

# Desert Truffle Mushrooms in Spate Irrigation Areas

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Practical Notes Spate Irrigation

### Introduction

Among naturally growing crops and non timber forest products, one of the most promising is the mushroom family. In Pakistan there are many types of mushroom that grow widely during spring and summer season depending upon conditions such as rain, humidity, temperature and soil characteristics. All in all there are 21 varieties of wild mushroom on record that are edible in Pakistan (see box 1). In this note desert truffle mushrooms (*Terfezia leonis Tul.*) are discussed. The potential of systematically collecting the white desert truffles is largely unknown in Pakistan and even less explored, even though desert truffles fetch very high prices on international delicacy markets.

Unlike other mushrooms, the desert truffle grows underground. These truffles have no stalk or cap, are whitish in colour and are irregularly shaped (see the pictures). The size of truffles varies from 2 to 6 centimetres. Like the majority of the truffle species, desert truffles are ectomycorrhizal and thus require a plant symbiont to complete their sexual life cycle. In the spate irrigated areas of Pakistan the desert truffle enters into symbiotic relations with sorghum.

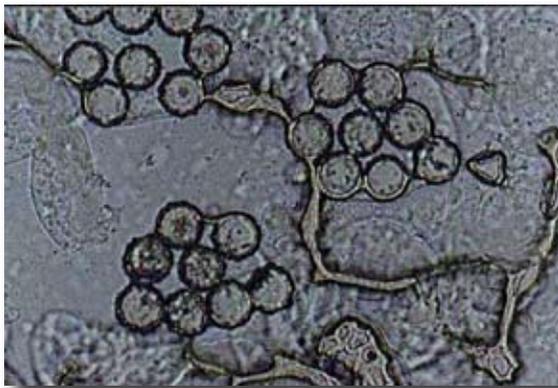


Figure 1 Truffles developing on host plant in Garehbygone (photo: Irai Javidtash).

Desert truffles are also encountered in flood water spreading areas in South Iran Javidtash 1989). The species of the truffles found at a depth of 8-15 cm in the sedimentation basins of the artificial recharge of groundwater systems is probably *Terfezia hafizi*. The known hosts for the desert truffle in Iran are *Carex stenophylla Wahlenb.* and *Helianthum salicifolium (L.) Miller*. Yet other plants may act as hosts too - because the same truffles are found in places where this two host plants do not occur. A methodical research is needed to identify other hosts as well.

### Collecting the truffles

In Iran it is the traditional knowledge that the late October-late November rainstorms, particularly if they are accompanied by thunderbolts, are the prerequisites for having an abundant harvest in March and April. It seems that fineness of sediments and wind-blown sand, along with more nutritious floodwater provide a suitable environment for the truffle growth.

In Pakistan farmers explain that rain water on desert land, fallow lands, and fields free from pesticides and fertilizer provide the best basis for wild mushrooms to grow. Spate water is equally good. Spate irrigation fields and adjacent sites, where spate water has spread once, are particularly suitable. The Kachhi region (Balochistan) is considered among the best grounds for wild mushrooms in the country.

In Europe famously dogs and pigs are used to sniff the ground to search for truffles. In Pakistan on the other hand truffles are collected by local specialists - men and women - who acquire these skills through experience and from elders. Farmers explain that the truffles make cracks in the ground and can also be spotted as the soil is slightly lifted upward too. Truffles are usually found near the sorghum plants in a field at a depth ranging

#### Box 1: Wild mushrooms in Pakistan

- *Agaricus augustus*
- *Agaricus compestris*
- *Agaricus placomyces*
- *Agaricus rodmani*
- *Agaricus silvaticus*
- *Agaricus silvicola*
- *Armillaria mellea*
- *Cantharellus cibarius*
- *Craterellus cornucopioides*
- *Flammulina velutipes*
- *Macrolepiota procera*
- *Morchella angusticeps*
- *Morchella conica*
- *Morchella esculenta*
- *Podaxis pistillaris*
- *Termitomyces clypeatus*
- *Termitomyces eurhizus*
- *Termitomyces heimii*
- *Termitomyces microcarpus*
- *Termitomyces radicans*
- *Termitomyces striatus*

from 5 to 10 centimetres. The truffles may be found either singly or in pairs. In rare cases three or four truffles are found at a single site. The most opportune occasions to find truffles are in relatively humid locations a few days after the rains in summer season. Collectors take care to gather the truffles as soon as possible, because if left too late the truffles will have decayed. The preferred time to collect truffles is early in the morning. Collectors often mark the places and remember to search the same site the following year as they believe that “seed” remains there for next growth season. Certain fields, locations and dry spate river beds are believed to have high likelihood of producing truffles. For example the bed of Kaura Spate River in DG Khan District has certainty of underground mushroom at certain locations and people collect these every year in the particular season.

There are no rules or legislation about the collection of truffles but generally the collection of small truffles is discouraged and if possible collectors return in several days to collect the same truffle when it has grown in size. Often collectors go in a row and search for the truffles, whereby each collector has an allotted space. The collected truffles are spread out on cloth sheet so as to avoid damage. Fresh truffles have high

percentage of moisture and some soil adheres during picking. A collector carefully transports his truffles from the field to his home in a bag or container so as to avoid damaging them. Later the soil is removed carefully from the truffles before they are sold to market. Some farmers believe that cleaned parts along with removed soil, if put back into similar ground have high chances to develop in the next season.

Usually truffles growing in open fields or other similar sites are considered nature’s gifts and landowners do not have any objection to making their land freely accessible to allow people to collect these delicacies. However, formal permission is required for non owners to collect truffles within a sown field. Sometimes truffles are dried by simply slicing them and sun-drying them in an open space. Mushrooms with solid fibre structures are preferred for this process.

The prices are Rs.150/Kg (US\$ 2/Kg) for common mushrooms (above ground). The prices for special wild mushrooms are considerably higher. For example the special wild mushroom for Swat region commonly known as Guchhai (morel) are sold in Rs. 10,000-Rs. 20,000 (125-250 US\$) per kilogram. The prices for desert truffles are even higher than this.



Figure 2 Truffles collected from sorghum field.

Local consumption

Though the main and most lucrative market is abroad, some truffles are consumed locally. As with wild vegetables (see Practical Note 9) mushrooms have been utilised by people in rural areas for a very long time. Truffles are appreciated as they are rich in protein and certain vitamins. Proteins are up to 30% of weight. In addition truffles contain carbohydrates, sodium, potassium, calcium, magnesium, iron, cobalt, phosphorus, sulphur and chlorine. The active principle of mushroom is Agaric Fungi Acid. Local medical practitioners also use these truffles for medicinal purposes. It is quoted in hadith that mushroom water can be used for various eye ailments. Wild mushrooms have several other medicinal values and generally are thought to fortify the effect of other drugs.

For example when mushroom powder is mixed during the grinding process of surma (antimony), this surma strengthens the eye lashes, corrects refraction defects and sight weakness and relieves any type of inflammation of the eyes. The dried powder of mushrooms is also used to treat diarrhoea. It lessens the temperature of the body and reduces the production of phlegm. It is also used for weight gain. Locally, if it is applied on protruded umbilicus of small children with saresham mahi (*Acipenser huso* Linn/*Acipenser stellatus*) and vinegar, the umbilicus becomes retracted. Its local application is also effective in hernia. It is a haematinic too. Its paste is a good healing agent for wounds. It is given in typhoid typhus and other fevers with honey and shows very good effects. It is a very good haemostatic, if applied on leech bites (Khan 1999).

Box 2: Composition of the truffles

A limited chemical analysis of the truffles found in the sedimentation basins (SB) and the foothills of Sarvestan (S) was done. The composition of the truffles was:

Place	Protein (%)	Nitrogen (%)	Potassium (%)	Phosphorus (%)	Water content (%)	Fresh weight (gram)
SB	28.3	4.6	1.9	0.76	72.5	15.66
S	26.3	4.2	2.3	0.68	78.4	10.84

The largest sample in the SB was 9.1 cm in length, while it was 4.4 cm in the foothills.

Source: Javidtash 1989



Figure 3 Collector has identified the truffle's site.



Figure 4 Close View of Truffle site where soil has cracks and bit lifted upwards.



Figure 5 Digging site confirms the appearance of Truffle - Showing the size and number.



Figure 6 Collector collects Truffles.

Recommendations: research and market chains

The occurrence of truffles in spate irrigation areas not widely known – and may be explored more, as the rewards can potentially be very high. According to some sources Pakistan exports 79 tons of morel mushroom overseas annually (Pakistan Economic Review 2001). The morel mushroom grows too and fetches a local sale price of USD 150/ kg. Main importers from Pakistan are European Union and Japan. In contrast to the morel mushrooms the white truffles are largely unknown commercially, but their potential may be much higher.

Village collectors at present even have difficulty to market the desert truffles due to the following different reasons:

- There is no local market to speak of. There is not enough information about truffles among the richer middle-class who can afford to buy them and at the same time distinguish between common wild mushrooms and truffles. High class restaurants only prefer to get truffles if the supply is on regular basis
- Collectors lack the processing and value added skills for truffles in order to get good prices. The grading, packing and storage techniques according to overseas standards are not known to local collectors

- First of all the availability of white truffles is not known to a wide majority of people including academic, research and marketing companies
- There are commercial companies dealing with wild mushrooms but none of them dealing with white truffles
- There is completely inadequate information about marketing channels and prospects. Though Iran and China have been able to export sizable quantities of desert truffles, Pakistani production internationally is entirely unknown.

Knowing the high value of truffle mushrooms and the growing world demand for it, the development of truffle marketing is highly promising. There is at present no specialised research dealing in this sector and not much practical knowledge is available. The main issues are recognising and naming different types and better understanding the symbiotic relations. There is a need to invest in a market chain for truffles – linking collectors, intermediaries and export markets – so as to better understand the demand and the requirement for quality control, grading and supply of truffles and probably for other high value products from spate irrigation areas.

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This note was prepared by Karim Nawaz with inputs from Irai Javidtash and Sayyed Ahang Kowsar (Fars Research Center for Agriculture and Natural Resources, Iran), G Bhatti (Centre of Biodiversity Shah Latif Universtiy, Khairpur, Pakistan) as well as from Lisbeth Orrock and Frank van Steenberg.

The Pakistan Spate Irrigation Network supports and promotes appropriate programmes and policies in spate irrigation, exchanges information on the improvement of livelihoods through a range of interventions, assists in educational development and supports in the implementation and start-up of projects in Spate irrigation. For more information: [www.spate-irrigation.org](http://www.spate-irrigation.org)

