

Herbs and Spices

Essential Oils

The characteristic scents of aromatic plants are due to the presence of essential oils, volatile substances that contribute to the essence or aroma of certain species

Essential oils are commonly found in leaves, flowers, and fruits, where they occur in specialized cells or glands

Essential oils in flowers serve to attract pollinators; those in other plant parts are thought to play a significant role in discouraging herbivores, particularly insects, and inhibiting bacterial and fungal pathogens

People have used herbs and spices for thousands of years for their flavors, but an added benefit is the antimicrobial properties of the essential oils, which can significantly reduce spoilage

History of Spices

Ancient trade

During the time of the Ancient Greek Civilization, the spice trade flourished between the Mediterranean region and the Far East

Spices such as cinnamon, cassia, black pepper, and ginger were brought by Arab merchants from India, China, and Southeast Asia by caravan

When Alexander the Great conquered Egypt, he established the port city of Alexandria, which became the leading trading center for centuries to come for spices from the East and a meeting place for traders from Europe, Asia, and Africa

Spices were used extensively in the Roman Empire for culinary use, in medicines, and in luxury items such as perfumes, bath oils, and lotions

After the first century, Rome began trading directly with India, thus breaking the Arab monopoly on spice trading

As the Roman civilization spread its influence through Europe, exotic spices were introduced to local tribes

When Rome fell in 476, the trade between Europe and the East virtually disappeared

Marco Polo

During the Dark Ages, exotic spices from the East were rare, but merchant travelers kept a limited supply flowing from Arab trading centers to Europe

The Crusades, beginning in 1095, increased importation of spices and other goods from the Near East; the merchant cities of Venice and Genoa rose to prominence during this time

In 1271, the Venetian trader Marco Polo began his travels at 17 years of age; he, his father, and his uncle spent the next 25 years in the Orient

Several years after his return to Venice, Marco Polo was taken prisoner during a war between Venice and Genoa; a product of his captivity was publication of *The Travels of Marco Polo*

This book, describing many of the spices from places like Java, China, and India, spurred travelers to establish overland routes to the East, and soon explorers were searching for sea routes

Age of exploration (see fig. 17.1)

Prince Henry of Portugal (Henry the Navigator) sought to break the Venetian-Muslim trade monopoly by finding a sea route to the East; his efforts during the early 15th century laid the groundwork for the Age of Exploration that followed

In 1486, Bartholomew Dias discovered the Cape of Good Hope at the southern tip of Africa, proving that a sea route to India was possible

In 1497, Vasco da Gama sailed around the Cape of Good Hope to the west coast of India

In 1492, the Genoan Christopher Columbus, under the flag of Spain, sailed to the New World thinking he had discovered the route to China and Japan; he eventually brought many plants such as yams, sweet potatoes, cassava, kidney beans, maize, capsicum peppers, and tobacco to Europe

From 1519 to 1522, Ferdinand Magellan, sailing for Spain, circumnavigated the globe and discovered a western route to the Spice Islands (now known as the Moluccas); many important oriental spices, including cloves, nutmeg, mace, and pepper, are native to these islands

Imperialism

During the 16th century, Portugal monopolized the spice trade to Europe; they became wealthy and powerful as they established control over the major spice centers throughout the East

The Dutch and English broke this control early in the 17th century

Eventually, the Dutch became the dominant force in the East Indies, Ceylon (Sri Lanka), and the Persian Gulf spice markets; the Dutch East India Company was the officially sanctioned trading conglomerate of the Netherlands

In the latter half of the 18th century, the Dutch monopoly began to break down as the British and French established spice plantations in their own colonies; by the end of the 18th century, Dutch control had ended

By the early 19th century, the English East India Company had control over most of the spice-rich Orient, but decentralization of the spice trade had begun and a spice monopoly would never occur again

New World discoveries

New World spices, introduced first to Spain, included allspice, vanilla, and several varieties of capsicum peppers such as chili peppers and paprika

Spices (see table 17.1)

Cinnamon and cassia (see fig. 17.2)

Cinnamon is one of the oldest and most valuable spices known; its use is documented in ancient Egyptian, biblical, Greek, Roman, and Chinese accounts

This spice comes from the bark of an evergreen tree, *Cinnamomum zeylanicum*, a member of the family Lauraceae, which also contains avocado and bay; it is native to India and Sri Lanka

The similar spice cassia (often called cinnamon) comes from several related species, but mainly from *Cinnamomum cassia*, native to Southeast Asia

Only the inner bark is used for true cinnamon; the entire bark is used for cassia

Cinnamon and cassia are commonly used in foods, but they have also been used in medicines, perfumes, and scents (see fig. 17.3)

Black and white pepper (see fig. 17.4)

Both black and white pepper are obtained from the berries of *Piper nigrum*, a climbing vine in the Piperaceae native to India and the East Indies (capsicum peppers are in the Solanaceae and are native to the New World – see p. 277)

For black pepper, berries are picked green just before ripening; they are allowed to dry for a few days and during this time they turn black and shrivel

For white pepper, the berries are allowed to ripen on the vine; after harvesting, the outer hull is removed, leaving the grayish white kernel

Cloves (see fig. 17.5)

Cloves were used in ancient China to sweeten the breath of court officials before they addressed the emperor

Cloves are the unopened flower buds of *Eugenia caryophyllata*, an evergreen tree in the myrtle family, Myrtaceae, native to the Spice Islands (now the Moluccas)

After picking, the buds are dried and marketed as whole cloves or ground and used in desserts, beverages, meats, pickling, sauces, and gravies

In Indonesia, cloves are mixed with tobacco for cigars and cigarettes

Extracted clove oil has been used in medicines, disinfectants, mouthwashes, toothpastes, soaps, and perfumes; synthetics are now replacing natural clove oil

Nutmeg and mace

Nutmeg and mace are obtained from the same plant, the nutmeg tree, *Myristica fragrans* of the nutmeg family, Myristicaceae, native to the Spice Islands

The fruit is a drupe with a fleshy mesocarp that is removed, exposing the aril-covered endocarp (see fig. 17.6)

The netlike aril (a fleshy envelope that surrounds some seeds) is removed, dried, and ground to become mace

The pit, consisting of the stony endocarp and seed, is cured by drying until the seed rattles freely in the shell; the shell is cracked, releasing the seed or nutmeg, which is sold whole or ground

Nutmeg and mace have some minor hallucinogenic properties, but the essential oils responsible for these effects can be quite toxic in large quantities

Nutmeg and mace had reached Europe by the 12th century and were two of the precious spices of the Middle Ages

Ginger and turmeric

Ginger is obtained from the rhizomes of *Zingiber officinale* of the ginger family, Zingiberaceae; it is a small herbaceous perennial native to tropical Asia (see fig. 17.7)

The Spanish introduced ginger into the New World, and today many people believe that the best ginger comes from Jamaica

Ginger is a versatile spice used in baked goods, Oriental dishes, pickles, vegetables, meats, poultry, and ginger ale; it has been used medicinally to relieve nausea

Turmeric comes from the rhizome of *Curcuma longa*, also native to tropical Asia and also a member of the ginger family

Turmeric is a common ingredient in prepared yellow mustard, it is the main ingredient in curry powder, and it is often used as a substitute for saffron; it is commonly used in Middle Eastern and East Indian cooking

It is used as a brilliant yellow dye to color both foods and fabrics, and it is used in medicines and cosmetics in parts of Asia

Saffron (see fig. 17.8)

Saffron, the modern world's most expensive spice, is obtained from the stigmas of *Crocus sativus*, a member of the Iris family, Iridaceae; it is native to eastern Mediterranean countries and Asia Minor

It is a spice that was much desired by the ancient civilizations of Egypt, Assyria, Phoenicia, Persia, Crete, Greece, and Rome, and it may be the oldest spice used in the region

The Arabs introduced saffron into Spain in the 10th century, and today Spain dominates world production with 70% of the market

The stigmas are removed from the flowers and are dried by slow roasting; it is sold as saffron threads (whole stigmas) or powdered

It takes 150,000-200,000 flowers to yield 1 kilogram (2.2 pounds) of saffron, which has a retail value today of about \$70 per ounce

Saffron is widely used in French, Spanish, Middle Eastern, and Indian cooking, being an essential ingredient in bouillabaisse, paella, arroz con pollo, saffron cakes and buns, and challah

Hot chili peppers and other capsicum peppers (see fig. 17.9)

Capsicum peppers are native to the New World where they were cultivated for thousands of years by the people of tropical America

They were introduced into Spain by Columbus and were soon cultivated throughout Europe, Asia, and Africa; when Cortéz conquered Mexico, they were a significant part of the diet of the native peoples

Capsicum peppers are the fruits of plants belonging to a single genus in the tomato family (Solanaceae), *Capsicum*; there are five cultivated species and hundreds of varieties

Capsicum annuum is the most widely cultivated species and includes the mild sweet bell peppers as well as many varieties of hot peppers such as cayenne

Capsicum frutescens is cultivated mainly in the tropics and warm temperate areas and generally has a more fiery taste such as tabasco peppers

Capsicum chinense, despite its scientific name, has South American origins; it includes the habañero, the hottest chili pepper known

Capsicum baccatum is the most widely grown pepper in South America, where it is called aji

Capsicum pubescens, the least known of the domesticated chilies, is grown in the highlands of Central and South America

The biting taste of capsicum peppers is due to a mixture of several related alkaloids, of which capsaicin is the most prevalent; the hotness of peppers is rated using Scoville Heat Units (see table 17.2)

Capsaicin is used in law enforcement in pepper spray, and it is used in creams to relieve the pain of arthritis, shingles, cluster headaches, and other ailments

Capsicum peppers are excellent sources of vitamin C

Many varieties are sold whole, either fresh or dried; powders, prepared by grinding dried fruits, include paprika, red pepper (also sold crushed), cayenne, and chili powder (actually a blend of spices)

Capsicum peppers are widely used in cuisines throughout the world as exemplified by their use in many Hungarian, Italian, Mexican, Cajun, Indonesian, Indian, and Oriental dishes

It is traditional in New Mexico to string red chilies into ristras, which are hung near entranceways of homes as a symbol of hospitality

Vanilla (see fig. 17.10)

Vanilla is the only spice obtained from a member of the orchid family, Orchidaceae

It comes from the fruits of *Vanilla planifolia*, a perennial vine native to the humid tropical rain forests of Central America and Mexico

During the curing process, the characteristic vanilla aroma develops as vanillin is synthesized

With proper curing the pods turn black and have crystals of vanillin on the surface; they are sold whole or processed into vanilla extract

Vanilla, an important commodity among the Aztecs, was introduced into Spain and soon spread throughout Europe

Allspice

Allspice is made from the berries of a New World evergreen tree, *Pimenta dioica*, a member of the myrtle family

It was used by the Mayans and was discovered by Europeans in the 1570s

The berries are picked near ripe and then dried; it is used whole mainly in pickling vegetables and meats, or ground as an ingredient in baked goods, cooked fruits, sauces, and relishes

Herbs (see fig. 17.11 and table 17.3)

The aromatic mint

The mint family, Lamiceae, is the source of many important herbs including spearmint, peppermint, marjoram, oregano, rosemary, sage, sweet basil, thyme, and savory

The Mediterranean region is an important center of origin for the mint family, and a variety of these herbs have been used for thousands of years by the civilizations that developed in this area

Typifying mint flavors are spearmint and peppermint, *Mentha spicata* and *Mentha piperita*; the flavor comes mainly from menthol

The leaves or oils from these plants are widely used as flavorings and perfumes in items as diverse as gums, candies, cookies, cakes, cigarettes, toothpastes, mouthwashes, antacids, soaps, jellies, ice creams, and teas

Both marjoram and oregano (*Origanum majorana* and *Origanum vulgare*) were used by the ancient Egyptians, Greeks, and Romans in foods and medicines

Sweet basil, *Ocimum basilicum*, is one of the oldest herbs known; it is native to India and has a long history of use in Greece and other Mediterranean countries

The parsley family

The parsley family, Apiaceae, provides many familiar herbs such as parsley, caraway, dill, fennel, celery, anise, coriander, celantro, cumin, and chervil

Sometimes the fruits are used and sometimes the leaves are used

Parsley is native to the Mediterranean region; it was used by the early Greeks as a symbol of both victory and death, and by the Romans as a culinary herb

Dill, a native to the Mediterranean area and Europe, provides both leaves and fruits that are widely used as seasonings; commercially it is an important commodity for the pickling industry

Caraway is native to most parts of Europe, Asia, North Africa, and India; it provides the distinctive flavor of seeded rye breads and is commonly used in cheeses, soups, sausages, and a variety of meat and vegetable dishes

The mustard family (Brassicaceae)

In addition to the important vegetable crops that come from the mustard family (e.g., cabbage, broccoli, cauliflower, Brussels sprouts, turnips, radishes), two flavorful herbs or condiments come from this family – mustard and horseradish (see fig. 17.12)

Mustard is prepared from *Brassica alba*, white mustard, and *Brassica nigra*, black mustard; both are native to Europe and western Asia, and they have been used since the Middle Ages

Whole mustard seeds are used primarily for pickling; ground mustard is used in many ways, but especially for prepared mustards

The sharp tangy taste of mustard comes from volatile oils

Horseradish has a long history of use as a medicinal plant; its use as a condiment dates only from the Middle Ages in Denmark and Germany

The pungent aroma and biting taste of horseradish comes from a volatile oil

Japanese horseradish, wasabi, comes from a plant in the mustard family that is not closely related to common horseradish

The pungent taste of wasabi comes from isothiocyanates, which are antimicrobial and may prevent tooth decay; these compounds are said to prevent cancer and to alleviate asthma symptoms

The lily family (Liliaceae)

Onions, garlic, leeks, shallots, and chives are all members of the genus *Allium*

Onion and garlic are two of the oldest cultivated plants used for both culinary and medicinal purposes

The pungent flavor and scent of onion and garlic are due to the presence of various volatile sulfur compounds that are released when the tissues are cut

After digestion, these compounds enter the bloodstream and are transported to the lungs where they diffuse out into exhaled air

On the good side, the organic sulfur compounds inhibit the growth of many disease-causing bacteria and fungi and also inhibit the formation of blood clots (which have been linked to certain forms of cardiovascular disease as the cause of heart attacks and strokes)

Garlic consumption may lower cholesterol levels, especially LDL levels

Main Points of A Closer Look 17.1 – Aromatherapy: The Healing Power of Scents

Aromatherapy is a holistic approach to healing using essential oils extracted from plants (see table 17.A)

Main Points of A Closer Look 17.2 – Herbs to Dye For

Natural dyes are obtained from both animal and plant sources

Two of the best known animal dyes are:

Tyrian purple, which comes from the mucous gland of several species of welk, a type of shellfish

Cochineal red, which comes from females of a type of scale insect found on the *Opuntia* cactus

Herbal dyes include:

A deep, rich blue, from indigo in the legume family

Blue from woad in the mustard family

Red from the madder plant in the coffee family

Many common household, yard, and garden plants are sources of dyes (see table 17B)

This lecture outline was prepared mainly from *Plants and Society*, by Levetin and McMahon, 2003 (3rd edition), and may contain phrases or entire sentences taken verbatim from that source.