FLAVOR CHEMISTRY OF ETHNIC FOODS

An Overview

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Ethnic and international foods have gradually been integrated into our daily diets in North America. However, the existing literature on flavor characteristics and chemistry of such foods remains fragmentary and diverse. An attempt has been made to present a summary of the current status of knowledge in this area.

INTRODUCTION

Flavor is an important sensory aspect of the overall acceptability of foods. The flavor of food is influenced by both its odor-active volatiles and taste-active non-volatiles. However, methods of preparation and heat processing as well as presence of other ingredients and seasonings might exert a profound effect on the characteristics and "ethnic" flavor of certain foods. Proximity of cultures and ethnic groups has also caused modification in certain food formulations in order to offer an "international" flavor to them. As an example, while Chinese food has preserved its overall authenticity, it has undergone certain modification and transformation which has led to the availability of the so-called American-Chinese or North American-Chinese cuisines.

FLAVOR GENERATION IN FOODS — ROLE OF INGREDIENTS AND PROCESSING METHODS

Flavor of foods is generated by the action of enzymes, fermentation or heat-processing operations. Ingredients or combination of specific ingredients present in different food formulations of ethnic origin may influence the formation of Maillard reaction products as
well as effects on lipids via oxidation or participation in Maillard reactions as well as reaction of amino acids and proteins with carbohydrates. Other food components such as spices and condiments as well as certain vitamins and specific amino acids may modify the flavor of foods and thus lead to generation of specific “ethnic”, such as Chinese, Japanese, Indian, Thai, etc., aromas in selected foods.

The Maillard reaction in relation to flavor has been the subject of a number of reviews (Bailey, 1998; Hurrell, 1982; Mottram, 1994; Nursten, 1986; Tressl et al., 1993). An important reaction associated with the Maillard reaction is Strecker degradation which involves oxidative deamination and decarboxylation of α-amino acids in the presence of a dicarbonyl compound. This leads to the formation of an aldehyde containing one less carbon than the original amino acid and an α-aminoketone. Strecker aldehydes, mercaptaldehydes and α-aminoketones as well as hydrogen sulfide, ammonia and acetaldehyde are formed from degradation of cysteine. Lipid degradation may also afford aldehydes that could participate in the Maillard reaction.

These compounds serve as important intermediates for the formation of many odoriferous compounds. Breakdown of methionine as well as thiamine may also provide a number of intermediates as well as heterocyclic and sulfurous compounds (Shahidi, 1989). The Maillard products formed may further react with one another. Thus, interaction of furfural, furanones and dicarbonyl compounds with other reactive compounds such as amino compounds, hydrogen sulfide, thiols, ammonia and aldehydes may produce an array of flavor-active compounds, including heterocyclics, among others.

Lipid components of food may also undergo different reactions via autoxidation, thermal oxidation, photooxidation and lipoxygenase-assisted oxidation to produce a wide range of flavor-active compounds. While the primary products of lipid oxidation, hydroperoxides, are odorless, their breakdown leads to the production of aldehydes, ketones, alcohols and hydrocarbons, among others. Free fatty acids may also be formed via thermal hydrolysis of lipids. Substituted fatty acids may further cyclize to produce lactones and other flavor-active compounds. The role of lipids in aroma generation has been reviewed in the literature (Chen and Ho, 1998; Mottram, 1998; Shahidi and Cadwallader, 1997; Skibsted et al., 1998).

Different sauces produced via brine fermentation processes are used in many ethnic foods. Shoyu is a popular Japanese sauce from soybean that is used widely in Japan and other South East Asian countries, but Miso is not internationally as popular because of its paste consistency (Chapter 2). Meanwhile, black soybeans are brine fermented to produce moromi which is subsequently cooked with coconut sugar and spices to afford Indonesian soy sauce known as Kecap manis (Chapter 3). Meanwhile, a complex ingredient which includes dried shrimp, fish, sugar and roasted sesame, among others affords Sa Cha sauce (Chapter 4) which is important in Chinese cuisine. Meanwhile, brine fermentation of fish affords fish sauce which is again very popular in Vietnam and other South East Asian countries (Chapter 5). Furthermore, soy sauce, garlic, scallion and shallot as well as ginger, star anise and black or Shiitake mushroom are among the condiments and ingredients used in Chinese foods and are responsible for many volatile and non-volatile components responsible for the rich and delicate flavor of Chinese dishes that are popular worldwide (Chapter 6). In addition, coriander fruit is used as a spice while its fresh leaves serve as important culinary herbs, more commonly known as Chinese parsley (Potter and Fagerson, 1990; Chapter 7). Meanwhile, the importance of Wasaki and Japanese horseradish in food flavors has been documented (Chapter 8). The rhizomes of greater galangal are also widely used throughout the South East Asian countries (Chapter 9) and pandan leaves have a strong characteristic aroma which is desirable in various bakery products, sweets and home cooking (Chapter 10).