

Useful fungi of the world: morels and truffles

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Morels and truffles differ widely in their form and behaviour. The morels resemble mushrooms to the extent that they have a cap borne upon a central stem, whilst the truffles form solid, round balls, which grow underground. These are the edible ascomycetes. Both morels and truffles represent some of the most highly prized edible mushrooms in the world.

The morels are sometimes referred to as the 'truffles of the north', but other popular names include 'sponge', 'pine cone', 'corn cob', and 'honeycomb mushroom'. They are the most popular of the springtime, edible fungi, usually occurring from late March through to mid-June, although each crop will survive only for a several days. Morels have a delicate flavour that can be overwhelmed during cooking, but delicious when eaten alone. They are normally prepared by frying in butter and can be preserved, with drying being the most popular method.

As few other mushrooms are available in the Spring, morels are highly prized, although possibly more so in North America than in Europe. The collecting of morels is almost a spring ritual but they can prove difficult to find owing to their dull grey, brown or black colours. They prefer a disturbed soil, and are especially common in old apple orchards, under hedgerows, on wasteland, composted areas, and at the sites of forest fires. There are two kinds of morel, the true morels belonging to the genus *Morchella*, and the false morels or lorchels belonging to the genus *Helvella*. Lorchels can cause serious poisonings and should be avoided. True morels may be classified into two groups. There are the black morels, with dark to deep grey or black ridges at maturity, such as *Morchella conica* and *Morchella elata*. These usually appear slightly earlier, and are usually associated with cedar, pines, and burnt areas, occasionally on dunes and in the coastal depressions between dunes. Massive fruitings can occur, with one find of an estimated 20,000 kilograms found on one burnt site of about 0.5 hectare in Austria in a single season. The other group comprise the common morels, in which the ridges are white, ivory or dull yellowish brown, such as is found in *Morchella esculenta*. There are a number of varieties, varying in shape and colour, sometimes regarded as separate

species, ranging from yellow, with a large round head (var. *rigida*); ochre-yellow and small (var. *rotunda*); grayish brown to ochre yellow, with a rounded to conical head (var. *vulgaris*); blackish brown, with a rounded to conical head (var. *umbrina*). These occur in mixed hardwoods, especially beech, maple, old apple trees or stumps, and around dead elm trees. In the UK, morels have shown a noticeable increase in their distribution in urban areas over recent years. This is attributed to the increasing use of bark mulch in gardens. They have never been successfully cultivated until very recently and then only with limited success. Attempts at cultivation in North America have involved the use of sterile masses of mycelium, or sclerotia, which are enriched by placing them on a layer of wheat or rye grain. These sclerotia are then harvested and distributed on a mixed bark and soil layer to produce the fruit bodies. However, so far the fruit body yield has been poor, and the small size has yet to be overcome.

Perhaps the truffles represent the best known and most expensive, in commercial terms, of all the edible fungi. Weight for weight, the White Piedmont Truffle (*Tuber magnatum*) is probably the most expensive food utilized by mankind. The Black or Périgord Truffle (*Tuber melanosporum*) is also among the most valuable, and is sometimes referred to as the 'black diamond'. The taste and perfume has made it famous among connoisseurs, and no restaurant can achieve true distinction unless it is included on the menu. Therefore it is not surprising to discover their use since ancient times and even though they are difficult to find, they have been known for thousands of years. Theophrastus, around 300 BCE, described the truffle as a 'vegetable without roots'. Pliny (23 – 79 CE), in his *Naturalis Historia*, Book xix, marvelled over truffles: 'Among the most wonderful of all things is the fact that anything can spring up and live without a root. These are called truffles (*tubera*), they are surrounded on all sides by earth, and supported by no fibres. There are two kinds: one is sandy and injures the teeth, the other without any foreign matter; those of Africa are the most esteemed. Peculiar beliefs are held for they say that they are produced during autumn rains, and thunderstorms especially, and are best for food in the spring. They grow on the shore where there is much sand.'

The references to 'sand' and 'Africa' refer to the desert truffles (*Terfezia*, *Tirmania* species) which were popular at the time of Ancient Rome.

True truffles were not formally recognized and described as fungi until the early eighteenth century, and sometime later did they first appear in French cuisine, probably imported from Italy. Today truffle orchards are well established in France, Spain and Italy. Over the past 30 years, tissue culture of the Périgord Truffle mycelium became widely used allowing the development of truffle orchards, offering economic return to farmers without removing the trees. Some success after several years has been achieved in north-western North America through inoculating Douglas fir seedlings with the Oregon White Truffle (*Tuber gibbosum*).

There are about thirty species of true truffles, belonging to the genus *Tuber*, although there are many similar fungi that also grow underground. They may be found throughout Europe but become much scarcer in northerly localities. The main truffle producing area lies between 40 – 47° latitude in the Mediterranean region. The climate and soil requirements are very precise for each stage of the life-cycle. The soil is especially important, preferably well-drained, light, slightly alkaline or chalky, and never a heavy clay soil.

The White Piedmont Truffle is unknown outside of Italy, and possibly in a small area of Croatia. It resembles a knobbly potato, yellowish grey in colour, with a smooth surface, and can be quite large. It has a relatively short season, extending from mid-September until the end of November, but requires a good summer rainfall. The fruit bodies are usually found associated with willow and poplar trees, growing under grass. Whereas the presence of a Périgord Truffle fruit body may be indicated by an area of bare ground, this is not the case with the White Piedmont Truffle, and a trained dog is essential to hunt for it. The centre for the white truffle is Alba. In 1991, the cost of the white truffle was around €2,500 for one kilogram. The aroma is extremely strong and overpowering, variously described as a mixture of garlic and cheese, but such comparisons are quite misleading. The aroma can only be described as unique and exotic!

Undoubtedly, the best known of the truffles is the Périgord Truffle. The scent is more important than the taste. It has been said that the 'truffle is a vegetable whose perfume has something animal about it'. The fruit bodies have a black warty surface, and inside there is a lightly veined black-and-white marbled flesh. The species is found only in Spain, Italy and southern France. France can produce 80 per cent of annual yield and, in reality, much more from Provence than from Périgord. Up to 300 tonnes of the Périgord Truffle is sold every year and, in 1991, the price fetched was around €500 per

kilogram. It is harvested between mid-November and the end of February, improving in quality over the season. Recent French imports of the Chinese Truffle (*Tuber indicum*), from the provinces of Szechwan and Yunnan, and also from Pakistan, have proved a serious threat to Périgord Truffle production, as they can be sold at about one-third of the price, but it is generally agreed that it is far inferior in both aroma and taste. As the Périgord Truffle is such a potentially valuable crop, attempts at artificial cultivation have been made over many years, but some success was only achieved in France in the 1960s, and more recently in New Zealand. It is virtually always associated with oak trees, and commercial production has involved inoculating the surrounding soil with soil taken from known truffle trees, or by transferring saplings. The fruit bodies take 7–15 years to produce by this method, but once achieved can produce successive crops over the next thirty years.

Other important truffle species include the Burgundy Truffle (*Tuber uncinatum*), producing a black, warty fruit body, containing a chocolate brown flesh with white veins. This is a species of higher altitudes, common in Burgundy and Lorraine, growing under oaks, hornbeam and beech, also pines, spruce and cedar. This may be harvested until the end of December. The Summer Truffle (*Tuber aestivum*) also forms a black, warty fruit body that may be large and heavy. It is found in France, Spain, Germany, and up to southern England. In France, it is frequent in Provence, growing under oaks and pines, especially in May-June and throughout the summer, if rainy. However, the aroma is mild and insipid, and the species can be purchased at around €55 per kilogram. This is also known as the 'English Truffle', and was collected commercially in England up to 1935. The Musky or Magenta Truffle (*Tuber brumale*), is also very similar to Périgord Truffle in appearance, season and distribution but has a poor smell and taste.

To find truffles, it is necessary to detect their distinctive scent, produced by a compound similar to pheromones. Truffle hunting is endemic to France, Italy, Poland, Portugal and Spain. The hunting traditionally involved a trained sow, but problems exist with modern travel, and the difficulties in stopping the sow from eating the truffle once found. A dog is now the preferred aid. One of the best methods is detection by flies. The ground is lightly swept with a pine twig so that, where a truffle is present, the truffle flies (*Suilla gigantea*) will be disturbed from laying their eggs, and fly away with a characteristic pattern of flight. Thus the truffle is detected, and sniffing the soil will guide the hunter to the truffle, which can be up to 40 cm deep.