A concise guide to *Spices Herbs Seeds and Extractives*

American Spice Trade Association

INTRODUCTION

This guide is based on the highly specialized knowledge of people who work with spices every business day of their lives-the members of the American Spice Trade Association (ASTA). Their skills range from sourcing spices all over the world to importing, trading, purchasing, and analyzing and all facets of processing.

In the following pages, this expertise has been applied to the major spices, herbs, seeds, dehydrated vegetable seasonings and extractives that make up the business of spices in the United States. For each product, information has been drawn from the ASTA members who are most familiar with the spice being presented.

Although this guide would certainly be interesting to anyone who is curious about spices, it is designed primarily to be a reference for food industry and foodservice personnel. It contains technical and purchasing information, for example, that simply does not apply to consumers who purchase spices from retail sources, since they do not ordinarily have choices for origins, types, grades and qualities of spices. On the other hand, the data contained here should be of great value to commercial customers whose volume of purchase makes it possible for spice companies to offer such choices.

Making the expertise of ASTA's membership available to customers who use spices in food products and large-volume cookery is a project that ASTA began some 40 years ago and has continued to develop ever since. The first publication of the kind you will find here was a brochure title "What You Should Know About Cinnamon". Much of it's trade information was supplied by a member who had devoted his entire business career to the subject of cinnamon. To that was added the knowledge of scientists and manufacturing personnel at ASTA member firms. The ASTA Information Bureau (at Lewis & Neale Inc.), which prepared the brochure, added a brief history of cinnamon from its extensive files. The same format has been applied to the entire product descriptions presented here.

The spice trade is a dynamic business that continuously reflects political and economic developments all over the world. As a result, ASTA has periodically updated and revised this information as needed (The original cinnamon brochure has been revised four times, for example). All sections in this guide were reviewed shortly before publication and updated where necessary.

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Allspice

When Columbus returned from his first voyage to the New World, he spoke of having found "a tree the leaves of which smelt just like cloves." He was referring to what we now know as *allspice*.

The Spaniards labeled the dried berries of the allspice tree *pimienta*, or pepper. It was a complete misnomer, based only on visual appearance. It is true that allspice berries and black peppercorns look somewhat alike, but they are not related.

Strangely enough, when the early botanists began classifying the products of the New World, they went along with the Spaniards' error. This aromatic spice was given the name *Pimenta dioica (or P. officinalis)*. This was eventually anglicized to *pimento* and to this day, allspice, which is about as different from pepper as a spice can be, is still widely called *pimento* in the trade (though currently there is a movement to drop the term entirely).

At beginning of the 17th century, when allspice was first imported into Europe in commercial quantities, the new spice was called *Jamaica pepper*. By 1693 it was listed as "sweet-scented Jamaica pepper, or allspice." A writer of that period reported that allspice was initially sold in Europe as a substitute for cardamom. The name *allspice* stemmed from the fact that though clove is its dominant flavor note, this spice has a more mellow, sweet, rounded flavor. One early observer described it as a blend of cloves, juniper, pepper, and cinnamon. Later writers settled on a combination of cloves, cinnamon and nutmeg, which remains the most prevalent description today.

It is interesting to note that at the beginning of the 20th century, Europe alone was using four times more allspice than is being produced today. It was a very popular spice for processing meats and fish and much used in baking. After World War II interrupted supply lines and shattered demand, Jamaican farmers cut down many of the trees, or stopped tending them, with the result that production dropped and has never fully recovered. Today, however, the fish pickling traditions continue to create demand. Eastern Europe has become a major customer for Jamaica's production, using the imported allspice to season its huge herring catches.

Many attempts have been made to grow allspice trees in other parts of the world; though the trees live and flower, fruiting has never been successful. Consequently, allspice remains the only spice produced in commercial quantities exclusively in the western hemisphere.

CULTIVATION

The dried unripe berries of trees of the myrtle family are the source of allspice. Eugenol is the major flavor component in both allspice and clove (allspice oil contains 60% to 75% eugenol)

Several islands of the Caribbean grow allspice trees, but the main producer is **Jamaica**. Other current sources are **Guatemala, Mexico,** and **Honduras**.

Allspice trees average 20 to 30 feet in height, and are usually found in the uplands. They begin to bear fruit in seven or eight years and reach maximum production in about 15 years. From then on they may bear up to 100 years. The average tree in Jamaica produces about 2-1/2 pounds of dried product (about 14,000 berries) annually. But some trees will yield up to 100 pounds in a year.

There are both "male" and "female" allspice trees. The so-called "male" trees rarely bear fruit, but before the time of fruiting, there is no way to tell which is which. Most of the male trees are eventually cut out of a grove.

MAJOR TYPES OF ALLSPICE

The island of Jamaica is not only the world leader in production, but its allspice traditionally commands a premium price. Where the essential oil content of allspice from all sources ranges from 2% to 4.5%, the Jamaican product averages 4%. Some authorities believe that the Jamaican trees, which are mostly cultivated, are also a different strain from those found on other Caribbean islands and in Central America.

There is only one grade of Jamaican allspice. It is the product of hand picking and careful sun drying. The berries are picked green in order to retain maximum flavor (once ripened fully, flavor fades quickly). After picking, the berries are heaped onto a concrete platform (known as a "barbecue") and covered for about 48 hours. This induces a slight fermentation. They are spread out thinly to dry in the sun for five or six days. Properly dried berries will rattle when shaken, as the loosened seeds impact against the outer husk. The growers then give them a preliminary cleaning and they are shipped to the Jamaican Government Pimento Clearing House for a final cleaning before export.

In recent years, Guatemala has been an important source of allspice. Visually the berries are quite similar to the Jamaicans, except that they tend to be somewhat larger. On the other hand, essential oil content is lower, averaging slightly above 3%.

In Guatemala, Honduras and Mexico, allspice is mostly a product of wild trees in the rain forest areas. Harvesting is done by chopping off branches (or taking down the whole tree) and picking the berries off the ground. In some places it is a by-product of chicle (gum) harvesting, since the allspice trees are often nearby. After a brief drying in a jungle clearing, the berries are sent to a collection point where they are usually boiled to avoid mold. They are then dried further before shipping.

Mexican berries are largest in size of the major commercial types and they are much darker in color (closer to black than the chocolate brown shade typical of the other origins). The berries are less sweet and mellow than the Jamaican type, and their essential oil content is, on average, lower than in either Jamaican or Guatemalan berries.

Allspice berries from Honduras are similar in appearance to berries from Guatemala and Jamaica, although they are larger than the latter. Essential oil content is roughly the same as in the Mexican berries.

BUYING AND USING ALLSPICE

The higher the essential oil content, the more pronounced the taste and aroma of allspice berries will be. Prices among the origins vary accordingly. The end use determines how important flavor intensity will be, but it should be emphasized that higher oil content often turns out to be more economical in the final assessment, because less is needed. When uniformity in size and color (for the whole berries) is desirable, the Jamaican product is preferred, because it is handled so carefully. This also applies to uses in which the origin is to be mentioned, because it is widely recognized that the Jamaican is the top-of-the line allspice.

Whole allspice berries are a staple of mixed pickling spice and are frequently used in commercial sweet pickle preparations. Ground allspice is used in such blends as pumpkin pie spice, apple pie spice, seafood seasoning and curry powder, and is present in many formulations for sausage and pickled meats and fish products. It is also much used in sweet goods baking, puddings and fruit preparations.

For handling and storage information, see page 55.

Basil

Basil has enjoyed steady growth in consumption over the past 25 years. In fact, this herb has become big news on the spice shelf. In 1964, the UNITED STATES was only importing 40,000 pounds of basil a year, compared to six to eight million pounds today—in addition to domestic production. These figures become all the more impressive when you consider that a pound of basil will season enough chicken cacciatore to feed more than 3,000 people!

The basil boom is another tribute to the popularity of Italian foods in the UNITED STATES Much of the credit goes to pizza, which has driven oregano out of the realm of the unknown to an annual consumption of more than 10 million pounds, and now seems well on the way to doing the same for basil.

The ancients couldn't seem to make up their minds about basil. Its botanical family name comes from the Greek "to be fragrant," but some Greek herbalists and physicians scorned it. In 250 B.C., the writer Chrysippus declared flat out that it "exists only to drive men insane." Another Greek observed that "a she goat that browses on everything avoids basil alone." Worse yet, they spread the word that scorpions breed under basil pots. But the early Romans apparently loved basil and, in fact, made it a symbol of love and fertility. Through the centuries it became a custom of young Italian suitors to wear a sprig of basil as a sign of their marital intentions. A gift of basil became a symbol of hospitality. In India, one variety of basil was considered sacred and good Hindus believed that a leaf of basil buried with them was a passport to heaven. Perhaps the strangest bit of basil lore comes from South America where it was said in an early 19th century report that a type of basil plant produced salt. Supposedly, crystals miraculously formed on the leaves each night and in the morning the natives would gather them–as much as half an ounce per plant–and use them for table salt.

Over the years, basil's culinary virtues gradually moved to the fore and by the time the first settlers came to America it was one of the herbs they cherished. Its greatest usage, however, continued to be in Mediterranean countries such as Italy and France.

CULTIVATION

An annual plant of the mint family, *Ocimum basilicum L.* supplies the most popular culinary basil, also known as "great basil" or "sweet basil." There

are perhaps 40 different species and uncounted varieties of them in the *Ocimum* clan, but *basilicum* is prized for its rich green leaves and sweetly scented herbal bouquet. It is called *herb royale*, in France, for the fact that *basilicum* is derived from the Greek *basileus*, or "king." The plant grows about two feet high, with a profusion of leaves that are grayish green underneath and a slightly shiny light green on top. The sweet basil of commerce is a cultivated crop, yielding several leaf cuttings a season. Like most herbs, it has low volatile oil content, usually less than 1%.

Basil is native to India and Persia, and is now widely grown in at least a dozen countries throughout the world, including the UNITED STATES The principal source of imports to the UNITED STATES at present is **Egypt** with **Mexico** and **Israel** as distant seconds.

MAJOR TYPES OF BASIL

Commercial basil production in the UNITED STATES is found mostly in **California** where it began shortly after World War II, and more recently in New Mexico. Basil lends itself well to modern American farming and processing techniques. American basil is usually milder and less harsh than imported varieties. It is also highly prized for its rich color, cleanliness, and uniformity of milling, to the point where it sometimes brings as much as three times the price of the most expensive imported basil. Uniformity is particularly important to spice packers because it assures them of even, attractive fills in their containers.

The domestic product is mechanically dried and then milled into four sizes: coarse (about ¼ inch), primarily for retail packs; medium (about 1/8 inch), popular in foodservice and salad dressing manufacturing; fine, much used in the pizza industry; and ground or powdered (about 1/16 inch), for use in any product where aroma and flavor are important and any evidence of leaves is unwanted. This selection of leaf particle size is unique to the American product.

In recent years, Egypt has been America's largest source of imported basil. (Egypt is no newcomer to basil production, but previously most of its output was shipped to Europe.) The Egyptian product is said by buyers to have a "mintier" flavor than domestic basil. Egyptian basil is produced mainly in the regions of Beni Suif and Fayon in the vicinity of the Nile. French basil was at one time a premier product; however, little French basil has been available for import over the past few years.

BUYING AND USING BASIL

Basil is subject to a large price spread among origins. This means the buyer needs to give special attention to the end usage before making the buying decision. If it is important to have a product with high color and sweet flavor, a choice of milling sizes and to be assured of uniformity, the domestic product is the best choice. When these considerations are less important or a ground product is required, imported basil is often used.

The flavors of basil and tomatoes have a special affinity and this is one reason for today's increased usage of this herb. America has adopted southern Italy's love of tomato-based sauces used on pizzas, pasta and other dishes. In addition, basil is the main ingredient in pesto, the garlicky green sauce from northern Italy that can be tossed with pasta, stirred into soups or used as a sandwich spread.

For handling and storage information, see page 40.

Capsicums

It was only a quirk of history that gave Peter Piper the chance to pick a peck of pickled peppers. What he picked should have never been called *peppers*.

The error occurred when the early Spanish explorers came to the Caribbean. Bear in mind that they were looking for a shorter route to the spice riches of the East. And, even in those days, pepper,–true pepper– was the most valuable spice. In the islands of the New World they found small but fiery red vegetable pods, which the Indians used in cooking.

In what may have been innocent confusion, or perhaps a little face saving, the Spaniards named this discovery *pepper*. Technically, these pod-bearing plants are known as *capsicums*.

Adding to the confusion, capsicums proved to be extremely adaptable when the explorers sent the seeds back to Europe. In an amazingly short time, the cultivation of capsicum pods spread to almost every part of the world. Moreover, in many places the pods developed different characteristics as to shape, color, size, and pungency. Before long, capsicums grew to be one of the largest and most diversified clans in the plant world and the term *pepper* became all the more misunderstood.

CULTIVATION

The term *capsicum* encompasses five species and some 300 different varieties of plants producing fleshy vegetable pods. Botanically, it is part of the family *Solanaceae* that also gives us tomatoes and tobacco. Commercially, the two most important species are *Capsicum annuum* and *Capsicum frutescens.* Broadly speaking, *C. annuum* varieties are more apt to be milder (though some are pungent), while *C. frutescens* produce our fieriest products.

In consumer terms, capsicums are the source of paprika, red pepper flakes and chili pepper. Capsicums can also be found in spice blends such as chili powder, seasoning salt, meat tenderizer and taco seasoning, as well as in products such as barbecue spice. Hot pepper sauce in its many forms just couldn't be made without capsicums.

The compounds that separate the capsicums from other plant groups are capsaicinoids: crystalline substances that are extremely pungent. The capsaicinoids include capsaicin, nordihydrocapsaicin, and dihydrocapsaicin. The higher the capsaicin oil contents the hotter the pepper. All capsicums have some capsaicinoids but in such varieties as the sweet bell peppers they have been so minimized through cultivation over the years that the flavor today imparts little or no tang. The same is true for the mild or "sweet" types of paprika and especially those strains developed by American producers.

Generally, the hottest varieties come from tropical regions of **Africa, South America** and **China**. Chilies with medium to high pungency are produced in **China, India, Japan, Mexico, Pakistan, Turkey** and **UNITED STATES** Such varietal and origin names as Santakas, Hontakas, Bahamians, Carolinas, Louisianas, Pakistanis, Jalape**n**os and Pequins are common in the spice trade, but they are losing their identities with industrial buyers because of variations in pungency from crop to crop, year to year. As a result, the modern spice grinder must test and evaluate each lot, whether imported or domestic. Though names are colorful and memorable, buyers are more interested in an assured heat level and color value in every shipment.

PAPRIKA

Paprika is the most important capsicum product in the spice trade. Unlike most spices, which are sold in the whole form as well as ground, the term *paprika* refers only to a ground product prepared from *Capsicum annum L.* pods. The intensity of color differs according to the varieties of peppers and processing. Flavor varies even more markedly, from very mild and sweet to fairly pungent. (See page 34 for a more detailed discussion of paprika.)

RED PEPPER

Consumption of hot capsicum peppers, or chilies, has increased 85% in the UNITED STATES over the past 20 years. As a result, ground and crushed red pepper has gained importance within the spice trade. There is a trend toward de-emphasizing varietal and origin distinctions in favor of categorizing red pepper simply by heat level. This is both practical and more to the point, since heat is the principal quality being sought. (Other factors such as size, shape or texture are not usually primary considerations.)

Ground red pepper is sometimes called *cayenne*. Historically, this was meant to signify a ground red pepper product of extremely heat. The word can be misleading, however. It seems to connote a specific product but in practice carries no industry standard of heat level, nor does it refer to a particular type of capsicum. As a result, ASTA has recommended to its members that *cayenne* be phased out as a product term. In the meantime, when a company wishes to include the word *cayenne*, it should be parenthetical to the main term, *red pepper*. In retail and foodservice packs, this practice has already been adopted by a number of firms.

Industrial buyers have a wide choice in buying red pepper. In bulk quantities, it can be ordered by minimum/maximum heat level. The current way to specify heat is in Scoville Heat Units (SHUs), measured by high-pressure liquid chromatography (HPLC). (See method 21.3 in *ASTA's Official Analytical Methods;* see page 56 for information.) The HPLC analysis measures parts per million of capsaicinoids. Pungency levels of ground red pepper typically range from 4,500 to 70,000 SHUs. The HPLC method has proved to be more accurate and have less variation than the old organoleptic Scoville test. (In August 1998, the ASTA Technical Committee voted to drop the older Scoville Sensory Method 21.0.)

To achieve a customer's specified heat level consistently, spice processors blend different types and lots of chilies. They also standardize mesh grinds and color values, paying special attention to the cleanliness aspects of these ground products. Crushed red pepper is also offered in various mesh sizes, with ¼ inch and 1/8 inch the most popular. Most spice houses sell the same types of chilies that are ground or crushed for red pepper in whole form, for specialty uses.

Red pepper is often used in flavoring stews, baked beans, sweet and sour pickles, smoked pork, frankfurters, fresh pork sausages, liver and ham spreads, barbecue sauce, ketchup, steak sauces and salad dressing. Mexican, Indian, Southeast Asian and Italian foods also call for red pepper.

CHILI PEPPER AND CHILI POWDER

While the term *chilies* in the spice trade denotes any of the small, hot capsicums, the term *chili pepper* refers to the ground product of larger, milder peppers used in the blend called chili powder and in various applications in Mexican-style cookery. Two basic varieties provide most of the chili pepper needs of the UNITED STATES: The 6-4 variety has a mild heat, while the California variety is "sweeter." They are similar in appearance—bright red and seven to eight inches in length—and are produced primarily in California, New Mexico and Mexico.

By selecting sub-varieties and different processing methods, producers can supply food manufacturers with dark ground chili pepper for chili con carne, lighter-colored powder for sauces, and medium-hued product for barbecue or Coney Island sauces. Each ground chili pepper product can be designed for a particular need and standardized for red color, brown color (degree of caramelization), pungency, flavor, etc.

Ground chili pepper is primarily an industrial product. It does not ordinarily reach the retail and food service levels as such. However, it does come to these markets as an ingredient in barbeque spices, salad dressings, Mexican-style foods, barbecue sauces and snack foods. It is also a key component of chili powder, a blend that also contains other spices. Typically, a chili powder blend consists of about 80% ground chili pepper, along with garlic powder, oregano, ground cumin seed and a little salt. Some formulas contain such other spices as cloves, allspice, anise, coriander or cinnamon.

As with ground chili pepper, chili powder may be produced with varying degrees of pungency and in different shadings of color, from bright red to mahogany. The deeper shades are created by caramelization of natural sugars during the mixing process. It is not uncommon for industrial buyers to have a choice of as many as 10 different chili powders as standard blends and access to any number of custom-blended variations. At the retail and foodservice levels, each brand line usually offers only one blend of chili powder, but the formulations differ among brands.

Chili powder is used in chili con carne, barbecue sauces, dips, potato chips, crackers, sauce mixes and Mexican-style foods.

OLEORESIN CAPSICUM

Capsicum oleoresin is solvent-extracted from ground red pepper and standardized to desired heat levels. It can also be soluble in aqueous media with the addition. ASTA members normally sell the oleoresin according to pungency in standard dilutions.

For handling and storage information, see page 55.

Caraway

Caraway is native to Europe and western Asia. It has been cultivated from Sicily to northern Scandinavia since the Middle Ages. Caraway was mentioned in the *Form of Cury*, a record of ancient English cookery compiled by the master cooks of King Richard II. It was added to seed cakes and bread, as well as to cabbage and bean dishes. During Shakespeare's era, caraway was highly popular in England and was, in fact, more widely used than today.

References to caraway in ancient texts go back many centuries before the English citations. Discorides, a Greek physician and herbalist who lived in the first century, recommended oil of caraway as a tonic for pallor. The root of caraway, which is edible, was once considered superior to the parsnip and was supposedly a favorite of the soldiers of Valerius in the days of Julius Caesar. It was once believed that placing caraway on an object would prevent its theft. The believed powers of caraway also extended to potions that kept lovers from straying, and prevented pigeons and chickens from flying the coop.

CULTIVATION

Caraway seed is the fruit of an erect hardy herb similar to a carrot (and, like the carrot, a member of the parsley family). Known botanically as *Carum carvi L.*, caraway can be either an annual or biennial plant. Most caraway marketed commercially is of the biennial variety because of its ease of cultivation and higher yield of the essential oil that provides its distinctive flavor.

Seeds of the biennial plant, planted in March of one year germinate in about two weeks and ripen in the

summer of the second year. In the seeding year, biennial caraway plants resemble carrots, growing about eight inches tall, with finely divided leaves and a long taproot. By the second year, two-to-three foot stalks develop, topped by umbels with pink or white flowers. These produce the seed which is used as a spice. The crescent-shaped seeds, which are from 1/10- to 1/5-inch long, are curved and tapered at each end, have five pale ridges, and are somewhat horny and translucent. Caraway seeds should have a uniform shape and consistent brown color between each ridge. The flowers usually appear in May or June and harvesting takes place about two months later.

Harvesting is often done early in the morning while the dew is still on the plants, for then the seeds fall less readily than during the hottest part of the day; consequently, losses are less. After being cut the seed stalks are stacked in piles for about 10 days to complete the ripening and drying before threshing.

Caraway grows best in a moderately light clay soil that is rich in humus and well tilled. The seed is sown in rows about 14 inches apart. A cover crop that matures in the first season–mustard, poppy, beans, white clover or coriander–is often sown simultaneously to improve the economics of growing the biennial variety of caraway. The cover crop matures more quickly and is harvested before the caraway sends up its flowering stem.

Caraway is grown from northern temperate through tropical climates, including, **Canada, India, Jamaica, Northern Europe** (especially The Netherlands), **Russia** and the **United States**. Today, Canada supplies much of the United States caraway market.

Seeds of the biennial plant contain 2% to 5% essential oil. The oil composition is 50% to 70% carvone and about 30% limonene. Generally, the more northern the latitude in which caraway is grown, the higher the proportion of essential oil. Full sun also results in higher oil content.

BUYING AND USING CARAWAY

As with any spice, the way to secure the best caraway for a particular need is to consult a reputable spice supplier. Such a firm will be qualified to give technical advice on caraway performance and to provide uniform quality in every shipment.

Caraway seeds, which taste simultaneously warm, sweet, biting and acrid, are a classic ingredient of rye breads. They are also used to flavor cakes, cookies, biscuits, cheese, and applesauce. In Europe caraway is added to several varieties of cheese, such as Gouda, Havarti and Muenster. The seeds are also used in the preparation of sauerkraut, Irish stew and Hungarian goulash.

The oil, which is usually extracted from the seed by steam distillation, is used to flavor meats, sausages, perfumes, mouthwash and gargle preparations, and digestive aids. Along with cumin and fennel, it is an essential ingredient in the liqueur called k**u**mmel. In India, where caraway is thought to have antibacterial properties, the oil is used to flavor soaps. Because carvone, the principal constituent of the essential oil, can be produced synthetically, the use of oil of caraway has declined in recent years.

For handling and storage information, see page 55.

Cinnamon

The sweet-spicy aroma and flavor of cinnamon have been prized since the beginning of civilization. The Chinese included this spice in their earliest herbals preparations and use it medicinally to this day. Egyptians have imported cinnamon for more than four thousand years. Romans believed its fragrance to be sacred (the emperor Nero burned a year's supply of his city's cinnamon at the funeral rites for his wife Poppaea). Cinnamon was one of the major incentives for exploration in the 15th and 16th centuries, and thus played a vital role in the discovery of America. Today, cinnamon ranks as one of America's most popular flavors and certainly the baker's most important spice.

CULTIVATION

The pungently sweet spice we know as cinnamon is ground from the dried bark of trees in the evergreen family of the genus *Cinnamomum.* There are several varieties of cinnamon-producing trees with characteristics that differ, depending on where they grow. Some types resemble thick-stemmed bushes six feet to ten feet tall, while others grow as large as five feet in girth and fifty feet in height. At harvest, the bark is slit and stripped off both trunk and branches. It curls up tightly to form long slender quill-shaped "sticks." Some cinnamon comes to the United States in this form in lengths up to 30 inches. In addition, each producing area sends bark that was broken during the harvest, cleaning or packing process. As with other spices, cinnamon retains its aroma and flavor longer in its whole form; thus, the grinding is almost always done in this country to ensure maximum freshness.

MAJOR TYPES OF CINAMMON

As mentioned, there are several species of trees in the *Cinnamomum* family. Almost all of the cinnamon used in the United States is derived from trees grown in the **Southeast Asia**. Among spice industry professionals, the term cassia is used to distinguish between the three Southeast Asian types of cinnamon and the Ceylon type of cinnamon. The Southeast Asian group is native to China, Indonesia and Vietnam, which produce what most Americans recognize as cinnamon: a reddish brown powder with a strong aroma and flavor.

Indonesian cinnamon *(Cinnamomum burmannii*) comes from the mountainous areas inland from the port of Padang on the island of Sumatra. The highest concentrations of essential oil in the varieties known as Korintje cinnamon and Vera cinnamon are found in the thicker bark on the lower parts of the trees. Their grade designations as follows: Korintje "A" consists of bark from the main trunk and larger branches of older trees, with the outer bark scraped off and volatile oil between 2.5% and 4.0%; Korintje "B" comes from the side branches or trunks of younger trees (usually unscraped), and with volatile oil between 2% and 2.5%; Korintje "C" is thin bark and broken pieces from the smaller branches, always unscraped, and with volatile oil of less than 2%. Coming from a higher altitude, Korintje cinnamon characteristically has a slightly more intense color and flavor than the Vera and is thus rated the better type. In general, Korintje is deep reddish brown and has a sharp cinnamon flavor; the Vera is lighter in color.

Chinese Cinnamons *(Cinnamomum Cassia)* - Tunghing & Sikiang (Kwangsi)
These barks come from the southeastern part of China within a few hundred miles of the Vietnamese border. This accounts for the fact they have characteristics similar to those of Saigon cinnamon. However, they are lower in essential oil and therefore, not as strongly flavored as Saigon cinnamon. In color they tend to be more of a true brown than reddish brown. The Sikiang variety is a littler lower in oil than Tunghing, but comparable to Indonesian grades in oil level.

Saigon cinnamon *(Cinnamomum loureirii)* has traditionally been considered the finest-quality cinnamon due to the fact that its oil content runs higher on average than that of other types. (Oil from Saigon cinnamon can run as high as 7%). Saigon (and Chinese) cinnamons have a distinctly sweet flavor as compared to Indonesian types. The color of Saigon cinnamon is reddish brown, but it tends to be darker than the Indonesian type. Saigon is once again permitted entry into the United States after nearly 20 years of embargo.

Another source of cinnamon, *Cinnamomum cassia*, is from the southeastern part of China. The Sikiang variety is a little lower in oil than the Tunghing variety, but comparable to Indonesian grades in oil level. The region is close to the Vietnamese border, which accounts for the fact that some characteristics are similar to those of Saigon cinnamon. However, Chinese cinnamon is lower in essential oil and therefore, not as strongly flavored as Saigon cinnamon. In color it tends to be more of a true brown than reddish brown.

Cinnamon from the island of **Sri Lanka (Ceylon)** is quite different from the Southeast Asian varieties. It is characteristically tan-colored, with flavor and aroma so much milder than that of cassia that the average person in this country would consider it weak or poor cinnamon. Most Sri Lankan cinnamon brought into the United States is re-exported to Mexico, Central and South America, where it is preferred for certain confections. In labeling, however, any bark from the *Cinnamomum* family (whether cassia or Ceylon-type) may be called *cinnamon*.

BUYING CINNAMON

The cinnamon best suited to American bakers comes from the Southeast Asian varieties known as cassia. Cinnamon barks are graded largely on their content of essential oil (the principal component of which is cinnamic aldehyde), which is determined by steam distillation. The higher the oil content, the more intense the aroma and flavor. Thus, the cassia types of cinnamon are on average higher in oil content than the Ceylon types, and are preferred by the American market. Ceylon-type cinnamon is usually available at a discount, compared to cassia, and is typically used as a base for "fortified" cinnamons and for more economical cinnamon "blends," provided it has no off-notes in the flavor profile.

When purchasing cinnamon, the commercial baker must consider specific needs. It may be desirable to give a baked product high cinnamon coloring and yet only relatively mild cinnamon flavoring. In this case, the buyer would look for a rich-colored cassia cinnamon with a moderate oil content, or perhaps a cinnamon blend (in which two or more grades are mixed to give a desired performance). The blending of different cinnamon varieties or grades to create a customized product for various types of baked goods has become a standard practice.

Whether a buyer wants a single type of cinnamon or a blend, the first step is to deal with a quality-minded ASTA member or bakery supplier handling such a line. These firms have the technical facilities and experience as well as the integrity to ensure the customer gets full value and consistent quality in every shipment. Analytical chemical procedures are used today for determining the origin of cinnamon. An example of the modern controls available for spices is seen in the ASTA's *Official Analytical Methods* (see page 56 for information), which is used by its members and many other companies and laboratories. This series of analyses (one is specifically designed to determine the amount of cinnamic aldehyde in cinnamon and another to determine total volatiles) puts spice buying on a clear, scientific basis. Using these standardized procedures, the buyer and supplier have a common basis for specifications and bids.

For handling and storage information, see page 55.

Cloves

Probably the most fragrant fire in the history of the world was lighted in the forests of the Dutch East Indies (actually, the Moluccas Islands) in 1816. Its fumes could be detected for hundreds of miles, and its side effects were even more astounding. In addition to consuming thousands of trees, it caused a tragic native insurrection and may have changed the climate of the islands. All of the remarkable aspects of this fire were due to a single fact: The trees bore the spice we call cloves.

The story really began centuries before the fire, when the wonderful flavor of cloves was discovered. Records show this spice was already important to the Chinese thousands of years ago. In the Han period, 220-206 B.C., it was required that all court officials hold whole cloves in their mouths when addressing the Emperor—just to make sure their breaths were clean.

Cloves became one of the most prized spices in the West, as well. In England, for instance, before the discovery of the sea passage around the Cape of Good Hope, cloves cost the consumer 360 times more than their price in the Asian lands that grew them. Thus, cloves were one of the treasures sought by Columbus, Magellan and other explorers.

The great East Indies fire was related to another attempt to profit from the lucrative clove trade. Burning off young trees was the Dutch way of regulating supply and keeping prices high. But the natives of the area believed that the lives of their children were linked to the lives of the new trees they planted at the time of birth. The fire of 1816 destroyed an unprecedented number of young "birth trees" and the outraged natives could stand it no more. They revolted in a bloody insurrection led by Pattimura, "the George Washington of the Moluccas," who even today remembered as one of Indonesia's heroes.

The destruction of the clove trees was believed to have another effect: The climate of the Moluccas became so unhealthy that Dutch garrisons had to be relieved every six months. The reason, according to chroniclers of the times, was that the clove trees had given off such strong aroma that they had always mitigated the harmful effects of fumes from nearby volcanoes. When the number of trees was reduced so substantially, the remainder could no longer combat the vapors from within the earth.

Though the fire proved a disaster for the Dutch, it was an event some 40 years prior that triggered the loss of the country's clove monopoly. In the 1770s the ambitious governor of the French island of Mauritius—a M. Poivre—is said to have sent an expedition to the Moluccas, which succeeded in spiriting away some clove seeds and seedlings. Up to that time, botanists had been very sure that cloves would grow only in the Moluccas. But they were wrong. The clove tree is happy on any mountainous tropical island where, as the saying goes, it can "see the sea." Mauritius was such an island. From this original planting, seeds were sent to French islands in the Caribbean, as well as to Reunion, Madagascar and Seychelles in the Indian Ocean. Gradually, the islands off Africa, particularly Zanzibar and Madagascar, became the world's main sources of this spice.

CULTIVATION

Cloves are the dried, unopened flower buds of an evergreen tree, *Syzygium aromaticum L*. The tree is a myrtle that grows to a height of 30 to 40 feet. It begins flowering in about seven years and continues to produce for another 80 or more years. The tree can live for 100 years, and there are records of trees 150 years old.

The word *clove* comes from the French *clou*, or nail, which describes its shape. The bud is composed of two parts—the stem and a bulbous head. For sale as whole cloves, it is more desirable for the buds to be intact—that is, heads and stems attached, but this is not as important when they are to be ground.

To obtain the spice, the buds must be picked when the heads develop a pink cast, or just before they

open. If they are allowed to flower they have no value as a spice. In some areas there are two crops a year—one in the late summer and early fall, the other from late fall through the first of the year. It is the nature of the clove tree to vary its yield from bumper crops to light ones in cycles that range from two to six years. A mature tree may produce from 7 to 40 pounds in one harvest. At picking, the buds are fairly uniform in color, but as they dry in the sun, the stems turn very dark brown and the heads become light tan in color. It takes 4,000 to 7,000 buds to make a pound of dried cloves. During the drying, they lose two-thirds of their harvested weight.

MAJOR TYPES OF CLOVES

Cloves are produced in many parts of the world, from their native **Indonesia** to several countries of the Indian Ocean, to Latin America. However, most of our imports today are from the **Madagascar area** (including the Comores Islands). Tanzania (Zanzibar) was a major source, but in recent years production has declined.

The United States also imports what are called "hand picked" cloves from **Penang**, **Malaysia** and **Sri Lanka**. This trade term does not refer to harvesting but rather to the selection by hand of the biggest, best-looking specimens. These are used in fancy retail packs, or when a food manufacturer is using cloves to make an impressive garnish.

Indonesia is a major producer, but it is also the largest customer for cloves, because of its national penchant for clove-flavored cigarettes. Called *kreteks* (because they crackle when lighted), these cigarettes are two parts tobacco and one part cloves. The cigarettes use much of the world production of cloves.

The characteristic odor and flavor properties of the spice and the clove tree stems and leaves are determined by the composition of their aromatic steam volatile oil. The major constituent of the oil and oleoresin is eugenol, the ingredient that gives cloves its characteristic flavor and aroma.

For grinding purposes, there are no significant differences between cloves from the Madagascar area and those from other parts of the world. Volatile oil content is the essential quality factor in cloves and various areas consistently supply product that meets or exceeds 15 percent volatile oil. Origin specifications are not necessary in clove buying. Instead, the customer specifies volatile oil percentage, and various other analytical measurements, and the spice company meets the specifications from whichever source is currently available.

Clove oil products are distilled from the stems and the leaves as well as the buds. The leaves yield roughly two percent, the stems about four to six percent and the buds approximately 15 to 17 percent.

The bud oil is the premium product, used as a food flavoring and seasoning blend ingredient, and in high-quality perfumes. Stem oil, while it has a bud-type flavor is principally used as a less expensive replacement for the bud oil. Leaf oil is not ordinarily used in its crude form, but is further processed to isolate its eugenol and eugenol derivatives.

USING CLOVES

Cloves are the strongest of all the aromatic spices. As a result, they are used at fairly low levels, but in an extremely wide range of products.

In the United States, their most visible roles are in baked ham and certain sweet pickles. However, they have an important supporting function in countless spicing and seasoning combinations for sweet baked goods, sausages, luncheon meats and spreads, soups, salad dressings, relishes and casserole-type preparations, from baked beans to pot roast.

In addition to whole and ground cloves, substantial quantities of clove oil are used in the United States—some in good products, but heavily in perfumes, cosmetics, medicines, mouthwashes and toothpastes.

For handling and storage information, see page 55.

Coriander

The familiar Christmas verse alluding to "visions of sugar plums" probably referred to fruit-filled confections, but the original sugar plums were sugar-coated coriander seeds.

As with many spices, the origins of coriander seeds and leaves are lost in antiquity. It's safe to say that coriander has been used for thousands of years. One early record occurs in the Medical Papyrus of Thebes, produced in 1552 B.C. In the Book of Exodus, *manna* is described as being "as white as coriander seed." Early Babylonians and Assyrians mentioned it many times and coriander seeds were found in an Egyptian tomb of the 21st Dynasty (1090-945 B.C.). At first, coriander was favored more for supposed medicinal benefits, but by the third century B.C. the Romans had decided it was an excellent

seasoning for food. The Greeks and Romans also considered it an aphrodisiac.

Though coriander is native to the Mediterranean area, its cultivation spread quickly throughout Europe, the Middle East, India and Asia. It is believed to have been one of the earliest herb plantings in North America—dating to 1670 in Massachusetts—and it soon appeared in Latin America, where the leaves, rather than the seed, became most popular. In Thailand and China a third seasoning us derived from the roots of this plant.

CULTIVATION

As an annual herb of the parsley family, *Coriandrum sativum L.* is related to other herbs such as anise, caraway, cumin and fennel. The plant grows to a height of two to three feet. The leaves are finely divided, but flat—looking much like Italian parsley. The fruit (coriander seed) is mostly globular in shape with distinctive straight and wavy longitudinal ridges, or ribs; color varies from yellowish tan to deeper brown, with shadings of purple and dark spots in the growing tip area of seed from some origins. A globular shape is the norm but the seed from India resembles a football in shape.

There are three categories of coriander product on the United States market today: whole and ground seed; dried and freeze-dried leaves (cilantro) and oil and oleoresin extractives. In commercial practice one plant does not produce both spices; it's either seed or leaf.

CORIANDER SEED

Whole or ground coriander seed has a flavor that seems to be a blend of lemon and sage, with a sweet note as well. Though the plant is quite easy to grow and thrives in a wide range of climates and terrains, coriander seed is somewhat difficult to harvest. The fruit is suspended at the end of thin, fragile stems. Harvesting should be done in high humidity, when the stems are more resilient and shattering losses are minimized.

Major producers of coriander seed include **Canada, Morocco, India, Pakistan, Bulgaria,** and **Romania**. Other producing countries include **Iran, Turkey, Egypt, Israel, China, Thailand, Poland, Hungary** and the **Netherlands**. Countries such as India and Pakistan cultivate large amounts of coriander but much of the production stays in the country for domestic consumption. It is estimated that 25 to 40 percent of world coriander production is used in India for curry powders.

The predominant supplier of coriander seed to the United States is Canada. Over the past 15 years, Canada has replaced the traditional sources of Morocco, Romania, and Bulgaria. Canadian seed is mechanically harvested; it is very clean and is stored in silos for year-round availability.

Morocco produces a large low-oil seed, with prominently defined ribs and attractive coloring ("big and bold," as spice traders put it). It can run 1/8 inch in diameter or larger. Moroccan seed is light yellow, overall, but darker near the part where it has been separated from the stem. The tip of the growing point is always darker and turns purple-brown when the seed is ready for harvest. This color makes Moroccan-type seed easy to recognize. Because it is larger and very handsome, it is particularly suited to whole-seed uses, such as in mixed pickling and crab boil spices. Most of the Canadian production is of this large-seeded, lower-oil type.

Romanian seed is smaller than the Moroccan and color is light brown, with a dark brown growing spot at the tip end. The longitudinal ribbing is somewhat less defined than in the Moroccan seed. The Romanian product is popular with distillers and food manufacturers looking for stronger flavor. It has a high volatile oil content, requires a longer growing period than larger seeds and is most frequently used for production of coriander oil and oleoresin.

In addition to curry powders, large amounts of coriander seed are used by the distilling industry, primarily for gin, but also for various liqueurs. Sausage manufacturers, soft drink makers, confectioners, snack food producers and pickle manufacturers make up an important market.

CILANTRO

The young leaves of the coriander plant give us the herb that goes most commonly by its Spanish name, *cilantro*, but is sometimes referred to as Chinese parsley. Cilantro must be harvested before the plant flowers because it bolts quickly. A small-seeded plant is usually used for cilantro production.

Cilantro has a lively pungent flavor and aroma that is indispensable to many dishes. It is often used in Mexican and other Latin American dishes and in Chinese cookery, but it is also frequently found in recipes from the Middle East, India, and Southeast Asia (Indonesia, Thailand and Vietnam). Over the past 20 years, it has become quite popular in the United States. On the spice shelf, cilantro appears in either dried or freeze-dried form.

California is a major domestic producer of cilantro.

CORIANDER EXTRACTIVES

Both essential oil and oleoresin of coriander seed are available to food and beverage manufacturers. The oil is primarily produced in Europe and is one of the oldest spice extractives, mentioned in commercial records as early as the 16th century. Today it is used by distillers, soft drink manufacturers, picklers, sausage makers, and tobacco and cosmetics manufacturers. The sausage industry is the largest user of the oleoresin and the soluble seasoning products derived from it. The solubles are also used in snacks, pickles, and frozen and canned entrée products. The oleoresin, which contains both volatile and non-volatile extractives, has a relatively high volatile oil content. It is particularly suited to products that will be subjected to high heat processing and to foods that will be microwaved.

For handling and storage information, see page 55.

Cumin Seed

Cumin seed is an ancient spice, mentioned a number of times in the Old Testament and called the best of all condiments by Pliny, the Roman naturalist. It was prized both as a seasoning and a medicine, and some claimed that this strongly flavored seed kept lovers faithful and prevented chickens from straying. The Romans are said to have substituted cumin for pepper, creating a paste that was spread on bread.

By the Middle Ages, cumin seed had become one of the most popular spices in Britain and on the European continent. From the 16th century on, however, it seems to have gradually lost favor—perhaps supplanted by caraway. Germans still use cumin, along with caraway, in the liqueur *kümmel* and the Dutch have a delicious cumin-flavored cheese, but the spice has never regained the status it once enjoyed in Europe.

The Middle East, North Africa and India, on the other hand, continue to include cumin in many of their classic dishes, from couscous to curries. Eventually it became a staple seasoning of rice and beans and every other everyday fare throughout Latin America. In the United States, cumin has been incorporated into Mexican-inspired specialties such as chili con carne. Testifying to its South-of-the-Border connection is the fact that cumin seed packages in the United States usually include the Spanish word comino on the label. In the Southwest, even non-Latinos often call it by this name.

Cumin is the essential flavoring and aromatic factor in chili powder, an American invention, and an important ingredient in curry powder. As Americans have acquired a taste for Southwestern, Mexican and Indian foods, the use of cumin has shown substantial growth.

CULTIVATION

Cumin seed is the dried fruit of *Cuminum cyminum L.*, an herbaceous annual of the parsley family. The term *cumino dulce* is sometimes heard in Europe, but that refers to anise, not cumin.

Cumin is native to Egypt and has always been widely cultivated in a band which begins in the western Mediterranean and extends through the fertile crescent of the Middle East to India. Because the plant adapts to both warm and cool climates, it is grown to some extent in countries all over the world. In many places of origin, however, domestic demand leaves little for export. On the other hand, the fact that cumin is widely cultivated offers potential for drawing it from new sources as the political and economic picture changes around the world. Cumin seed is uniformly elliptical and deeply furrowed, looking somewhat like caraway seed, to which it is related, but without caraway's characteristic curved shape. The color is pale green to tan, but the shading changes somewhat according to source. When mature, the plants are cut, dried and then threshed to obtain the seed.

MAJOR TYPES OF CUMIN SEED

In the past, **Iran** supplied a major portion of United States imports of cumin seed. Due to political conflicts between the two countries, the United States now imports almost no Iranian cumin seed.

India is the world's largest producer of cumin seed, but it is also the largest consumer. The flavor and aroma characteristics of Indian and Iranian cumin are quite similar. The Indian industry markets its golden-brown product in several grades. The best available in the United States is designated "prime quality," with an essential oil content ranging from 3% to 5%.

The United States obtains varying amounts of cumin seed from other countries, depending on how much remains after domestic demand is met. **Pakistan, Syria** and **Turkey** are fairly constant suppliers. Cumin from these sources varies from 2% to 5% in essential oil, but the flavor characteristics may differ slightly from Indian seed.

BUYING AND USING CUMIN SEED

The higher the oil content of cumin, the more intense the flavor will be. Many spice companies are placing less emphasis on origin and more on oil content in selling cumin to industrial customers. Flavor and cleanliness are components of quality. The seeds are rarely used whole in the United States, except in retail packs, so appearance and uniformity are not usually prime concerns of the food manufacturer. For ground cumin seed, a typical specification calls for 95 percent to pass through a United States Standard 30 mesh screen.

Most of the cumin seed used in the United States goes into chili powder and other Mexican-style products. Indian cooking uses large amounts of cumin, which is an essential component of curries. It is also an excellent spice for rice dishes, stuffings, sauces and marinades, particularly for Middle Eastern dishes. Cumin can also be used in breads and even some sweet baked goods. Its usage in cheese parallels caraway, but the flavor is different. After chili peppers, cumin is perhaps the most distinguishing flavor characteristic of Latin American foods.

For handling and storage information, see page 55.

Dill

It is hard to believe that dill, which enlivens so many different dishes today, took its name from ancient Norse and Saxon words meaning to "lull." In earlier times, herbs were often named for their medicinal properties rather than their culinary virtues. Dill was thought to be a soporific as well as being helpful in alleviating hiccups, stomachaches and bad breath. It was also a popular "tool" of magicians and was used as a weapon against witchcraft.

Early Babylonian and Assyrian sources vouched for the medicinal value of dill, and the Romans gave their gladiators a tonic of dill. In some documents, including the Bible, the term "aneth" really referred to dill. By the Middle Ages, dill was widely used in cooking, but an interesting anomaly was beginning to develop. This plant, which was native to the Mediterranean, was becoming a staple of northern European cooking and was all but forgotten in southern areas. French and Italian cookbooks hardly mentioned it (except to call it "bastard fennel"), whereas it became central to German, Scandinavian and Russian cooking.

Dill's most famous culinary use–the dill pickle–is at least 400 years old. In his *Paradisi in Sole* of 1629, Parkinson noted that dill is "put among pickled cowcumbers where it doth very well agree, giving to the cold fruit a pretty spicie taste or relish." Among other writers of the era, Evelyn praised "gerkins muriated with the seeds of dill" and Addison wrote, "I am always pleased with that particular time of year which is proper for the pickling of dill and cucumbers."

Dill was introduced commercially into the United States in the 1850s, and has become increasingly popular in the United States in recent years.

CULTIVATION

Western countries, plus Russia and parts of the Middle East, grow the so-called "true" dill classified as *Anethum graveolens.* It is believed to be native to the Mediterranean and southern Russia. India and other areas in Asia grow a type called *Anethum sowa,* which is native to northern India. The principal difference is that the sowa seeds are larger, longer, and narrower in shape.

The dill plant is an annual of the parsley family that can reach a height of three feet. It is distinguished by umbrella-like clusters of little yellow flowers and fine, gracefully curving leaves. As a parsley, it is related to anise, caraway, coriander, cumin and fennel. Its flavor, though unique, has overtones of these relatives.

There are five types of dill products in commerce today: seed, leaves (normally called dill weed), dill seed oil, dill weed oil and oleoresin dill.

DILL SEED AND DILL WEED

Most of the dill seed destined for the spice shelf comes from **India**. It has a flavor that is similar to but somewhat stronger than that of dill weed. Indian seeds are elliptical in shape, slightly humped and with clearly defined ridges running lengthwise. The tan-colored dill seed's most prominent feature, however, is a thin, yellowish edge that frames it. When harvested, the seeds have a hair-like strand, or whisker, at one end. In years past, there was a "dewhiskered" grade designation in the spice trade, but today dill is so routinely "barbered" at the source that the term is no longer needed. Dill seeds yield between two to four percent essential oil. The principal component is carvone, which is also the main constituent of caraway oil. Ground dill seed is available industrially, but is not usually offered at retail.

No one seems to know why the leaves of the dill plant became known as dill weed, but it's a term widely used in the spice trade. Growers speculate that dill acquired this name because it is such a hardy plant. It seeds itself and thrives almost anywhere there is well-drained soil and plenty of sun. At one time, the "weed" designation was literal because most leaves came from wild plants, but cultivation is now more common.

In general, the leaves have a mellower, fresher flavor than the seeds. The United States, primarily in **California**, is the major producer of dill weed for the spice shelf. Egypt is our other important source. To obtain dill weed for use as a spice (rather than for extraction), the top eight inches of the plant are harvested and the stems removed. Some growers feel that it should be harvested before flowering; others say it's better afterward.

DILL EXTRACTIVES

Dill weed oil is the major dill extractive. Most of it is produced in Washington, Oregon, Idaho, and western Canada. It is a field-distilled product, since it is believed that the best quality comes from freshly harvested leaves. For this purpose, dill has been grown commercially in the United States for more than 30 years. Dill weed has less oil than the seed; it has a cleaner, fresher dill flavor than dill seed oil and one that doesn't seem as "oily." The dill oils are bought on carvone content, but the dill weed oil normally has less carvone than dill seed oil.

Little dill seed oil is used in the United States. Small amounts are imported from Europe and India (though spice buyers here think that most of the product that comes through Europe today is really Indian). Because it is higher in carvone, dill seed oil has a stronger, more intense flavor.

Oleoresin dill is prepared from the seed. Unlike dill weed and seed oils, which contain only volatile fractions, the oleoresin contains both volatile and non-volatile extractives. The color of oleoresin dill is light amber to green. Five pounds of the oleoresin is equivalent in flavor content to approximately 100 pounds of ground spice.

BUYING AND USING DILL

The pickle industry is the largest user of dill; for this purpose, dill weed oil is the main choice. Dill weed oil can be treated with emulsifiers to disperse easily in water/vinegar solutions. This product flavors evenly and does not discolor the liquid. When available, dill seed oil and oleoresin dill are also used in pickling. Whole and ground dill seed are used commercially in a wide variety of products, including sausages, baked goods, condiments, cheese, curry powder and dry mixes for sauces and dressings. Dill weed has become an important herb for the spice shelf. It is used in salads, sauces, breads, egg and seafood dishes. As already mentioned, dill is an important component of Scandinavian, Russian, Middle Eastern and Indian Foods.

Carvone content is the key to dill buying, especially in the extractives. However, high carvone content is not the only consideration in purchasing dill. The industrial buyer is best served by working with the supplier to secure the type of dill best suited for the purpose.

For handling and storage information, see page 55.

Fennel Seed

Fennel seed had its heyday during the reign of Britain's King Edward I, in the 13th century. According to his "wardrobe accounts," the royal household consumed over eight pounds of fennel seed a month! In contrast, at today's consumption rate in the United States, it would take eight years for 100 people to eat that amount of fennel seed.

There is no record of how fennel was used at the king's palace, but a writer of the same period gives us some insight: "Fennel is of great use to trim up and strowe upon fish, as also to boyle or put among fish of divers sorts, cowcumbers pickled and other fruits. The seed is much used to put in pippin pies and divers other such baked fruits, as also into bread, to give it the better relish."

The ancients believed that fennel seed was particularly helpful for eyesight. This theory may have stemmed from the writings of Pliny, who noted that the "juices of fennel" not only "quickened the sight" of snakes but helped them shed their skins in the spring and gave them a sleek and youthful appearance. Fennel was also thought to increase strength. Roman gladiators mixed it with their food before entering the arena and the victor was often crowned with a wreath of fennel.

Our word *marathon* comes from the Greek for fennel. The famed battle of Marathon, 490 B.C., was fought on a field of fennel. During the struggle, the Athenian athlete Pheidippides is said to have run 150 miles to Sparta for aid, and that is the root of our modern usage of marathon.

As with anything that has been known as long as fennel, there is a considerable body of mythology and folklore associated with it. Prometheus was said to have brought the spark of fire from heaven hidden in a stalk of fennel. Ancients felt that a bunch of fennel hung over a doorway would ward off evil spirits. And, as a remedy, fennel was prescribed for everything from weight loss to snakebite.

CULTIVATION

Fennel seed is the dried fruit of *Foeniculum vulgare Mill*. There are a number of variants in this family. The vegetable called fennel or, in Italian, *finochio*, comes from the plant known as Florence fennel, which develops bulbous stalks that are eaten raw in salads or in cooked dishes; the aromatic leaves are often used as a garnish or flavor enhancer. There is also a bitter fennel, the seeds of which are sometimes used in liqueurs. However, the fennel seed consumed as a spice comes from "sweet" or "garden" fennel. It is easily identified by its anise-like flavor and aroma.

A member of the parsley family, the fennel plant is a perennial, which grows to a height of three to five feet. It is a native of Europe and Asia Minor and grows in dry semi-acid soil. The leaves are feathery and finely divided. The flowers are small and golden-yellow and each produces only two seeds. These are about 1/8 to 5/16 inch in length, oblong or oval in shape and deeply furrowed lengthwise. The seed color ranges from green to yellowish brown.

MAJOR TYPES OF FENNEL SEED

Over the past decade, the major sources of fennel seed imported into the United States are **Egypt** and **India**. The amounts of seed from the two countries vary by availability in each crop year. Indian seed generally possesses a slightly higher volatile oil content and is characterized by light or pale green seeds of uniform size and shape. Egyptian seed is less uniform, but once the seed is ground, uniformity does not affect product performance. In recent years, **Turkey** has become an important exporter of fennel to the United States. Sources are often used interchangeably. Volatile oils of the various fennel seeds range from 1% to 5%.

BUYING AND USING FENNEL SEED

Industrial buyers can obtain fennel seed in three forms: whole, cracked and ground. Essential oil of sweet fennel is also available, as is an oleoresin. Today the biggest use of fennel seed is in Italian sausage, giving it a distinctive, anise-like flavor and aroma. A huge amount of this sausage ends up on pizza and this is a key reason that consumption of fennel seed has more than doubled in the United States in recent years. Fennel seed made the list of the top 12 spices consumed in the United States for the first time in 1998, nosing out basil for the final spot. In 2000, it ranked 14 in spice consumption (ginger and basil are 12 and 13). Fennel seed is used as a seasoning in other Italian-style products, including pepperoni and Italian loaf. It is also an ingredient of most curry powder formulations, some Italian-type breads and baked goods, and some varieties of sweet pickles.

Sweet fennel oil is used in liqueurs, candy, condiments, pickles, desserts, meat products and a number of pharmaceutical and cosmetic preparations.

For handling and storage information, see page 55.

Garlic (Dehydrated)

Garlic, known botanically as *Allium sativum L.*, is an annual plant that develops a bulb and a strong root foundation. Many spear-like leaves grow from the base of the bulb. As the bulb matures, the leaves dry down to create a protective outer layer surrounding each clove. Collectively, several layers of skins or sheaths protect the entire bulb from damage and moisture loss.

Because garlic is grown from individual cloves, the only improvement to garlic varieties has been through the selection of superior garlic types for specific uses. Just recently, fertile garlic varieties have been discovered and a method to produce true seed has been developed. Garlic breeding is still in its early stages, however, and no new varieties have been developed.

THE DEHYDRATION PROCESS

Garlic's tremendous popularity led producers to establish it as one of our first dehydrated vegetable seasonings. The character of the vegetable and the way it is normally used made it a natural for dehydration. In this form, there are no storage problems, no peeling and chopping or pressing necessary to add the taste of garlic to a dish. Another advantage: There is never any waste.

The domestic garlic dehydration industry takes meticulous measures to ensure an outstanding product. The garlic varieties predominantly used by

domestic manufacturers of dehydrated garlic are either California Early or California Late. California Late matures in eight months and is usually harvested in late July or August, while California early garlic requires a seven-month growing period and is generally harvested in late June or early July. Both are well adapted to natural conditions in California and give dehydrators an extended processing period. Typically, garlic grown for the dehydration industry has white skin, high solids content, good yield and no flower stalk.

After harvesting, garlic bulbs are washed to remove the outer skins and cracked carefully to obtain individual cloves. The garlic cloves are sliced and dried using various scientific methods, all of which are designed to reduce moisture to less than 6.8%. In the dehydration process, the sliced garlic is deposited on a stainless steel, continuous-conveyor belt that passes through a series of stages with different trays, air flow and retention times, depending upon the garlic variety and specified use of the product. Each stage is carefully controlled to optimize moisture removal and flavor retention.

TYPES OF DEHYDRATED GARLIC

Dehydrated garlic is milled into eight distinctive particle sizes: Large Sliced, Sliced, Large Chopped, Chopped, Minced, Ground, Granulated, and Powdered. Two additional forms of garlic are also available: coarse and fine agglomerated powder. Each product is developed to satisfy the requirements of various end uses. When flavor alone is important, the Powdered or Granulated forms are recommended. To the powdered form of dehydrated garlic, only a small amount of an anti-caking agent, such as calcium silicate (less than 2%), is added to impart free-flowing properties. When texture and mouth feel are important, the Minced, Chopped or Sliced forms are suggested.

The American Dehydrated Onion and Garlic Association (ADOGA) has established standard nomenclature for the various garlic particle sizes and has made available special bulk index control products for retail packs. Their Official Standards and Methods are available from dehydrated onion and garlic suppliers.

USING DEHYDRATED GARLIC

Dehydrated garlic can be added directly to most foods or blended with salt, pepper, and other seasonings. If it is added to a vinegar solution or to foods lacking enough water for hydration, it should be rehydrated. To rehydrate, add enough cool water to powdered or granulated garlic to make a smooth paste. Or, cover minced and larger-piece sizes with water and allow the garlic to soak 10 and 20 minutes, respectively.

One pound of dehydrated garlic has the equivalent flavor of five pounds of raw prepared garlic.

The growing popularity of dehydrated garlic can be attributed to its consistent quality and flavor on a year-round basis, a favorable visual appearance, a desirable pungency, and a product easily adaptable for all manufacturing purposes. Few seasonings have as many applications as garlic. Except for desserts and other sweet dishes, there is hardly a food that does not benefit from at least a small amount of garlic. Moreover, in certain sausages, cheeses, breads, sauces and snacks, garlic becomes so important that it defines the product – as in the case of garlic bread or a garlic spread.

PURCHASING

In the U.S., dehydrated garlic is packed in moisture-barrier containers including 55-gallon fiber drums, bag-in-boxes, multiwall bags, hermetically sealed cans, and jars. At retail, of course, the various forms of dehydrated garlic are available in a variety of smaller packages.

For handling and storage information, see page 55.

Ginger

A Greek baker on the Isle of Rhodes is credited with introducing gingerbread about 2800 B.C. If that seems to give ginger a certain venerability, consider the fact that the Greeks are thought to have learned about ginger from the Chinese, who had been using it a long time before that!

Actually, no one is sure how old this pungent spice is, or where exactly it came from, because ginger has never been found growing wild. The Chinese and Indians, however, were probably the earliest cultivators. And it was one of the first spices to be introduced and achieve prominence in the Western world.

Ginger pops up frequently throughout early Greek and Roman literature. The best guess is that most of it at that time came from India, but Arab traders who brought it to the Mediterranean were loath to reveal its origin. The word *ginger* comes from the Latin zingiber, which in turn is from *singabera*, an ancient

Indian Sanskrit, meaning “antlers” (which dried ginger roots resemble).

In the Middle Ages, ginger was valued on a par with black pepper. A pound of either was worth the price of a sheep. As with pepper, its pungency was prized for the preservation of meats and it frequently appeared in strong sauces and stews. It was also one of the earliest medicines, often prescribed for its carminative properties in treating stomach distress.

Gradually, however, the cake called gingerbread became the dominant use of this spice in Europe. This confection was know in England before the time of the Norman Conquest and manuscripts of the period referred to it variously as gyngerbreed, gensbrede, gyngerbrede, and gingibretum. Around the 15th century, creative bakers began shaping it into fanciful birds, animals and letters, and this led to gingerbread men. Gingerbread became the gift of love and respect. In Russia, at the birth of Peter the Great, the Czar received over 100 loaves of gingerbread, some of them weighing as much as 200 pounds, and made in the form of such things as the Russian Imperial Eagle and the coat of arms of the city of Moscow.

Unlike other of the tropical spices, ginger is easily transported in the plant form and, when the New World was opened, it was the first Asian spice to be introduced for cultivation in the Caribbean. Production was quickly established in Jamaica and by 1547 that island was already exporting ginger to Spain. Jamaica ultimately became known worldwide for the excellence of its ginger. Meantime, Portuguese explorers also took ginger plants to West Africa, where another ginger industry was established.

Gingerbread gave rise to a long list of ginger-spiced baked goods and sweet desserts in Europe. There were gingersnaps and ginger cakes, puddings, creams, biscuits, cordials and wines, as well as pickles and relishes. In the 1800s English taverns began keeping ground ginger at the bar for patrons to sprinkle atop their beer. From this came the inventions of ginger beer and ginger ale. While Europe favored ginger for baking and beverages, however, Asian countries valued it as an ingredient in savory dishes and condiments. To this day, it is an essential of Indian and Southeast Asian curries and probably appears more frequently in Chinese, Japanese and Polynesian main dish recipes than any other spice.

CULTIVATION

Ginger comes from the roots (actually, tuberous rhizomes, but more commonly called roots) of *Zingiber officinale Roscoe*. Much ginger is sold in the fresh form today, and the fresh roots are also preserved in syrup and offered as a confection. But it is important to note that the *spice* ginger comes only from the *dried* roots of the plant. Ginger is a perennial, growing two to three feet tall, somewhat resembling the iris. The flowers are mainly yellow with a distinctive purple lip. Most of it is harvested by digging up the whole plant and breaking apart the tubes after the leaves yellow and wither. Some of the tubers are reserved for propagating a new crop. The spice trade refers to whole pieces of dried ginger roots as “hands” or “fingers”. It is true that many pieces roughly resemble a palm with stubby fingers.

The appearance of dried ginger differs considerably, according to its origin and the processing it receives. Unpeeled hands of ginger have a rough surface and a tan color. Partially peeled pieces are lighter in color. The completely peeled product will shade to buff, even off-white, depending on origin. Dried ginger can also be bleached or sold as “splits”. The “split” is made when the whole rhizome is split in half lengthwise to shorten drying time.

MAJOR TYPES OF DRIED GINGER

The U. S. import statistics list more than a dozen sources of ginger, but some of them are shipping only fresh ginger at this time, while others are very small contributors of the dried product. Following are the major types of dried ginger currently available to U. S. buyers:

India has long been a large dried ginger producer. It has been a major UNITED STATES supplier of dried ginger for many years. Cochin is the designation for the Indian dried ginger we receive. This ginger is grown around the port of Cochin on the Malabar Coast. It is an unpeeled product that has simply been washed and dried. The whole hands are light yellow in color and have a subtle, lemon-like undertone in aroma and flavor, which comes from a small percentage of citral in the essential oil. The content of the essential oil ranges from 1.5 to 2.2 percent.

China is the world’s other major dried ginger supplier. The People’s Republic of China ships dried ginger in two forms – whole peeled and sliced unpeeled. The peeled product also comes in two grades - No. 1 and No. 2. The former contains larger pieces and has a somewhat lighter color. The peeled product in general commands a higher price. For the Chinese, the practice of slicing the unpeeled roots, resulting in “splits” is done to accelerate the drying

process. The Chinese ginger tends to be whiter in color than the Indian, somewhat more fibrous, and a little more bitter in flavor. It is produced mainly in the Southern provinces of Yunnan, Hunan, and Kwangsi.

Nigeria produces ginger for the American market. Australia has also developed a ginger industry, but much of the Australian product is imported as candied ginger. Australian ginger, which is mechanically dried, has a stronger lemon flavor due to the high citral content of the volatile oil.

FRESH GINGER

Over the past ten years, a large fresh ginger market has developed in the United States. The State of Hawaii has a domestic ginger industry and produced approximately 12 million pounds of fresh ginger in 1997. Top of the line Hawaiian ginger is available fresh from winter to late spring. South and Central American countries, Brazil, Costa Rica, Ecuador, Guatemala, Honduras, and Nicaragua, produce large amounts of fresh ginger for their home markets and for import into the United States. Thailand is another source for fresh, sweet, and candied ginger.

BUYING AND USING GINGER

The best recognized uses for ginger in the American market continue to be ginger ale, gingerbread, and gingersnap cookies. Otherwise, this spice is a "silent partner" in many cuisines. But in a quiet way it plays many parts. It appears in the formulas of scores of sausage products, as well as countless baked goods, other desserts, condiments, pickles, and spice blends. In ginger ale, other soft drinks, and pickles the oil or oleoresin extractives are normally used. These forms also find their way into medicines and cosmetics.

As indicated in the sections on the major types of ginger, there are subtle differences in color and flavor between the Indian and Chinese products. But these are not significant enough to affect the end use and therefore, origins are not usually differentiated in the ground ginger sold to industrial users. Specifications for ground ginger depend on the end use of the spice. ASTA recommends a maximum moisture of 12.0%. Volatile oil is usually at 1.5% minimum. Specifications for parameters such as ash and acid insoluble ash depend on needs of the buyer. It is advisable to let a knowledgeable spice supplier help formulate specifications according to the nature of the usage being planned.

Mustard Seed

As the title indicates, this brochure is about the spice mustard seed (whole and processed), not the condiment prepared mustard. Obviously, mustard seed is the base condiment and this is far and away the largest use of the seed. It's so important, in fact, that the present day name for the seed is believed to have come from the condiment, instead of vice-versa, as would normally be the case. As one explanation goes, the early Romans liked to mix the sweet "must" of new wine with certain crushed seeds which they called *sinapis*. The resulting paste was called "mustum ardens" (hot must). As time went on mustum ardens became "mustard" and the seed itself took the same name. *Sinapis* was left to the botanists.

Mustard can be considered one of our most ancient spices. Pythagoras, the Greek Mathematician wrote of mustard's medicinal properties five centuries before Christ, and it is believed to have been widely used in Africa and China centuries before that. Jesus, of course, immortalized mustard when he spoke of the power of faith even if it were no larger than a tiny mustard seed.

Later, after the Romans spread their fondness for mustard to Gaul and Britain, preparations of mustard paste became more sophisticated. The town of Dijon, in France, is said to have begun making its now famous prepared mustard as early as the 13th century.

Among mustard's many claims to fame is the fact it was the subject of what may have been the longest food advertisement in history, a 3,000 worder by Alexander Dumas, for the mustard house of Bornibus in Paris in 1870. A colorful treatise on the history of prepared mustard, it is reproduced in his "Dictionary of Cuisine."

The modern era for mustard seed, however, began in 1720 when a Mrs. Clements of Durham, England, found a way of milling the heart of the seed to fine flour. This was later industrialized in England in the 19th century and became the standard method of processing the seed for use as a spice in cooking and also for prepared mustards.

Mustard seed is widely cultivated and is much used throughout the world, but Americans, with our penchant for hot dogs, have become by far the largest consumers.

CULTIVATION

The mustard plants, which give us the spice, are part of the broad genus *Brassica*, from which we also get cabbages and turnips.

Within the mustard group of *Brassica* there are three classes of plants, which produce the spice seeds:

Brassica hirta Moench – supplying "yellow" or "white" mustard seeds.

Brassica juncea – from which we get both "brown" and "oriental" mustard seeds.

Brassica nigra – which gives us "black" or "Trieste" mustard seeds.

(The famed Swedish botanist, Linnaeus used *Sinapis* to refer to the mustard group, but *Brassica* appears to have become more widely accepted today).

There has been considerable confusion over terms in mustard seeds, caused mostly by color descriptions. For example black mustard seeds are actually more brownish in color and for a long time were known as "English Browns" in that country. This has led some writers to assume that Brown and Black species are the same, but this is definitely not the case. Further confusion has been caused by the fact that although brown and oriental seeds are both from the same species, oriental seeds are actually yellow in color.

MAJOR TYPES OF MUSTARD SEED

The seeds of the *Brassica hirta* are slightly larger than the other types used in food, averaging about 3mm in diameter and flattened laterally. As the names above imply, they are mostly a pale straw color. They also have a slightly pinkish cast and there can be an occasional light brown one. The major distinction of the yellow mustard seed is that its sharp taste stems from a non-volatile flavor substance. This gives it sharp tongue taste but not aromatic pungency.

Yellow mustard is thought to have originated in Europe. Today it is widely cultivated there and we still import it from such countries as Denmark and the United Kingdom. However, as with the other mustard seed types, most of our supply now comes from Canada and the Dakotas-Montana area.

Both types are from the *Brassica juncea*. They share the same chemical make-up; though the average fixed oil tends to run somewhat higher in the oriental while the protein and fiber content are typically higher in the brown. The seeds of both are about 2 mm in diameter. The brown seeds are reddish brown to dark brown in color, but the oriental seeds are mostly light yellows with an occasional brownish one. The important difference in this species (applying to both brown and oriental) is that the seeds contain a volatile oil, which produces a very pungent aroma as well as bite. The effect is like that of horseradish, a sensation that shoots quickly to the sinuses. Chinese restaurant mustard, the hot English mustard, and Dijon and German mustards all exhibit this effect because all are made from brown or oriental seeds.

The *Brassica juncea* types probably came from Africa, India, and the interior of China. Today they are widely cultivated. The U. S. draws most of its supply from Canada and our northern plain states. In recent years the oriental seed has been replacing the brown in the Canadian and American growing areas.

The *Brassica nigra* seeds are not unlike brown mustard seeds in outward appearance. They are about 2mm or less in size but tend to be a little more oblong than spherical. This species is thought to be native to Europe and the Middle East and until comparatively recent times it was the main seed of commerce in Europe. Since World War II, however, brown and Orientals have gradually replaced it because they can be grown more economically. The black mustard is of no consequence in the U. S. market today.

THE UNIQUENESS OF MUSTARD

No other spice is quite like mustard. Its flavor and pungency can only be fully experienced by triggering an enzyme action, which releases it. The most effective trigger is water at room temperature, although low-acid liquids like milk and beer will also work. Acidic liquids, such as wine, vinegar, and lemon juice are poor triggers (but good substance preservatives) of the flavor. Heat, as in cooking, can also impede the flavor release. As a result it is best to moisten mustard powder with water and let it stand for 10 minutes before adding it to just about any food preparation, including salad dressings. Incidentally, any powdered mustard will produce the fire of a Chinese restaurant mustard if it is wetted to a thin paste and left to stand 10 minutes. However, it should then be used immediately, because its pungency disappears within a few hours unless vinegar or other acidic liquid is added.

Unlike other pungent spices (i.e. pepper and the capsicums), mustard's bite does not build up or persist. Hot mustard consumed with an appetizer will not dull the appreciation of foods, which follow. Conversely, low levels of mustard (in mayonnaise and sauces) actually stimulate the sense of taste.

Mustard also has a unique ability to emulsify liquids. Powdered mustard added sufficiently to salad dressing will hold the oil and the vinegar together.

Mustard absorbs liquids in foods. This not only helps prevent separation but also provides liquid control in wet products. The powdered mustard has been shown to absorb 1.5 times its weight in salad oil and twice its weight in water.

Mustard is also a preservative. Its essential oil inhibits the growth of certain yeasts, molds and bacteria.

BUYING MUSTARD SEED

The spice mustard comes in three forms for the industrial buyer:

I. Whole Mustard Seeds

As sold in this country, the whole seeds are select, bold (big) seed of the yellow type. They are used primarily in pickles, relishes, and condiments where the appearance of whole seeds is attractive.

II. Powdered Mustard or Mustard Flour

This is the most important processed form of mustard seed. At retail it is labeled "powdered" while industrially it is often termed "flour" which is one of its designations in the FDA standards. As with wheat flour, the husk (bran) of the seed is removed by milling and the heart ("midlings") of the seed is finely ground. The heart meat can be milled to a uniformly fine powder, which disperses and blends particularly well in cooked foods, sauce products, and prepared mustards. Mustard flour is usually a blend of oriental/brown and yellow seed. The miller thus produces a product, which can be adjusted to meet the buyer's end-use requirements. Industrially, the buyer purchases on the basis of specifications for such criteria as flavor (amount), heat and pungency levels, fineness of grind, color and protein content. Other factors, such as desired shelf life for the end product, may be determinants as well.

III. Ground Mustard

Sometimes called "mustard meal," this is the product of grinding the whole seed, husk included. It may be a blend of yellow and brown/oriental seeds but is mostly prepared from yellow alone. Its principal customer is the sausage industry. The point is that the husks contain a mucilaginous substance, which acts as a good binding agent in sausage products. The ground mustard thus offers this feature in addition to flavor.

When the fixed oil is wholly or partially removed from ground mustard, the resulting by-product is termed "mustard cake." Since the oil removed is a vegetable oil, which does not contribute to flavor, the other valuable properties remain in the cake. This product does not have use in blending, and is not a significant item in commerce today.

Nutmeg & Mace

Nutmeg and mace are two different spices from a single fruit. It is a fact sometimes confuses people now, but in the past it was positively mystifying. One well-worn tale of a time when the price of mace in Europe rose so much higher than that nutmeg that Amsterdam officials sent a message to the Dutch governor in the East Indies asking him to burn the nutmeg trees and plant more mace!

Until the late 18th century, the world's only source of nutmeg and mace was the islands called the Moluccas (or "Spice Islands"). When the Dutch took control of this area, nutmeg and mace were among their richest prizes, they proceeded to establish one of the tightest monopolies the world has ever known. Nutmegs – the seed of the trees – were limed before shipment in the belief that this made them infertile.

There is a legend that it was a Frenchman named Mr. Poivre started the erosion of Dutch control by smuggling some seedlings of nutmeg out of the East Indies and planting them on the island of Mauritius in the Indian Ocean. Whether this story is true or not, it is a fact that transplantings occured in the late 18th century and a number of other areas began producing these spices. Eventually, the British West Indies – principally Grenada – became the world's second most important source of nutmeg and mace.

Today, Indonesia supplies about 50% of UNITED STATES nutmeg and mace. West Indies supply 25% and the remainder comes from India and other countries. Nutmeg and mace have a spicy-sweet flavor that adds appeal to all kinds of foods, from sweet baked goods to cream-based preparations such as custards and whiter sauces. Nutmeg is lighter in color and less intense in flavor than mace.

CULTIVATION

The fruit of the nutmeg tree resembles a small peach, or apricot. In place of soft, juicy flesh, however there is a thick, fibrous husk underneath the skin of the nutmeg fruit. Inside is a thick layer of lacy material, which produces mace; it surrounds the seed shell and the seed itself, which is the spice known as nutmeg.

When ripe, the husk splits apart, revealing the crimson mace inside. At this point, the fruit is

harvested, and the mace is carefully peeled away from the seed shell. Once removed from the seed shell, the "blades" of mace are spread out to dry. The nutmegs are dried in the shell until they rattle when shaken. The very thin shells are then cracked and the nutmegs removed.

Nutmegs are predominantly oval in shape, but some are nearly round. They are approximately an inch in length and three quarters of an inch in diameter, with a ridged, or wrinkled surface that is light brown in color. Nutmegs are solid throughout and a cross section shows a heavy network of dark brown veins in which the volatile oil is found.

MAJOR TYPES OF NUTMEG

East Indian nutmeg is produced commercially in the islands of Siau (Siauw), Sangihe, Ternate, Amboina, Banda, and Sumatra. Whole nutmegs from this area used to be graded by size, but today most are imported in a broken/cleaned condition to help meet cleanliness specifications. There is also a whole grade of whole nutmegs called ABCD, which consist of mixed sizes, and one known as Shrivels, composed of heavily wrinkled nutmegs. Though less attractive, this grade can have an excellent volatile oil content. Finally, the lowest grade of nutmegs, BWPs (broken, wormy, punky) is only used for extraction. In general, the East Indian nutmegs are highly aromatic, with a distinctively characteristic bouquet. They test high in steam volatile oil and not so high as West Indian in fixed oils – the reason for their excellence and characteristic aroma and flavor.

West Indian nutmeg is the other major type available in the UNITED STATES market. It is produced mainly in Grenada, but also on the islands of St. Vincent, and Trinidad. The majority of nutmegs from this area are shipped to the UNITED STATES in a grade known as "SUNS" (sound unassorted nutmegs). A smaller percentage arrives sorted by size; popular sizes are 60/65, 80s, and 110s (referring to the number of nutmegs in one pound). The flavor and aroma of West Indian nutmeg compares favorably with the East Indian product, but on averages is lower in steam volatile oil and higher in fixed oils. As a result, it is milder in flavor and somewhat lighter in color.

MAJOR TYPES OF MACE

The two sections or "blades" of mace surrounding each nutmeg are joined at the bottom. When harvested, mace blades are scarlet. After being dried, they change to an orange or yellowish brown color. Thin and lacy, mace is very light in weight. For every one hundred pounds of nutmeg a tree produces, it yields only three and one-half pounds of mace.

East Indian mace comes from the same area od Indonesia as nutmeg. Traditionally, the mace from the island of Banda has been considered the grade; however, very little is commercially available in the U. S. today. In general, East Indian mace is a brilliant orange color, tests high in steam volatile oil and has a rich flavor. It is shipped in four grades: No. 1 Whole, No. 1 Broken, No. 2 Whole (darker color) and No. 2 Siftings. Mace is quite fragile after it is dried, hence the "broken" grade. The No. 2 "Siftings" designation refers to the broken blades, plus the smaller bits of dark pieces which result from breakage at the time mace is peeled from the nutmeg shell.

Unlike East Indian mace, which is sundried, **West Indian mace** is cured after drying. Curing consists of storing product in the dark for about four months. During storage, the color changes to a pale yellow. Mace from this area is shipped to the UNITED STATES in three grades: Whole No. 1; Broken No. 1; No. 2 Siftings (or Peelings). The "Siftings" grade refers to small, discolored pieces.

BUYING AND SELLING NUTMEG AND MACE

Nutmeg and mace are usually classified as baking spices because both are particularly good in sweet foods. They find a much wider range of use than other "baking spices", however. For example, they are frequently included in formulas for frankfurters and other meat products. They are much used in soups and preserves, in sauces and in combinations with dairy products (such as eggnog). Mace tends to be sweeter and more delicate than nutmeg. For foods such as pound cakes, cream pies and cream soups, mace is often chosen because of its lighter color.

As with other aromatic spices, the quality of nutmeg and mace is judged largely on essential oil content, as determined by steam volatile oil distillation. The richer the oil, the more intensive the flavor and aroma. Naturally, the grades testing higher in steam volatile oil command the higher prices. But, remember that the more intensively flavored spices often prove to be the best buy in the long run because their flavor goes farther in the end products.

The buyer should insist on pure ground nutmeg and mace. The type and grade to buy depends on the intended use. Frequently, a specification will require a certain level (or range) of volatile oil. To meet this, a quality -minded spice supplier can blend different grades of nutmeg or mace from the same area, so that the final product is consistent in every shipment.

Fine grinds are not recommended for nutmeg and mace, as they promote caking. A practical grind for

these spices is one in which 95% will pass through a U. S. Standard No. 25 sieve (or a Tyler No. 24).

The most important consideration in any spice purchase is the choice of supplier. A top quality spice house can help the buyer develop practical specifications if desired, and can live up to them consistently. In preparing specifications and maintaining quality control, the American Spice Trade Association's Official Analytical Methods * can form a sound basis. When requirements are stated according to ASTA methods of analysis, buyer and seller will be speaking the same language.

For handling and storage information, see page 40.

Onion (Dehydrated)

The cultivated onion belongs to the *Allium cepa L.* species of the lily family, and is one of the world's oldest crops, originally grown somewhere between Western China and the Caspian Sea.

Onions were depicted as food in Egyptian tombs as early as 3200 B.C. The Egyptians considered the onion a symbol of perfection. In ancient India, onion was described as having beneficial medical properties, and in Roman times, Nero praised its value for improving his voice. Onions are mentionedin the Bible and in the Koran. Columbus planted onions to the New World on his second trip, in 1494.

There may be some truth to the ancient legends: Scientific research suggests that onions possess useful antibacterial, fungicidal and antioxidant properties.

CULTIVATION

Onions are bulbs that grow into a biennial plant. During the first year of growth, the plant stores food at the leaf base, ready to send up new leaves and a flower head the following year. As a vegetable we treat onions as annual plants and eat or process the bulb before it has a chance to flower.

There is tremendous demand for onions and they are grown domestically around the world, except in the tropics. Depending on the quantity used and the cooking method, onions add subtle or forthright flavor to many different foods.

Dehydrated onions offer several advantages compared to the fresh product. Preparation time in a home kitchen or food processing plant is likely to be shorter because the onions are already cleaned, peeled, trimmed, sliced, diced or ground. No waste or mess, because dehydrated onion is all usable. And dehydrated onion offers consistent flavor, whereas raw onions vary widely in pungency and flavor.

The UNITED STATES is the world's largest surplus producer of onions, most of which are grown along the Pacific Coast. California has the largest growing area. Some onions for dehydration also are grown in Western Arizona, Oregon, Washington State and Nevada.

Onions for drying are grown from seed and requires about seven months for maturity. Plantings begin in the Imperial Valley of southern California and continue north as the season progresses through the San Joaquin Valley to the Oregon border. The first harvest is from the Imperial Valley in early May, and the season continues into November. Onions can be grown in a variety of soil conditions. However, fine stone-free, well irrigated soils are preferred.

The largest UNITED STATES manufacturers of dehydrated onion are located in California, and some dehydrated onions are imported from Japan, Korea, Peru and other countries.

Dehydrated onion is produced by removing the water from the raw onion to a maximum level of 5%, followed by milling or separating to specific particle size.

Prior to drying, the onions are cleaned and peeled, their roots and tops are removed, and the onions are washed and sliced. The sliced onions are placed on a stainless steel, continuous conveyor belt that passes through a series of dryers with different temperatures, air flows and retention times. Each stage in the useful antibacterial, fungicidal and antioxidant properties.

CULTIVATION

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Onions grown for dehydration in the UNITED STATES should have white outer skins, have a high solids content, and good pungency and flavor. Strains of the Southport White Globe, well adapted to growing conditions in the Western UNITED STATES, are used extensively by the American onion dehydration industry, Plantings are staggered for harvesting from early spring to late fall. The White Creole and Creoso onions are also sometimes used for dehydration,

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Prior to drying, the onions are cleaned and peeled, their roots and tops are removed, and the onions are washed and sliced. The sliced onions are placed on a stainless steel, continuous conveyor belt that passes through a series of dryers with different temperatures, air flows and retention times. Each stage in the drying process is carefully controlled to remove the optimal amount of moisture without damaging the onion's volatile flavor compounds or color.

The enzyme system, which develops the onion flavor when the cells are cut or broken, is heat sensitive.

After dehydration, the slices are milled and separated within designated ranges to yield specific particle sizes.

BUYING DEHYDRATED ONION PRODUCTS

To a buyer, the choice of size depends upon the onion's specific use in a food product. Where flavor alone is the important factor, powdered or granulated onion is recommended. If appearance, texture, and mouth feel are important, larger particles are needed.

All the various sizes of dehydrated onion are available in toasted form. Toasting gives the product a more robust onion flavor.

The American Dehydrated Onion and Garlic Association has set up standard for nomenclature for the various onion particle sizes and has provided bulk index tolerances for some types of packaging.

USING DEHYDRATED ONION

Dehydrated onion may be used in all formulations or recipes calling for onion. In foods with sufficient liquid, such as soups and stews, no rehydration is necessary. If it is to be added to foods that are highly acidic, such as vinegar-based recipes, or to foods lacking enough water for hydration, then prior rehydration is required. To rehydrate, cover the onion with cool water, allow to stand 20 to 50 minutes depending on particle size, drain, if necessary, and add to the formulation.

As is true of all dehydrated vegetables, the weight of the reconstituted onion will be slightly less than the weight of the original raw product, because the water-absorbing capacity of the onion is decreased by the dehydration process. Flavor, solid matter, and appearance all compare favorable to raw product, however.

One pound of ground, granulated or powdered dehydrated onion is the equivalent in flavor to about 10 pounds of fresh onion (the ration is 1:8 for dehydrated sliced, diced, chopped or minced onions).

For handling and storage information, see page 40.

Oregano

The ancient Greece referred to oregano as "joy of the mountain" (*oros* meaning mountain and "ganos" meaning joy). It was a wild herb that favored hilly terrain. Interestingly, the roots of oregano help bind soil and keep it from washing away on the steep slopes.

Oregano's story is perhaps one of the most unusual in the herb world. Although, it has been known and

used for centuries, its meteoric rise in popularity is recent.

It is difficult to trace oregano's early history with certainty because of its closely entwined relationship to its cultivated cousin, marjoram. One source will attribute a bit of lore to oregano and another will credit the same fact to marjoram. They are both of the same genus have long been confused.

One fact seems clear, however. Oregano was not as widely used in cooking as was marjoram, except along the shores of the Mediterranean. Herb usage in the Middle Ages and eventually in America put heaviest concentration on the garden plants. Sweet marjoram was one of the most popular of these. On the other hand, few people even attempted to cultivate oregano (for one thing, those roots which adapt it to hillsides have a tendency to crowd out other plants in a garden).

But, the story was different in Italy, Greece, and other Mediterranean countries, as well as in Mexico. There it became a tradition to pick the wild oregano, in recognition of its affinity for tomato-based sauces, lamb, seafood, chili peppers, and almost any dish flavored with garlic. It was not until after World War II, when returning G. I. brought back a love for pizza that oregano was "discovered" in this country. Not only did pizza call for oregano, but it was placed it right on top of the crust where people noticed its enticing flavor and aroma.
From an herb with volume so low the Department of Commerce never listed it separately in import reports, oregano to a million and a half pounds a year by the 1960's and imports have since grown to 14 million pounds. This fact becomes all the more remarkable when one considers that a pound of oregano is enough to flavor pizza for a family of four everyday for a year!

Most recently, oregano has enjoyed another boost – from the current boom in Mexican –style foods.

HOW OREGANO GROWS

Botanists agree that oregano is an herb of the mint family, but they have been debating its proper classification for centuries. Tradition in commerce recognizes different plants, both wild and cultivated as oregano. The public frequently confuses this herb with marjoram.

Oregano from the **Mediterranean area** is *Origanum vulgare L.*, meaning it is a wild species of the genus *Origanum.* Marjoram (now called *Origanum majorana*) is a member of the same genus. Though some people refer to oregano as "wild marjoram" this classification shows that the reverse is true (marjoram is really a cultivated species of *Origanum).*

Long established trade practice also recognizes the leaves of certain plants in **Mexico** as oregano, since the flavor and aroma bear a "family" resemblance to the Mediterranean oregano (though far from identical). Mexican oregano is from the genus *Lippia*, quite distinct from *Origanum.*

The two major designations for oregano in commerce today are Mediterranean and Mexican. Though crops fluctuate from year to year, imports from the Mediterranean are approximately twice those from Mexico.

Greece was for many years a leading source of Mediterranean oregano. For the past several years, however, Turkey has been by far the leading supplier of oregano to the U. S., followed by Greece and Israel. Though Italy harvests a great deal of oregano it is such a heavy user that comparatively little finds its way here.

There is an old adage in the trade that oregano from either side of the same mountain may be different. It is certainly true that there can be flavor differences, but the essential characteristics are the same throughout the area. The Mediterranean-type product, as compared to the Mexican, is a smaller leaf of somewhat lighter green color and milder, sweeter flavor. Compared to sweet marjoram, however, it is stronger flavored and has a slightly bitter, minty taste.

The harvesting and processing of oregano is similar in Mediterranean countries and Mexico. The picking is apt to be done by the whole family, including women and children. They sell to collectors who go from village to village, and they in turn sell either directly to the shippers or their agents. The shippers do the cleaning, removing stems and buds and any foreign matter, and during this process the dried leaves are broken and sifted to various sizes. There are no grade designations within the producing areas, but as will be discussed under the Buying section, this herb is often sold by mesh size, indicating average particle size.

Mediterranean oregano will typically has a minimum of 2% for its essential oil.

The Mexican variety is a much more robustly flavored oregano. Some people describe its flavor quality as "wild", in comparison to the Mediterranean type. The leaves in their original form are larger and a somewhat darker shade of green. The flavor strength is also confirmed by a higher essential oil content, which averages 3% to 4% percent. Because

Mexican leaves tend to curl up when dried, the herb was once called “curly leaf oregano” in the trade.

The intended end use is the key to buying oregano. Between the Mediterranean and Mexican types, the question is not so much which is better but what flavoring effect is desired. For an Italian or Greek specialty product, there is no question but that you should be buying the Mediterranean oregano has the authentic flavor that is needed. For that matter, the eastern half of the United States, because of a heavy Italian population and consequent exposure to this type of oregano, is apt to think of the Mediterranean as more typical oregano. On the other hand, chili powder and all the products flavored with it would not be properly flavored with any but the Mexican oregano. By the same token, westerners making a barbecue sauce would probably want Mexican oregano because it is what they know as oregano.

The second key is appearance. As mentioned, the foreign shippers sift the leaves to size when cleaning them. From Europe, it is typical to be given a choice of 30, 50, or 60 mesh oregano – the 30 mesh yielding the largest leaf particle size and the 60 the smallest. Not all sizes are regularly available from spice companies here, but the guideline is that the larger leaf particles give the choicest, more refined appearance. And the more refined the product is the more flavor you receive per pound. In Mexico, shippers often refer to their most refined product as “Greek cut.”

The industrial food customer in the U. S. is given a basic choice of ground or whole leaf oregano (which may be termed “cracked” or “broken flaked” or some similar designation which recognizes that the leaves are not in the original whole form). Beyond that, various mesh sizes may also be available, but rather than be specific on that point, the buyer is better served by letting his supplier know the end use and asking for the best product available.

Paprika

During a Turkish invasion of Hungary in the 16th century, a new crop was introduced to the land of the Magyars. They called it “Turkish pepper,” which in Hungarian became *paprika*. The spice flourished in its new home and grew so popular that it inspired a classic dish known as *paprikash*, made with chicken, meat or fish. Because of its attractive color, paprika eventually became known as the “garnish spice”.

In reality, paprika wasn’t Turkish at all. It was a product of the New World - a member of the huge plant family of pod peppers called *capsicums*, which are native to the Western Hemisphere. Turkey was simply one of many places that received seeds of capsicum plants soon after the discovery of the Americas.

As it developed in Europe, however, paprika became a spice somewhat different from its relatives across the Atlantic. The peppers that Columbus and his men found the natives eating were fiery pods.

In Europe, under different soils, climates and cross breeding, the fruit of these capsicums took on new characteristics. In Hungary, the traditional peppers became much milder than their American cousins, but they still retained a distinctive nip. In Spain, where the returning *conquistadores* had also transported capsicum seeds, they developed products with varying amounts of heat; today, the mildest of these is most commonly exported to the UNITED STATES

Regardless of their particular characteristics, all the European peppers eventually became known as paprika. In recent decades, the paprika story has taken an interesting turn. Increasing quantities are now being produced in the hemisphere of its ancestors. In western states of the UNITED STATES, there is a thriving paprika industry that includes both sweet and mildy pungent types.

CULTIVATION

The brilliant red powder we know as paprika comes from the dried pods (fruit) of the plant species *Capsicum annuum L.* As such, it is part of a clan that ranges from the sweet Bell peppers we eat as a vegetable to the very hottest of chilies. Since several varieties are used to produce paprika, pods in one growing area may differ in shape and appearance from those of another. Some have a round shape; others are elongated. In general, they are medium to small, as peppers go, and quite fleshy. They grow on small, bushy plants which are members of the *Solanaceae* family (also includes tomatoes, potatoes, morning glory). When ripe, they are picked and either spread out to dry in the sun or dehydrated in specially constructed dryers or in continuous belt, multistage driers, depending on the producing area.

Unique in the spice realm is the fact that paprika always refers to a dehydrated, ground product. It is processed into powder where it is grown, whether overseas or domestically.

Paprika peppers are selectively bred for color and flavor. These factors can be further controlled to a certain extent in processing the harvested pods. The seeds and veins have negligible red color; therefore the more of these materials the processor removes, the more intense will be the extractable red color of

the ground product. Removal of vein material also may affect pungency, since whatever pungency is present in paprika pods is found in the veins.

One of paprika's extremely interesting attributes is its content of vitamin C (ascorbic acid). The Hungarian scientist, Dr. Szent-Gyorgyi, who won a Nobel Prize in 1937 for his work on vitamin C, found paprika pods to be one of the richest of all sources of ascorbic acid. Paprika also contains vitamin A.

THE MAJOR TYPES OF PAPRIKA

For many years, the **American Southwest** (California, New Mexico, Arizona and Texas) have been the major suppliers of paprika to the domestic market. The American paprika is scientifically cultivated and mechanically dried, making it possible to adjust moisture for maximum stability and retention of maximum color extraction value. American paprika is visually red - orange in color and its producers were among the first to standardize color and ship uniformly throughout the year.

Over the years **Spain** has supplied most of the imported paprika used in the United States. Spain produces a sweet paprika in a wide range of color values. The Spanish government sets up minimum standards for each crop. Spanish paprika can be ground to the customer's specification, but a medium grind, known as "freeflowing," is normally shipped. Other grinds can be requested. Today, Spanish shippers are selling paprika on the basis of ASTA color for extractable color. Spanish paprika is produced from a round capsicum fruit and has a sweet flavor. It is reddish brown in color and is heavily used in the meat industry.

Historically, **Hungary** was our second largest supplier of paprika to the UNITED STATES, but in the past few years the bulk of their crop has been sold in Europe. Hungarian paprika, produced from long peppers, has a distinctive flavor and is in great demand in Europe, where it is used as a seasoning as well as a coloring agent. It is bright red in color. In recent years Hungary has produced sweet as well as hot paprika to suit the requirements of UNITED STATES buyers. Both "freeflowing" and regular grinds are shipped for all types of Hungarian paprika.

Other major producing countries for paprika include **Chile, Israel, Morocco** and **Mexico**. In addition, the African countries of **Zimbabwe** and **South Africa** have become important producers of paprika in recent years.

WHICH PAPRIKA IS BEST?

Paprika is used primarily for its coloring properties and sometimes for flavor. The end use determines which of these factors is most important and, therefore, which paprika is best for a particular buyer. In general, a high extractable color rating enhances the value of paprika, but in many cases this can also be the most economical product to use, since less may be needed. The yellow-orange to red-orange hue of paprika is created by a mixture of carotenoid pigments biosynthesized in the pod.

The term "extractable color rating" (amount of color extracted by an appropriate solvent) is important because surface color is not always a reliable indication of paprika's ability to color a food. Occasionally, a paprika that looks richly red to the naked eye will deliver less extractable color than expected in a finished food product. This is because the surface color can vary with fineness of grind, amount of heat (temperature) developed during processing and the moisture content. Storage temperatures and humidity at the time of grinding-as well as the raw material itself-may also affect the outward appearance. This is not to say, however, that surface color should not be considered; it should, along with the grind and the color extraction value. When garnishing is important, surface color alone is a consideration.

BUYING PAPRIKA

ASTA has an official method for measuring color: Method 20.1., Extractable Color in Capsicums and Their Oleoresins. * Commercially available paprika usually ranges from 65 ASTA color to 180 ASTA Color. When specifications call for paprika on the basis of standard ASTA color units, the buyer and seller can be assured they are speaking the same language. Today, this method is being used worldwide.

The typical standard grind for retail pack paprika calls for 95% to pass through a UNITED STATES Standard #40 (Tyler #35) sieve. However, the bulk buyer has a wide choice in grinds, depending on the preference and end use. The finer the grind the more possibility of caking, but there are product situations where a very fine grind may be indicated. Producers may add up to 2% silicon dioxide, a free-flow agent approved by the Food and Drug Administration. (For information on *ASTA's Official Analytical Methods*, see page 56.)

OLEORESIN PAPRIKA

Oleoresin paprika is an oil-soluble extract prepared with the use of a solvent from dried, deseeded, and ground paprika pods. After extraction, the solvent is removed under vacuum to meet prescribed

regulations. The major producers of oleoresins are the **UNITED STATES, Spain, India** and **Morocco**.

Oleoresin paprika is used in snack seasonings, sausage products, cheeses, soups and other foods where characteristic paprika coloring and flavor are desired. Oleoresin paprika can be standardized with vegetable oils to a wide range of ASTA color values and solubility characteristics for different applications. This flexibility often makes oleoresin paprika the product of choice where appearance of the finished product is the prime consideration. As with ground paprika, the oleoresin needs to be protected from strong light and excessive heat to avoid color degradation. Prior to use, the containers should be stirred to ensure homogeneity.

For handling and storage information, see page 40.

Pepper

Through the centuries, one spice has stood out in popularity. Pepper helped build the glory and wealth of ancient Alexandria… was the ransom ransom the Huns demanded when they lay siege to Rome…and was sought after by Columbus as he set sail for what he hoped were the Spice Islands of the Orient. In ancient times it was often worth its weight in gold and was commonly used to pay tribute and taxes. More recently, it played a vital part in the establishment of early America's merchant marine and was behind the fortune, which founded Yale University.

CULTIVATION

Peppercorn are dried berries from a woody, climbing vine. The scientific name is *Piper nigrum L.* – no relation to the capsicums, or pod peppers, that give us sweet red and green peppers and the hot chilies. A native of the Western Ghat Mountains in India, pepper is now cultivated in the tropics of both the eastern and western hemispheres. While it does grow wild, most of our pepper today comes from cultivated plants. Production ranges from plantation scale to home garden, depending on the area. The vines, which have large, ovate leaves, (resembling philodendron) are trained to climb support trees or stout poles of 12 feet or so in height. Since several cuttings are planted around each support, the vines eventually resemble tall, very thick bushes.

It takes several years before a vine comes into full production. (The maturing period varies according to area and techniques of cultivation.) The pepper berries grow in spike-like clusters of roughly four to six inches in length (varying according to type) and bear 50 or more berries. As they ripen, they turn from green to yellow and then to red.

If the end product is to be black pepper, the berries are picked green and then dried. As the berries dry, the skin wrinkles and turns to deep brown or black. When ground, the peppercorns yield a powder of light and dark particles- a combination of the dark skin and light-colored core.

White pepper is produced by removing the dark skin and using only the core. First, the berries are left to ripen longer on the vine. This makes it easier to remove the skin. After they are picked, these mature berries are soaked to loosen the skin as much as possible and then rubbed to remove it entirely. The cores, or white peppercorns, are then put out in the sun to dry.

It is also possible to produce a white type of pepper from dried black peppercorns by removing the skin in a machine. This is known as "decorticated black pepper" or "decorticated white pepper." It can be used interchangeably with white pepper from a color standpoint, but in flavor it is more reminiscent of black pepper.

MAJOR TYPES OF PEPPER

Black, white and green peppercorns are classified in commerce according to their source. Black pepper is the biggest seller except in Europe, where white pepper is preferred for general use. Milder in flavor and typically finer in grind than black pepper, white pepper is also used in dishes and food products where dark particles would be undesirable, such as in light-colored sauces and salad dressings, mayonnaise and cream soups. Green peppercorns consist of fresh young green pepper berries picked and either packed in a brine or wine vinegar, or air- or freeze-dried to preserve their color. Green peppercorns have a fresh flavor that is less pungent than black or white pepper.

A good portion of the world's black pepper comes from the **Malabar Coast** located in southwestern India. Malabar pepper is highly aromatic, with a distinctive, fruity bouquet contained in its volatile oil. There is also a grade designation known as "Tellicherry", which refers to large, "bold" berries

Indonesia - principally the Lampong district of southeastern Sumatra – is another major producer of fine-quality black pepper. Lampong pepper is similar to Malabar pepper in pungency and flavor, testing high in steam volatile oil and non-volatile extract. Ground Lampong black pepper is relatively light in color. Muntok white pepper comes from the island of Bangka, off the southwestern coast of Sumatra.

Since the late 50's, when its first major exports of black and white pepper began, Brazil has become a major supplier to the UNITED STATES market. Cultivation is concentrated in the north, along the Amazon River. Brazilian black peppercorns have a relatively smooth surface; the outer skin is black and the center of the berry is creamy white. Brazilian white pepper is lighter in color and less pungent than Muntok white pepper. Much of this product is exported to Argentina and Western Europe, with smaller quantities reaching the UNITED STATES

Sarawak, former a British colony but now part Malaysia, is another major world producer of pepper. Most Sarawak is sold to Japan and other Asian countries. Sarawak also produces a great deal of white pepper.

Vietnam, is the newest source of significant black pepper supply. In 2002, Vietnam is expected to rank with India and **Indonesia** as the largest pepper-producing nations.

Countries also grow pepper in smaller quantities include **China, Madagascar, Nigeria** and **Thailand.** Very little of their product reaches the UNITED STATES

The major sources for **green peppercorns** are **Madagascar, India** and **Brazil.** When fresh young green pepper berries are picked and either packed in a liquid or in air or freeze-dried to preserve their color, we have the product called green peppercorns. The most common liquid packs are brine and wine vinegar. Both keep the corns soft and greenish in color, but the wine vinegar adds its own distinctive flavor note. Freeze-drying retains more of the natural green color. Freeze-dried green peppercorns are also available in the ground form. The berries used for green peppercorns are usually milder in flavor and bite than black pepper and somewhat different in flavor than white pepper.

BUYING PEPPER

Pepper buyer should first evaluate their needs. Is pungency most important? Is a fine bouquet desired also? How important is appearance and uniformity of a grind? These and other considerations should be weighed carefully and then discussed with the reliable supplier.

Common grinds for pepper include cracked, coarse grounds or table or "normal" grind, fine grind and pulverized. As with other spices, a bulk buyer can specify a particular particle size. Generally speaking the finer the grind the more immediately available the flavor and, by the same token, the shorter the shelf life.

EXTRACTIVES

Because an extractive of pepper needs to offer both aroma and bite, oleoresin black pepper is the major extractive for this spice; the bouquet is found in the essential oil, while the bite comes from non-volatile piperine. Oleoresin black pepper is usually added to a carrier to make it easily dispersible. The resulting soluble seasoning may be liquid or dry. The oleoresin may also be mixed with gum or starch and spray-dried to encapsulate it for added flavor/aroma protection. Oleoresin black pepper and its extractive derivatives are important in food manufacturing both by themselves and in blends with ground spices because they can be customized to a variety of processing needs.

For handling and storage information, see page 40.

Saffron

Since ancient times, saffron has been prized as a perfume, medicine, aphrodisiac, dye and culinary seasoning. It is believed to have originated in the Eastern Mediterranean at least 3500 years ago and was well known in Greece, Persia and the countries of Asia Minor. Saffron was mentioned in the Old Testament's Song of Solomon and by 500 B.C. it was an important crop in Kashmir. It was introduced into Spain by Arab invaders about the tenth century and into England, Germany and France a century or two later by returning Crusaders.

As a perfume, saffron was strewn in Egyptian, Greek and Roman halls to freshen the air. The upper classes bathed in saffron-scented water and Cleopatra used it in her cosmetics and perfumes.

Medical use of saffron dates back at least to 2600 BC, when a book of Chinese medicine prescribed it an overall tonic, especially for those in need of stimulation or stamina. The Romans added saffron to their wine to prevent hangovers. Others used it to treat abdominal complaints, as a sedative and as an aphrodisiac. In 1670, medicinal use of saffron reached its peak when the German physician J. F. Hertodt published a volume called *Crocologia* touting saffron as a cure-all for everything from toothache to plague. Saffron is no longer used in Western medicine, but is still prescribed in India and elsewhere in the Asia as a tonic and treatment for digestive ills.

The stigmas of the saffron crocus contain an orange pigment that has been used as a dye for at least two thousand years. Shortly after Buddha died in the fifth

century B.C., saffron was adopted by his priests as the official color for their robes. The dye has been used for royal garments in several cultures. On a more plebian level, Irish housewives in the sixteenth century used to dye their bed linens on the assumption that whoever came into contact with saffron gained strength.

Production of saffron requires extraordinary amounts of labor; hence there is no such thing as inexpensive saffron. As a consequence, unscrupulous sellers were often tempted to dilute the product with other substances – turmeric, marigold petals, even bits of wax or molasses. In 14th century Germany, strict inspection was initiated to detect and prevent adulteration. Violators are known to have been burned at the stake or buried alive. Severe punishments were also meted out in medieval France and England to those who tampered with saffron.

CULTIVATION AND PROCESSING

Saffron consists of the dried stigmas of a particular type of crocus flower (*Crocus sativus L.*) belonging to the iradaceae family. The name *saffron* is derived from the Arabic word *za'faran*, meaning "yellow." The saffron crocus is a small bulbous perennial, six to ten inches high that produces up to five violet-colored flowers from each bulb. The plants blossom in early autumn and must be picked and processed during the very short blooming period. Each flower is picked by hand and the three inch-ling stigmas- dark orange-red and funnel-shaped, with lacy, pale ends- are removed. Stripping of the fragile stigmas must be done quickly, before the flowers wilt, and with considerable skill to avoid damage. These stigmas, when dried, are the saffron prized by home cooks and chefs the world over.

On average, about 70,000 flowers must be processed by hand to separate a little more than five pounds of stigmas, that, when dried, will produce one pound of saffron. Under favorable conditions, yield per acre averages eight to twelve pounds. Total annual world production is estimated to be about 100 tons – equivalent to more than 10 billion hand-picked flowers.

According to one estimate, about 190 hours of labor are required to pick and separate the stigmas in one pound of dried saffron. Once stigmas have been separated from the flowers, careful drying is necessary to produce a good-quality product. The traditional method in Spain involves carefully toasting the stigmas in a sieve over the embers of a charcoal fire. This product is known as "saffron hay" and takes 30 to 45 minutes to dry. The so-called "Gucci saffron" is prepared by removing the entire style with stigmas, binding these together in bunches, and drying in the sun. This method is sometimes used in Iran.

The plants grow best in a moderate climate. Soil should be sandy or loamy and well drained. Saffron prefers a cool, sunny location and can withstand substantial frost. Since saffron does not seed, it must be propagated vegetatively. Each season, new corms are formed above the old ones, which wither and drop away. Since each corm produces several daughter corms, the crop density increases rapidly and must, therefore, be dug up and replanted every four to ten years.

MAJOR TYPES OF SAFFRON

The principal commercial sources of saffron are **Spain, Iran, India, Greece, Italy** and **France**. Saffron is available commercially in two forms; dried threads and powder. The latter is a more concentrated form and is more easily measured for use in cooking, but loses its flavor more readily than saffron threads. Both forms impart a pleasantly spicy, slightly bitter taste, somewhat pungent odor and distinctive yellow color to foods. In general, the coloring strength of saffron determines its flavor and aroma. The higher the color, the more intense the flavor and aroma.

The International Organization for Standardization (ISO) has a standard (number NFV 32-120-2) that establishes international specifications for saffron, (*crocus sativus L.)*. It requires a minimum bitterness, expressed in terms of picrocrocin, absorbency of 70, and a minimum coloring strength, expressed in terms of crocin, absorbency of 190 degrees, to be present in any saffron sold as Category I, the highest quality.

BUYING AND USING SAFFRON

Saffron is used as a spice and colorant in cooking. It is an essential ingredient in such Mediterranean specialties as paella, arroz con pollo and bouillabaisse. It is often used in chicken and fish dishes ands in Middle Eastern and Asian dishes. It is also used to desserts such as crème brulee, custard, fruit compote and rice pudding.

There are several other natural ingredients, such as turmeric or annatto, which lack the characteristic flavor and aroma of saffron but can provide similar coloration at lower cost. As with any spice, the way to make sure you get the best saffron for your particular needs is to consult a reputable spice supplier. Such a firm will be qualified to give technical advice on saffron performance and will be equipped to provide uniform quality in every shipment.

For handling and storage information, see page 40

Sage

It was not at all uncommon for the ancients to prize certain herbs and spices for medicinal purposes. But of all the herbs so described, sage was for centuries the most revered. John Evelyn noted in his *Acetaria*, 1699, "In sum, 'tis a plant, indeed, with so many and wonderful properties as that the assiduous use of it is said to render man immortal."

Even its botanical name, *Salvia*, was a recognition of what the Old World considered to be sage's great healing properties – the Latin root *salvare* meaning "to cure". Dozens of sage concoctions are found in early treatises, including infusions for fevers and stimulating beverages. "Sage is singular good for the head and braine; it quickeneth the sences and memorie, stengtheneth the sinewes, restoreth health, and taketh away shaking and trembling of the member," wrote one medieval physician.

In medieval Europe, sage tea was the favorite hot beverage, and this herb was also added to ale. Later, when trade brought teas from China, sage tea lost its prominence in the western world, but the Chinese were so captivated by it that they would trade three or four pounds of tea for one pound of sage.

By all accounts, sage was the most important herb in colonial American gardens, both for culinary and medicinal reasons. Sage-particularly fresh pork sausage-was on of the foods that established sage as a major seasoning. Poultry stuffings and sage cheese pushed it into further prominence. Today there are few sage remedies remaining, but modern America uses more sage for seasoning that any other country.

CULTIVATION

The leaves of the sage plant, a small perennial evergreen shrub of the *Labiatae*, or mint family, are the source of this herb. There are a number of varieties of sage, but the most important commercially is *Salvia officinalis L*. (Incidentally, the herb plant should never be confused with the common sagebrush of our western UNITED STATES)

Sage leaves are elongated and spear-shaped, averaging roughly two inches in length. Before drying they are grayish-green overall, and often more gray on the underside. When dried they turn a silvery gray. They have a soft, velvety texture. The herb of commerce is native to the Mediterranean area and grows profusely on the rock strewn hillsides common there. The plant grows to about two feet in height and bears small blue flowers in spiked clusters. The leaves are picked while the plant is in flower and either dried in the shade outdoors or in warehouses where the help of warm air is circulated. The herb is distinctively aromatic and fragrant with slightly medicinal, piney, and bitter flavors.

MAJOR TYPES OF SAGE

Salvia officinalis is native to the Mediterranean area and has traditionally been sourced from the former Yugoslavia. Today, *Albania* is our largest supplier. Sage is also available from **Turkey, Italy, Greece, France** and **Germany.**

In recent years, Albania has been our major supplier of sage. Because nature doesn't know political boundaries, the sage plants from Albania and the former Yugoslavia has many of the same flavor and aromatic qualities. There is just one grade of Albanian sage and it comes packed in loose, semi-pressed bales.

The top grade of sage from the former Yugoslavia area is known as Prime No. 1 Dalmatian, which refers to the coast origin and is a trademark designation that restricts its use to the Prime No. 1 grade. The principal difference between Dalmatian and other Yugoslavian and Albanian products is the care with which it is cleaned and processed (it also contains a higher percentage of the small, top leaves). Legally, lesser grades of sage may only be called "Yugoslavian." Dalmatian sage is shipped to the UNITED STATES in tightly compressed bales of approximately 110 pounds each and all bales are individually numbered. This grade traditionally commands the highest price among sages.

In any given year, there are several other types of sage, know by their national origins, which come to the U. S. market in smaller volume. Turkish sage has been most consistent in recent years, but Greek, Israeli, and others appear from time to time. Several botanical varieties of sage are represented in these other origins and none is valued as highly as the *Salvia officinalis* of the Adriatic. These other types are less expensive and can be used in certain ways, but are not interchangeable with the Yugoslavian and Albanian varieties.

BUYING SAGE

For the industrial user, sage is available in a variety of forms: whole leaf, cut, rubbed and ground. **Whole leaf sage** been cleaned and prepared for sale, but not cut or otherwise processed. Cut sage has been cut (rather than ground) into smaller pieces, usually to the buyer's specification (particle sizes of 1/8 to 1/4 inch are common); other terms of this condition

included cracked, sliced and butcher's chop. Cut sage is the choice where the manufacturer wants the sage to be visible in the end product.

Rubbed Sage has been put through only a minimum grinding and coarse sieve. The result, due to the soft, velvety texture of the sage leaves, is a fluffy, almost cotton-like product, unique among ground herbs. Many sausage makers prefer this minimal processing for sage in the opinion that it preserves flavor longer at the same time that it makes it suitable for easy blending into a product. More sage is sold in the rubbed form than any other. However, the buyer should be aware that "rubbed" is a traditional term, not a standardized one. The consistency can vary according to the processing procedure of the supplier.

Ground Sage is sometimes called "finely rubbed" to differentiate it from "rubbed" which also goes through a grinding process. In general, this simply means that the sage has been further pulverized and sifted through finer sieves. The final granulation (particle size) is up to the buyer and this, in turn, depends on the end use. Basically, the finer the powder the more completely the sage will blend into the food and the less chance that it will be seen in the finished product. This can be important in some products, especially light colored ones and those in which sage is not meant to be a noticeable characteristic.

In general, the buyer should look for fresh, rich aroma in sage and flavor quality consistent with the type (as discussed). Color is a silvery gray, should be fresh in appearance, not faded. Specifications for sage should be based on the ASTA's cleanliness specifications, which give the buyer and seller a common language; adherence quality standards can be guaranteed by an ASTA member whose firm grinds spices.

USES OF SAGE

Sage is valued in nearly all blends calling for an "herbed" character. Of these, pork sausage is undoubtedly the largest user. Traditionally, the southern and mid-western regions of the UNITED STATES have most emphasized sage in their sausages, but other markets have become heavy sage users as well. Poultry stuffings, poultry seasoning and seasoned bread crumbs also emphasize sage and it plays an important role in countless seasoning blends for soups, sauce mixes, salad dressings and herb-flavored snacks. Sage cheese is another popular specialty.

SAGE EXTRACTIVES

While both essential oil and oleoresin extractives are produced from sage, the oil is the principal form and it is prepared mainly from Albanian and Yugoslav sage – *Salvia officinalis.* As with the leaf spice, the Dalmatian sage oil is considered the top grade. Other sage oils, identified by their countries of origin, appear on this market, but they are derived from different varieties of sage and exhibit markedly different qualities of flavor and aroma. Sage oil is prepared by steam distillation. The oil can also be made water dispersible and is frequently coated on dry ingredients and sold as "soluble spice." The sausage industry, particularly for country pork sausage, is the largest user, but it also appears as a supporting seasoning in countless herbed preparations, from sauces and dips to cheese, breadcrumbs, soups, gravy mixes and prepared entrees.

For handling and storage information, see page 40.

Sesame Seed

Few products can claim predates the creation of the world. But sesame can, if you accept history as the ancient Assyrians wrote it. Their stone tablets, which represent some of the earliest written records yet discovered, tell of their gods drinking sesame wine on the night before they made the earth!

Numerous archeological digs have found evidence of sesame oil being used thousands of years before Christ. In addition to making sesame cakes, wine and brandy, the Babylonians used the oil for cooking, medicine and toiletries. They considered sesame oil an excellent vehicle for perfumes and an antidote "to the bite of the spotted lizard."

Of course, the most famous reference to sesame came in the tale of Ali Baba and the forty thieves, in The Thousand and One Nights. "Open sesame" was the magic password that opened the door to the robber's den. The phrase was both a tribute to a very familiar product of the times and also to the fact that ripe sesame pods burst open at the slightest touch, scattering their seeds.

It is estimated that over four billion pounds of sesame seeds are produced annually worldwide. Most are expressed for oil and most of that is consumed in the producing countries. At one time sesame was also an important vegetable oil in the UNITED STATES During the period 1935-39 our imports of sesame seed averaged 58,000,000 pounds a year, largely for oil. Soon after that, however, the combined effects of World War II and the development of inexpensive soybean and cottonseed oils all but pushed sesame oil out of the picture here. After the war, in the early

50's, our consumption averaged about 12 million pounds a year.

Then, in 1956, a Washington, D.C. homemaker created an "Open Sesame Pie" and won the $25,000 first prize of the Pillsbury Bakeoff. The resulting publicity spurred spice companies to put sesame seeds on the retail shelves and bakers began sprinkling them on breads and crackers. Out of this renewed attention came sesame's greatest starring role – on hamburger buns – and suddenly, imports began soaring. By 1961, imports had doubled and; by 1973 we were back to pre-War levels and still growing.

Today, sesame seeds are used in countless baked goods and snack products. The interest in ethnic foods and gourmet cooking is boosting sales of such Middle Eastern specialties as halvah (a confection of ground sesame seeds, honey and dried fruit) and hummus (made with ground sesame seeds, called tahini paste). Above all, sesame's modern Cinderella story – its climb back to the level of more than 100 million pounds a year, making it one of our leading spices by volume – is linked to the fast food industry and its billions of sesame-topped hamburger buns.

CULTIVATION

Sesame seed comes from a tall annual herb of the *Pedaliacae* family, named *Sesamum indicum L*. Its precise origin is unknown, but it is listed as being native to Africa, India, Afghanistan and Indonesia by various authorities. It is cultivated today throughout the warmer climes of the world (as a rule, anywhere cotton can be grown, sesame can be grown).
Each sesame seed is covered by a fibrous hull, which, according to variety, may range in color from yellowish-white to red, brown or black. Much of the seed that comes to the UNITED STATES is light tan in its hull color. Once hulled, the oval-shaped, flattened seed in all varieties is pearly white and has a glossy finish. The seed is 1/8 inch in length and is oval shaped.

Traditionally, major producers of sesame seed are located in countries where labor is least costly due to the hand labor needed for harvesting. Seed pods in traditional varieties are fragile and, unless handled very carefully, will burst open, resulting in loss of seed. New shatter resistant varieties have been developed for mechanical harvest; their pods only open slightly at maturity. Under favorable conditions, both varieties produce approximately the same yields of seeds.

Oil content is important in the sesame industry. Sesame ranks sixth in world production of edible oil seeds. Most sesame varieties today yield between 50 and 60 percent of a high quality fixed oil (non-volatile fatty oil of vegetable origin). The high-protein residue from the pressings is formed into cakes used for animal feed. These cakes are also used to produce sesame flour, which has many health food applications.

The UNITED STATES relies on about 12 countries for its sesame seed supply. The principal sources at present are **Mexico, Latin America** and **India**. Central and South American producers include El Salvador, Guatemala, Nicaragua and Venezuela. The UNITED STATES has the potential to be a competitive producer, given access to the new shatter resistant seeds and machine harvesting. At present, **Texas** and **Oklahoma** are major US growers.

NUTRITION

Sesame oil has a favorable fatty acid profile. It is low in saturated fat and characteristically void of any trans-fat isomers. Antioxidants help maintain oil stability. In addition to the oil, sesame seed is roughly 25%-30% high -quality protein. It is rich in the sulfur-based amino acids, methionine and cystine, two amino acids lacking in many other sources of vegetable protein. Sesame is also comparatively high in calcium and vitamin B.

BUYING AND USING SESAME SEED

The basic choice in sesame is between hulled and unhulled product; the latter is known as "natural". Though much of the hulling is done in the UNITED STATES, some taken place in other countries.

Natural sesame is also used by makers of bread sticks, crackers, Italian and whole-grain breads, snack foods and health food products. For applications in which the seeds coat a product, natural seed has the advantage of sticking better than, hulled sesame. The hull also adds to the storage life, keeping the oil stable, and, because there is no processing, natural seed is less expensive.

Hulled sesame is the form most widely used in the UNITED STATES- for example, on hamburger buns and on many bread and cracker products, and in the making of tahini paste and halvah. For best flavor, sesame seed should toasted before use or during baking. Toasting, of course, darkens the color and, in some toppings, it is better to keep the seeds light in color to provide attractive contrast.

Specification for natural sesame should concentrate on color, cleanliness and dryness. Color should be as even as possible. Mottled hulls are fine for oil extraction, but not as desirable for toppings. If the predominant color is tan, the fewer the dark seeds,

the higher the quality. The seed should also be dry, because it handles more easily and adheres better as a topping. If natural seed is being purchased for hulling, the bigger the better, so the hulled seed will be of sufficient size.

Hulled sesame should be white, clean and dry, without any of the oily residue that can be left behind by processing.

While dark seeds are undesirable in most sesame, there is an Asian product in which the hulls are uniformly black. Black sesame seed is not generally available in country except at ethnic grocers, but it is highly regarded in Japan and China for its flavor.

In Mexico and Latin America there are varieties which produce a "sweet" sesame. On the American market, candy makers are the prime customers for this product.

In the UNITED STATES, **sesame oil** is considered a specialty salad and cooking oil. There are two types: a cold compressed product that has a clear, golden color and bland taste and an Asian type made by roasting the seeds before pressing. The Asian type is dark in color, has a very strong taste and is used sparingly.

For handling and storage information, see page 40.

Thyme

Throughout the ages, thyme has had a wonderfully positive image. Its name, which is pronounced "time" and comes from the Greek *thymon*, has various meanings but the most frequently mentioned are "courage" and "sacrifice". The ancient Greeks could pay no higher compliment than to say "He smelled of thyme." To the Romans thyme it was a prime remedy for melancholy and a means to courage and strength when they infused it in their bath water. In the Middle Ages it was common for ladies to embroider a sprig of thyme "symbolizing courage) into the scarves they gave their knights

Medicinal virtues attributed to thyme through the ages include the following: soothes the throat and cures coughs; strengthens the lungs; promotes sleep and eliminates nightmares; improves digestion; cures a hangover; improves eyesight; warms the heart; soothes the liver; takes away hardness of the spleen; is excellent for shortness of breath; takes away hot swellings; eases the gout; cures pains in the loins and hips.

Although scientific evidence may not support some of these health claims, it is interesting to note that thymol, the active ingredient in thyme oil, is recognized even today as a carminative (treatment for flatulence), anti-spasmodic and counter-irritant. Before the development of synthetic thymol, thyme oil was used in cough drops, antiseptic mouth washes, liniments and antifungal preparations.

CULTIVATION

Botanists and hobby gardeners are familiar with about 100 varieties of thyme, which differ widely in appearance, aromas and flavors. There are with flavors and fragrances ranging from lemon to pepper, mint, pine, licorice, caraway and nutmeg. The spice trade, however, deals almost entirely with *Thymus vulgaris* L., the so-called sweet or garden thyme. The leaves of this herb come from a small perennial of the mint family, native to southern Europe and the Mediterranean area. Much of the thyme in spice commerce today still comes from wild plants, but in recent years the herb has been cultivated to an increasing degree.

The leaves of *Thymus vulgaris* measure about ¼ inch length and 1/10 inch in width. They yield from 0.8% to 2% of volatile oil (usually about 1%). Their grayish green color differs in intensity according to origin. The plant, which grows to about 18 inches in height, produces small rose and lavender flowers that are very attractive to honey bees. The most famous product of this relationship is the incomparable thyme-scented honey of Mount Hymettus in Greece.

Thyme grows best in a mild climate in a well-drained sunny location. It is often found wild on the hills of southern Europe. Thyme is grown in the UNITED STATES as well as produced domestically. Currently, the major sources of imported thyme are **Jordan, Israel, Columbia, Morocco,** and **France**. Spain is also a major grower but imports have been reduced over the past few years.

MAJOR TYPES OF THYME

At one time, **France** accounted for roughly 30% to 50% of the UNITED STATES thyme supply, but in recent years, production has declined. However, the French product continues to command high prices for its oil content, color and cleanliness. Its leaf particles average larger than those from other sources and are somewhat greener in color. Most French thyme is a product of wild plants, but some is cultivated.

Provence produces the crème de la crème of French thyme; however, very little of true Provence thyme seen in the UNITED STATES market is from this region. Provencal thyme has very high oil content

and consequently a strong flavor. It is mountain-grown and comes from wild plants.

Spain harvests three seasonal types of thyme (all *Thymus vulgaris*): winter (February- March); gray (April-May); and red (May-June). The names, however, are not descriptive; all three types look very similar. The red type has the highest oil content and is used primarily for distillation. The gray is favored for the spice trade. Winter thyme is the least expensive product—lowest in oil and less attractive than the others. It should be noted that these distinctions are made primarily within the spice trade. The food company buyer is more apt to find such terms as "Spanish Fancy" and FAQ (fair average quality-a term referring mostly to cleanliness).

Thyme is also being grown commercially in **California**. Most of it is *Thymus vulgaris* of the type known as French thyme. Additionally, a small amount of *Thymus citriodorous* (lemon thyme) is produced in the Golden State-mostly for use in herbal teas, to which it brings a strong lemon aroma. All of the Californian thyme is cultivated, yielding about three crops a year. As with other domestic herbs, the American thyme is machine dried and cleaned and selected for rich color as well as flavor.

THYME EXTRACTIVES

Both essential oil and oleoresin extractives are prepared from the flowering tops of the thyme plant. As with other aromatic herbs, the volatile oil is the most important extractive. The Spanish red thyme is the prime source of the oil and it is marketed as Red Thyme Oil. There is also a White Thyme Oil as well, but this is a redistillation of the red oil rather than the product of another plant. It tends to be pleasingly aromatic and smoother in flavor than the red oil.

Essential oil of thyme is usually extracted by steam distillation of the fresh herb. The essential oil is located in small glistening oil glands on both surfaces of the leaves. Yield and quality of essential oil varies according to genetic makeup of the plant material, crop maturity oat harvest and distillation practice. Oleoresin of thyme, of course, contains both volatile and non-volatile components. As extracted it is a very viscous material, which is normally standardized with a food-grade solvent before use. The oleoresin is often added to soluble carriers, either liquid or dry, for seasoning applications.

COMMERICAL USES

The best purchasing method for thyme is to let your spice suppliers know the needs of your product (i.e. the relative importance of color, aroma, flavor, etc.) and then look to them to recommend the type of thyme best suited to the purpose and budget. In the food industry, thyme is used as a supporting flavor and fragrance in many different savory formulations-from salad dressings, stuffing mixes, poultry seasoning, soups, sauces, gravies, condiments, entrees, herbed breads and snacks, sausages, vegetables and liqueurs. Thyme accompanies bay leaves and parsley in the classic *bouquet garni* mixture and seasons Mediterranean cooking in blends with savory, oregano, rosemary and marjoram. An example of its use in American cooking is Manhattan-style clam chowder.

For handling and storage information, see page 40

Turmeric

Writing in 1280 A. D. of his travels in China, Marco Polo reported, "There is also a vegetable which has all the properties of the true saffron, as well as the colour, and yet it is not really saffron. It is held in great estimation, and being an ingredient in all their dishes, it bears, on that account a high price."

He was referring to turmeric, which in medieval times was commonly called Indian saffron. It is very understandable that turmeric would be linked with saffron by the ancients. Then, as now, saffron was the most precious of all spices because of the extremely laborious process required to harvest and prepare it. Naturally, everyone looked for a less expensive substitute and in some respects turmeric filled the bill.

Marco Polo exaggerated a bit in saying turmeric has "all the properties of true saffron". Certainly its flavor bears no resemblance. Turmeric is not particularly aromatic spice; it has a mild, earthy odor and slightly bitter, slightly peppery flavor. But, like saffron, turmeric is a powerful coloring agent. At various points in history its coloring property has been much more prized than its flavoring qualities. While India and Indonesia have always used it more as a spice, other parts of the world long considered it a dyestuff. Even in the United States, it was imported and classified principally as a textile and leather dye until the development of aniline dyes in the 1930's. It was not until after World War II that our government import statistics began listing it as a spice.

Imports of turmeric fell off substantially in the period after man-made dyes replaced it, but this ancient spice gradually found a new life in food usage and its consumption in the UNITED STATES has been increasing quite steadily in recent years. Part of its growing demand stems from the fact that it is a very

effective natural colorant and this is making it especially attractive to quality-minded food manufacturers today.

CULTIVATION

Turmeric comes from the roots of *Curcuma longa L.*, a perennial native of southern Asia. Its place of origin has never been identified. It is a member of the ginger family and, like ginger, the root consists of a central rhizome with numerous short "fingers" branching off from it. The outer color of the roots is basically brownish-yellow but may be lighter or darker according to variety. Inside, the color is yellow to orange-yellow. When the root is dried and ground, the color of the powder is yellow with an orange tinge.

Above ground, the turmeric plant consists of long, lance- like leaves that shoot up from the rhizome to a height of two to three feet. It thrives in hot, moist tropical climates with well-drained soils. Tumeric is propagated from root cuttings and roughly eight or nine months after planting the roots are ready for harvest. They are dug up carefully and cleaned and then cured. The curing process differs in the various producing areas but essentially it is a combination of cooking and sun drying during which approximately 80% of the weight is lost. After harvest the turmeric is 'cured'; that is, boiled in water or mild alkali. This procedure reduces drying time and gives the turmeric a more uniform color.

The color of turmeric varies from bright yellow to orange depending on the variety. The yellow hue of turmeric is produced by a mixture of three polyphenol pigments synthesized in the rhizomes of the plant. This collection of pigments is commonly called curcumin and is made up of curcumin (the dominant pigment), demethoxy curcumin and bis-demethoxy curcumin.

MAJOR TYPES OF TURMERIC

India is by far the world's leading producer of turmeric. Most of its output stays at home because it is such an important ingredient in their curries and other dishes. Additionally, it continues to be used there as a dyestuff to some extent. Though only a small fraction of its production is exported, India supplies almost all of the turmeric America uses. It is reported that there are some 30 species of turmeric grown in India, but only two are commercially significant: **Madras** and **Alleppey**. India keeps most of its Madras turmeric for domestic use and exports most of its Alleppey; thus, the latter is the type which is most seen in the UNITED STATES

Alleppey turmeric has a peppery, earthy odor and a slightly aromatic, somewhat bitter taster. It is said to have gingery and nut-like undertones.

It is fortunate for the American market that India's preference is for the Madras turmeric, because Alleppey is better suited to our needs. It has higher color value, more flavor and is easier to grind. Its volatile oil (flavor principle) ranges from 3.5 to 5.5 percent. (Madras is approximately 2 percent.) Alleppey's curcumin (color property) ranges from 4.0 to 6.5 percent. (Madras is approximately 2 percent.)

The Alleppey roots are brownish yellow on the outside and deep yellow to orange-yellow internally. In contrast, the Madras roots internally are a lighter, brighter yellow and this color difference, along with a different flavor, is what makes the Madras variety more popular in India.

Two grades of Alleppey turmeric are available on the UNITED STATES market today: "fingers" and "splits and bulbs". The former are the appendages, separated from the main rhizome and broken into lengths of one to three inches. They are the best grinding material and thus command the highest price. The "splits and bulbs" grade is made up of pieces from the main root, which tend to be a little more fibrous, and more difficult to grind.

The UNITED STATES also imports turmeric from sources such as some **Pacific islands** and from**Thailand**, but the sum from these and all other sources at present is only about three percent of our total import.

TURMERIC EXTRACTIVES

Extractives are important to any discussion of turmeric, particularly as related to its coloring ability. Extraction is done both overseas and here in the U.S, and thus there are imported as well as domestic turmeric extractives on the American market.

The extractable color in turmeric is called **curcumin**. This is what delivers its coloring strength. About 20 pounds of dried turmeric root yields one pound of curcumin.

Oleoresin of turmeric is the solvent extract of the dried, ground rhizomes. The yield of the oleoresin is about 10%-12%. Oleoresin of turmeric is available as is, or may be mixed with various edible solvents to make it either water or oil dispersible, or dispersible in both. The oleoresin is also available coated onto various dry carriers or as spray-dried product, making it easier to handle. A crystalline curcumin material

may be refined from the oleoresin with a hydrocarbon solvent. This and certain other types of curcumin preparations provide coloring power without the characteristic turmeric flavor, all in all, an extractor may offer a large number of turmeric extractives to answer various needs of industrial users.

COMMERICAL USES

The higher the volatile oil content, the more flavor and aroma turmeric will have. The higher the curcumin content, the more coloring power it will offer. In prepared mustard – where turmeric is most commonly found color-flavor, flavor and aroma are all important, though their relative importance differs with the type of mustard being prepared. For ground turmeric the second most important use is curry powder, in which it provides the characteristic color and contributes to the flavor. Extractives of turmeric are essential in many pickle, relish, and sausage products. Chicken soup and broth are often colored with water soluble turmeric. Flavor sensitive products such as cheese and other dairy products use curcumin-based preparations that are essentially devoid of characteristic turmeric flavor. The flavorless product is also preferred for coloring food items such as ice cream, lemonades, confectionery and baked products. Oleoresin turmeric is also blended with other coloring ingredients such as oleoresin paprika and annatto extract to attain various shadings of yellows and reds.

For handling and storage information, see page 40.

Spice Extractives

The history of spice extraction undoubtedly began with early experiments in perfumery and pharmacy. In those simpler times spices were important raw materials for both medicines and perfumes, and ancient hieroglyphics show that the earliest Egyptians were already well versed in the art of distilling them. There is a papyrus dating back to 3300 B. C. that records formulations for various medicinal tinctures of botanicals.

Just as any cook performs extractions in marinades and in the simmering of sauces and stews, the ancients proceeded from simple macerations (extraction by soaking without heat) to digestions (with heat) to percolation (circulating a solvent through a powdered botanical).

Extracts of important food flavorings like vanilla were available at pharmacies as early as the 1700's, and drugstores continued to be the place to buy such products right into the 19th century. Even today, some pharmacies offer spice extracts, maintaining the historic link. A flavoring extract industry emerged in this country early in the last century and this eventually brought fluid alcohol extracts to supermarkets.

The industrial spice extraction industry, serving food manufacturers, came into being with the development of oleoresins during the 1930's. By 1942, commercial processing of spice oleoresins was well established in the U. S.

Today, extraction of spices, producing essential oils and oleoresins is preformed both here in the **U. S.** and overseas. Domestic extractors include those who process a wide range of imported and American-grown spices and those who operate in some of our growing areas, concentrating on an individual commodity (i.e. paprika, dill, mint, etc.).

Imported oils and oleoresins come from a dozen or more origins, led by **India, Spain, Canada** and **Morocco**. In order to convert spices and botanicals into value-added oleoresins, the governments in many developing countries have encouraged the establishment of extraction facilities by local businesses. Extracts produced in the UNITED STATES are exported to countries worldwide, including Europe, Mexico, Australia and Canada.

How Extractives Are Used

As the American food manufacturing industry grew larger and more sophisticated, standardization and quality control became increasingly important for flavoring and seasoning ingredients. Couple this development with a spectacular growth in total spice consumption after World War II and the setting was right for the technical development of a whole new family of spice products.

Today, the food manufacturer can choose from the biggest spice shelf ever available, ranging from whole spices to ground spices in many different granulations, to essential oils, to oleoresins, to liquid and dry solubles, to spray-dried or encapsulated flavors, and an infinite variety of blends of these products.

The extractives are manufactured, macroscopically clean products that can be customized to specific food product needs (solubility, dispersibility, invisibility). They can be given special characteristics (greater or lesser aroma, flavor, color). And, each shipment can be standardized without regard to seasonal or year-to-year crop conditions.

In the early years of spice extractives, the food manufacturers were urged to use either ground spices or some form of extractive. Today the art of seasoning has gone far beyond this simple choice. Depending on the product and its production and marketing objectives, it may well be that a combination of ground spice and extractives will be used and this blend may include other flavors and seasoning adjuncts as well.

Basic Extractives

There are two basic product groups - essential oils and oleoresins. All other extractive products – soluble seasonings and emulsions, dry solubles, spray-dried and encapsulated spices – are derivatives, produced for different characteristics and purposes. **Essential oils** are the volatile, aromatic components of a spice, extracted by physical means such as steam distillation. Essential oils differ from fixed oils in that they are volatile at the boiling point of water. For many aromatic spices, the essential oils constitute the primary components of flavor. On the other hand, such products as paprika, turmeric and the capsicums have little or no aromatic volatile oil. Their attributes of color and heat come from non-volatile constituents.

The essential oils for which demand is currently highest include anise, cassia/cinnamon, cloves, mint, nutmeg, sage and dill.

Essential oils are sold. in ready-to-use form by dealers who select and control their quality according to customer request. Essential oils can be treated in many ways to concentrate, fractionate or solubilize them depending on their end use.

The essential oils are used in seasoning such products as spaghetti sauces, ketchup, mayonnaise and salad dressings – wherever there is an oil soluble system. Much of the time, however, the oils today are being used to fortify and standardize oleoresins and other extractive products, as well as in blended seasonings (extractives and natural spices).

As mentioned, some spices have little or no volatile oil content while in others the non-volatile components may be as important as the volatiles. This fact led to the development of **oleoresins**, extractives that contain non-volatile materials as well as the volatile essential oils. Since steam only distills the volatiles, various kinds of solvents are used to prepare oleoresins and these are then removed (technically to the point of de minimus) once the extraction is completed in accordance with federal regulations.

Black pepper illustrates the usefulness of oleoresins. This spice's aromatic "bouquet" has been prized for centuries – the product of its essential oil. But its bite is equally important, this comes from its non-volatile component, piperine. Other non-volatiles also contribute to its flavor. Oleoresin black pepper, compared to oil of black pepper, provides the more complete profile.

In addition to black pepper, the oleoresins sold in the greatest volume include capsicums and paprika, cassia/cinnamon, celery seed, ginger and turmeric.

Today, oleoresins are produced by either a continuous or two-stage process. In the continuous method, the solvent is circulated through the ground spice material in a closed system and the extraction of volatiles and non-volatiles is accomplished at the same time (during several percolations). In the two-stage process, the volatiles are first steam-distilled; then the non-volatiles are removed by solvents and then the two are re-combined.

Oleoresins of spice seeds are sufficiently fluid for use as is and therefore require no additives. Other spices, however, usually need the addition of vegetable oil and/or some type of food grade solubilizers to reduce their viscosity.

Oleoresins may be used as is or combined with ground spices to create custom blends, or used as a base for a number of different seasoning products. When the oleoresins are used alone, the manufacturer normally mixes them with a carrier to make them easily dispersible.

Soluble Seasonings are oleoresins and/or oils which have been added to soluble carriers, either liquid or dry.). When additional solubilization agents, such as Polysorbate 80, mono- and di-glycerides and water soluble gums are added to the oleoresins, the manufacturer creates **liquid solubles** (emulsions, concentrates, suspensions) that are soluble in oil or water systems. These are particularly well suited for pickling solutions, condiments, sauces and beverages.

When oleoresins are plated onto dry, but soluble, carriers they are known as **dry solubles**. Typical carriers are salt, dextrose, maltodextrin; the choice depends on the nature of the food product being seasoned. When dry solubles are used, the customer does not have to add anything further. They are the pound-for-pound equivalents of ground spice (or can be multi-fold) as they come from the supplier and may be added directly to the product. The dry solubles are designed to be used in any food application where ground spices would be appropriate.

During **spray-drying** and **encapsulation**, oleoresins are mixed with gum or starch and water to create a slurry that is sprayed into a very hot chamber. The water is flashed off and the resultant powder is composed of particles in which the oleoresin is encased in a gum or starch coating. The coating helps protect the flavor/aroma during storage, makes the seasoning more heat stable and keeps it free flowing. On the other hand, when an encapsulated particle comes in contact with water there is a quick release of flavor and aroma. As a result, spray-dried flavors are especially suited to dry soup and salad dressing mixes, beverage powders and any other product that is going to be mixed with or reconstituted in water.

Buying Extractives

The first rule of smart buying in extractives is the same as for all spice purchasing: Deal only with top quality suppliers who can assure you the consistent quality that is one of the biggest advantages of extractives. Flavor consultation, guidance on which seasonings will best meet the product's needs and help in developing realistic specifications are some of the other services a quality supplier can offer.

Extractives are purchased on standards set by the Food Chemical Codex (or according to the customers' private specifications) for such quality attributes as volatile oil, piperine (pepper), pungency (capsicums), color (paprika, turmeric, annatto seed) and solvent residues (oleoresins). The ASTA's *Official Analytical Methods* has become the basis for testing and expressing the quality factors in all types of oils and oleoresins. When the buyer's specifications are based on these methods, comparisons become realistic and quality control is more effective.

Storage and Handling

When properly dried and stored, whole spices such as peppercorns and nutmegs have been known to keep for many years and then deliver potent flavor when ground. Ground spices and the leafy herbs are more fragile, but when stored properly, the qualities of aroma and flavor for which they are prized will be retained long enough to meet any normal requirements for food manufacturing – from six months to a year, if necessary.

Here are some basic rules that will help protect a spice buyer's investment:

- Store spices, herbs and seeds in a place that is cool (no higher than 68%), dry (no higher than 60% humidity) and dark. Excessive heat can volatilize and dissipate aromatic essential oils, and high humidity may cause caking. Exposure to light may also reduce color values, especially in the case of the capsicums (paprika, red pepper) and green herbs such as basil.

- Cold storage (32F to45F, with 50% humidity) is highly recommended for capsicums. This will aid in color retention and protection against infestation. Conditions resulting in very low moisture in the product may decrease the color stability, whereas high moisture may result in mold growth.

- Natural sesame seed will keep well in a cool, dry place for up to two years. Hulled seed, however, has a much shorter shelf life. To guard against rancidity, keep it in cold storage during hot weather.

- Optimal storage conditions for dehydrated garlic are 28% to 32% humidity at 65F. When stored in this way, the product has a shelf life of up to three years.

- Date containers when they arrive, so that older stock will be used first. Large-scale containers should be stored on pallets or raised platforms, off the floor and away from outside walls, to minimize the chance of dampness.

- Make it a hard and fast rule that all spice containers be tightly closed after each use. Prolonged exposure to air will cause some loss of flavor and aroma.

- Extractives should be stored in cool, dry conditions, never in excess of 75F.

Containers should be as full as possible and tightly sealed, For light-sensitive products, such as paprika and turmeric, opaque containers are essential.

- All ASTA members offering these products are equipped to deliver fresh stock at any time of the year. There should never be a need to purchase excessive amounts of spices that can deteriorate if storage conditions are less than ideal.

SELECTED ASTA PUBLICATIONS

Official Analytical Methods of the American Spice Trade Association
Fourth Edition 1997

ASTA Cleanliness Specifications Fro Spices, Seeds and Herbs (Foreign and Domestically Produced)
Revised April 28, 1999

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