Welcome to Gernot Katzer's Spice Pages

On these pages, I present solid information on (currently) 117 different spice plants. Emphasis is on their usage in ethnic cuisines, particularly in Asia; furthermore, I discuss their history, chemical constituents, and the etymology of their names. Last but not least, there are numerous photos featuring the live plants or the dried spices.

To navigate through my site, use the search engine, browse the indices or go to the list of all spices.

I am on an extended journey that leads me through the Indian subcontinent. To learn more of my past travelling route, and to see some pictures from well-known and lesser knows places in India, open the contact page.

List of all spices:

Ajwain

Almond

Allspice

Anise

Annatto

Asa foetida

Basil

Bear's Garlic

Black Cardamom

Black Cumin

Black Mustard

Blue Fenugreek

Boldo

Borage

Caper

Caraway

Cardamom

Cassia (Chinese Cinnamon)

Celery

Ceylon Cinnamon

Chameleon Plant

Chaste Tree

Chervil

Chile

Chive

Cicely

Clove

Coriander

Coconut

Cresses

Cubeb Pepper

Cumin

Curry leaf

Epazote

Dill

Fennel

Fenugreek

Fingerroot

Gale

Garlic

Ginger

Grains of Paradise

Greater Galangale

Horseradish

Hyssop

Indian Bay-leaf

Indonesian Cinnamon

Indonesian Bay-Leaf

Juniper

Kaffir Lime

Laurel

Lavender

Lemon

Lemon Balm

Lemon Grass

Lemon Myrtle

Lemon Verbena

Lesser Galangale

Licorice

Lime

Long Coriander

Long Pepper

Lovage

Mahaleb cherry

Mango

Marjoram

Mexican Pepper-leaf

Mexican tarragon

Mugwort

Myrtle

Negro Pepper

Nigella

Nutmeg & Mace

Olive

Onion

Orange

Oregano

Pandanus flower

Pandanus leaf

Paprika

Paracress

Parsley

Pepper

Peppermint

Pepper Rosé

Perilla

Pomegranate

Poppy

Pumpkin

Rice paddy herb

Rocket

Rose

Rosemary

Rue

Safflower

Saffron

Sage

Sassafras

Savory

Sesame

Sichuan Pepper

Silphion

Southernwood

Star Anise

Sumac

Tamarind

Tarragon

Tasmanian Pepper

Thyme

Tonka bean

Turmeric

Vanilla

Vietnamese Cinnamon

Vietnamese coriander

Wasabi

Water pepper

White Mustard

Zedoary

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Indices:

- Alphabetic Index
  - 10000 names in about 50 different languages (*really* large file)
- English Index
  - lists English synonyms and botanical names
- Geographic Index
  - according to country of origin or main usage area
- Morphologic Index
  - plant part used for cooking
- Botanic Index
  - plants arranged in systematic botanic order
- Spice Mixture Index
  - quick key to main ingredients to about 20 traditional spice mixtures

Other Texts:

- Overview
  - Traditional welcome message, copyright, disclaimer, ...
  - Please read the note on copyright!
- Introduction
  - Some information and ideas on various topics related to spices
- Literature
  - Lots of books (mostly German, I apologize)
- WEB-Pointers
  - Some links referring to spices and cooking
- Spice Sources
  - Where to get unusual herbs and spices (applies mostly to readers in Europe and the USA)
- List of Pictures
  - Technical and copyright issues with my pictures

A German version of this site is also available.

Es gibt auch eine deutsche Version dieses Sites.

This site uses Google Analytics, a tool that helps me analyzing visitor navigation and thus yields useful information for further improvement of my site. Google Analytics employs Cookies and JavaScript. Visitors who do not accept cookies will not suffer from any lack of functionality of the Spice Pages. For details, see the Google Analytics Terms of Service.

For questions and comments,
please contact
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Introduction

Definitions

According the Austrian Food Law, the term “spice” refers to plants or parts of plants (possibly dried) that are used to enhance the flavour or taste of human food. Apart from the measures necessary for conservation, spices must not be technically modified or mixed with any other components (the law applies special names to such mixtures).

It will be seen that this definition is rather narrow: Many ingredients serving exactly the same purpose as spices, like beef extract, dried fish, fish sauce, shrimp paste, soybean sauce or fermented wheat, are excluded. This is probably because, with the exception of beef extract, these preparations have no tradition in Central Europe, at least not in our times. Of course, also salt is not considered a spice.

It will also be noted that this definition does not make any distinction between herbs and spices, as seems to be common in English language. Thence, the meaning of *herb* will refer to a subset of the meaning of *spice* in all documents on this site, or, put the other way, the meaning of *spice* will include tropic plants with aromatic fruits or barks (traditionally called “spices”) and plants of temperate climate featuring aromatic leaves (traditionally called “herbs”). You might call that bad and idiomatically incorrect English, and you’ll be right with this critique; still, that’s the price native English speakers have to pay for the advantage of reading the Internet in their mother tongue (please let me make perfectly clear that this is *no* private war against English language, but simply a statement about the dynamics of living languages).

Although at most forty different spice plants are of global importance (economically and culinarily), many more are used as condiments locally, in the region of their natural occurrence. Some of these are traded in small quantities and used in ethnic restaurants or by emigrants who do not forsake their cooking traditions, other have some use as medicine and are therefore available in western pharmacies. Many spices that have been used extensively in past centuries in Europe have now become obsolete and are now not even known to the

Western public – mostly because other spices with similar sensory quality became cheaper and were preferred. It is my interest to gather information about well-known and well-researched spices as well as about those exotes.

At present, I own dried samples of about 117 different spice plants (and of course a lot more that I could not yet identify). This is, however, only a small fraction of the total number of plants used throughout the world: Especially in tropic regions, lots of local plants growing abundantly without cultivation are used for traditional cooking, and these are mostly not even researched, yet traded in significant scale.

On Constituents

About the main constituents in spices, quite a lot should be said, or nothing at all; this is a very large field and easily confused by superficial discussions. Still, I want to explain some of the terms that appear frequently in my spice articles.

The constituents responsible for the spicy properties of plants are always *secondary metabolism products*; this is, they are not involved in primary metabolism (production of plant tissue and production/use of energy storing molecules); thus, they are not vital for the plant. In some case, it is supposed that the aroma molecules are essentially by-products of metabolism; in most cases, though, they play an important rôle in attracting pollinators or drive away herbivorous animals. It is somehow paradoxical that plants are grown and spread world-wide

as food enhancers, although their tasty constituents' intention is to discourage the consumption of the plant.

Although there is a large number of classes of plant constituents known, most plants contain only few of them. It is frequently observed that botanically related plants contain similar or even the same constituents; this also explains why spices appear clustered in some plant families, while other families do not contain any aromatic plant.

Only a small fraction of the many biochemicals found in plants are relevant for the quality of spiciness; many classes are hardly ever found in spices, as their taste in unpleasant or they are not safe at all. The following classes are most important culinarily:

Terpenes:

This is by far the most important class of aroma compounds. Many of them exhibit an aromatic fragrance reminiscent to turpentine (which is a terpene mixture distilled from various fir species).

Terpenes are widely distributed secondary metabolism products, showing low boiling point and, thus, strong aroma. The name *terpene* properly is reserved for hydrocarbons made up from isoprene units, but is frequently extended to derivatives of these (alcohols, ethers, carboxylic acids, esters …), which should be called *terpene derivatives*.

Furthermore, benzoid dehydration products of terpenes appear in plants, e.g. the phenol *thymol*, which is responsible for the aroma of thyme and ajwain.

Depending on molecule size, we discriminate between mono-, sesqui-, di- and triterpenes, having 10, 15, 20 and 30 carbon atoms, respectively. Of these groups, *monoterpenes* are of utmost importance; 90% of all spices owe their fragrance to them. Nearly all monoterpenes are not specific for a species, but occur in many different plants; thus, the characteristic aroma of a spice is caused by a specific mixture of monoterpenes, not by a specific individual compound. Monoterpenes are formed in all plant families, but are most numerous and highly-concentrated in the mint family (Lamiaceae) and the parsley family (Apiaceae), both of which contain a large number of spice plants.

Given their large number, it is amazing that only a few monoterpenes exhibit severe toxicity for humans, although quite many may cause skin irritation. Most of the toxic monoterpenes are actually ketones; examples include umbelliferone (from California Bay leaves), pulegone (from pennyroyal) and a number of furanoid terpene ketones found in perilla, e.g., isoegomaketone.

Thujone (in mugwort, wormwood, sage and many cypress species) is commonly made responsible for the adverse effects of the absinth liquor popular at the begin of the 20.th century (see southernwood). Another example of a toxic monoterpene ketone found in

many spice plants is camphor, a pleasantly-scented, but quite dangerous substance. Camphor is found in many spices of the mint family (e.g., rosemary or sage).

Furthermore, the “organic” insecticide pyrethrum should be mentioned; pyrethrum and its derivatives are monoterpenoids with anomalous structures; they are effective insecticides, but hardly toxic for mammals. A most untypical monoterpene is cantharidine, which is won not from a plant but from a kind of bug called “Spanish fly”; it is occasionally abused as an aphrodisiac. Amazingly, cantharidin is extremely toxic for humans, but much less for other mammals.

Higher terpenes are less volatile and, therefore, of less olfactory importance. While sesquiterpenes are moderately common constituents in aroma plants (though in small concentrations), di- and triterpenes are rather exotic and rare in spices. Among the sesquiterpenes some are common to many families, but generally, the higher terpenes tend to be specific to a family, genus or even species. Sesquiterpenes are of some importance for the fragrance of cinnamon, conifers (juniper) and take an important part in the aroma of ginger and other plants of the ginger family (Zingiberaceae), like turmeric and galangale.

Polygodial (tadeonal) is an unusual sesquiterpene derivative; despite being nonvolatile, it has culinary value. Polygodial is a partially unsaturated dialdehyde and has an intensive,

biting hot taste; both water pepper and Tasmanian pepper owe their pungency to that compound.

Di- and triterpenes tend to taste strongly bitter; a mixture of phenolic di- and triterpenes is responsible for the slightly bitter taste of several spices of the mint family (Lamiaceae); see also hyssop. Many diterpenes are pharmacodynamically very active, which means that they can be effective medicines or effective poisons, depending on circumstances. For example, the toxicity of the infamous “Pontic honey” from the Turkish Black Sea coast is due to traces of diterpenes contained in the nectar of local *Rhododendron* species.

Triterpene glycosides are known as saponins, and some of them are highly toxic due to their haemolytic power, but due to poor resorption this does usually not apply to oral route. Glycyrrhizin (from licorice) is a rare example of a saponin with pleasant taste.

Of the tetraterpenes, the most important group are carotenoids. This term includes characteristically (yellow to orange) coloured unsaturated tetraterpene hydrocarbons and derivatives of such hydrocarbons; all plants contain carotenoids, and several vegetables and fruits owe their orange colour to them. Usually, they are soluble in fat; thus, small drops of oil will take up the entire colour in soups or sauces spiced with paprika. A rare example of a water-soluble carotenoid is found in saffron.

Phenylpropanoids:

This class of aroma compounds is rather small and appears most frequently in the magnolia order (Magnoliidae), e.g., cinnamic acid in cinnamon; but phenylpropanoids are by no means restricted to that class. Other representatives include the toxic safrol (also spelt safrole; see sassafras, nutmeg), and eugenol (cloves); yet another related compound is vanillin in vanilla beans. Lastly, coumarin (woodruff, tonka bean) must be mentioned as a wide-spread phenylpropanoid. Similar to terpenes, phenylpropanoids are frequently volatile; *essential oils*, which are won by distillation, are mostly made up from these two classes of compounds.

Diarylheptanoides:

This group of non-volatile compounds is only found in the rhizomes (rootstocks) of spices of the ginger family (Zingiberaceae), e.g., zedoary and fingerroot; diarylheptanoids are responsible for the pungent taste of these spices and for the yellow colour of turmeric.

Biochemically, they are related to phenylpropanoids; their basic structure, though substituted and modified in numerous ways, is 1,7-diarylheptan-3-one. Structurally related but simpler 1-aryl-alkanones appear in ginger and grains of paradise.

Alkaloids:

This important class of biochemicals contains several well-known poisons and medicines (atropine from belladonna, morphine from poppy, cocaine from the South American

coca shrub and coniine from hemlock, just to name a few). Because of high toxicity and generally bitter taste, they are rarely found in spices, and then mostly not responsible for the taste (e.g., nigellin in nigella or boldin in boldo leaves). Yet the pungent principles of chiles and black pepper are closely related to alkaloids. Since they are mostly not volatile, alkaloids do not exhibit aroma and do not show up in essential oils.

Glycosides:

This is a large and inhomogeneous group of biochemicals. Their common feature is that they consist of two parts: A carbohydrate (sugar), mostly glucose, and another, non sugar-like part, which is generally termed *aglycon*. According to the chemical identity of the aglycon several types of glycosides are discriminated; it is important to realize that the chemical bond binding the sugar to the aglycon (called *glycosidic bond*) is weak and easily cleaved, yielding the free aglycon. Glycosides are generally non-volatile and thus lack fragrance, but the aglycon itself may well be volatile and, then, show up in the essential oil.

Some plants store aggressive compounds, which could be harmful for the plant itself, in form of glycosides; the dangerous substance can, if needed, produced readily by enzymatic reaction. A well-known example are cyano-glycosides contained in the seeds of apricots, cherries or bitter almonds; on cleavage of the glycosidic bond, they yield the highly toxic hydrocyanic acid.

A similar example are mustard oil glycosides, which are found in the cabbage family (Brassicaceae): Their aglycon is a pungent and lachrymatory isothiocynate, which is, in its free form, stable for only a few minutes. These glycosides are contained in black and white mustard seeds and in horseradish.

Coumarin (e.g., in woodruff or tonka beans) and vanillin (in vanilla beans) are examples for aroma compounds which are stored as glycosides and are liberated only by drying. To convert the scent-less glycoside to the aroma compound as quantitatively as possible, these two spices need extensive post-processing after plucking.

Tannines:

Members of this inhomogeneous class of biochemicals are found in nearly all plant families; their taste is astringent and rather unpleasant. Thus, they are not valued in spice plants. High tannine content is considered a sign of bad quality (see cassia), but in small amounts, even tannine has some culinary merits (see rosemary, sumac).

Fruit acids:

This term includes some chemically related di- and tricarboxylic acids, of which citric acid is, before tartric and malic acid, the most important. All these acids feature the same, purely sour taste and lack specific fragrance; the typical aroma by which we distinguish between lemon, orange, pomegranate or mango is solely determined by other, volatile compounds.

Carbon hydrates:

All green plants are capable of synthesizing sugars (primarily, *glucose*) from water, air and light; glucose, in turn, acts as a kind of fuel, which can be combusted and thereby yields energy. Other sugar types are produced from glucose. Sweetness of fruits serves to attract animals to spread the seeds; they frequently contain, besides glucose, the chemically related fructose.

Storing large amounts of sugar in a plant cell is not feasible; on the other hand, many plants need to store the energy content of glucose, e.g., over winter, to allow rapid growth in spring. A suitable compound to store glucose is *starch*, which is, therefore, frequently found in perennial plant parts (for example, subterranean stalks called rhizomes: potatoes or ginger) or in seeds (e.g., cereals).

Sulfur compounds:

Many sulfur compounds featuring sulfur in low oxidation state emanate a strong, rather unpleasant smell (e.g., thioles, sulphides and di- and polysulphides). As biochemicals, they are most prominent in the onion family (Alliaceae: garlic and onion), but appear also in the botanically unrelated asafetida.

Lipids:

Lipids are commonly known as fats if solid and as oils if liquid; there is no further difference between fat and oil besides the melting point, which reflects gradually

different composition. Lipids are an efficient form to store energy, and occur, in the plant kingdom, mainly in seeds. Vegetable oils and fats are nearly exclusively composed of triglycerides, i.e., esters of the alcohol *glycerol* with three molecules of *fatty acids*. Fatty acids are long-chain carboxylic acids, ranging in chain length from 12 (lauric acid) to 22 (behenic acid); shorter or longer chains are rarely found in significant amounts. Plants cannot synthesize fatty acids with an odd number of carbon atoms.

Examples for unsaturated fatty acids are oleic, linoleic and linolenic acid, with one, two and three C=C double bonds, respectively. Linolenic acid is essential for humans, and, in the past years, large intake of linolenic acid was considered most important in preventing a number of diseases resulting from unbalanced lipid metabolism. Yet recent studies indicate that the importance of oleic acid may have been underestimated in the past.

Besides contributing a flavour of their own, oils are most important as a cooking medium that allows various techniques of high-temperature cooking, resulting in brown, crispy and tasty surfaces. But there is another point: Since most aroma compounds dissolve more easily in fat than in water (chemist call such a behaviour *lipophilic*), small amounts of vegetable or animal fat tend to improve the taste of every dish, since they extract the aroma from the spice pieces. Indians like to fry their spices shortly in hot oil, which is

even more effective because the high temperature increases the solubility and speed of solution.

For details on the production and grades of vegetable oils, see sesame. Further oil plants discussed on these pages are olive, black mustard, poppy, coconut and safflower.

On Etymologies

I have tried to give etymological explanations to the names of spices wherever I was able to find some in different sources. Different sources differ amazingly in their interpretation of names, and in some cases simply no convincing derivation is known. In many cases, Greek or Latin names have (via the pharmacies of the Middle Ages) spread to all European tongues, but this makes it even harder to find the ultimate source of the name.

With respect to plants native in the Mediterranean region, we frequently find that names can be traced back to Old Greek, but not further. In some cases, early loans from some semitic tongues (e.g., Phoenician) are supposed, but in others, no connection to any known language can be constructed. This, certainly, does not imply that the Greek built these names arbitrarily, but simply indicates that the original languages are now lost. The Greeks themselves were invaders who came to the Southeast European peninsular in the second millennium B.C.; it is reasonable to suppose that they named all plants new to them by words taken from the local

pre-Greek tongue. Unfortunately, we do not know anything about these pre-Greek (also called Aegean or Mediterranean) languages. Some of the plant names taken thence may be crocus (saffron), marjoram, mint, olive, rose and parsley (another example is *lotus*).

Another complication is caused by the phenomenon of *folk etymology*, which is found in all languages: A name of no special significance to the speaker is influenced by common word which it, by chance, resembles. For example, English *orange* was borrowed from Italian *arancio*, but the initial vowel changed its quality, being influenced by French *or* "gold", which seems a reasonable association for a golden-yellow fruit, but is linguistically not related at all. Folk etymology occurs also with old names that have lost their meaning even to native speakers.

Combined effect of multiple loaning and folk etymology sometimes yield curious results. So, English *horseradish* obviously has nothing to do with horses – but still it is surprising to learn that the first element of this name had meant *greater*. In German, the plant war originally termed *mehr-rettich* "great-radish" (German *mehr* being equivalent to the related English *more*), which was later reinterpreted as the homophonous *meer-rettich* "sea-radish" (folk etymology). In English, the first element was associated with *mare* "female horse" and the plant was therefore called *horseradish* (loan translation).

After these explanations, no one will doubt that etymologies are mostly an uncertain matter. Sometimes, many plausible theories have been ventilated by different sources; sometimes no reasonable explanation is known. Still, I feel that having a close look at word history give

surprising insight in early relations between cultures which seem far sundered today; for example, we learn that mustard was brought to Central Europe by the Romans and prepared with wine (*vinum mustum*, “young wine”), but the German name of the plant, *Senf*, goes (possibly) even back to the border area between Afganistan and Türkmenistan, thus showing that even in the antiquity, the world was not infinitely large or unconquerable.

On recipes

Maybe, in some distant future, I shall present a collection of recipes at this WWW site; but for the next time, this is not planned. There are several reasons for this decision:

1. First, there are more recipe sites in the internet even the most productive cook can try in his lifetime (a tiny selection of recipe sites is featured at my WWW pointer collection). There is no reason for me to further increase that superfluousness. I furthermore do not think that recipes I could offer to the net community were in some way singular or innovative to meet the concurrence.
2. Second, I feel sure that anyone seriously interested in any particular cooking style owns plenty of books devoted to that theme. I could probably not add anything substantial.
3. Third and most important, I do not feel that recipes are that crucial. Recipes are sequences of single working steps; in order to get satisfactory results, one must master

> these steps technically *and* be able to estimate their combined influence on the finished dish. To me it seems most important that my readers get the necessary knowledge to find answers to questions like: *What* spice fits to the dish? *In which manner* can I apply it? *Which* other ingredients does it harmonize with? *When* must I add it? *What* cooking technique (boiling, frying, deep-frying, baking, …) works best? Given these answers, all you further need is just talent of improvisation, trained taste buds and spirit of adventure (not necessarily in that order).

Fact knowledge is most important if you want to cook authentically. Correct choice of cooking fat, vegetables and spices (and of course, cooking technique) is an important prerequisite to imitate the taste of your last holidays within the limits of your own kitchen. To make such a choice easier, I have put most emphasis on background and larger context than on isolated recipes.

It should be clear, thus, that my sporadic hints on the preparation of some famous or typical dishes do not even try to substitute real recipes – about Italian *pesto* there is much more to be said than just the ingredients pine nuts, olive oil, garlic, *parmigiano* cheese and basil. By such "explanations" I intend to give the reader a coarse idea on a dish or a cooking style and, maybe, to make him interested in these. If you do not try to mix the five above ingredients (and probably get disappointed by the result), but buy a book on Italian cuisine and read it carefully, then you have met my intentions.

On Ground Spices

As a last point, I like to take position with regard to a much-discussed question: Is it better to buy ground spices, or should you buy them as a whole and grind them yourself?

There are arguments for both sides. Industrial spice mills are not like your coffee mill – they are able to cool their content during grinding, thus preventing volatile constituents to evaporate. Furthermore, the produce a very fine powder which, by its high surface, releases its aroma quickly and efficiently. On the other side, exactly this high surface/volume ratio makes the product more susceptible to degradation during storage – either by evaporation or by reaction with oxygen.

This loss of aroma is *not* a purely academic problem noticed by the finest gourmets' taste buds, but dramatically quick: Whole cloves, for instance, can be kept for years; I will have to increase the amounts slightly, but even after five years less than 50% of the essential oil is gone. Ground cloves, on the other side, will be essentially tasteless after but one year and thus unsuited for cooking at all. Storage conditions, though, will notably influence aroma stability; yet I found the simultaneous conditions cool, dry and dark difficult and not easy to combine with readiness and quick availability near the oven.

Thus, I feel ground spices only suited for large spice consume, which makes it necessary to buy fresh, sealed containers every few months. This is certainly not true in most households. Thus,

I prefer whole spices in nearly all cases; grinding may then be performed with a small mortar (metal is not acceptable!) for amounts of about a tea spoon; larger quantities are conveniently treated with a coffee mill (which must not be used for coffee any more, otherwise your coffee will taste rather, ahem, unique). Such a home-made powder is not as fine as commercially ground spices, but since it is much fresher, the quality is still significantly superior.

Some spices are, because of their strong texture, difficult to grind at home. Examples are rhizomes in the ginger family (ginger, galangale and turmeric) and some other woody plant parts, e.g., cinnamon (even more cassia) and star anise. If you want to have these spices ground at all, it is probably most advantageous to buy them in powder, but in small amounts.

Some other spices are nearly always sold ground; of these, paprika is probably the most important example. Buying small quantities and using them quickly is probably the best idea. The same holds for some spice mixtures like *chili powder*.

All articles and indices are available both in English and in German language. Every English document contains only links to other documents in English, except one link pointing to the German translation of itself. Both the German and the English version contain exactly the same information (or, at least, are intended to do so).

To navigate through my spice collection, you may want to try one of the following indices:

Report problems and suggestions to Gernot Katzer (treabgxngmre)

Geographic Spice Index

In this index, you will find spices ordered according to the region they probably stem from. Since spice trade is nearly as old as humanity itself, we cannot reconstruct the natural occurrence of spice plants in all cases.

For every region, I have included the most important spices used in present-day local cuisine. Of course, this information cannot be exhaustive, in part because spice usage may differ even in relatively small regions and in part because since I have not travelled to all these places, I rely on second-hand information, which is rather sparse about some topics.

You may find that this index is rather Asia-centered; although certainly true, I claim that this is not due to my personal interest in Indian and South-East Asian cooking, but rather due to the fact that nearly all spices important in our days are of Asian origin (exclude allspice, vanilla and chile from this statement). Therefore, it seemed convenient to split up the Asian section of this index in several parts, while only one section deals with African or American spices, respectively.

This index contains short hints about more than 60 herbs and spices that are not treated on my pages. Some of these spices are very obscure, have highly specialized (often non-culinary) applications, are only used in a small region or are merely of historic interest. Some others are quite interesting and deserve a fuller treatment, but I do not know enough about them to write a full article. Whenever that changes (maybe because of your help?), I will gladly write more about these spices.

Central and Northern Europe

Surprisingly few spices actually stem from Europe, although many have been imported. The Romans brought many of their Mediterranean spices to the countries north of the Alps, and some of them found the climate acceptable and were easy to cultivate; some even spread over the new habitat and became part of the local flora.

The following plants are commonly believed to be of European origin, although you might find different opinion expressed in some literature.

- Bear's garlic (ramson) (*Allium ursinum*)
- Blue Fenugreek (*Trigonella caerulea*)
- Borage (*Borago officinalis*)
- Caraway (*Carum carvi*)
- Celery (*Apium graveolens*)
- Chives (*Allium schoenoprasum*)
- Cicely (*Myrrhis odorata*)
- Gale (*Myrica gale*)
- Horseradish (*Armoracia rusticana*)
- Juniper (*Juniperus communis*)

- Mugwort (*Artemisia vulgaris*)
- Southernwood (*Artemisia abrotanum*)
- Water cress (*Nasturtium officinale*)

Today, Europe's local cuisines use a lot of herbs from the Mediterranean, of general importance are bay leaf, marjoram, oregano, rosemary, savoury and thyme, most of which can be grown in cool temperate climate (in our days, though, they get mostly imported because of cost and quality considerations).

Since ancient times, onion and garlic are cultivated in Europe. However, because of its strong odour, garlic is less appreciated especially in North Europe, where excessive garlic consumption seems to be regarded as a kind of social crime. Onion is more used as a vegetable.

Hungary is well-known for its paprika (bell pepper) and its variety of diverse chiles (a gift from the New World). In other European countries, hot chiles are less enjoyed, although they do play some rôle in South East Europe (Balkan peninsular) and in some of the Mediterranean states.

Tropic spices are usually not essential ingredients in traditional European cuisine – with the exception of black pepper, which is held in high esteem all over the world. Cinnamon and cloves find their main applications in sweet dishes, ginger and nutmeg are used even less.

Although cardamom is nearly unknown in most of Europe, Scandinavians are very fond of it and use it to flavour bread and pastries.

There are more European plants that get used culinarily, though in most cases use is rare, or restricted to a small area; others are mainly of historical interest.

- In the first place, there are **truffles** (black or Périgord truffle, *Tuber melanosporum*, and white or Alba truffle, *Tuber magnatum*), whose absence from this page can only be regarded as a serious demerit. They played an eminent rôle in French cuisine of the 18.th century, and still have much importance despite their high price.
- **Angelica** (*Angelica archangelica*, Apiaceae) is distributed over Northern Eurasia. All plant parts have a strong and penetrating odour and are occasionally used for cooking, particularly in Northern Europe (e.g., for fish soups). The plant is, however, more important for flavouring liqueurs.
- **Asarabacca** (European ginger, *Asarum europaeum*, Aristolochiaceae/Aristolichiales/Magnoliidae) is a perennial herb of forests in Europe except the Mediterranean. The fleshy rhizome contains an essential oil of variable composition and has a pleasant aromatic flavour. In Chinese (*A. sieboldii*, *A. heterotropoides*) and North American (*A. canadensis*, "wild ginger") relatives, a nephrotoxic compound called aristolochic acid has been found. Nevertheless, both the

European and a American species enjoy some popularity as wild vegetable and flavouring.

- **Calamus** (Sweet flag, *Acorus calamus*, Araceae/Arales/Arecidae), though native to India, is now naturalized all over the Northern hemisphere. The rhizome is very aromatic and can be candied like ginger (whence the name “German ginger”), but is rarely used to flavour food. It is quite bitter (which is why it often appears in liqueurs), and the high content of β-asarone makes it rather unsafe on regular use. Calamus traded in pharmacies nearly always stems from American plants that are low in β-asarone.
- **Elder** (*Sambucus nigra*, Caprifoliaceae/Dipsacales/Cornidae) bears highly scented flowers, which are used as flavouring for desserts and beverages. The dark purple fruits have, in times fortunately long past, been used as a wine colourant.
- **Garlic mustard** (*Alliaria petiolata*, Brassicaceae) has leaves with a distinct garlic flavour and seeds that are pungent like mustard. It is used occasionally by peasants, especially in Eastern Europe.
- **Ground ivy** (*Glechoma hederacea*, Lamiaceae) is an extremely common weed in Central and Western Europe. The leaves, which have an aroma slightly reminiscent of mint and thyme, are an interesting if seldom-used culinary spice; I have heard of Czech recipes using it. In the past, they were also employed for beer brewing whence the name “alehoof”.

- **Hop** (*Humulus lupulus*, Cannabaceae/Urticales/Dilleniidae) is, of course, very important for beer brewing, but is hardly ever used for cooking. Also, beer has (other than wine) not much use in the kitchen except, maybe, to quench the cook's thirst.
- **Poplar** (*Populus alba*, Salicaceae/Salicales/Dilleniidae) yields leaf buds and young leaves with characteristic, aromatic odour; some sources state that they have been used as a flavouring in the past. They are still employed as flavourant for local types of liquor.
- **Reflexed stonecrop** (*Sedum reflexum*, Crassulaceae/Rosales) has fleshy leaves with fresh flavour which are used mainly in Western Europe as a garnish. Chopped stonecrop leaves have formerly been quite popular to add extra sensation to salads, but in our days it is no longer fashionable.
- **Salad burnet** (*Sanguisorba minor*, Rosaceae) is a wild plant in Western Europe that gets occasionally cultivated. It is rich in tannines to which the leaves owe a astringent but nutty taste. The leaves are used to spice up lettuce, salads and particularly the Frankfurt Green Sauce (see borage).
- **Wild rosemary** (Marsh tea, *Ledum palustre*, Ericaceae/Ericales/Cornidae) is a wild plant of bogs and swamps of the Northern hemisphere. There are several subspecies, one of which ("Labrador tea") is a popular tea plant in Canada. The European form was, like the ecologically similar gale, used for *gruit* beer, although it contains narcotic sesquiterpene alcohols and is not fully harmless.

- **Sorrel** (*Rumex acetosa*, Polygonaceae) is known for its acidic and pungent leaves which contain oxalic acid. It is used occasionally, e.g., in Green Sauce.
- **Tansy** (*Tanacetum vulgare*, Asteraceae) grows all over Europe, but as far as I know, its culinary usage is restricted to Britain. The leaves have a dominant, not very agreeable, odour which is mostly due to the toxic thujone (see also southernwood).
- **Woodruff** (*Galium odoratum*, Rubiaceae/Gentianales/Cornidae) grows wild in the forests of Western Europe. On wilting of the aerial parts, coumarine is liberated (see also tonka bean) which gives its incomparable flavour to some traditional flavoured wines.

The Mediterranean Region

The area around the Mediterranean Sea, belonging in part to Europe, Asia and Africa, has always been a cultural unity. Early spice trading routes lead from China and India via the Arab peninsular to the Mediterranean Sea, which made the region an important place of cultural and culinary exchange. In the warm Mediterranean climate, many fragrant plants grew abundantly; and in the course of millennia, even more have been introduced by traders, refugees or immigrants from further East.

The following are generally considered as native Mediterranean plants; however, some are open to dispute, e.g., cumin or even the apparently “typical Mediterranean” olive.

- Ajwain (*Trachyspermum ammi*)
- Anise (*Pimpinella anisum*)
- Coriander (*Coriandrum sativum*)
- Cumin (*Cuminum cyminum*)
- Fennel (*Foeniculum vulgare*)
- Hyssop (*Hyssopus officinalis*)
- Garden cress (*Lepidium sativum*)
- Lavender (*Lavandula angustifolia*)
- Mahaleb cherry (*Prunus mahaleb*)
- Myrtle (*Myrtus communis*)
- Nigella (*Nigella sativa*)
- Oregano (*Origanum vulgare*)
- Olive (*Olea europaea*)
- Rocket (*Eruca sativa*)
- Rosemary (*Rosmarinus officinalis*)
- Rue (*Ruta graveolens*)
- Sage (*Salvia officinalis*)
- Saffron (*Crocus sativus*)
- Savory (*Satureja hortensis*)
- Sumac (*Rhus coriaria*)

- Thyme (*Thyumus vulgaris*)

Asian spices became popular in Europe first in the Age of Hellenism. Later, spice trade blossomed in the late days of the Romans, about two thousand years ago; from the beginning, spice trade was dominated by the Arabs. Apicius' *De re coquinaria* is one of the oldest European cookbooks; it lists some tropical spices, of which long pepper was most valued. Black pepper, cloves and Chinese cinnamon (cassia) also figure prominently. The enigmatic spice silphion (probably of Northern African origin) became extinct around 100 AD and was substituted by asafetida (from Central Asia). The usage of olive oil is a cultural constant in the Mediterranean since five millennia.

Today, Mediterranean Europe mostly relies on its native or imported herbs. Basil (stemming originally from South or even South East Asia) today grows wild all over South Europe and is used extensively, especially in Italian cuisine; the same holds for the indigenous oregano. Garlic figures more prominently than in Northern European countries. Regionally, saffron is used for fish or sea food specialties, but the high price of this spice limits its usage. Throughout the region, some dishes require small amounts of chiles; fiery food, however, is not typical.

Typical spice mixtures from Southern Europe are *bouquet garni* (see parsley) and *Herbes de Provence* (see lavender).

In Asia Minor and West Asia, herbs cease to be dominant. Coriander and cumin (from Persia, but grown locally) are popular, and the use of pungent spices (mainly black pepper and chiles) becomes more common. The berries of the sumac tree are essential to reproduce the astringent and sour taste found in many dishes from Turkey to Israel.

In Northern Africa, chiles take an important part in fiery stews and sauces. Coriander and cumin both are used extensively, but also African spices (grains of paradise) are common. Of the spices from tropical Asia, cinnamon and cloves find most use. All these, and more, may appear in Moroccan spice mixtures (*ras el hanout*, see cubeb pepper).

Although a large number of Mediterranean herbs is discussed here, the treatment is not exhaustive: There are many more that find their way in the kitchen on occasion. Sometimes, these are wild relatives of herbs treated here which are collected by knowledgeable family members, because their flavour is regarded superior to that of commercially grown ones. This usage is often very local and is hardly mentioned in cookbooks. This applies particularly to herbs of the mint family, e.g., thyme, marjoram and especially oregano. Further interesting plants from the Mediterranean are:

- **Black lovage** (alexanders, *Smyrnium olusatrum*, Apiaceae) is similar to lovage and celery, having aromatic roots, leaves and fruits. Today, the culinary importance of that herb is low.

- **Mastic** (*mastiha* [μάστιχα]) is a resin obtained from *Pistacia lentiscus* var. *chia* (Anacardiaceae), a tree growing only on the island of Chios in Eastern Greece, though lesser grades are harvested from related species. It was an important commodity in the Middle Ages, but is now only used in Greek cooking (see mahaleb cherry for more).
- **Samphire** (*Crithmum maritimum*, Apiaceae) grows along all coasts of Europe, from the Atlantic Ocean to the Black Sea. The leaves are succulent with a salty-aromatic flavour and have been a popular flavouring for salads in the past; samphire pickle, formerly much eaten in Britain, is now still popular in the Mediterranean.
- **Pennyroyal**, *Mentha pulegium* (Lamiaceae), differs markedly from culinary mints. It is used since antiquity in Roman cooking (see silphion). Despite its mild toxicity, it is a traditional herb in Britain.
- **Calamint**, *Calamintha nepeta*, is an aromatic herb used in regional Italian cooking (*nepitella*). Its flavour reminds of related Lamiaceae herbs, e.g., thyme, mint savory or oregano.
- **Pine nuts** (*pignoli*) are the seeds collected from the Mediterranean stone pine (*Pinus pinea*, Pinaceae/Pinales); in temperate Asia, related pine species are also used. They have a wonderful ethereal-aromatic flavour and are particularly important in Spanish and Italian cooking, e.g., for *pesto* (see basil).

- **Purslane** (*Portulaca oleracea*, Portulacaceae/Caryophyllales) is an annual herb probably native to the Himalayas, but today naturalized in Western Asia and Southern Europe. Although often eaten cooked as a vegetable, the raw leaves and stems have a crispy texture and a salty, fresh taste that makes them a good garnish for Mediterranean cold foods, e.g., West Asian appetizers. The flower buds have a more pronounced flavour and have been tried as a caper substitute.

West and Central Asia

Many important spices actually stem from West or Central Asia, even if some of them are in our days cultivated from Morocco to Vietnam:

- Almond (*Prunus dulcis*)
- Asafetida (*Ferula assa-foetida*)
- Bay leaf (*Laurus nobilis*)
- Black mustard seed (*Brassica nigra*)
- Dill seed (*Anethum graveolens*)
- Fenugreek (*Trigonella foenum-graecum*)
- Garden cress (*Lepidium sativum*)
- Garlic (*Allium sativum*)

- Lemon (*Citrus limon*)
- Marjoram (*Majorana hortensis*)
- Onion (*Allium cepa*)
- Poppy (*Papaver somniferum*)
- Rose (*Rosa damascena*)
- Tarragon (*Artemisia daracunculus*)

Possibly, cumin and some other of the spices listed in the previous section have their origin actually in western Central Asia, being spread westwards by migrating peoples in prehistoric times.

Today's Persian or Arabian cooking uses a multitude of spices, having easy access to Indian or Southeast Asian ingredients. Cardamom is much valued as an essential component of Arab-style coffee.

Cooking styles of the Arabic peninsular have a preference for aromatic but fiery food. Yemeni *zhoug* (see coriander), a spicy chili-laden paste, and Saudi Arabic *baharat* (see paprika) may serve as examples.

The Caucasus republics, situated between the Black Sea and the Caspian Sea, have developed a unique style of foods, although Russian and Turkish influences can bee seen. Georgia has a mild yet flavourful cuisine much basing on the flavours of dried herbs (see blue fenugreek for

the Georgian spice mix *khmeli-suneli* [ხმელი-სუნელი]) and of sour-fruity sauces prepared from fresh or preserved fruits. Fresh herbs are often sprinkled over warm and cold dishes; uniquely, Georgian cooking makes parallel use of both parsley and coriander leaves; the latter are not used anywhere else in the region.

A similar inkling to fruity flavours is found in neighbouring Azərbaycan (Azerbaijan) and in Iran. A typical Irani spice that is, unfortunately, missing from these spice pages is **barberry**, *Berberis vulgaris* (Berberidaceae/Ranunculales), called *zereshk* or *sereshk* [زرشک] in Farsi and *k'ots'akhuri* [კოწახური] in Georgian; it is often used to flavour ground meats or Persian rice dishes (*polo* [پلو]). Another source of sour flavour in Irani foods are dried limes (see also fenugreek for *khoreshte ghorme sabzi*).

An interesting herb typical for Georgian cooking is **marigold** (*Tagetes erecta*, Asteraceae), which appears in several recipes including the spice mix *khmeli suneli* (see blue fenugrek). In Georgian, it is simply called "yellow flower" (*q'vit'eli q'vavili* [ყვითელი ყვავილი]) or "Imeretian saffron" (*imeruli zaprana* [იმერული ზაფრანა]), and sometimes just *zaprana* which can lead to confusion with the much different saffron. The marigold flowers are dried and ground to yield a yellow powder that hat a mild, sweet scent. It can best be substituted by safflower. Sometimes, also the fresh sprigs are used that have a different, much stronger flavour reminscent of the South American *huacatay*.

The proper Central Asian region, between the Caspian Sea and the Tianshan mountains [天山], is a region rather devoid of local spices, although imported spices are available since antiquity,

because the ancient Spice Route running from China to the Mediterranean cuts through that region. Cookbooks of Kazakhstan sometimes mention local herbs with cress-like flavour. Combinations of dried fruits with meats are very popular, where cooks often use local species of genus *Prunus* (apricot, plum).

South Asia

South Asia, which encompasses the Deccan peninsular and the southern slopes of the Himalayas, has a variety of indigenous spice plants. Furthermore, Southeast Asian spices have been traded in India since thousands of years. Therefore, Indian cuisine is one of the most fragrant and aromatic in the world. A large number of spices native to South Asia has been exported long ago either to the West or to the East. For example, in today's South East Asia, we find spices of Indian origin that have no place in today's Indian cooking, e.g., lemon grass or lesser galangale. The following table shows only those South Asian spices that flavour the contemporary South Asian kitchen.

- Basil (*Ocimum basilicum*)
- Black cardamom (*Amomum subulatum*)
- Black cumin (*Bunium persicum*)
- Black pepper (*Piper nigrum*)

- Cardamom (*Elettaria cardamomum*)
- Cinnamon (*Cinnamomum zeylanicum*)
- Curry leaf (*Murraya koenigii*)
- Indian bay leaf (*Cinnamomum tamala*)
- Long pepper (*Piper longum*)
- Mango (*Mangifera indica*)
- Orange (*Citrus sinensis*)
- Screw pine (pandanus) flower (*Pandanus odoratissimus*)
- Turmeric (*Curcuma longa*)

In today's Indian cuisine, many more spices play an important part. Chiles, brought to Asia from the New World by the Portuguese, are used generously, especially in South India and Sri Lanka. Tamarind (from East Africa) is used to give some Southern Indian curry dishes a sour and tart flavour. Of the European and Central Asian spices, coriander, cumin and garlic are now indispensable for the taste of Indian food. Cinnamon, originally growing on the island of Sri Lanka, is now valued all over India and frequently combined with cloves, which stem from Southeast Asia.

Arab influence in South Asia is strongest in Afghanistan, Pakistan and North India. Cooks in these regions tend to use less chiles but more fragrant spices (cloves, saffron and cinnamon).

There are numerous spice mixtures in India, but most of them have nothing in common with the *curry powder* of Western supermarkets (see curry leaves). Most mixtures are actually not powders but pastes, made from ground spices, garlic, ginger and oil and are neither stored nor traded. Mixtures containing only dried spices are the Bengali *panch phoron* [পাঁচ ফোড়ন] (see fenugreek), the North Indian *garam masala* [गरम मसाला, گرم مسالح, also گرم مصالح] and the more Southern *sambar podi* [சாம்பார் பொடி] (for the latter two, see cumin). Another Southern Indian mixture (*bese bele* powder) is mentioned under coconut.

See black cumin about Northern Indian (Moghul style) cooking, and ajwain about spiced butter (*tadka* or *tarka*). See also onion. For a few typical recipes, see Indonesian bay-leaf for the aromatic Northern *biriyani* and tamarind for the fiery Southern *vindaloo*. Indian spiced tea (*chai masala* [चाय मसाला]) is discussed under cardamom.

Nepali cooking resembles Indian cooking in several ways, and some preparations, e.g., pickles, are quite comparable. Nepali food is typically milder than Indian food, both with respect to actual heat and usage of aromatic spices. This doesn't make the food of Nepal bland or uninteresting, because due to Chinese influence, there are several additional flavourings made by fermentation: Cheese, soy products and the typical Nepali *gundruk* [गुन्द्रुक], dried fermented vegetable leaves. Noodles in various styles are another culinary mark left by neighbouring China.

Finally, Burma, or Myanmar, as it is now called, is the meeting place and melting pot of the great cooking traditions of India and Southeast Asia. Noodles, shrimp paste, soy sauce and

sesame oil on one side and cardamom, cinnamon, turmeric and cumin on the other side witness the mixed heritage and give Burmese curries their distinct and very tasty character.

I am fascinated by Indian cooking; consequently, my treatment of Indian spices is intended quite exhaustive. Nevertheless, there are some Indian spices of which I still know too little to write a detailed description:

- First of all, one should mention **kokam** ([कोकम], kokum, *Garcinia indica*, Clusiaceae/Theales/Dilleniidae), a souring agent for South West Indian fish curries. In Sri Lanka, *goraka* [ගෝරකා, **கொறக்கா**] is a similar spice, probably derived from *Garcinia cambogia*.
- There is a little-known spice ***radhuni*** [রাধুনি] or *randhuni* [রাঁধুনি] used only in Bengali cooking and practically unavailable outside of Bengal. Its botanical identity is *Trachyspermum roxburghianum* (Apiaceae, Hindi: *ajmud*), but it gets often confused with ajwain. True *radhuni* has an aroma comparable to celery and fenugreek. Truly authentic variants of the Bengali spice blend *panch phoron* contain *radhuni* where the common mixtures have black mustard seeds (see nigella for details).
- In Nepal, ***jimbu*** [जिम्बु] are the dried leaves of a local onion species (*Allium wallachii*, Alliaceae); see chives for a description of its usage.

- **Cockscomb** (*Celosia argentea* var. *cristata*, Amaranthaceae/Caryophyllales) is a common ornamental in some European countries. In India, the bright red flowers (Hindi *lal murghka*, Kashmiri *moul* [مول]) are used as a food colourant.
- **Horseradish tree** (Drumstick tree, *Moringa oleifera*, Moringaceae/Capparales) grows wild in Northern India (Southern foothills of the Himalayas). The tree is very versatile: The young fruits (*drumsticks*) are eaten as a vegetable, an interesting oil (*ben oil*) is extracted from the seeds, the leaves are used medicinally and the root and root bark are rich in glucosinolates, which lend them a pungent, horseradish-like flavour. Nevertheless, this is one of the more rare flavourings in Indian cooking.
- The wild tree *Buchanania lanzan* (Anacardiaceae) yields edible seeds (***chironji*** [छीरोंजी]) with almond flavour; they are used in India, particularly the North East, to make sweets.
- The herb *Saussurea lappa* (syn. *S. costus*) (Asteraceae) is native to Kashmir and grows nowhere else; in India, it is known as ***putchuk*** or ***kushtha*** [कुष्ठ], and in the West, the name **costus** is most common. The dried root has a strong, perfumed odor and is often used in perfumery; in late antiquity and the early Middle Ages, it was used in Europe as a culinary spice.
- **Spikenard** (*Nardostachys jatamansi*, Valerianaceae/Dipsacales/Cornidae, Sanskrit *jatamansi* [जटामांसि] or *jatavati* [जटावती]) is a similar case: It is also native to the Himalaya region and is of great importance for perfumery, but in our times practically

never used for cooking. The related herb *Valeriana celtica* (Alpine valerian, speick) was, since the Middle Ages, often used as a cheaper substitute for expensive spikenard.

- **Alkanet** (*Alkanna tinctoria*, Boraginaceae) is a Mediterranean plant cultivated in India for its red rhizome, which yields a dye (Hindi *ratan jot* [रतन जोत]). The dried rhizome is occasionally used as a food colouring in the North West.
- The so-galled **mango ginger** (*Curcuma amada*) is a minor and rather strictly South Indian spice. The plant much resembles turmeric, but the rhizome is only pale yellow; its scent indeed mimicks the fragrance of unripe mangos very closely.
- A rather enigmatic "spice" of Southern India is a dried lichen referred to as *kalpasi* [கல்பாசி] in Tamil and *dagor phul* in Marathi (the latter name occasionally stands for star anise, though). The plant material is rather tastelesse, but it is widely used; I am not sure about its culinary merit.

Southeast Asia

Due to its tropical climate, Southeast Asia has a large number of native aromatic plants, most of which are preferred fresh in local cuisines. The Moluccas, a group of small islands on the border between Asia and Australia and home of nutmeg and cloves, have been the center of European spice policy in the late Middle Ages and the first centuries of the modern times.

- Chameleon plant (*Houttuynia cordata*)
- Cloves (*Syzygium aromaticum*)
- Coconut (*Cocos nucifera*)
- Cubeb pepper (*Piper cubeba*)
- Fingerroot (*Boesenbergia pandurata*)
- Ginger (*Zingiger officinale*)
- Greater galanga (*Alpinia galanga*)
- Indonesian bay leaf (*Eugenia polyantha*)
- Indonesian cinnamon (*Cinnamomum burmannii*)
- Kaffir lime (*Citrus hystrix*)
- Lemon grass (*Cymbopogon citratus*)
- Lesser galanga (*Kaempferia galanga*)
- Lime (*Citrus aurantifolia*)
- Long pepper (*Piper retrofractum*)
- Mace and Nutmeg (*Myristica fragrans*)
- Perilla (*Perilla frutescens*)
- Rice paddy herb (*Limnophila aromatica*)
- Screw pine (pandanus) leaf (*Pandanus amaryllifolius*)
- Vietnamese cinnamon (*Cinnamomum loureiroi*)
- Vietnamese coriander (*Polygonum odoratum*)

Today, all these spices (with the exception of cinnamon varieties, cloves and nutmeg, which are not so much in use) feature prominently in at least some of the major South East Asian cuisines. Furthermore, chiles, ginger and garlic are found all over the region, as are coconut products: coconut milk and coconut oil.

In Southeast Asia, numerous independent culinary styles have evolved; yet most of them prefer spices fresh (if available), and also fresh herbs (basil, coriander leaves and mint) are popular as a fragrant decoration in Vietnam, Cambodia and Thailand. Throughout the region, pungent fish preparations are essential: Fish sauces (*nam pla* [น้ำปลา] in Thailand, *nuoc mam* [nước mắm] in Vietnam), shrimp pastes (*gapi* [□□□] in Burma, *trassi* in Malaysia and Indonesia) and the unique Cambodian paste prepared from fresh water fish, *prahok* [ប្រហុក]. Fish sauce is also known in Southern China, where it is called *yu lu* [魚露]; but in Chinese cuisine, it is only a minor flavouring.

Thai cooks use even more spices (e.g., kaffir lime leaves, lemon grass and fingerroot) and other strong-smelling ingredients like dried fish to achieve the characteristic aroma of Thai dishes. Since they use chiles generously, Thai food is sometimes extremely hot and fiery. For Thai curries, see coconut. See also basil and mint for more Thai recipes.

In Cambodia and Vietnam, spice usage is not that dominant, and also Philippinos cook rather mildly. Besides garlic and ginger, Philippine cuisine makes use of the South American annatto

seeds. This spice was introduced to the Philippines by the Spaniards and is hardly known in other Asian countries.

Vietnamese cuisine is unique for its massive use of fresh herbs, some of which are used only rarely outside of Vietnam (Vietnamese coriander, long coriander), while others (rice paddy herb, chameleon herb) do not appear in other any other cooking style at all.

On the numerous islands of Indonesia, lots of very different regional cuisines have developed, which is to be explained by different life conditions (jungle nomads, farmers or seafarers; village-bound or cosmopolitan urban cultures), food taboos because of different religions (Islâm, Christianity, Hinduism, Buddhism, Animism), different climates (tropical jungle, mountain woods, highlands or even dry areas) and several other factors.

Most Indonesian cuisines do not use sweet spices, which is all the more remarkable because cloves, nutmeg and the Sumatra cinnamon variety are indigenous to Indonesia. Instead of these, the most popular spices are ginger, onion, garlic and moderate amounts of chiles, furthermore galanga and turmeric. Indonesian dishes frequently need shrimp paste (*trassi*) and soy sauce (*kecap*), which is also used in a thick and very sweet variety (*kecap manis*). Especially Jawanese dishes sometimes contain large amounts of sugar and taste sweet-spicy, while I enjoyed rather hot food in Sumatra, and Bali certainly displays the largest variety of different spices.

Some highlights of Indonesian cookery are shortly discussed under greater galangale (*rendang*, a buffalo stew from Western Sumatra), Sichuan pepper (*sangsang*, a spicy pork variety meats stew from Northern Sumatra), coconut (*ayam pa'piong*, a chicken dish from Sulawesi), mango (the pan-Indonesian fruit salad *rujak*) and lesser galangale (*bebek batulu*, Balinese roast duck). About Indonesian spice pastes (*bumbu*) in general, see lemon grass, for information about Balinese cuisine see Indonesian bay leaf and for Jawa cookery see tamarind.

Many more herbs and spices are used in the many and varied culinary styles of that large region. Particularly in Vietnam, there is a large whealth of local herbs that are not commonly available in the West. The following are particularly worth noting:

- In Thailand (*cha pluu* [ช้าพลู]) and Vietnam (*la lot* [lá lốt]), fragrant **wild betel leaves** are commonly used to wrap rice or other foods into. These leaves stem from a member of the pepper genus (*Piper sarmentosum*, Piperaceae) which is closely related to the so-called betel pepper, *Piper betle*, in indispensable part of the betel bits consumed in South East Asia and India (*pan* [पान]).
- **Torch ginger** (*Etlingera elatior*, Zingiberaceae) is a unique spice: The inflorescence is used to flavour curries in Singapore and Malaysia (*bunga kantan*).

- **Musk mallow** (ambrette, *Abelmoschus moschatus*, Malvaceae/Malvales/Dilleniidae) is a closely related plant with aromatic seeds. There is constant rumour of it being used as a coffee flavourant, but I don't even know where this usage is supposed to happen.
- **Vietnamese balm** (*Elsholtzia ciliata*, Lamiaceae) plays some rôle in Southern Vietnam (*rau kinh gioi* [rau kinh giới]) as part of the canonical herb garnish (see Vietnamese coriander).
- **Butterfly pea** (*Clitoria ternatea*, Fabaceae) has large, deeply blue flowers that are used to give a bluish hue to desserts in Thailand (*anchan*, *anjan* [อัญชัน]) and Malaysia (*bunga telang*). In our days, it is mostly substituted by synthetic food colourants.
- **Broadleaf thyme** (Cuban oregano, Indian borage, Mexican mint, *Plectranthus amboinicus*, *Coleus amboinicus*, Lamiaceae) is a herb native to South East Asia, though it has been introduced to the Caribbean. The leaves posses a strong odour due to an essential oil rich in carvacrol. The fresh herb is used in Indonesia (*daun jinten*), but especially in Vietnam (*rau day tan las* [rau tần dầy lás]), as a garnish.
- Quite rarely, I have read reports claiming that the pungent seeds of some members of the Araceae family (e.g., **Giant Elephant's Ear**, *Colocasia gigantea*) are used as pepper surrogate in South East Asia.

- The fruits of the tree *Garcinia atroviridis* (Clusiaceae/Theales/Dilleniidae) are used as a source of acidity especially in Malaysia (***asam gelugur***), similar to the use of other *Garcinia* species in South India and Sri Lanka.
- *Aleurites moluccana* (Euphorbiaceae/Euphorbiales/Dilleniidae) yields seeds ("**candle nut**", *kemiri*) which are a very common although bland ingredient of Indonesian spice pastes. See also lemon grass about spice mixtures containing candlenuts.
- A quite interesting spice is derived from the Indonesian ***pangi*** or ***kepayang*** tree, *Pangium edule* (Flacourtiaceae/Violales). The seeds, known as *kluak* or *kluwak* in Indonesian and as *pamarassan* in *bahasa toraja*, are an ingredient typical for a few Indonesian local cuisines, e.g. in East Jawa and Central Sulawesi. They provide a dark colour, an intensive nutty taste and a smooth, somewhat oily texture. For flavour development and removal of hydrocyanic acid, the seeds need a fermentation procedure by which they turn from cream colour to almost black.
- Sandalwood (*Santalum album*, Santalaceae/Santalales/Rosidae) is the core wood of a parasitic plant native to the Lesser Sunda Islands, probably Timor. Today much of it is grown in Southern India and used for incenses. Though powerfully fragrant, it has never been used much for cooking.

East Asia

The whole East Asian region is dominated by Chinese culture. Chinese cookery is very varied and highly sophisticated; it has influenced all East Asian cuisines, and is also a important contribution to all South East Asian culinary styles.

- Chameleon plant (*Houttuynia cordata*)
- Chinese cinnamon (cassia) (*Cinnamomum cassia*)
- Ginger (*Zingiger officinale*)
- Lesser galanga (*Kaempferia galanga*)
- Perilla (*Perilla frutescens*)
- Sichuan pepper (*Zanthoxylum piperitum*)
- Star anise (*Illicium verum*)
- Wasabi (*Wasabia japonica*)
- Water pepper (*Polygonum hydropiper*)

Chinese cuisine derives its attraction not so much from different spices, but from a multitude of meat and vegetable ingredients with different flavour, shape, colour and texture, and from a wealth of standardized cooking and frying methods; the only common spice mixture is the

famous *five spice powder* (*wu xiang fen* [五香粉], see star anise), which is frequently used to flavour fried meat all over China. Soy sauce (*jiang you* [酱油]) is the most important condiment in China, but to prepare authentic Chinese foods, also other soy products are needed, for example sweet bean paste (*haixian jiang* [海鲜酱], better known by its Cantonese name *hoisin jeung* [海鮮醬]), hot bean paste (*douban jiang* [豆瓣酱]) and fermented black beans (*dou chi* [豆豉]).

1. The least spicy cooking style in China is Cantonese cuisine, which is native to the Guangdong province [广东, 廣東]. The name "Cantonese" derives from the province capital Guangzhou [广州, 廣州] that was formerly known as "Canton" in the West. Cantonese cuisine has a reputation for its exotic meat dishes made from dogs, cats, monkeys and snakes. It is also known for a varity of barbecued meats (*siu mei* [燒味], Mandarin *shao wei* [烧味]), for example spare ribs (*cha siu* [叉燒], often spelled *char siu* in the West, Mandarin *cha shao* [叉烧]).

   A famous Cantonese food term is *dim sam* [點心] (in English also spelt *dim sum*), which is not a dish but a light meal composed a selection of small dishes; a most popular choice are meat-stuffed dumplings made from ground pork, chicken or shrimps with light yet subtle flavourings. Outside of Guangdong, the term has mainly come to mean a variety of such steamed pasta. Though Cantonese in origin, *dim sam* is now enjoyed all over China (Mandarin *dian xin* [点心]).

2. By tradition, fiery food is rather uncommon in China, except in two Central Chinese provinces: Hunan [湖南, 湘] and Sichuan (Szechwan) [四川, 川], which is also known as Tian-fu [天府] (“heavenly province” or “land of plenty”). In these both provinces, but especially in Sichuan, chiles, garlic and aromatic sesame oil are popular. An important flavouring of Central Chinese cookery is red hot bean paste, *doubanjiang* [豆瓣酱] made from fermented broad beans. Due to domestic migration, spicy Sichuan and Hunan foods have recently become available and popular in wider parts of China. In contrast, the cuisine of the mountainous Yunnan province [云南, 雲南] has not yet attracted much interest, though it is spicy and related to the Sichuan cuisine.
3. The North-Eastern Chinese cooking is usually termed the Shanghai [上海] style. It is particularly rich and often uses sweet flavours. A typical motive of Shanghai cooking is the use of rice wine (*liao jiu* [料酒]). Red-braising (*hongshao* [红烧]) is a cooking technique that originates in Shanghai, although it is today commonly found all over China.
4. The fourth and last Great Cuisine is the Northern Beijing [北京] style, which has a large repertoire of baked foods (a Central Asian influence) and uses more wheat than rice due to climatical reasons. Two signature dishes are Beijing duck (*beijing kao ya* [北京烤鸭]) and Mongolian hotpot (*meng-gu huo-guo* [蒙古火锅]). Furthermore, sweet and sour dishes are popular: Fish ore meat are battered, deep-fried and served with a sweet-sour sauce (*tangcu* [糖醋] “sugar and vinegar”)

A handful of Chinese dishes are shortly discussed at this site: See ginger on *gong bao* [宫保] (stir-fried chicken with peanuts in Sichuan style), orange on *au larm* (Sichuan braised beef), Sichuan pepper on *shui zhu niu rou* [水煮牛肉] (Sichuan water-boiled beef) and chile on *mapo doufu* [麻婆豆腐] (bean cheese with ground pork in spicy sauce). See also star anise about five-spice-powder (*wu xiang fen* [五香粉]) and cassia on red braising (*hongshao* [红烧]) and cooking in *master sauce* (*lu shui* [鹵水]).

Cuisine in Japan restricts itself to utmost simplicity with respect to spices: Only Sichuan pepper (more precisely, a closely related Japanese species) is used as a condiment, either alone or mixed with tangerine or orange peel and chiles in form of the spice mixture *shichimi tōgarashi* [**七味 唐辛子**]. Japanese dishes, thus, owe most of their flavour to their ingredients, whose freshness and skilful preparation are crucial, furthermore to dried sea grass and kelp, several different soy products (e.g., soy sauce *shōyu* [**醤油**, **しょうゆ**]) and other fermented crops (*miso* [**味噌**, **みそ**]). A pungent root, wasabi, is served as a green paste to raw fish (*sashimi* [**刺身**, **さしみ**]) and rice bits (*sushi* [**寿司**, **すし**]); several herbs (water pepper, perilla and the young leaves of Sichuan pepper) are used both for flavour and as a decoration.

In sharp contrast, the cuisine in Korea, the most Eastern country of East Asia, is fiery and pungent, dominated by chiles, toasted sesame seeds and garlic; pickled vegetables (*kim chi* [김치]), both spicy and sour, are also very popular. Soy bean paste (*den jang* [된장], also spelled *doen jang* or *doin jang*) similar to Japanese *miso* and bean-chile paste (*gochu jang* [고추장],

also spelled *kochu jang*) are essential flavourings. In both Korea and Japan, fresh spring onions are a common garnish.

There are some further local herbs and spices that are occasionally used. For example, Chinese cuisine utilizes several local onion species (*Allium*, see chives); for Sichuan, particularly, cookbooks mention “local Himalaya herbs” but don’t give any clear identification. We should also note the following:

- **Ginseng** (*Panax ginseng*, Araliaceae/Araliales) is mainly known as an expensive herb in traditional Chinese medicine, and as a flavouring for alcoholic drinks. Nevertheless, it is also used as a culinary spice, especially in Korea.
- **Camphor** is of old an important aromatic, although it has never much been used for cooking. Yet in China, camphor has been used in the past for flavouring frozen desserts, and even now it is sometimes part of smoking mixtures, giving rise to specialties like *tea and camphor wood smoked duck* (*zhang cha ya zi* [樟茶鸭子]). There are two different products commonly named “camphor”: The better-known Chinese or Japanese camphor (from *Cinnamomum camphora*, Lauraceae) is composed of 2-bornanone and generally considered much inferior to the much more pricey Sumatra camphor or camphor of Baros (from *Dryobalanops aromatica*, Dipterocarpaceae/Malvales/Dilleniidae) which is mostly composed of borneol.

- Japanese cuisine uses the fresh leaves of ***mitsuba*** [ミツバ, みつば] (*Cryptotaenia japonica*, Apiaceae), as a culinary herb. Fresh leaves are chopped and sprinkled over soups or salads. In Chinese, the herb is known as *ya er qin* [鸭儿芹]).

Africa

Few African spices have ever become known in the West. Personally, I know only four, of which sesame's origin is uncertain.

- Grains of Paradise (Melegueta Pepper) (*Aframomum melegueta*)
- Negro Pepper (Kani Pepper) (*Xylopia aethiopica*)
- Sesame (*Sesamum indicum*)
- Silphion (Silphium)
- Tamarind (*Tamarindus indica*)

During the Age of Explorations, the former two (from West Asia) were traded as cheep substitute of black pepper, unless the sea route to India was established. Later, people lost interest in them and they are now nearly forgotten (and difficult to obtain). Silphion is the

name of a legendary spice in ancient Rome, which was so popular that it became extinct in the early Imperial era. Its botanic classification is subject to debate.

Tamarind probably stems from East Africa, but is in our days grown in tropical climate all over the world and is an important ingredient in Asian or Latin American cuisine.

Sesame is one of the most important oil seeds of mankind, yet little of the crop is used as a spice. Specialties containing sesame are found all over the Old World, from Europe to Korea.

Today's African cooking is dominated by Arabic influences, mostly so in the North and East, where Islâm prevails. In the South, there is much colonial influence, both by European colonists and immigrants from India and Malaysia. East Africa has absorbed Arabic and Indian cooking techniques and developed a unique cuisine by blending foreign influences with local traditions. Cooking in West and Central Africa has conserved its distinct character and is hardly comparable to any other culinary style.

In West Africa, e.g. in Nigeria, Cameroon, Ghana, Benin, food is often very pungent due to the use of extrahot chiles that have been imported from the Caribbean. Other important flavourings are dried fish products, smoked meats and toasted peanuts; the typical cooking medium is unrefined palm oil (from *Elaeis guineensis*) whose flavour also contributes significantly to the character of West African cooking. Furthermore, a number of local spices are used that are, however, hardly available outside the region (except grains of paradise and, if one is very lucky, negro pepper).

In North Africa, however, subtle spice mixtures based on cumin and coriander dominate, and aromatic Asian spices are popular. See cubeb pepper about the exceedingly complex mixture *ras el hanout*. Arabic or Indian influence is manifest in spice mixtures like Tunisian *gâlat dagga* (see grains of paradise) and Ethiopian *berbere* (see long pepper).

Quite many spices of other continents are grown in today's tropical Africa, where they are mostly planted as "cash crops" and exported. Nigeria, for instance, is a large producer of ginger. The tiny but fertile islands East of Africa are sources for several of the finest spices for European consumers: Réunion (formerly known as "Bourbon") exports vanilla and allspice, and Zanzibar has long outgrown Indonesia as the major clove producing country.

I don't know much about other native African spices, which of course does not mean that those do not exist. For example, various **scented pelargoniums** are native to South Africa; they are often referred to as "scented geraniums" but belong not to genus *Geranium* but *Pelargonium*, which is closely related but distinct (Geraniaceae/Geraniales). These herbs have an amazing spectrum of different flavours, most often lemony or rose-like floral, but there are also types with fragrance resembling mint, cinnamon and even nutmeg. Nevertheless, these astonishing plants have not yet found much application in cooking, although a few varieties are grown for the perfume industry.

Also in West Africa, the potentials of indigenous spices have not yet been exploited. Most of the native West African spices are unavailable in the rest of the world. In some cases, like the

akob bark and ***felom*** fruits (seeds?), I don't even know the botanical identity. Some more West African spices are mentioned in the below list.

- Several species of genus ***Aframomum*** (Zingiberaceae) yield edible fruits and pungent seeds, e.g., *Aframomum danielli* and *Aframomum citratum* ("***mbongo*** spice") See also grains of paradise
- The related genus ***Amomum*** also has representatives growing in the tropic belt from Senegal to Ethiopia which are used locally. Some of these have been traded as cardamom adulterants or surrogates in the past. See also black cardamom.
- Furthermore, there are African **pepper** species like *Piper clusii* (see cubeb pepper).
- Another source of pungent flavour might be found in the numerous indigenous ***Zanthoxylum*** species (Rutaceae) found in tropical Africa, but the literature is scarce (see Sichuan pepper about Asian relatives).
- "**Calabash nutmeg**" is the seed of *Monodora myristica* (Annonaceae) which was a common surrogate for nutmeg in 16.th century Europe; today, the species is also grown on Jamaica. However, I do not know about usage of calabash nutmegs in contemporary African or Caribbean cuisines.

- The oily seeds of the tree *Ricinodendron heudelotii* (Euphorbiaceae/Euphorbiales/Dilleniidae) have a characteristic, strong flavour and are used as a spice and thickener for sauces (local names ***njangsa***, ***njasang***).
- **Wild mango** or bush mango is the fruit of the jungle tree *Irvingia gabonensis* and the related species *I. wonbolu* (Irvingiaceae/Sapindales/Rosidae); there is only a loose botanical relationship to mango. The seeds, dried and ground, are known as *ogbono* and lend a sticky texture and presumably some flavour to West African chicken stews ("sauces").
- ***Koseret*** [ኮሰርት] is the Amharic name of the herb *Lippia adoensis* (Verbenaceae) which is used as a culinary spice in Ethiopia. It figures prominently in *kitfo* [ክትፎ], raw ground beef flavoured with spiced butter. Most Ethiopian cookbooks silently replace it by basil. See also long pepper about the spice mixture *berbere*.
- **Roselle** (red sorrel, *Hibiscus sabdariffa*, Malvaceae/Malvales/Dilleniidae, Arabic *karkadi* [كركديه]) is the purple, dried calyx of a plant related to the popular ornamental hibiscus species. A refreshing acidic beverage prepared from the calyces is quite popular in parts of Northern and Western Africa; more rarely, one reads about roselle calyces being used in salty food, e.g., Indian and Malaysian curries.

America

The contribution of the two Americas to the list of spices is, unfortunately, rather short. This is not for lack of aromatic plants, but mostly for lack of information regarding native American spices in Europe. In the USA, due to immigration, Latin American spices are easier to get by, but few of them have found a permanent place in the spice shelf. Of course, there is this one American nightshade plant that revolutionized almost any cuisine in the world …

- Allspice (*Pimenta dioica*)
- Annatto seeds (*Bixa orellana*)
- Boldo leaves (*Peumus boldo*)
- Chile (*Capsicum frutescens*, *C. chinense*, *C. baccatum*, *C. pubescens*, *C. annuum*)
- Epazote (*Chenopodium ambrosioides*)
- Filè (sassafras) (*Sassafras albidum*)
- Lemon verbena (*Lippia citriodora*)
- Mexican Pepper-leaf (*Piper auritum*)
- Mexican tarragon (*Tagetes lucida*)
- Nasturtium (*Tropaeolum majus*)
- Oilseed pumpkin (*Cucurbita pepo*)

- Paprika (bell pepper) (*Capsicum annuum*)
- Paracress (*Spilanthes acmella*)
- Pink pepper (*Schinus terebinthifolius*)
- Tonka beans (*Dipteryx odorata*)
- Vanilla (*Vanilla planifolia*)

Because in Northern America (the US and Canada) the cooking style is largely derived from and not very different from European cuisine, spice usage is generally rather low (exclude the Mexican-influenced cuisine of the Southern states of the US from this statement). Currently, there is only one plant native to North America treated on these pages: Sassafras (filè) has great though only regional importance in New Orleans cooking.

Allspice was introduced to Europe from the Caribbean islands; its alternative name *newspice* indicates its origin from the New World. Vanilla is native to México and has been used for flavouring a chocolate-like drink since Aztec times. A culinary herb native to México is epazote. Toasted pumpkin seeds are an ancient flavouring of Central American peoples that goes back to pre-Columbian times; yet extraction of oil from toasted pumpkin seeds, as practiced in Central Europe, is a much more recent invention.

From South America stem annatto seeds, much used locally, and pink pepper, a spice that became popular during the past decades in the *nouvelle cuisine*. Further South American spices

are tonka beans and paracress, which have, however, found only limited use outside of South America. Lemon verbena is another spice generally underrated.

The most important spice of both Americas are, however, chiles and bell peppers, which are both thought to be native to the Amazon region, but have been traded extensively as far north as the southern states of today's USA before the arrival of the Europeans. Today, they are high valued in all tropical countries of America, Asia and Africa.

Some more interesting plants from North, Central and South America are, unfortunately, not yet treated on this page. Some of these are:

- The **Californian bay leaf** tree (*Umbellularia californica*, Lauraceae) possesses highly aromatic leaves that have, however, been mostly replaced by Mediterranean bay leaves even in the USA in recent years.
- The **spice bush** (*Lindera bezoin*, Lauraceae) is native to the Eastern USA. All parts of the plant have a strong and pleasant, spicy aroma. The fruits have been used as a substitute of allspice.
- **Anise hyssop** (*Agastache foeniculum*, Lamiaceae) is native to Northern America; though belonging to the same family, it is not particularly closely related to hyssop. The broad leaves are intensively scented, reminding of anise or licorice, but are hardly ever used for cookery.

- The early North American settlers knew about the aromatic leaves of **wintergreen** (*Gaultheria procumbens*, Ericaceae/Ericales/Cornidae), a dwarf shrub of Northern North America: wintergreen tea was a popular beverage. Its aroma is due to an essential oil composed almost entirely of methyl salicylate. The essential oil is still used to flavour candies and confectionery in the USA and Canada.
- **Bergamot** (bee balm, *Monarda didyma* and relatives, Lamiaceae), was, similar to the former, a popular tea herb in the days of the pioneers, which reduced the dependency on expensive, imported black tea from Asia (*Boston Tea Party*). It has a lemony, but as the same time thyme-like, spicy flavour well suited for cooking. See also lemon balm.
- A sour beverage was brewed from the fruits of several American sumac species, e.g., **smooth sumac**, *Rhus glabra* (Anacardiaceae), but I do not know about culinary usage comparable to that of Mediterranean sumac.
- **West Indian bay leaves** (also *bay rum* or *Caribbean bay-leaves*) stem from the tree *Pimenta racemosa* (Myrtaceae) or, according to some other sources, also from the closely related allspice tree. They have a strong clove aroma and are particularly used in the cooking of Jamaica and Cuba.
- **Mexican bay-leaves** are quite different, stemming from *Litsea glaucescens* (Lauraceae), a tree closely related to the Mediterranean laurel.

- The so-called **White cinnamon** (wild cinnamon, *Canella winterana*, Canellaceae/Magnoliales) is native to the Caribbean and Florida. Its aromatic bark is occasionally used as an alternative for true cinnamon, yet I find its aromatic-pungent flavour more akin to sweet flag or galanga.
- In Central America, there is much usage of herbs termed “oregano” or “marjoram” in the cookbooks, but I suspect that local herbs are meant in the first place. At least two different herbs are known as “**Mexican oregano**”: *Poliomintha longiflora* (Lamiaceae) and *Lippia graveolens* (Verbenaceae). Furthermore, there are many more aromatic species in genera *Lippia*, *Coleus* and *Plectranthus* (both Lamiaceae) that have found culinary applications locally.
- **Aztec herb** (*Lippia dulcis*) is a shrub with leaves both aromatic and intensely sweet. Despite its toxicity (due to Campher), it is moderately popular among Western herb lovers (mainly for infusions), while I know nothing about indigenous use.
- The herb *Crotalaria longirostrata* (Fabaceae) is indigenous to México and used in Oaxacan cuisine, where its fresh leaves impart a mild bean flavour to soups and *tamales*. It is referred to by native names like ***chepil***, *chipil* and *chipilín*.
- The name ***hierba de conejo*** (“rabbit herb”) refers to h herb used to flavour bean dishes in Tabasco and Veracruz. Different sources give the botanical identity as *Tridax coronpifolia* (Asteraceae) and *Castilleja lanata* (Scrophulariaceae)

- The heart-shaped leaves of *Peperomia pseudoalpina* (Piperaceae) are a native flavouring of some Central Mexican provinces (Oaxaca, Veracruz, Puebla). The plant is known as ***tequelite*** or *cilantro silvestre* "coriander of the forests", where the latter name refers to both the coriander-like flavour and the wild occurrence.
- Yet another Mexican herb with coriander flavour is *Porophyllum tagetoides* (Asteraceae) with the local names ***pepicha***, *pipitza*, *tepicha* and *chepiche*.
- **Peruvian coriander** (*Porophyllum ruderale*, Asteraceae) is called *papalo* or *papaloquelite* in México and *killi* or *quillquiña* in Perú and Bolivia. Its flavour is reported "intermediate between coriander leaves and rocket", but I don't find it too similar to those. This herb is employed like coriander leaves, mainly for *salsa* (Bolivia: *sarsa*).
- **Mint marigold** (*Tagetes minuta* and *Tagetes elliptica*, Asteraceae) is an important herb in the Andean cuisines of Bolivia and Perú. In cookbooks, it is mostly named by its name in Quechua *huacatay* (Aymara *wacataya*). The herb has a remarkable, spicy-fresh flavour and should be used only in the fresh state, although a *pesto*-like concoction (*Salsa de Huacatay*, *black mint sauce*) can be made from it that preserves much of the original taste.
- The **peanut** (groundnut, *Arachis hypogaea*, Fabaceae) stems from Southern America, but is widely cultivated as a source of protein and fatty oil all over the world. Toasted peanuts are an important flavouring in many cuisines of West Africa and South East Asia.

- **Heliotrope** (*Heliotropium arborescens*, Boraginaceae) is a common ornamental of Peruvian origin; its vanilla-scented flowers have, in Europe, been used as a flavouring for pastry, fudge-like desserts and sherbets.
- **Sweet honey leaf** (*Stevia rebaudiana*, Asteraceae) is native to the highland of Paraguay; it is traditionally used by indigenous peoples as a sweetener, particularly for the local *mate* tea. Fresh and dried leaves have an intensive sweet flavour due to several diterpene glycosides (steviol, stevioside). Today, the plant is grown on a commercial scale in Japan, where stevia extract plays an important rôle as an artificial sweetener. In other countries, however, it has not yet been so successful.
- The members of genus ***Ocotea*** are trees with aromatic leaves, bark and fruit calyces; in the two species *O. pretiosa* and *O. quixos* native to the Amazonian basin, the aroma comes close to cinnamon. In the 16.th century, a large Spanish expedition perished, almost down to the last man, while searching for the origin of this spice (see annatto). Yet after its discovery, “American cinnamon” has not gained any culinary importance; but the closely related species *O. sassafras* is commercially grown as a source of safrole in Brazil.

Australia

Few plants of Australia have ever gained economical importance, **macadamia nuts** (*Macadamia integrifolia* and *M. tetraphylla*, Proteaceae/Proteales/Rosidae) being the chief example. There are, however, plenty of aromatic plants, some of which might gain some importance in the cuisines to come.

- Lemon myrtle (*Backhousia citriodora*)
- Tasmanian pepper (*Tasmannia lanceolata*)

Both spices are currently hardly known (less used) outside Australia, but in our global world, these things may change quickly. Note that in Australia, there are more indigenous flavourings that can be considered spices: The dried tiny berries of **bush tomato** (*Solanum centrale*, Solanaceae) have a complex taste not altogether dissimilar to Italian sun-dried tomatoes, although less fruity and more spicy. Another candidate is the so-called **wattle seeds**, dried and roasted seeds of various *Acacia* species, e.g., *Acacia victoriae*, *A. sophorae* and *A. murrayana* (Mimosaceae/Fabales). Both plants have a long record of indigenous usage by Aborigines.

I know of no spices originating from Oceania, but on Tahiti, a relative of vanilla is grown. The origin of coconut was long a matter of scientific dispute, but it has now been shown that the plant actually stems from Asia.

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