CHAPTER 4

Maple Syrup—Production, Composition, Chemistry, and Sensory Characteristics

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Contents

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Abstract Maple syrup is made from sap exuded from stems of the genus *Acer* during the springtime. Sap is a dilute solution of primarily water and sucrose, with varying amounts of amino and organic acids and phenolic substances. When concentrated, usually by heating, a series of complex reactions produce a wide variety of flavor compounds that vary due to processing and other management factors, seasonal changes in sap chemistry, and microbial contamination. Color also forms during thermal evaporation. Flavor and color together are the primary factors determining maple syrup grade, and syrup can range from very light-colored and delicate-flavored to very dark-colored and strong-flavored.

I. INTRODUCTION

Maple syrup is produced from the sap of several species of maple (*Acer*), chiefly through the concentration of sap via thermal evaporation. Although the chemistry of maple syrup is dominated by sucrose, a wide variety of sap collection and processing factors, microbiological interactions in sap, environmental influences, as well as the packing and storage of the finished product, combine to produce a range of chemistry and flavor profiles in maple syrup. Because of the large concentration factor (~40 gal of sap are required to produce 1 gal of syrup) and often delicate flavor profiles involved, several off-flavors are commonly found. Finally, the large price differential between maple syrup and other sweeteners provides incentive for adulteration.

II. HISTORY

Several different legends describe how Native Americans discovered that the sap of maple trees was sweet and could be boiled down to form maple sugar (Heiligmann *et al.*, 2006). The most likely explanation is that they observed birds and animals cutting holes or gashes into the twigs of trees, or drops of sap falling after branch breakage by snow or wind. These small wounds ooze sap in the spring, forming small drops of sap that are