



Ethnobotanical Survey on the Traditional Use of *Diospyros kaki* Fruits in Northwestern of Tunisia

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Abstract

Phytotherapy, also called green medicine, means plant-based therapy with the aim of curing, relieving or preventing an illness. Indeed, people have chosen excellent medicinal plants to treat themselves. In this context, we focused on carrying out an ethnobotanical investigation into the traditional use of *Diospyros kaki* fruits in the Nefza region (North-West of Tunisia). More importantly, this Tunisian region was selected given their richness in *Diospyros kaki* and the excessive consumption of these fruits by the habitants. The survey prepared includes two parts of questions: the first is linked to the profile of the respondent (age, sex and level of study) and the second was reserved for the identification and use of the selected plant (the parts used, the diseases treated and the methods of preparation and administration). The results obtained revealed that the fruits of *Diospyros kaki* are frequently used as a therapeutic remedy to treat different pathologies, and in particular digestive tract disorders (55%). The survey also indicated that the method of preparation was essentially the infusion and the most used part according to them is the fruits (55%) while the main method of administration is oral (91%). In conclusion, the inhabitants of this region mentioned that this medicinal and aromatic plant is very interesting for the possibility of therapeutic innovation. This innovation could be a basis for subsequent studies and pharmacological and experimental trials to discover the curative capacities of this plant.

Keywords: Phytotherapy; Ethnobotanical Survey; *Diospyros kaki*; Tunisia

Introduction

Humans and plants have been in close contact for a long time, this contact is explained by the human habit of consuming different species of plants, on the one hand for their taste and nutritional qualities and on the other hand for their medicinal and therapeutic qualities [1]. This better human adaptation to herbal treatment has developed with different traditions and rituals and has been transmitted and enriched over time. These medicinal plants are widely used in traditional medicine due to their abundance in primary and secondary metabolites as well as their special properties that are beneficial for human health [2]. In fact, they are used in different ways, infusion, decoction and maceration and almost all parts of the plants are used (fruits, roots, leaves, flowers) [3]. The World Health Organization (WHO) estimates that more than

20,000 plants are used worldwide for their medicinal properties, but only 3,000 plants have been scientifically identified [4].

Faced with the various undesirable problems noted, the treatment failures of certain marketed drugs and their high costs and despite the significant development of technology in this field, people are still bored with the safety, efficacy and harmlessness of the medical treatment they provide to follow. In this sense, people turn to green medicine and natural health products to treat themselves or simply to improve their health. Therefore, herbal medicine, in a precise way, is the art of treating with plants, discovering them and using them wisely [5].

Thanks to its high wealth of plants and its climatic diversity, Tunisia has around 200 aromatic and medicinal plant species [6]. These species are well known for their high concentrations of bioactive molecules and their effectiveness in treating different diseases. The species *Diospyros kaki* L. is among the main plants widely used by Tunisians to treat different diseases, it is a tree that belongs to the Ebenaceae family, Ebenales order. Since prehistoric times, persimmons (*Diospyros kaki* L.) have been cultivated in China, Japan and Korea [7]. There are about a thousand varieties of persimmon that can be divided into groups according to their color and astringency [8]. It is a tree that reaches 12 meters in height with a rounded or pyramidal frame. On the other hand, the persimmon prefers deep and even heavy soils, not dry, but well drained, permeable. The tree does not tolerate excess humidity and water stagnation in the soil. Indeed, in an impermeable ground, the tree perishes quickly. In very light, sandy ground, the fruit yield is low. During its first year of planting, the persimmon tree requires very frequent watering (about every other day).

The fruit must be picked with great care so as not to damage the skin of the fruit and not to crush it. A harvest takes place during the winter season, but it still differs from one variety to another.

To carry out our study, we carried out an ethnobotanical survey on the traditional use of *Diospyros kaki* fruits in the Nefza region (North-West Tunisia), during the collection period (October and November).

Material and Methods

Choice of region

The Nefza (Ouechtata) region, located in the northwest of Tunisia, was chosen because of its richness in *Diospyros kaki*.



Figure 1: *Diospyros kaki* L. fruits.

Questionnaire formulation

The questions asked to volunteers in the survey form are of two categories: the first category concerns the identification and civility of the person interviewed (name, first name, age, profession, etc.) and the second type concerns the identification and use of the

plant (stage of harvest, preparation, pathologies treated, method of administration, etc.). At the end of the questionnaire, an observation column has been added where the respondent can provide us with additional information on the use of the plant.

Methodology

The realization of this questionnaire requires the preparation of 100 forms. Before starting, the investigator must first introduce himself with a badge that contains useful information about his identity and the objectives of the work to gain the confidence of the people interviewed. A sort of selection of people to be interviewed to ensure certain reliability to the survey. Mothers, farmers, the elderly and some recommended healers were given priority. The questionnaire is carried out at their homes, in markets, in nurseries and in weekly souks.

The person is questioned mainly about the use of *Diospyros kaki* for the different uses. We take time with each person especially if they show good knowledge. Even if the person being interviewed provides us with information that we do not need, we listen to them so as not to reduce their willingness to continue.

Processing of results

Data obtained from the survey forms were then recorded on Excel. Data analysis used simple methods of descriptive statistics. Thus, quantitative variables are described using the numbers. Qualitative variables are described using the frequencies of the responses.

Results

Distribution of respondents according to age group

The ethnobotanical survey carried out allowed 100 individuals to be questioned. The median age is between 30 and 50 years, i.e. 36% (Figure 2).

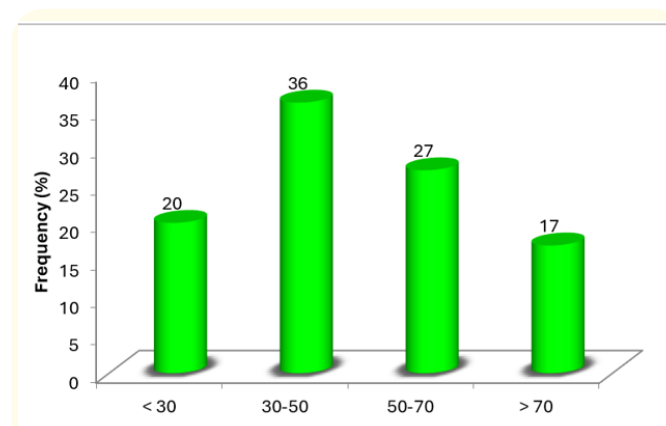


Figure 2: Distribution of respondents by age group.

Distribution of respondents by gender

The population surveyed is 50% men and 50% women (Figure 3).

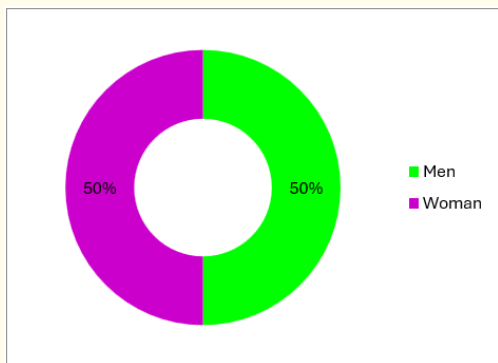


Figure 3: Distribution of participants by sex.

Level of study

Regarding the level of education, 38% of the population had secondary education, the rest of the respondents were divided between primary education (21%), university education (24%). 17% of the respondents were illiterate (Figure 4).

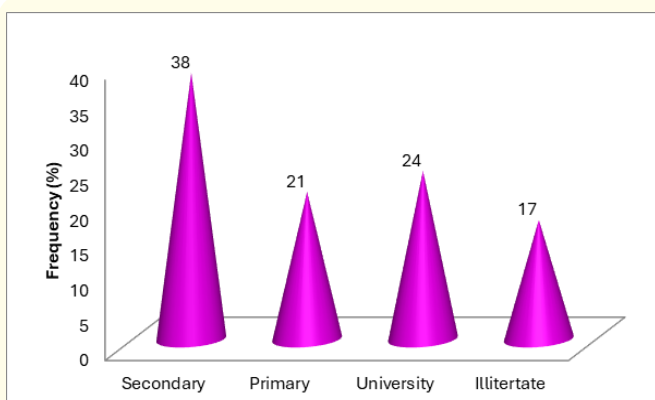


Figure 4: Distribution of respondents according to level of education.

Source of information on the plant

Most respondents (82%) acquire information through the experiences of others, only (18%) acquire information through reading scientific references (Figure 5).

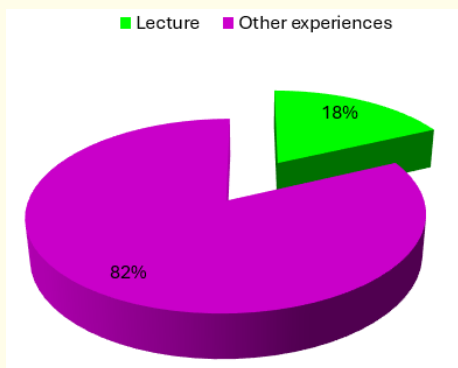


Figure 5: Origin of information from respondents in the Nefza region.

Traditional and medicinal use of *Diospyros Kaki L.* fruits

The questionnaire conducted in the Nefza region revealed that the persimmon fruit is used in traditional medicine to treat various diseases, especially those of the digestive system (55%). Persimmon is also used for the treatment of diabetes (16.42%), as a hormonal stimulant (17.14%) as well as the treatment of influenza and sore throats (8.57%).

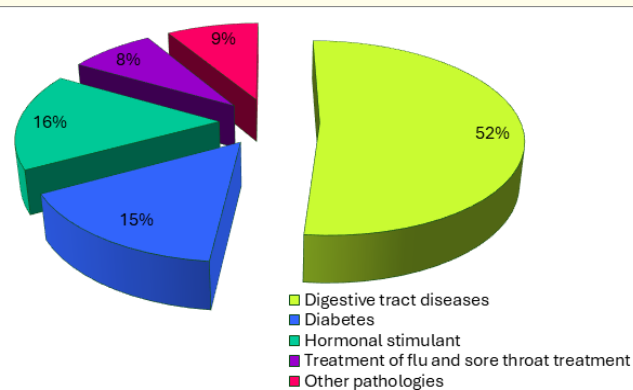


Figure 6: Frequency of different traditional uses of *Diospyros kaki* fruits.

The part used

According to the respondents, the most used part is the fruit (55%), followed by the leaves (21%) and the flower (16%) and very rarely the stem and the whole plant (Figure 7).

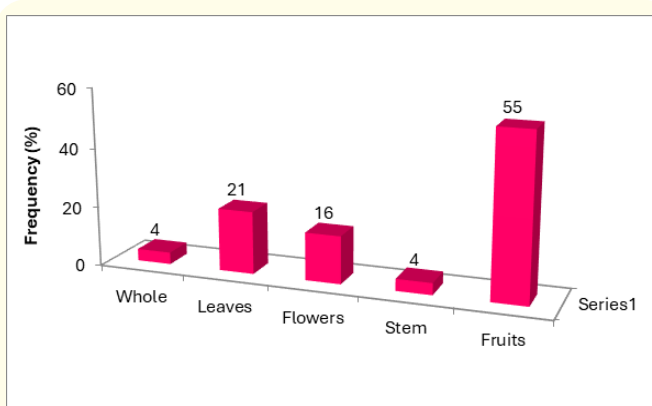


Figure 7: Frequency of the part used of *Diospyros kaki*.

Harvesting Stage

The survey revealed that 47% of respondents indicated that the persimmon fruit is effective and potent regardless of its raw or ripe state (Figure 8).

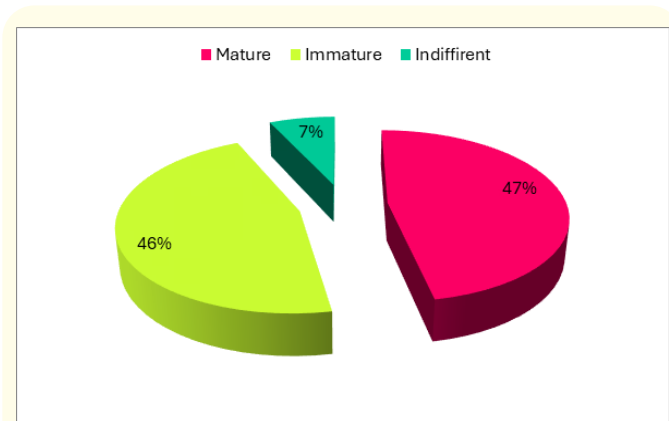


Figure 8: Harvesting stage of *Diospyros kaki* fruits.

Method of preparation

The survey shows four methods of preparation: decoction (50%), maceration (30%), infusion (10%) and other mixed (10%) (Figure 9).

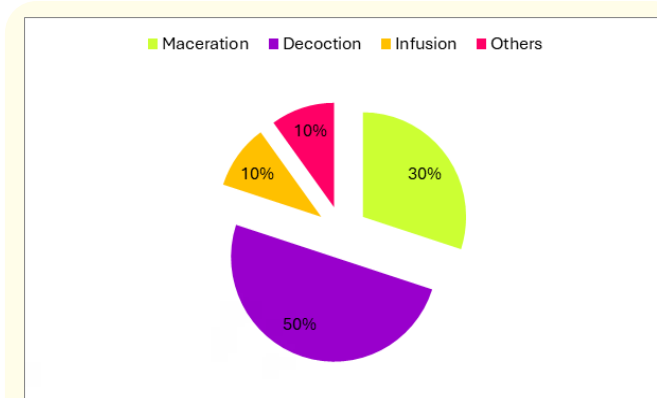


Figure 9: Different methods of preparing *Diospyros kaki*.

Mode of administration

The most frequent mode of administration of *Diospyros kaki* L. is oral ingestion (91%) (Figure 10).

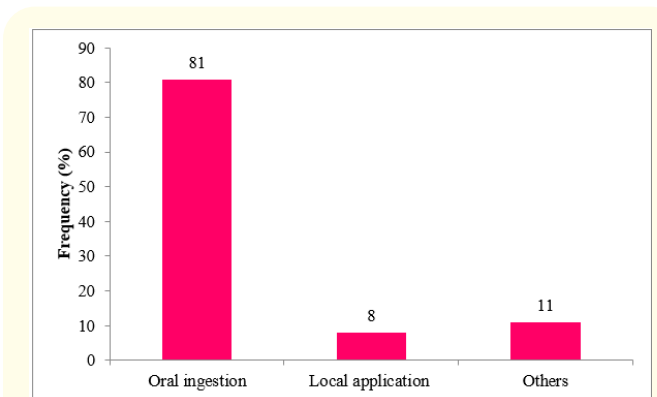


Figure 10: Different methods of preparing *Diospyros kaki*.

State of use

The population of Nefza uses *Diospyros kaki* fruits in fresh and/or dried state (88% and 12%, respectively) (Figure 11).

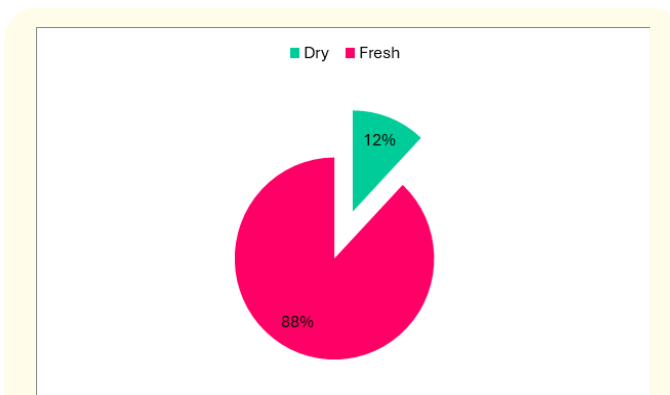


Figure 11: State of use of *Diospyros kaki* in the Nefza region.

Frequency of use

The survey revealed that the majority of respondents used persimmon in a moderate way, 65%.

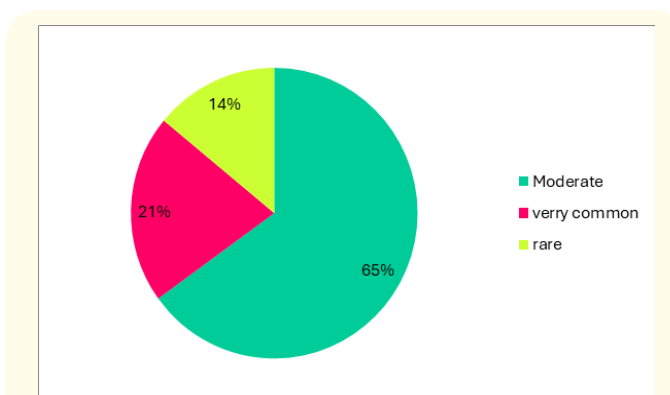


Figure 12: Frequency of use of *Diospyros kaki* in the Nefza region.

Degree of satisfaction

Most respondents (71%) were satisfied and very satisfied (23%). On the other hand, 6% of the population were not very satisfied (Figure 13).

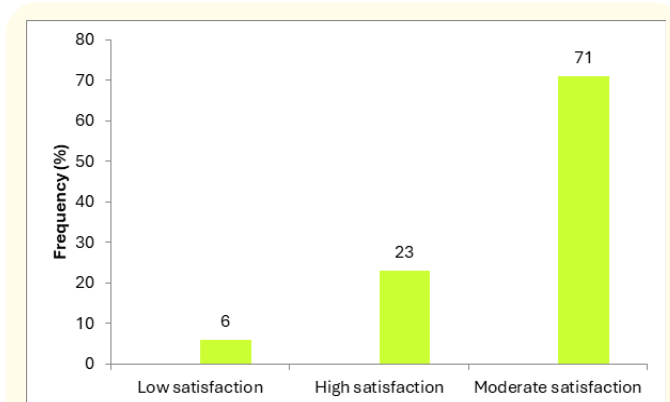


Figure 13: Satisfaction rate of respondents regarding *Diospyros kaki*.

Reason for herbal medicine

The majority of respondents (61%) mentioned that *Diospyros kaki* fruits were used for their effectiveness, 13% because of their low cost and 21% indicated that *Diospyros kaki* herbal medicine is preferred in order to avoid the side effects of synthetic molecules (Figure 14).

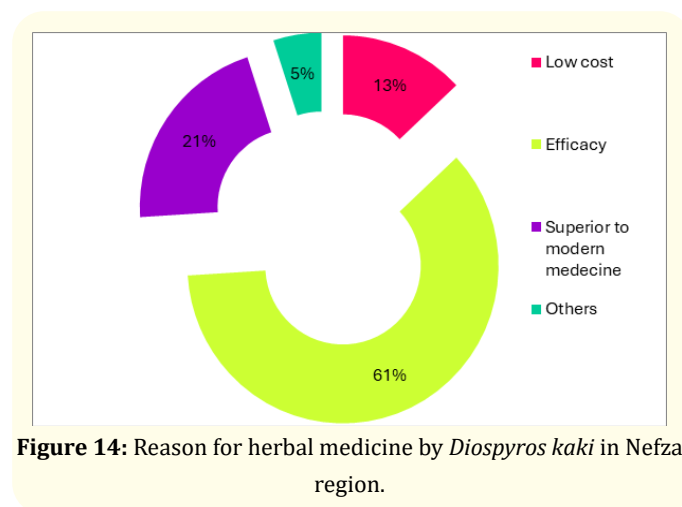


Figure 14: Reason for herbal medicine by *Diospyros kaki* in Nefza region.

Discussion

Traditional medicine or herbal therapy is one of the oldest medicines in the world [9]. Moreover, man has tested and chosen the real medicinal plants to use. Recently, there has been an enhancement of herbal medicine in different parts of the world. According to the World Health Organization [10], almost 80% of the population uses traditional medicine to treat certain diseases. In this sense, we have oriented ourselves to carrying out an ethnobotanical survey on the traditional use of persimmon fruit in the Nefza region (North-West Tunisia). The results of this survey show that the fraction of the population surveyed is made up of 50% men and 50% women. Most of the respondents are aged between 30 and 50 years. Regarding the levels of education, the questionnaire conducted in the Nefza region revealed that the majority of the population studied had a secondary school level (37%) while 23% of respondents had a primary level, 23% had a university level and 17% were illiterate. The questionnaire conducted in this region showed that persimmon is frequently used in traditional medicine to treat various pathologies, especially those of the digestive system such as diarrhea and ulcers. Our results corroborate those obtained by (Martínez-Las Heras, *et al.* 2017) [11] who showed that persimmon ensures the healing of subjects suffering from gastrointestinal diseases. The questionnaire also proved that persimmon is used as an antidiabetic. Also, our results are in line with several other researches that have shown that *Diospyros kaki* has a hypoglycemic power [12,13].

The respondents also cited four methods of preparation: decoction (50%), infusion (10%), hydrodistillation (10%) and maceration (30%) and that the most used part is the fruit (55%). Indeed

Pu., *et al.* [14] showed that the persimmon extract contains a high content of bioactive compounds. Other authors have used persimmon infusion to evaluate the antioxidant activity and have proven that the plant is rich in phenolic compounds and has a strong antioxidant power [15,16]. The method of administration is highly dependent on the pathology to be treated. Through this study, we were able to position the persimmon in the medicinal practices of a representative sample of the Tunisian population (Nefza). Our results obtained constitute a very valuable source of information for the region studied and the national medicinal flora. They could be a useful database for further research in the fields of phytochemistry and phytopharmacology.

Conclusion

The habitats of Nefza region confirmed that the fruits of *Diospyros kaki L.* are very beneficial for the treatment of different diseases including digestive tract diseases. These results can highlight this plant and add it to the list of promising and guaranteed plants in herbal medicine with its wide spectrum of pharmacological uses and medical applications.

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Research Ethics Committee Approval

The research paper was permitted to be published in any open access journal.

Conflicts of Interest

The authors of the paper have no conflict of interest.

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