Pak. j. life soc. Sci. (2025), 23(1): 7428-7439 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences

www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2025-23.1.00578

**RESEARCH ARTICLE**

# Ethnobotanical Study of White Onion (*Allium Cepa L.*) From Oulhaça in the Ain Temouchent Region, Algeria

Hadjira Houria ABDELLAOUI[1]*, Mohammed BOUZOUINA[1], Kaddour Bouderoua[2], Sena Bakhti[3], Maroua Riane Berdane[4]and Boulenouar Fatima Zohra[4]

[1]Vegetal Protection Laboratory, AbdelHamid Ibn Badis University, Mostaganem 27000, Algeria.
[2]Food Technology and NutritionLaboratory, AbdelHamid Ibn Badis University, Mostaganem 27000, Algeria.
[3] biotechnology Applied to Agriculture and Environment PreservationLaboratory, Higher School of Agronomy, Mostaganem 27000, Algeria.
[4]Belhadj Bouchaib University, Ain Temouchent 46000, Algeria.

***ARTICLE INFO***

Received: Jan 6, 2025

Accepted: Feb 27, 2025

***Keywords***

Ethnobotany

*Allium Cepa*

White Onion

Traditional Medicine
Culinary

Therapeutic

Algeria

***Corresponding Author:**

hadjira.abdellaoui@univ

**ABSTRACT**

This study provides an ethnobotanical analysis of white onion (*Allium cepa L.)* from Oulhaça, a highly valued local product. It is an essential ingredient in various culinary preparations and plays a significant role in the livelihoods of those involved in vegetable production in the Wilaya of Ain Temouchent, particularly in the Oulhaça region. The aim of this research is to explore the use of onions in traditional medicine through an ethnobotanical survey. The survey was conducted across 13 municipalities in the Wilaya, targeting a diverse demographic. The findings reveal that women use onions more extensively than men for medicinal, cosmetic, and culinary purposes. The bulb is the most commonly used part, accounting for 86% of reported usage. The most common therapeutic preparations are cooked, raw, and poultices, representing 36%, 31%, and 20%, respectively. Oral administration is predominant (54%), mainly in the form of extracts and infusions, followed by poultices (29%). Skin and gastric ailments are the most frequently treated conditions.

## INTRODUCTION

The concept of ethnobotany, first introduced in 1879 by French archaeologist and botanist Rochebrune under the term *"botanical ethnography,"* marks the inception of a scientific framework aimed at preserving and valuing traditional knowledge related to plants. Ethnobotany is a multidisciplinary field that investigates the cultural uses of plants and their roles in human societies (Malan, 2016). Numerous studies have underscored the vital importance of plants in the lives of humans and animals alike (Rousseau, 1961; Ozenda, 1977; Codou-David, 2012; Malan, 2016). The diverse applications of plants, often categorized into distinct domains, reflect ancestral knowledge that has been passed down through generations (Malan, 2016).

Today, a significant portion of the global population—particularly in developing countries—relies on traditional plant-based remedies for healthcare (Bouzid et al., 2017). Beyond medicinal plants, many edible plants possess remarkable therapeutic properties and have been integral to traditional medicine for centuries. These edible plants are valued for their recognized curative properties, which are extensively utilized by local populations (Dansi et al., 2008).

This study focuses on the onion (*Allium cepa L.*), a globally recognized edible plant extensively used by local populations for its diverse benefits. Since antiquity, the onion has been cultivated and celebrated for its therapeutic, medicinal, and culinary properties (McCallum, 2007). According to De Lannoy (2001), onions were first used as medicinal plants by the Egyptians, Greeks, and Romans before evolving into staple foods and condiments. Additionally, species of the *Allium* genus held significant symbolic importance; for instance, the Egyptians attributed sacred meanings to them, while Greek and Roman soldiers consumed onions to enhance physical strength during battles (Hess Halpern, 2018). Onions are rich in diverse bioactive compounds and have been recognized for their ability to help prevent common health conditions such as atherosclerosis, asthma, bronchitis, and coughs (Zhao Xin et al., 2021). These therapeutic attributes have given onions an almost mythical reputation across various cultures (Hess Halpern, 2018).

The varietal diversity of onions is notable, with six primary types classified based on bulb color, shape, size, cultivation methods, and commercial purposes: yellow, red, white, Spanish, scallions, and pickling onions (Ricroch et al., 1996; Bennacer and Bouderbala, 2016).

This study presents a pioneering ethnobotanical investigation into the white onion (*Allium cepa L.*) from Oulhaça, a local variety from the Wilaya of Ain Temouchent region. It aims to explore its culinary and medicinal properties and validate its dual nutritional and therapeutic potential. The findings are expected to enrich scientific databases and contribute to the valorization of the white onion as a "terroir product," paving the way for its recognition through labeling initiatives.

## 1. Description and Systematics of Onion

Onion (*Allium cepa L.*) is a herbaceous, biennial crop in the Alliaceae family (Fritsch et *al*., 2002). The first year focuses on bulb production, while the second year yields seeds. This biennial herbaceous plant belongs to the Alliaceae family (Fritsch and Friesen, 2002; Abdou, 2014; Boukeria, 2017). During its first year, the onion produces bulbs, while the second year is dedicated to seed production (Fritsch et al., 2002).

Classical Classification (Cronquist, 1981):

Kingdom: Plantae

Division: Spermatophytes

Class:Liliopsida

Order: Liliales

Family:Liliaceae

Genus: Allium

Species:*Allium cepa L.*

Phylogenetic Classification (Ruchot):

Kingdom: Plantae

Clade:Angiosperms

Clade:Monocotyledons

Clade:Asparagales

Family:Alliaceae

Sub-family:Amaryllidaceae

Genus: Allium

Species:*Allium cepa L.*

## 2. Unique Features of Oulhaça White Onion

Oulhaça's white onion stands out for its sweet taste, firm yet non-fibrous texture, perfectly circular shape, fine skin, and early maturity. These attributes result from traditional cultivation methods reliant on non-irrigated practices, benefiting from:

Specific soil properties with high water retention and loose structure.

A resilient local onion variety.

Favorable winter climate with high humidity due to Mediterranean proximity.

Expertise of producers who optimize these conditions.

These factors ensure balanced growth, leading to bulbs with high dry matter and sugar content. The juice is well-retained by smaller, more numerous cells compared to onions from other Algerian regions.

## 3. METHODOLOGY

### 3.1. Geographic and Population Context

Ain Temouchent lies at the western edge of the Oran Sahel high plains, 504 km west of Algiers, neighboring Oran, Sidi Bel Abbes, and Tlemcen. The study area, Oulhaça El Gheraba, is a coastal region located on the left bank of the Tafna River.

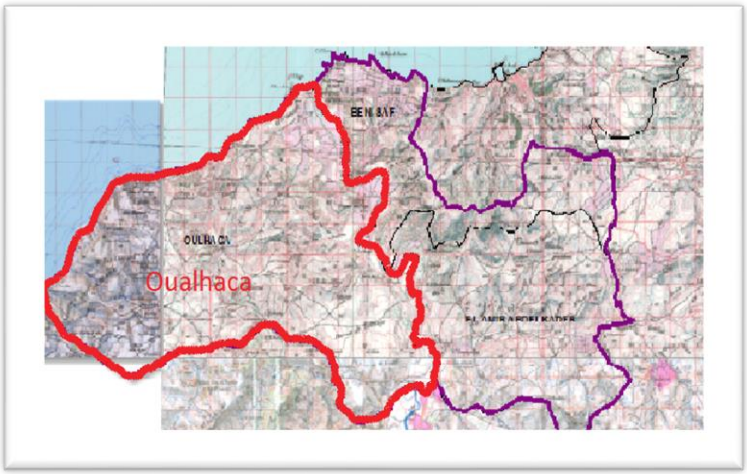


**Figure 1.Geographic Location of Oulhaça. Region**

### 3.2. Ethnobotanical Survey

The technical equipment employed for ethnobotanical research consists of a survey form, a camera, a hoe, and a net for collecting white Oulhaça onion "OWO".

#### 3.2.1. Sampling

Our sample comprises 100 individuals (N=100).

The questionnaire was developed to include the following parameters:

· The informant: Address, age, gender, education level, family status.

· The food plant information: Area of use - parts used - preparation method - usage method - collection period - treatment duration.

The investigation took place from June to August 2021 in the wilaya of Ain Temouchent, focusing on individuals practicing Traditional Medicine (PMTs). To gather reliable, effective, and significant information, we targeted specific groups such as herbalists, phytotherapists, households, resident healers, and market herbalists.

Our research employed semi-structured interviews, direct conversations, and door-to-door methods (MALAN 2016). This approach allowed us to question individuals with varying intellectual backgrounds, who provided insights into local therapeutic and traditional practices.

We conducted 100 surveys across different municipalities, including Oulhaca, Tadmaya, Beni Saf, Emir Abdelkader, El Amria, Ain Temouchent, Chaabat El Ham, El Maleh, Ain Tolba, Ain Kihel, Hammam Bouhadjar, Sidi Boumedienne, and Ain El Arbaa.

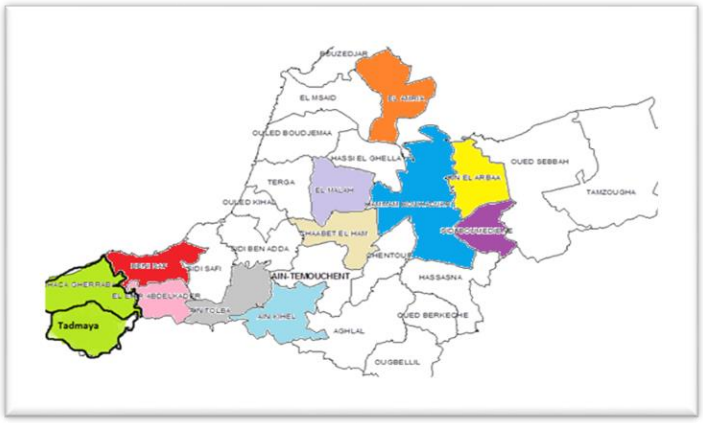


**Figure 2. Identification of ethnobotanical study areas in the Ain TemouchentRegion.**

### 3.3. Statistical Analysis

The collected information was examined using descriptive statistics, with frequencies expressed as percentages, utilizing IBM SPSS software. This analysis aimed to highlight the full range of local traditional therapeutic practices and the ailments they address.

## 4. RESULTS AND DISCUSSION

### 4.1 Variation in results according to informants

The majority of male respondents are familiar with the Oulhaça region, which is renowned for its scenic beauty and known for its high-quality local vegetables, appreciated for their taste and flavor, and highly sought after by consumers.

In contrast, the women surveyed were unable to differentiate the white onion from Oulhaça from those produced in other regions, perceiving it as an ordinary onion. On the other hand, the men highlighted that the Oulhaçawhite onion “OWO” is distinctive due to its external attributes, including its shine, firmness, golden color, and its sweet taste.

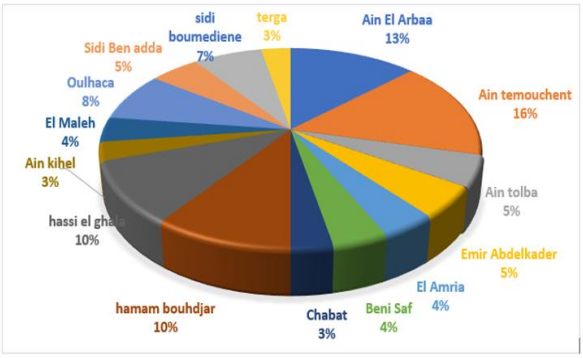


**Figure3. The therapeutic benefits of white onionin the wilaya of Ain Temouchent**.

### 4.2. Onion use by age

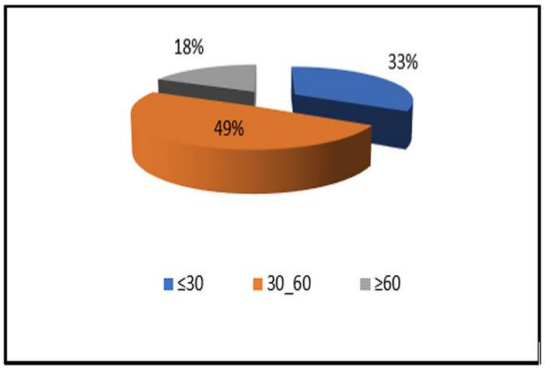


**Figure4.Usage of white onion by age group**.

Our findings reveal that 49% of individuals aged 30 to 60 consume onions significantly more frequently compared to those under 30, who exhibit a usage rate of 33%. In contrast, only 18% of individuals over 60 express interests in the therapeutic properties of onions. However, in the TiziOuzou region, several studies demonstrate that older individuals are more knowledgeable about traditional phytotherapy than other age groups (Derridj et *al.*, 2010). A similar trend is observed in the Zitouna region of El Tarf-Algeria (Boutabia et *al.*, 2010).

### 4.3 Usage by family situation

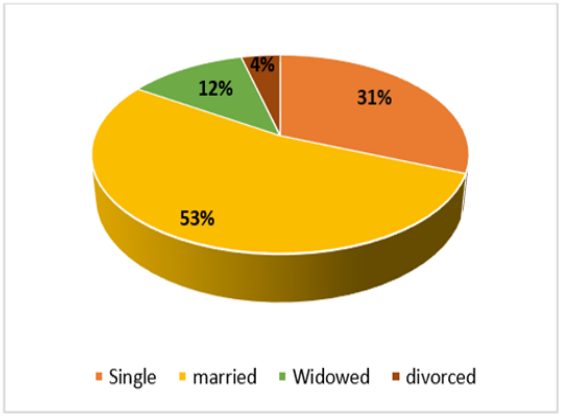


**Figure5.White Onion usage by family situation.**

The percentages of informants using white onion for therapeutic purposes vary according to marital status. Married individuals are the most represented in this survey, accounting for over 53%. In contrast, single individuals represent only 31%, widowed individuals 12%, and divorced individuals a minimal percentage of 4%. This can be explained by the fact that married individuals, as parents, are responsible for providing primary therapeutic care for their entire family, thereby reducing the financial burden associated with medical consultations and pharmacy costs. The results are consistent with other ethnobotanical studies, such as those conducted by El Hafian et *al*. (2014), which reported that 70% of medicinal plant users are married individuals.

### 4.4 Usage by gender

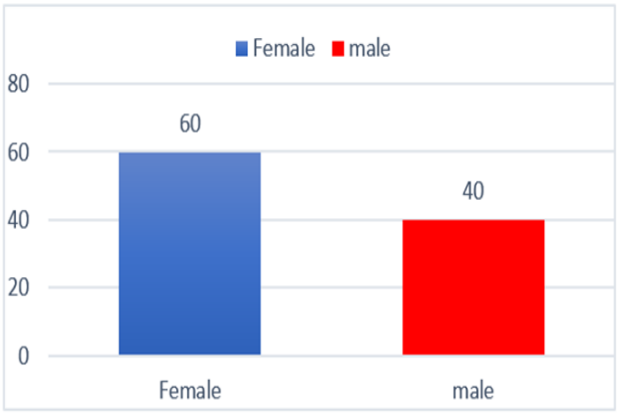


**Figure6.Uses of White Onion by gender**

The results showed that 60% of women use onions more extensively compared to men, who account for only 40%. This difference can be attributed to men being engaged in various tasks across different fields, such as agriculture, commerce, and others. In contrast, women use medicinal plants and agricultural products for a variety of purposes, including culinary, medicinal, and fodder applications (e.g., livestock feed). Additionally, women are more involved in phytotherapeutic treatments and the preparation of plant-based recipes, not only for their own care but also for the entire family.

Our findings are consistent with the ethnobotanical study of medicinal plants conducted in the Jijel region, where 68% of women were found to have greater knowledge of medicinal species compared to 32% of men (Aribi, 2013).

### 4.5. Usage According to Educational Level

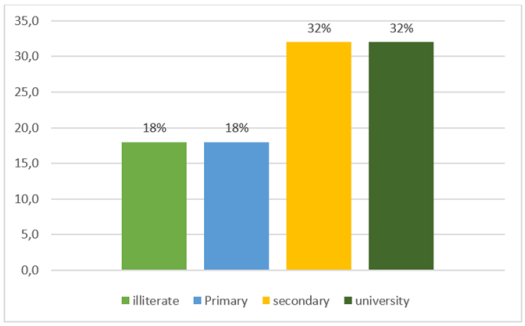


**Figure 7.Uses of white onion by education level.**

Secondary and university education levels each account for the same percentage, 32%. In contrast, individuals with primary education and illiterate individuals represent only 18%. However, in other regions of the country, phytotherapy is more commonly practiced by illiterate individuals (Ait Ouakrouch, 2015; El Hilah et *al*., 2016), as is also observed in Benin (Dougnon et *al*., 2016).

### 4.6. Use according to Origin of knowledge:

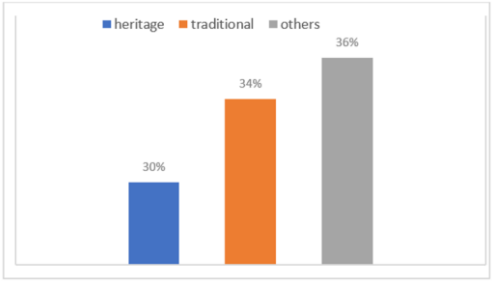


**Figure 8.Uses of white onion according to the origin of knowledge**

The knowledge of medicinal plant users and their properties is generally acquired through extensive experience accumulated over time and passed down from one generation to the next. However, the transmission of this knowledge and know-how from elders is currently at risk, as the younger generation does not always ensure continuity (Anyinam, 1995).

Indeed, 36% of the population rely on the experiences of other users when using onions as remedies for specific diseases (Figure 36), while 34% refer to traditional practices. Additionally, 30% report having inherited family knowledge and know-how regarding the therapeutic virtues of white onions from Oulhaça.

These findings align with those of Benkhnigue et al. (2011) in the Mechraâ Bel Ksiri region (Gharb region of Morocco), which indicate that 63.53% of the population rely on the experiences of others, 12.7% on herbalists, and 23.77% on their own knowledge for the use of medicinal plants.

### 4.7. Use according to harvesting period and collection of plant species

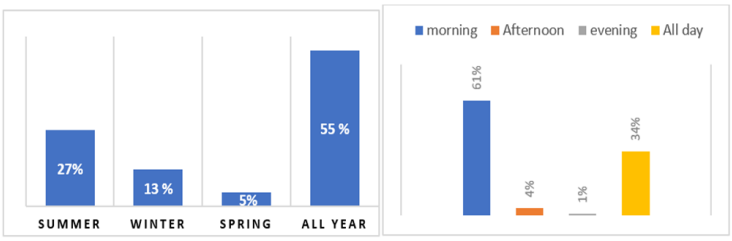


**Figure 9. Use according to collection period and time of day.**

Regarding the season and timing of plant organ harvesting, the main factor to consider is the seasonal availability of the crop. White onions are harvested at maturity throughout the day during a specific season, which extends from June to the end of August, as they are a staple food crop. However, according to the results obtained from the surveyed individuals, 55% reported that white onions are

harvested year-round, 27% in summer, and 13% in winter. As for the time of harvesting, the majority of respondents (61%) preferred the morning, while 34% opted for promoting wellness through their antioxidant, anti-inflammatory, and immune-supporting properties.

### 4.8. Usage of Plants According to the Parts Used

The histogram highlights the bulb as the most frequently used(86%), part for its therapeutic virtues. This observation aligns with existing literature, which emphasizes the bulb's richness in bioactive compounds, including flavonoids and sulfur-containing compounds (Smith et al., 2020). These compounds are renowned for their antioxidant, anti-inflammatory, and antimicrobial properties, establishing the bulb as a cornerstone in traditional remedies for colds, infections, and digestive disorders.Onion seeds are moderately utilized(9%) , reflecting their notable role in traditional medicine. They are commonly valued for their diuretic and detoxifying properties, as corroborated by studies (Jones & Taylor, 2018). The use of the whole onion plant, though less prevalent, signifies its application in holistic remedies. This practice aligns with traditions that seek to leverage the combined benefits of all parts of the plant. According to Rahman et al. (2021), the synergy of bioactive compounds present in the bulb, seeds, and leaves enhances their overall therapeutic efficacy, rendering the whole plant particularly valuable in specific traditional preparations.

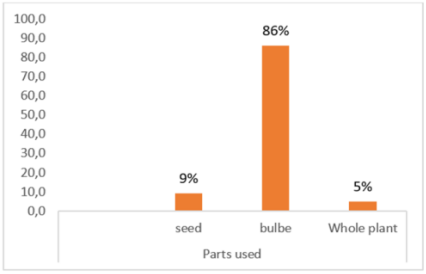


**Figure 10. Parts used of whiteonion**

The galenic form and mode of administration of various plant organs are critical in preparing recipes for diverse applications. In this study, onion bulbs were the predominant plant organ utilized, constituting 86% of the reported uses, followed by onion seeds (9%) and whole plants (5%). These findings align with the recognized therapeutic importance of onion bulbs, which are rich in bioactive compounds, as noted in studies by Griffiths et al. (2002) and Liguori et al. (2021).

Regarding galenic formulations, over 50% of the applications cited by users involved specific therapeutic forms such as onion extracts (44%), infusions (29%), and essential oils (21%). Similar findings have been discussed in the context of traditional medicinal practices, highlighting the prominence of extracts and oils for their bioavailability and effectiveness (Ezejiofor et al., 2017; Zhao et al., 2021). Fatty oils and powdered forms, however, represented only 3% of applications, reflecting their limited adoption in traditional and modern contexts.

Culinary uses accounted for 40% of reported applications, emphasizing the onion's dual role as both a food ingredient and a therapeutic agent. Cosmetic applications, constituting 10%, align with evidence of onion-based formulations being used for skin health and cosmetic benefits, as supported by research from Gupta and Kohli (2019) and Kang et al. (2020). These findings collectively underscore the multifunctionality of onions in health, culinary, and cosmetic domains

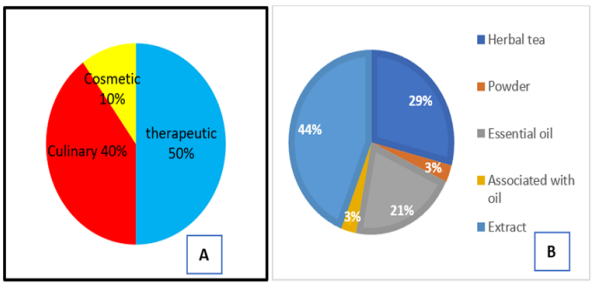


**Figure 11. Different uses for onions (A), Different ways of using onions (B).**

Regarding the preparation methods for onions, culinary applications dominate, with 40% of recipes involving cooked preparations, while raw forms account for 56%. Poultices, widely recognized for their therapeutic applications in wound healing and inflammation reduction, represent 35%, and decoctions constitute 16%, particularly for their role in traditional remedies (Griffiths et al., 2002; Ezejiofor et al., 2017).

The primary mode of administration is oral (70%), emphasizing the dietary and therapeutic significance of onions in managing various health conditions, as highlighted by research on their cardiovascular and antioxidant benefits (Zhao et al., 2021; Kang et al., 2020). Topical application follows at 37%, showcasing onions' role in treating skin conditions and promoting wound healing (Gupta & Kohli, 2019; Lee et al., 2022).

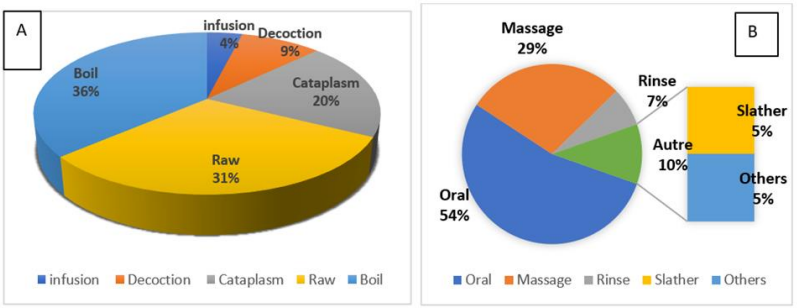


**Figure 11. Different types of preparation(A),Different types of administration (B).**

The figures reveal that oral use (70%) is predominant, followed by external methods such as massage (37%), rinsing (9%), and local application (7%).

Oral Use (70%): This result highlights the dual role of onions as both a food and a remedy. Bioactive compounds, such as quercetin, enhance their role in preventing metabolic and cardiovascular diseases. These findings align with those of Griffiths et al. (2002), who emphasized the importance of onions in diets for their health benefits.

Massage (37%): This practice is common in traditional medicine for treating joint and muscle pain due to the anti-inflammatory properties of sulfur compounds.

Rinsing (9%) and Local Application (7%): These methods indicate topical use, often for treating skin conditions, irritations, or infections. These practices rely on the antimicrobial activity of onion extracts, as reported by Benkeblia (2005).

### 4.9 Therapeutic indication

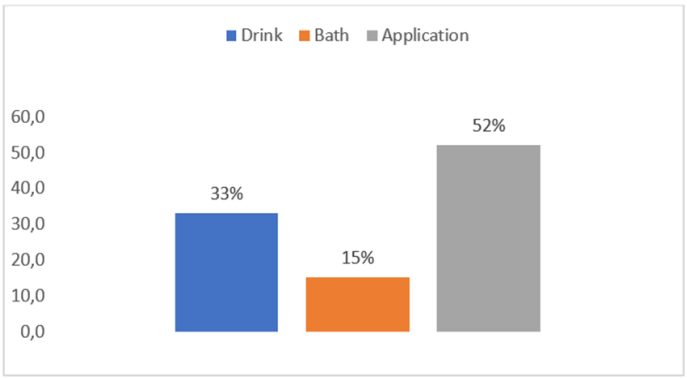


**Figure 12. Therapeutic Indications of White Oulhaça Onions.**

The onion juice has been widely used in traditional medicine across the world for its therapeutic properties. In ancient practices, onion juice was applied to treat conditions such as coughs, colds, asthma, sore throat, and other respiratory ailmentLaw YY (2016). The results showed that majority of respondents preferred external application (52%), followed by internal application, with 33% using it in the form of drinks and 15% in the form of aromatic baths.

### 4.10. Diseases treated:

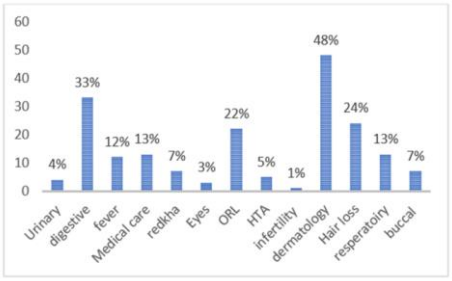


**Figure13.The different diseases treated by White OulhaçaOnion.**

In general, the results indicate that the most commonly treated conditions are skin diseases, accounting for 72%, followed by gastric diseases (33%), ENT (ear, nose, and throat) disorders (22%), and respiratory diseases (13%). These findings align with previous research highlighting the prevalent use of medicinal plants like onions for treating digestive ailments and dermatoses, as observed in Algeria by Hammiche and Gheyouche (1988). Similarly, El Rhaffari and Zaid (2002) reported that traditional remedies frequently target digestive and dermatological conditions, reflecting the versatility of plants such as onions in addressing a wide range of health issues. Additionally, onions are known for their antimicrobial and anti-inflammatory properties, which make them particularly effective in treating skin and respiratory conditions (Griffiths et al., 2002; Roldán-Marín et al., 2009)

### 4.11. Duration of treatment:

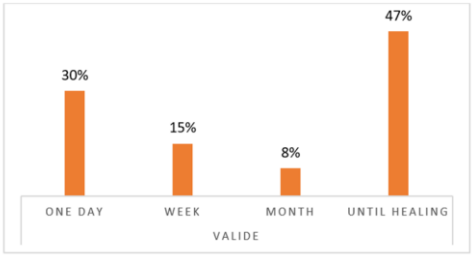


**Figure14. Duration of Use of White Oulhaça Onions**

The duration of treatment depends on individual practices and the specific conditions being addressed. In this study, the most frequent duration was "until recovery," reported in 47% of cases, followed by one day (30%), one week (15%), and one month (8%). This pattern contrasts with findings from Ndjouondo et al. (2015), where a single-day usage predominated (57.57%), followed by treatment until recovery (33.33%), one week (6.06%), and one month (3.03%). These differences highlight regional and cultural variability in ethnobotanical practices, as seen in similar studies emphasizing the influence of local traditions and the specific ailments targeted by medicinal plants (Bussmann & Sharon, 2006; Pieroni et al., 2018). Furthermore, the flexible use of plants in traditional medicine is often adapted to the perceived severity and chronicity of conditions (Zidorn, 2010).

### 4.12. Results of the therapeutic virtues of White Onion

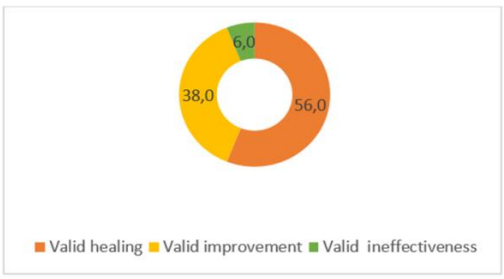


**Figure15.the use of onions as a treatment for various diseases**

A survey of users across various communes revealed that 56% believe onions are effective in achieving a complete cure for the diseases being treated, while 38% reported that onions contribute to improved health conditions without full recovery. Only 6% of participants deemed onions ineffective. These perceptions align with findings from Amiri and Joharchi (2013), who highlighted the widespread use of onions in traditional medicine due to their antimicrobial, anti-inflammatory, and antioxidant properties, which aid in treating infections and chronic conditions. Similarly, Block (2010) emphasized onions' bioactive compounds, such as sulfur-containing compounds, which play a role in disease prevention and recovery.

### 4.13. Side Effects

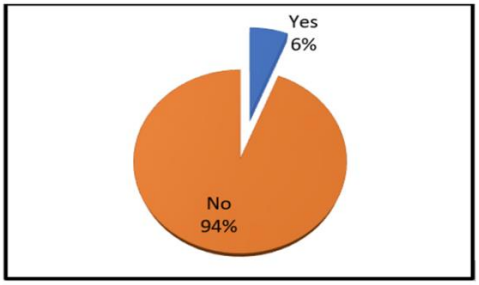


**Figure 16.Side Effects of Use.**

The results of our survey reveal that 94% of the local population considers white onion to be a medicinal remedy free of side effects. This perception underscores the widespread reliance on traditional knowledge in therapeutic practices. However, Hmamouchi (1999) cautions that the misuse or overestimation of medicinal plants' therapeutic properties by practitioners can pose risks. This includes insufficient emphasis on usage precautions and a lack of awareness about potential side effects or plant toxicity. Similarly, Ong and Kim (2017) emphasize the importance of responsible use of natural products, as some bioactive compounds in plants may cause adverse reactions if misused or consumed in excess. These findings highlight the need for education on safe and effective usage of medicinal plants like onions to prevent potential risks.

### 4.14. Precautionary use

Approximately 12% of individuals take precautions before using onions as a medical treatment. These are often individuals with chronic conditions, allergies to certain plants, pregnant women, and children, all of whom should use medicinal plants under healthcare supervision to prevent adverse effects. As documented by Hmamouchi (1999), such precautions are vital, especially given the potential toxicity of certain medicinal plants when misused.

The necessity of taking precautions is further supported by Ernst (2002), who highlights that even widely used natural remedies can pose risks without proper guidance on dosage, administration, and potential interactions with conventional medicines. Consulting a specialist, such as a naturopath or herbalist, is therefore recommended for determining therapeutic indications, appropriate dosages, frequency, and duration of use, particularly when medicinal plants like onions are employed as remedies for conditions resistant to conventional treatment (WHO, 2004). These measures are crucial to ensuring both efficacy and safety in the therapeutic use of onions and other medicinal plants.

## CONCLUSION AND RECOMMENDATIONS

Despite the advancements in chemical and modern medicine, traditional phytotherapy remains a vital practice for managing various diseases, especially in rural and semi-rural communities. This ethnobotanical study, focused on the medicinal uses of white onion (*Allium cepa L.*) from Oulhaça, conducted across different communes in Ain Temouchent province, provided the following key findings based on 100 surveys with the local population:

Women (60%) are more engaged in using onion for therapeutic purposes compared to men (40%).

Married individuals constitute 50% of onion users for medicinal purposes.

The age group between 30 and 60 years demonstrates the most knowledge and frequent use of medicinal plants, including onion, compared to younger and older demographics.

The study highlights that the onion bulb is the most frequently utilized part, followed by the seeds. Skin diseases emerged as the most commonly treated conditions, followed by gastric and ENT disorders, indicating onion's broad therapeutic applicability in local traditional medicine.

This investigation underscores the significant medicinal potential of Oulhaça's white onion, which holds an essential place in the ethnobotanical heritage of the region. As a result, the therapeutic applications of onion can serve as a critical tool for preserving and advancing phytotherapy practices.

Furthermore, this study sets a foundation for future biological screenings aimed at assessing the nutritional and therapeutic properties of Oulhaça's white onion. These efforts can pave the way for isolating and identifying bioactive compounds, potentially contributing to the development of functional foods and natural remedies that promote public health and well-being.

## REFERENCES

Ait Ouakrouch, I., 2015 – Ethnobotanical survey of medicinal plants used in the traditional treatment of type II diabetes in Marrakech. Doctoral thesis in medicine. Cadi Ayyad University, Marrakech. 92 p.

Amiri, M. S., &Joharchi, M. R. (2013). Ethnobotanical investigation of traditional medicinal plants commercialized in the markets of Mashhad, Iran. *Avicenna Journal of Phytomedicine*, 3(3), 254–271.

ARIBI I., 2013 – Ethnobotanical study of medicinal plants from the Jijel region: anatomical, phytochemical study, and search for biological activities of two species. Master's thesis, Univ. HouariBoumediène (USTHB), Algiers, 69-71 p.

BENKHNIGUE O., ZIDANE L., FADLI M., ELYACOUBI H., ROCHDI A., and DOUIRA A., 2011 – Ethnobotanical study of medicinal plants in the Mechraa Bel Ksiri region (Gharb region of Morocco). Acta Bot Barc, 53: 191-216.

Benkeblia, Nourdine. (2005).*Antimicrobial activity of essential oil extracts of various onions (Allium cepa) and garlic (Allium sativum). LWT* - Food Science and Technology, 38(4), 349-355. DOI: 10.1016/j.lwt.2004.06.011

Block, E. (2010). Garlic and other Alliums: The lore and the science. *Royal Society of Chemistry*, 379–396.

Boutabia L., Telailia, S., Cheloufi, R., and Chefrour, A., 2011 – Medicinal flora of the Oum Ali forest massif (Zitouna-El Tarf Wilaya, Algeria). Inventory and ethnobotanical study. Annales of INRGREF, 15, Special Issue, 201-213.

Bouzid, A., Chadli, R., Bouzid, K. (2017). Étude ethnobotanique de la plante médicinale Arbutusunedo L. dans la région de Sidi Bel Abbés en Algérie occidentale.Phytothérapie, 15(6), 373-378.

Bussmann, R. W., & Sharon, D. (2006). Traditional medicinal plant use in Northern Peru: Tracking two thousand years of healing culture. *Journal of Ethnobiology and Ethnomedicine*, 2(1), 47.

CODOU-DAVID, 2012 – Humans and plants in the Sahara. Environment. 172-182.

Cronquist A., 1981 – An Integrated System of Classification of Flowering Plants. Copyright 1981 Columbia University Press. Used with permission of the publisher. 53 p.

Dansi A, Adjatin A, Vodouhè R, Adéoti K, Adoukonou-Sagbadja H, Faladé V, Yédomonhan H, Akoègninou A, Akpagana K. 2008. Biodiversity of Traditional Leafy Vegetables Consumed in Benin. National Library: Benin.

De Lannoy G., 2001 – Onion (Allium cepa L.). In: Raemaekers R.H., ed. Agriculture in Tropical Africa. Brussels: DGCI, 518-526.

Derridj, A., Ghemouri, G., Meddour, R., and Meddour-Sahar, O., 2010 – Ethnobotanical approach to medicinal plants in Kabylie (TiziOuzou Wilaya, Algeria). Acta Hort. 853, ISHS 2010, 425-434.

DIBONG S.D., and MPONDO E., 2015 – Inventory and characterization of medicinal plants in the Kambo and Longmayagui sub-watersheds (Douala, Cameroon). Journal of Animal & Plant Sciences, 25(3): 3898-3916.

Dougnon, T.V., Attakpa, E., Bankolé, H., Hounmanou, Y.M.G., Dèhou, R., Agbankpè, J., De Souza, M., Fabiyi, K., Gbaguidi, F., and Baba-Moussa, L., 2016 – Ethnobotanical study of medicinal plants used against a skin disease.

EL HAFIAN M., BENLAMDINI N., ELYACOUBI H., ZIDANE L., and ROCHDI A., 2014 – Floristic and ethnobotanical study of medicinal plants used in the Agadir-Ida-Outanane prefecture, Morocco. Journal of Applied Biosciences, 81: 7198 – 7213.

El Hilah, F., Ben Akka, F., Bengueddour, R., Rochdi, A., and Zidane, L., 2016 – Ethnobotanical study of medicinal plants used in the treatment of dermatological conditions in the central Moroccan plateau. Journal of Applied Biosciences, 98: 9252 – 9260.

EL RHAFFARI U. and ZAID A., 2002 – Practice of phytotherapy in southeastern Morocco (Tafilalet): An empirical knowledge for a renewed pharmacopoeia, Metz. IRD. SFE, Paris, 293-318 p.

Ernst, E. (2002). The risk-benefit profile of commonly used herbal therapies: Ginkgo, St John's Wort, Ginseng, Echinacea, Saw Palmetto, and Kava. *Annals of Internal Medicine*, 136(1), 42–53.

Ezejiofor, T. I. N., Ezejiofor, A. N., &Orisakwe, O. E. 2017. The therapeutic effects of onion and garlic extracts in cardiovascular and other diseases. *International Journal of Health Sciences and Research*, 7(8), 312–323.

Griffiths, G., Trueman, L., Crowther, T., Thomas, B., & Smith, B. 2002. Onions—a global benefit to health. *Phytotherapy Research*, 16(7), 603–615.

Gupta, R., & Kohli, K. 2019. Cosmetic benefits of onions: A natural remedy for skin and hair. *International Journal of Cosmetic Science*, 41(6), 521–531.

HAMMICHE V. and GHEYOUCHE R., 1988 – Medicinal and therapeutic plants. Part 1: Medicinal plants in modern life and their status in Algeria. Annales INA El Harrach-Algiers, 12(1), T2, 419-433.

Hmamouchi, M. (1999). *Les plantes médicinales et leurs applications au Maroc*. Editions Le Fennec.

Hess Halpern., 2018. - Découvrez les vertus de l'oignon .EditionAlpen Monaco, 18,98-100 P.

Kang, S. J., Lee, J. S., & Oh, S. Y. 2020. Application of onion extract for skin health improvement. *Journal of Dermatological Treatment*, 31(2), 120–126.

Law YY, Chiu HF, Lee HH, Shen YC, Venkatakrishnan K, Wang CK.,2016-Consumption of onion juice modulates oxidative stress and attenuates the risk of bone disorders in middle-aged and post-menopausal healthy subjects. 7:902–12. doi: 10.1039/C5FO01251A Food Funct.

Lee, J. W., Kim, S. Y., & Kang, S. H. (2022). Role of onion poultices in inflammation management: A systematic review. *Journal of Alternative and Complementary Medicine*, 28(5), 503–510.

Liguori, I., Russo, G., Curcio, F., et al. (2021). Oxidative stress, aging, and diseases. *Clinical Interventions in Aging*, 13, 757–772.

Malan D.F., 2016 – Quantitative Ethnobotany. Elements of reflection. Bachelor's degree in Botany and Phytotherapy. NANGUI ABROGOUA University, UFR SN. 23 p.

John McCallum., 2007 -Genome Mapping and Molecular Breeding in Plants, Volume 5 Vegetables C. Kole (Ed.) © Springer-Verlag Berlin Heidelberg .

NDJOUONDO G.P., NGENE J.P., NGOULE C.C., KIDIK POUKA M.K., NDJIB R.C.,

Ong, E. S., & Kim, Y. (2017). Medicinal plants and their phytochemicals for the prevention and treatment of diseases. *PhytochemistryReviews*, 16(6), 1031–1050.

OZENDA P. 1977- flore du sahara ,deuxieme édition (reveu et complétée) Edition du

74. centre national de la recherche .scientifique 15 , quai Anatol. France.

Pieroni, A., Quave, C. L., Giusti, M. E., & Pardo-de-Santayana, M. (2018). Ethnobotanical study of traditional knowledge and medicinal plants in rural communities of Europe. *Journal of Ethnopharmacology*, 217, 157–168

Roldán-Marín, E., Sánchez-Moreno, C., & de Ancos, B. (2009). Onion as a functional food: Antioxidant and antimicrobial properties. *Food Chemistry*, 112(4), 1135–1140.

ROUSSEAU J., 1961 – The field of ethnobotany. In: Journal of Tropical Agriculture and Applied Botany, vol. 8, no. 4-5, April-May 1961. pp. 93-101.

World Health Organization (WHO). (2004). *Guidelines on Safety Monitoring of Herbal Medicines in Pharmacovigilance Systems*. WHO Press.

Zhao, X., Zhang, Y., & Agarwal, R. 2021. Bioactive components in Allium vegetables and their mechanism of action in health promotion. *Food Science and Human Wellness*, 10(1), 57–69.

Zidorn, C. (2010). Plant constituents and traditional preparations as protective agents against cancer. *Planta Medica*, 76(11), 1103–1111.