

# Mini Review: Why Desert Truffles “Terfès” Exist in Sahara?

Naïrouz Benzeggouta

Département de Chimie, Faculté des Sciences, Université de M'sila, 28000, Algeria

Received: November 03, 2014 / Accepted: November 09, 2014 / Published: November 10, 2014.

**Abstract:** The Sahara is a desert ecosystem of specific fauna and flora such as “manna” called “terfès” in North Africa, which are truffles growing in desert, edible and hypogeous fungi from the genus *Terfezia* and *Tirmania*. Scientific researches reveal that desert truffles contain proteins, amino acids, carbohydrates, fats, fiber, vitamins, some polyphenolics and minerals that give them unique properties as particular food and eye treatment. The existence of desert truffles in Sahara at the beginning of spring is synchronized to be the ideal treatment for endemic illness: “the trachoma”.

**Key words:** Desert truffles, terfès, antibacterial activity, trachoma, chemical composition.

## 1. Introduction

The Sahara is sometimes synonymous to sterile area and little suitable for life. However, it contains several species of plants and animals adapted to arid conditions. It represents a specific environment since in dry conditions and high temperatures, it takes a unique look that seems hard but it is a particular system within ecosystems in this universe [1].

In this strange environment, there are many creatures mentioned in prophetic medicine, because of their great importance such as: date palm, a mine of minerals [2]; arak, an antibacterial teeth cleaning twig from *Salvadora persica* tree [3]; sidr a multipurpose tree from *Ziziphus lotus* species [4]; athal (tamarisk or salt cedar) from the *Tamarix* genus and desert truffles known as manna or kama'a from the genus *Terfezia* and *Tirmania* [5].

As a part of my continuous studies in natural medicine [6], this paper will present the importance of

desert truffles found especially in the Arabic regions as food, treatment and prevention of desertification and to answer the question: why truffles exist in Sahara at the beginning of spring?

## 2. Definition of Desert Truffles?

In Arabic, they are called: “manne”, because they are a gift from God, “kama'a” means hidden, “fag'e” which pushes out the soil, “banat arrae'd” grows with spring thunderstorm, “meat soil” for their special taste and known as “terfès” in Algeria and other Maghreb countries.

Desert truffle is a word given to the genus *Terfezia* and *Tirmania* belonging to the family of *Terfeziaceae*, they are ascomycetes fungi, hypogeous (belowground), mycorrhizal and edible, usually endemic in arid and semi-arid Mediterranean region, North Africa and the Middle East [7]. The fruiting bodies are highly appreciated for their significant nutritional value and for their therapeutic properties. In the Prophetic medicine, the aqueous extract is used to treat eye infections [8].

Desert truffles live in symbiosis with the roots of some species of the genus *Helianthemum* (family of *Cistaceae*), this association is very important in

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**Corresponding Author:** Naïrouz Benzeggouta, doctor, assistant professor, research fields: antimicrobial agents, ethnopharmacology, medicinal plants, green chemical extraction, scientific miracles in quran and sunna. E-mail: [nairouzb@gmail.com](mailto:nairouzb@gmail.com).

ecological systems; the mycorrhiza could prevent erosion and desertification by sand fixation. Mycorrhizal fungi modify water relations in host plants: stomatal conductance, transpiration rate and leaf water potential are often higher in mycorrhizal plants under drought conditions due to a higher water uptake which allows such plants to maintain higher rates of photosynthesis and higher water contents than non-mycorrhizal plants [9].

In Arabic regions, many species could be found as: *Tirmania nivea* (Des. Fr.) called Zoubaidi because of its white color, *Tirmania pinoyi* (Maire), *Terfezia claveryi* (Chatin), *Terfezia leonis* (Tul.) and *Terfezia boudieri* (Chatin) [10, 11].

### 3. Desert Truffles as a Food

Many studies show the importance and the chemical composition of desert truffles, especially in their proteins and amino acids content which is upper than other edible mushrooms with a concentration no more than 27%, 85% which is digestible by humans; from 3% to 7.5% fat (unsaturated and saturated fatty acids); 7% to 13% of crude fiber; approximately 60% carbohydrates (glycerol, glucose, fructose, mannitol, inositol and trehalose in varying quantities) and 2%-5% ascorbic acid [12-14]. Many phenolics are also found like carotenoids, flavonoids and anthocyanin in different proportion according to geographical origins and climatic conditions [15].

Truffles also demonstrate great variances in both the mineral content as well as their amounts. Minerals including manganese, copper, sodium, calcium, potassium, iron, magnesium, phosphorus, cobalt, silicon, aluminium, sulfur and zinc were found in varying amounts according to species [12, 13].

So, truffles may be considered a source of nutriment for bedouin and nomad diet, living in arid regions after hard conditions in winter.

### 4. Desert Truffles as a Treatment

In addition to nutritional importance and unique

aroma, flavour desert truffles were studied for their biological activities: antimicrobial, antioxidant and hepatoprotective effects.

The antimicrobial activity has traditionally been the most studied biological activities of truffles following their use in the prophetic medicine as a treatment for eye disease. The protein fraction found to have an effect on the inhibition of bacterial growth [16].

Various extracts of desert truffles were found to cause significant inhibition in bacterial growth *in vitro* of *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Therefore, *Terfezia* and *Tirmania* species can be considered a source of natural therapeutic agents that can be used to treat conjunctivitis eye infections that may be transmitted by sandstorms in the beginning of spring [17, 18].

The aqueous extract had good effect *in vivo* against *Chlamydia trachomatis* causing a disease called trachoma [19], a serious health problem in many Sahara regions conducts to blindness if there is no treatment. *C. trachomatis* can be transmitted passively by certain species of flies, in particular *Musca sorbens* and *Musca domestica*. There is a very close relationship between the presence of flies on children's faces and trachoma. These flies multiply especially in warm season which begin in spring where trachoma increase [20]. In addition, in one of the world health organization (WHO) records, it was estimated that trachoma is endemic in 53 countries, mainly in Africa and Asia [21].

Besides antimicrobial activities, desert truffles showed to have an antioxidant potential. According to limited scientific reports some truffles can be considered antioxidant-rich edible fungi compared to other mushrooms [14]. Some desert truffles exhibited a higher oxidative inhibition on the basis of lipid peroxidation, deoxyribose and peroxidase assays, in comparison with some common food antioxidants such as alpha-tocopherol, BHA, BHT, and propyl gallate. However, the loss of antioxidant activity of edible fungi (truffles and mushrooms) occurred during

industrial processing [22].

Al-Laith [15] investigated the antioxidant capacities of desert truffles *Tirmania nivea* from different regions and concluded that the total content in ascorbic acid content, total carotenoids, esterified phenolics, free- and non-flavonoid phenolics, flavonoid and anthocyanin may be responsible for this activity.

The hepatoprotective activity of the desert truffle *Terfezia claveryi* was evaluated of different solvent extracts against a potent hepatotoxin carbon tetrachloride (CCl<sub>4</sub>) in male Wistar albino rats. Authors found that the aqueous extract have a very powerful hepatoprotective activity [23].

## 5. Conclusions

In conclusion, desert truffle is a gift from God since it grows wild and does not need to be sown or irrigated, mentioned as food and eye treatment. The presence of desert truffles in the Mediterranean region to the Middle East at the beginning of spring is another phenomenon. In spring, eye diseases increase with the increasing of sandstorms (in Sahara) that can transmit pathogenic germs; it is also the period of trachoma vectors multiplication. Desert truffles exist in Sahara and appear in spring to be the ideal eye treatment for the local population and to prevent blindness. Thus, moment and geographical distribution of the medicine “desert truffles” and the illness “pathogenic bacteria” are synchronized and in good conformity, this is a real harmony. Extraordinary properties of desert truffles do not stop here, there is always something to find with further researches.

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