

TRUFFLES

The true **truffles** are a group of several valuable and highly sought-after edible species of underground ascomycetes belonging to the fungal genus *Tuber*. All are ectomycorrhizal and are therefore found in close association with trees. The ascoma (fruiting body) of truffles is highly prized as food. It has a smell similar to deep-fried sunflower seeds or walnuts, though not all people are able to catch the odor of this fungus. The water after soaking truffles can taste a bit like soy sauce. Brillat-Savarin called the truffle "the diamond of the kitchen" and praised its aphrodisiacal powers. While the aphrodisiacal characteristics of truffles have not been established, it is still held in high esteem in French, northern Italian and Istrian cooking, and in international *haute cuisine*.

The origin of the word *truffle* appears to lie in the Latin term *tuber*, meaning "lump", which early on became *tufer*- and gave rise to the various European terms: French *Truffe*, Spanish *Trufa*, German *Trüffel*, and Dutch *Truffel*. The German word *Kartoffel* ("potato") derives from (now archaic) Italian *tartufo* (truffle) because of superficial similarities.

BIOLOGY

Strictly speaking, the true truffles are those several species of the genus *Tuber*; however, the term has been applied to several other genera of underground fungi around the world. These include the genera *Terfezia* and *Tirmania* of the family *Terfeziaceae*, known as the Desert truffles of Africa and the Middle East. The term "Hart's truffle" has been used to refer to *Elaphomyces* while "Bohemian truffle" has been used to describe *Pisolithus tinctorius*, which was historically eaten in parts of Germany.

True truffles form symbiotic relationships with several varieties of deciduous trees, including oak, beech, hazel and poplar, but cannot be found on maples or cedars. They flourish throughout the autumn, winter and spring, and can be found buried between the fallen leaves and twigs and the soil.

Their growth beneath the earth's surface is thought to be an adaptation to forest fires, drought, or severe cold, where the mushrooms on the surface of the soil are more prone to destruction.

Black truffle



The **Black truffle** or **Black Périgord Truffle** (*Tuber melanosporum*) is named for the Périgord region in France and grows exclusively with oak. Specimens can be found in late autumn and winter, reaching 7cm in diameter and weighing 100g though usually weigh less. Production is almost exclusively European, with France accounting for 45%, Spain 35%, Italy 20%, and small amounts from Slovenia and Croatia. In 1900, France produced around 1,000 metric tonnes (1,100 short tons) of *Tuber melanosporum*. Production has considerably diminished in the past century, and is presently around 20 metric tonnes (22 short tons) per year, with peaks at 46 metric tonnes (50 short tons) in the best years. 80% of the French production comes from southeast France: upper-Provence (*départements* of *Vaucluse* and *Alpes-de-Haute-Provence*), part of *Dauphiné*

(*département* of *Drôme*), and part of *Languedoc* (*département* of *Gard*); 20% of the production comes from southwest France: *Quercy* (*département* of *Lot*) and *Périgord*. The largest truffle market in France (and probably also in the world) is at *Richerenches* in *Vaucluse*. The largest truffle market in southwest France is at *Lalbenque* in *Quercy*. These markets are busiest in the month of January when the black truffles have their highest perfume. Black truffles on these markets sell between €200 and 600 per kilogram (\$280–\$840 per pound), depending on the quantity and quality of the harvest.

White truffle



The **White truffle** or **Alba Truffle** (*Tuber magnatum*) comes from the Langhe area of the Piedmont region in northern Italy and, most famously, in the countryside around the city of Alba. It is also found in Croatia, on the Istria peninsula in the *Motovun* forest alongside *Mirna* river. Growing symbiotically with oak, hazel, poplar and beech and fruiting in autumn, they can reach 12cm diameter and 500g, though are usually much smaller. The flesh is pale cream or brown with white marbling. Like the French black truffles, Italian white truffles are very highly esteemed (*illustration, right*). The white truffle market in Alba is busiest in the months of October and November. The *Tuber magnatum* truffles sell between €2000 and €4000 per kilogram (\$1000 - \$2000 per pound). In 2007, due to devaluations of the dollar, white truffles were selling at \$3000 - \$4000 per pound.

They produce a scent that mimics a male pig sex hormone, and for this reason, female pigs have been used historically in Europe to help find truffles. However, more recently, dogs have become preferred for truffle hunting since they can be trained to just find the truffles whereas sows eat the truffles as soon as they find them.

The record price paid for a single white truffle was set in December 2007, when Macau casino owner Stanley Ho paid \$330,000 (£165,000) for a specimen weighing 1.5kg (3.3lb), discovered by Luciano Savini and his dog Rocco. One of the largest truffles found in decades, it was unearthed near Pisa and sold at an auction held simultaneously in Macau, London and Florence.

The *Tuber magnatum pico* White truffle is mostly found in northern and central Italy, while the *Tuber borchii*, or Whitish truffle, is found in Tuscany, Romagna and the Marche. Neither of these is as aromatic as those from Piedmont.

Chinese truffle

The **Chinese truffle** (*Tuber sinensis*, also sometimes called *Tuber indicum*) is mass harvested in China. It resembles *Tuber melanosporum*, but its taste is bland, and its texture is chewy. Due to their low price, Chinese truffles are often exported to the West, but they should not be confused with *Tuber melanosporum*. Some truffle exporters or delicatessen shops sell Chinese truffles into which extracts of the real *Tuber melanosporum* are introduced. These fraudulent truffles are sold at a high price, pretending they are real *Tuber melanosporum*. Such practices are illegal, but unfortunately quite frequent. Another type of Chinese truffle is the *Tuber himalayensis*, which visually looks so much like the *Tuber melanosporum* that a microscope is needed to differentiate them, but whose taste is not as intense as the *Tuber melanosporum*. The *Tuber himalayensis*, however, is harvested in very small quantities in the Chinese Himalayas, and is not as frequently met on world markets as the *Tuber sinensis*. The third type of Chinese truffle is the Chinese summer white truffle, which does not yet have a scientific name. This truffle should not be confused with the much more expensive Italian *Tuber magnatum*.

Summer truffle

The **Black Summer Truffle** (*Tuber aestivum/unicinatum*) thrives in northern Italy, central Europe and the UK but also grows in Turkey and North Africa. It is highly valued for its culinary uses and costs up to \$670 a pound. Summer truffles do not have as strong an aroma or taste as winter truffles do. They are mainly harvested from June to November. These truffles grow in symbiosis with trees such as oaks, hazels and beech. They can weigh up to 20-30 g, and their shape is generally round, up to 4 cm diameter.

Other species

Two lesser-used truffles include the **Black truffle** (*Tuber macrosporum*) and the **Scorzzone truffle** (*Tuber mesentericum*). In the Pacific Northwest, several species of truffle are harvested both recreationally and commercially, most notably, the **Oregon white truffles**, *Tuber oregonense* and *Tuber gibbosum*.

Truffle oil

Contrary to popular belief, and even the belief of most restaurant chefs, the New York Times recently reported that most truffle oil does not, in fact, contain any truffles. The reality is that the vast majority of truffle oil is actually olive oil containing a synthetic flavoring agent whose chemical name is "2,4-dithiapentane". Indeed, Daniel Patterson reported in the *New York Times* on May 16, 2007 that "even now, you will find chefs who are surprised to hear that truffle oil does not actually come from real truffles." Nevertheless, many chefs continue to use synthetic truffle oil, which is inexpensive, because they consider it to be "a reasonable substitute."

HISTORY

Antiquity: The first mention of truffles appears in the writings of Theophrastus in the fourth century BC. In classical times their origins were a mystery which challenged many; Plutarch and others thought them the result of lightning, warmth and water in the soil, while Juvenal thought thunder and rain to be instrumental in their origin. Cicero deemed them children of the earth, while Dioscorides thought they were tuberous roots.

Italy in the Classical Period produced two kinds of truffles: the *Tuber melanosporum* and the *Tuber magnatum*. The Romans, however, only used the terfez (*Terfezia boudieri*), a fungus of similar appearance which the Romans called truffles, and which is sometimes called "desert truffle". Terfez used in Rome came from Lesbos, Carthage, and especially Libya, where the coastal climate was less dry in ancient times. Their substance is pale, tinged with rose. Unlike truffles, terfez have no taste of their own. The Romans used the terfez as a carrier of flavor, because the terfez have the property to absorb surrounding flavors. Indeed, Roman cuisine used many spices and flavors, and terfez were perfect in that context.

Islam: It is narrated in a hadith - Sahih Muslim - that Muhammad said "*Truffles are (a kind of) 'Manna' which Allah (God), the Exalted the Majestic, sent to the people of Israel through [Moses], and its juice is a medicine for the eyes.*" *Terfezia* was the main truffle consumed in the Middle East historically, and Ludovico di Varthema, in his *Travels* (1503-08), wrote of great quantities of them being sold, having been harvested in the mountains of Armenia and Turkey.

Middle Ages: Truffles were rarely used during the Middle Ages. The only trace of truffles in Medieval cooking is at the court of the popes in Avignon. Black and subterranean truffles were probably considered satanic and thus avoided, but the popes discovered them when they relocated to Avignon, near the producing regions of upper-Provence, and they became very fond of them. Truffle hunting is mentioned by Bartolomeo Platina the papal historian in 1481, when he recorded that the sows of Notza were without equal in hunting truffles, however they should be muzzled to prevent them from eating the prize.

Renaissance and Modern Times: Truffles reappeared in Europe during the Renaissance, where they were honored at the court of King Francis I of France. However, it was not until the 17th century that Western (and in particular French) cuisine abandoned "heavy" oriental spices, and rediscovered the natural flavor of foodstuffs. Truffles were very popular in Paris markets in the 1780s, imported seasonally from truffle grounds, where peasants had long enjoyed their secret. They were so expensive they appeared only at the dinner tables of great nobles —and kept women, Brillat-Savarin (1825) noted characteristically. The greatest delicacy was a truffled turkey. "I have wept three times in my life," Rossini admitted. "Once when my first opera failed. Once again, the first time I heard Paganini play the violin. And once when a truffled turkey fell overboard at a boating picnic."

CULTIVATION

Truffles long eluded techniques of domestication, as Jean-Anthelme Brillat-Savarin (1825) noted with his characteristic skepticism:

"The most learned men have sought to ascertain the secret, and fancied they discovered the seed. Their promises, however, were vain, and no planting was ever followed by a harvest. This perhaps is all right, for as one of the great values of truffles is their dearness, perhaps they would be less highly esteemed if they were cheaper.

"Rejoice, my friend," said I, "a superb lace is about to be manufactured at a very low price."

"Ah!" replied she, "think you, if it be cheap, that any one would wear it?"

However, contrary to stubborn legends, truffles can be cultivated. As early as 1808, there were successful attempts to cultivate truffles, known in French as *trufficulture*. People had long observed that truffles were growing among the roots of certain trees, and in 1808, Joseph Talon, from Apt (*département* of Vaucluse) in southern France, had the idea to sow some acorns collected at the foot of oak trees known to host truffles in their root system. The experiment was successful: years later, truffles were found in the soil around the newly grown oak trees. In 1847, Auguste Rousseau of Carpentras (in Vaucluse) planted 7 hectares (17 acres) of oak trees (again from acorns found on the soil around truffle-producing oak trees), and he subsequently obtained large harvests of truffles. He received a prize at the 1855 World's Fair in Paris.

These successful attempts were met with enthusiasm in southern France, which possessed the sweet limestone soils and dry hot weather that truffles need to grow. In the late 19th century, an epidemic of phylloxera destroyed much of the vineyards in southern France. Another epidemic destroyed most of the silkworms in southern France, making the fields of mulberry trees useless. Thus, large tracts of land were set free for the cultivation of truffles. Thousands of truffle-producing trees were planted, and production reached peaks of hundreds of tonnes at the end of the 19th century. In 1890 there were 750 km² (185,000 acres) of truffle-producing trees.

In the 20th century however, with the growing industrialization of France and the subsequent rural exodus, many of these truffle fields (*champs truffiers* or *truffières*) returned to wilderness. The First World War also dealt a serious blow to the French countryside, killing 20% or more of the male working force. As a consequence of these events, newly acquired techniques of *trufficulture* were lost. Also, between the two world wars, the truffle fields planted in the 19th century stopped being productive. (The average life cycle of a truffle-producing tree is 30 years.) Consequently, after 1945 the production of truffles plummeted, and the prices have skyrocketed. In 1900 truffles were used by most people, and on many occasions. Nowadays, they are a rare delicacy reserved for the rich, or used on very special occasions.

In the last 30 years, new attempts for mass production of truffles have been started. Eighty percent of the truffles now produced in France come from specially planted truffle-fields. Nonetheless, production has yet to recover its 1900s peaks. Local farmers are opposed to a return of mass production, which would decrease the price of truffles. It is estimated that the world market could absorb 50 times more truffles than France currently produces. There are now truffle-growing areas in Spain, Sweden, New Zealand, Australia, Oregon, North Carolina, Tennessee and the UK.

EXTRACTION

Looking for truffles in open ground is almost always carried out with specially trained pigs (truffle hogs) or, more recently, dogs. Pigs were the most used in the past, but nowadays dogs are preferred.

Truffle Hog	Truffle Dog
Keen sense of smell	Keen sense of smell
Innate ability to sniff out truffles	Must be trained
Tendency to eat truffles once found	Easier to control; probably will not eat truffles

The female pig's natural truffle radar as well as her usual intent to eat the truffle is due to a compound within the truffle similar to androstenol, the sex pheromone of boar saliva, to which the sow is keenly attracted. It may have been the strange attraction that pigs have to these fungi which prompted its discovery by early human populations.

In New Zealand and Australia

The first black truffles (*Tuber melanosporum*) to be produced in the southern hemisphere were harvested in Gisborne, New Zealand in 1993. In 1999, the first Australian truffles were harvested in Tasmania, the result of eight years of work. Trees were inoculated with the truffle fungus in the hope of creating a local truffle industry. Their success and the value of the resulting truffles has encouraged a small industry to develop. A Western Australian venture had its first harvest in 2004, and in 2005 they unearthed a 1kg truffle that is potentially the largest ever harvested in the southern hemisphere. Production is expanding into the colder regions of Victoria and New South Wales.

CULINARY USE

Because of their high price and their pungent taste, truffles are used sparingly. Supplies can be found commercially as unadulterated fresh produce or preserved, typically in a light brine.

White truffles are generally served uncooked and shaved over steaming buttered pasta or salads. White or black paper-thin truffle slices may be inserted into meats, under the skins of roasted fowl, in foie gras preparations, in pâtés, or in stuffings. Some specialty cheeses contain truffles as well.

The flavor of black truffles is far less pungent and more refined than that of white truffles. It is reminiscent of fresh earth and mushrooms, and when fresh, their scent fills a room almost instantly. In 2006, designer Tom Ford released a perfume that lists black truffle as its first note.

Truffle oil is often used as a lower-cost substitute for truffles to provide flavoring, or to enhance the flavor and aroma of truffles in cooking. However, most truffle oil is a synthetic product that contains no actual truffles.