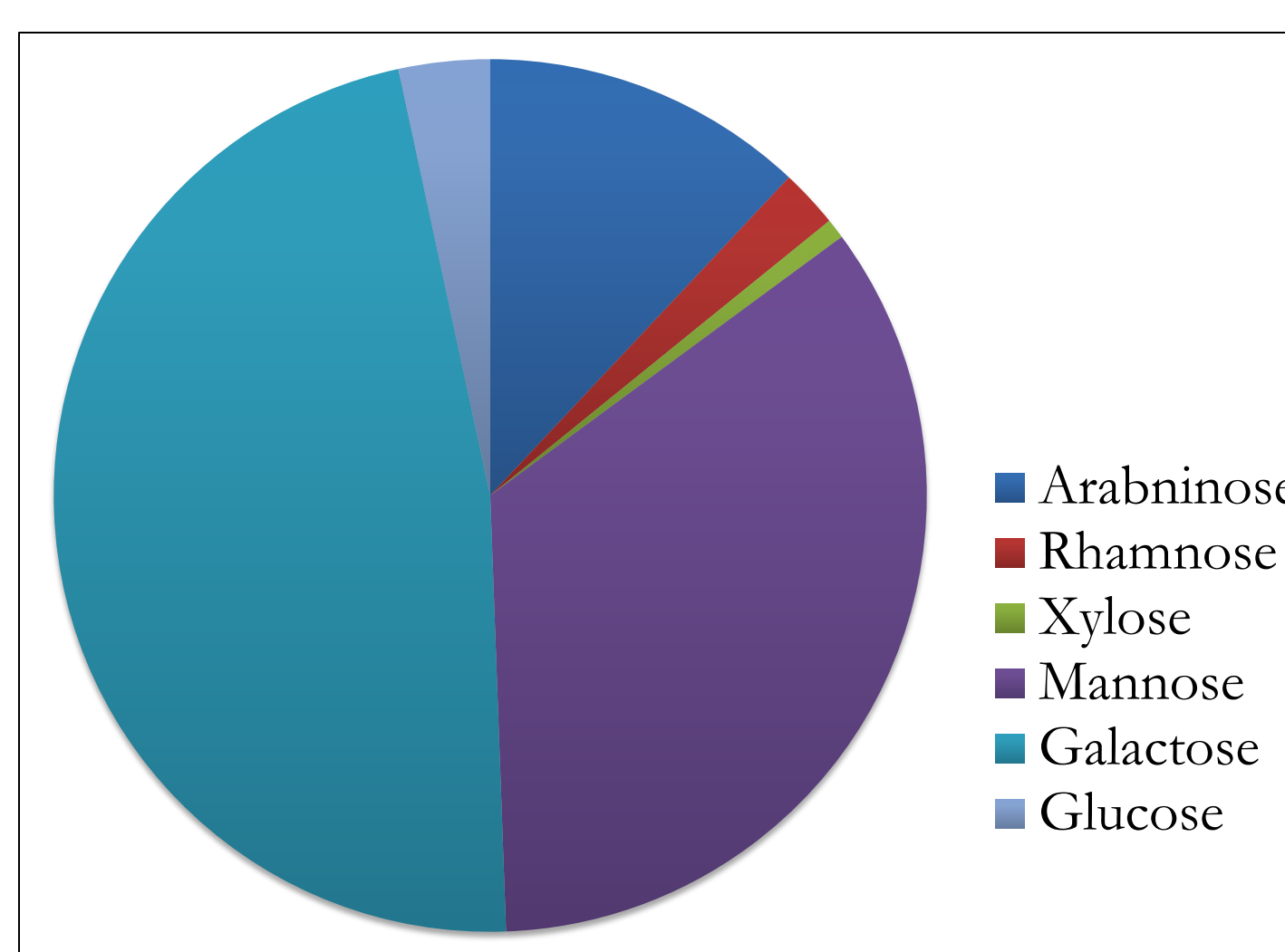


Figure 2: Monosaccharide Composition of Oligosaccharides in Roasted Coffee

Figure 1 and 2 show that coffee oligosaccharides have a diversity in size and monosaccharides composition that requires different enzymatic capabilities for deconstruction. This provides the basis for matching the coffee oligosaccharides as potential prebiotics to specific probiotic bacteria, for developing next generation selective prebiotics.

Result: Effect of Processing and Brewing on OS Abundance

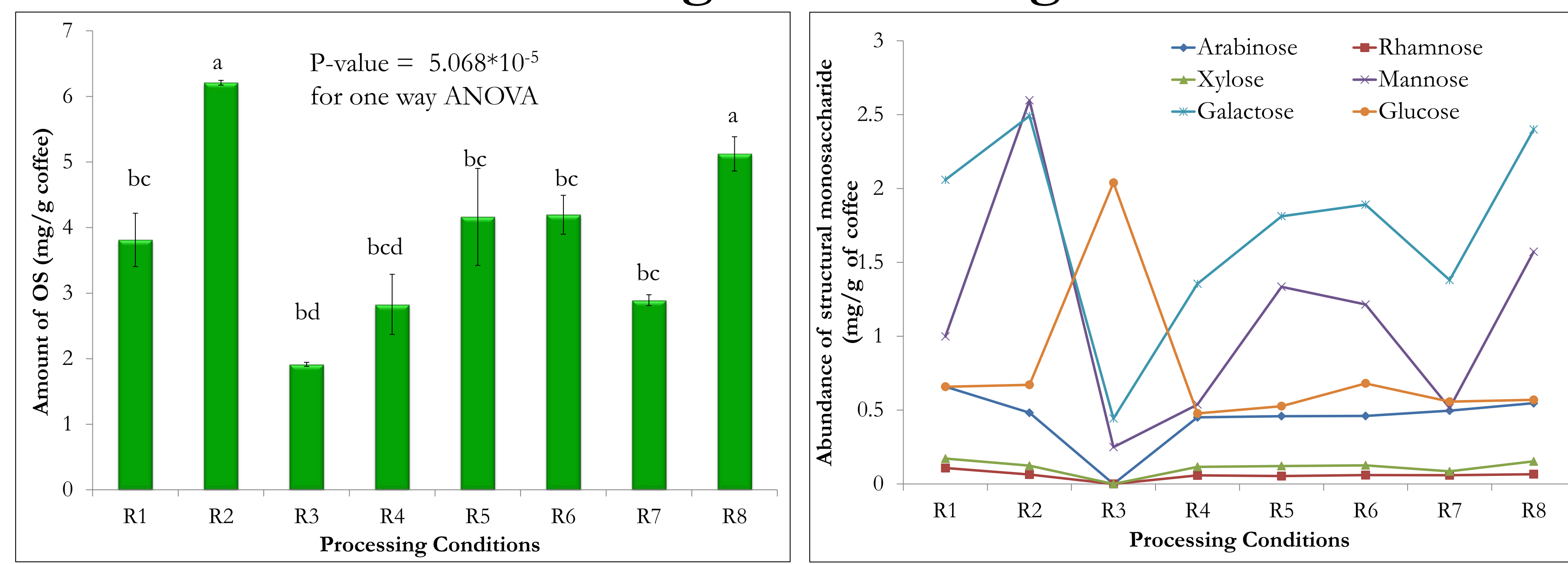


Figure 3: Abundance of (a) oligosaccharides and (b) their structural monosaccharides in coffee with different processing conditions (Note: due to the proprietary nature of this work, the detailed information of processing conditions are not shown here)

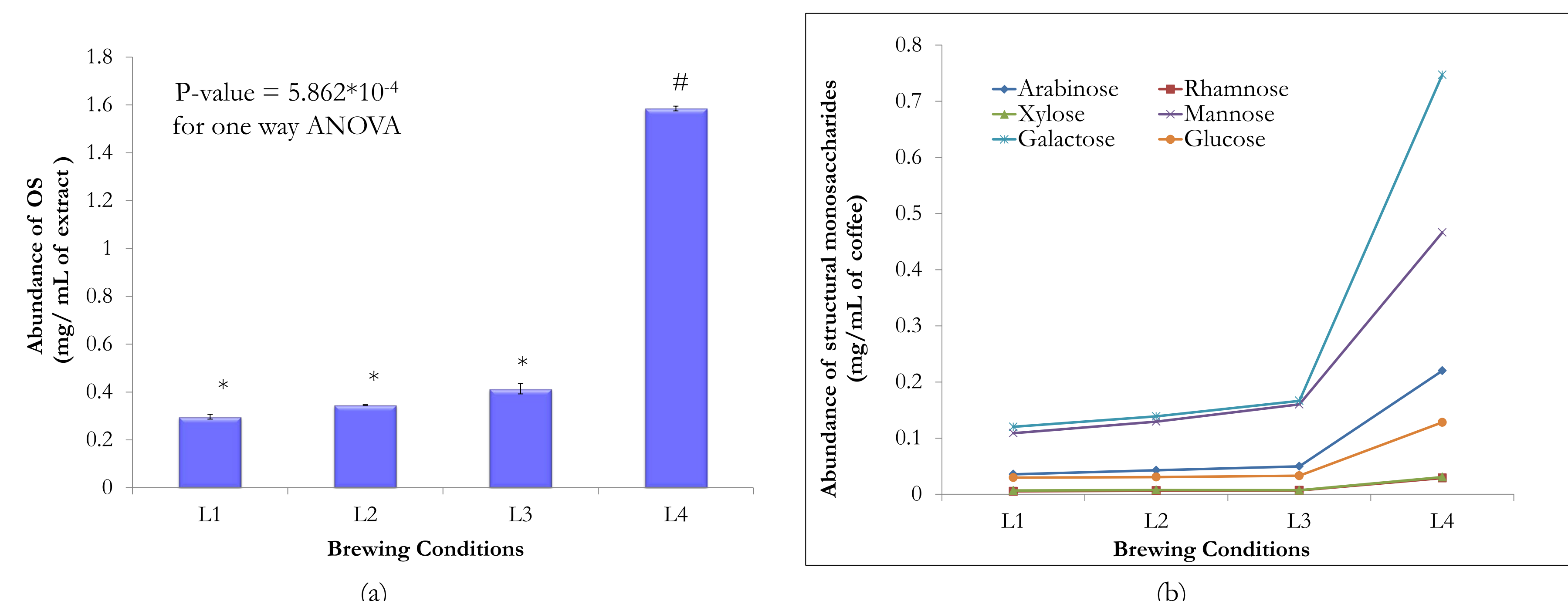


Figure 4: Abundance of (a) oligosaccharides and (b) their structural monosaccharides in four liquid coffee brewed by different conditions (Note: due to the proprietary nature of this work, the detailed information of brewing conditions are not shown here)

Figure 3 and Figure 4 indicate that the different processing and brewing conditions have significant effect on the abundance of coffee oligosaccharides and their structural monosaccharides

Work in Progress: Testing the bioactivity of coffee OS purified in lab scale



Figure 5: The growth of one *Bifidobacterium* spp. on MRS medium plate after inoculation with two coffee oligosaccharide extracts

Table 1. The number of bacteria in two coffee oligosaccharides extract

	Coffee Oligosaccharide Trial #1	Coffee Oligosaccharide Trial #2
Number of bacteria (CFU/mL)	3.1 * 10 ⁶	3 * 10 ⁶

We produced sufficient amounts of purified coffee oligosaccharides by using lab scale extraction and purification and used them to grow selected *Bifidobacterium* species. The results in figure 5 and table 1 show utilization of coffee oligosaccharides by certain species of *Bifidobacterium*.

Conclusion

There is increasing interest in food products enriched with bioactive oligosaccharides. Interestingly, we discovered that the composition, structure and abundance of coffee oligosaccharides vary among different processing and brewing conditions. The demonstrated diversity of monosaccharides composition of coffee oligosaccharides may requires different bacterial enzymatic machineries for utilization as carbon source, thus providing the basis for matching these prebiotics to specific existing probiotic bacteria. In conclusion, the present work shows that oligosaccharides in coffee have diverse range of size and monosaccharides composition thus coffee represents a promising source of next general selective prebiotics.

Acknowledgement:

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