ATCC 11842) and prebiotic components (inulin and fructo-oligosaccharides). The cultures were reported to grow and survive in the carrot juice at acidic pH condition during a storage period of 4 weeks at 4°C. In another study by Nazzaro *et al*., [100], carrot juice was incorporated with alginate-inulin-xanthan prebiotic gum encapsulated *L. acidophilus* DSM 20079, and its growth and stability during storage and under gastrointestinal conditions were examined. Encapsulation enhanced the cell viability and stability of *L. acidophilus* during storage and under gastrointestinal conditions.

The use of prebiotic alginate encapsulated probiotic microbe in dairy-based beverages not only protects and enhances the viability of probiotic microbes but also improves the overall functional property of the product.

12.8 Conclusion

Alginates are hydrocolloids derived from certain bacterial species and brown seaweeds/algae. Commercially available alginic acid and its salts are derived from brown seaweed sources such as *Laminaria.* Alginates, due to their physical and chemical properties, find various applications in food and beverage industries. Alginates are prevalently used as a stabilizer, thickener, suspending agent, emulsifier, encapsulating wall material, and a prebiotic source in various beverage products. Alginates find their application in beverage industries as an additive and ingredient. Salts of alginates such as sodium and potassium alginates find their application as a thickener and stabilizer in many non-acidic and calcium-free beverages. Calcium alginate is, in general, preferred as an encapsulating agent for protecting live microbes, flavor, color, and other bioactive compounds to enhance its viability and stability in beverage products, to which it is added, during processing and storage. Propylene glycol alginate, an esterified form of alginic acid, is known for its water solubility and viscosity-modifying property. Propylene glycol alginate is prevalently used in beverages as a stabilizer, thickener, emulsifier, and suspension agent, whereas it cannot be used as a gelling agent due to the esterification of carboxyl groups. Thus, application of alginates is established to improve the rheological and textural properties and also the functional property of beverages.

References

1. Saha, D. and Bhattacharya, S., Hydrocolloids as thickening and gelling agents in food: A critical review. *J. Food Sci. Technol.*, 47, 6, 587–597, 2010.