***Review Article***

***KASNI*****(*CICHORIUM INTYBUS* LINN.): A SCIENTIFIC RECAP**

**Abstract**

Nature has been a source of therapeutic agents for thousands of years, and a large number of modern important medications have originally been obtained from natural sources. World Health Organization reported that 75% of the world population still depends on plant-based traditional medications for primary health care. *Cichorium intybus*, commonly known as chicory, is well known as a coffee substitute and traditionally utilized as home grown solution for various ailments since ancient times. This plant is widely used in folk medicine for treatment of gallstones, appetite loss, gout, jaundice, skin swellings, rheumatism and liver inflammation. It has been shown that it is having hypoglycemic, hypolipidemic, hepatoprotective, gastroprotective, anti-inflammatory, analgesic, antioxidant, antiallergic, antimicrobial and many other pharmacological effects. The whole plant of *Cichorium* contains a number of bioactive medicinally important compounds such as inulin, esculin, oligofructose, cichoric acid, phenolic acids, caffeic acid, caffeoylquinic acid, volatile compounds (monoterpenes and sesquiterpenes), coumarins, lactones, flavonoids etc. However literatures shows that significant number of these constituents has not been fully investigated for their pharmacological potential. This paper provided detailed overview of uses, types, characteristics, pharmacological activities and bioactive constitute of Kasani. The aim of this review paper is to give an overview of Kasni and its socially imperative medicinal uses in Unani perspective on the basis of current scientific studies and evidences.

**Keywords**: Kasni, Cichory, Coffee substitute, Unani, Therapeutic action, Traditional use.

**Introduction:**

*Cichorium intybus* L. also known as chicory or *Kasni* is well-known medicinal & culinary herb with various biological activities. From ancient time it is using in traditional system of medicine and as a coffee substitute & vegetable crop and occasionally for animal forage also.Its leaves, flowers, seeds, and roots have been customarily utilized as home grown solution for various ailments ranging from wounds to diabetes since ancient times1,2. Kasni is said to be suitable for all kinds of temperaments of the liver and an excellent tonic for the liver & digestive tract hence using as Hepatoprotective & as cleansing of urinary tract for a long time.3,4 The Kasni has been extensively used by unani reknowned physicians as *Mufatteh Sudud* (Deobstruent), *Musaffi Dam* (Blood Purifier), *Muqawwi Kabid* (Hepatic Tonic), *Muqawwi Meda* (Tonic for Stomach), *Waram i Meda* (Gastritis) and *Mushil* (Mild Laxative) in the treatment of *Amraz i Kabid* (Liver Disorders), *Ghisyan* (Nausea and Vomiting), and *Amraz i Kulliya* (Kidney Diseases).5 The whole plant of *Cichorium* contains a number of medicinally important compounds such as inulin, esculin, volatile compounds (monoterpenes and sesquiterpenes), coumarins, flavonoids and vitamins.2,9 Many therapeutic uses like anti-diabetic, anti-inflammatory, antioxidant, hepatoprotective, gastroprotective, hypolipidemic, analgesic, immunological, antimicrobial, wound healing and various other ailments have been proved by the recent scientific pharmacological studies.1,2 Eventhough *Kasni* (Cichorium intybus) has various medicinal uses but many of its constituents have not been fully explored for their pharmacological potential hence, further research is necessary to gain the better understanding of the phytochemicals and mechanism of their action against various diseases and scientifically validation with experimental and clinical study.  The aim of this paper is to give an overview of Kasni and its socially imperative medicinal uses in Unani perspective on the basis of current scientific studies and evidences.

**Plant profile**

Taxonomic classification:

Kingdom: Plantae

Subkingdom: Tracheobionta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Asteridae

Order: Asterales

Family: Asteraceae ⁄ Compositae

Genus: Cichorium L.

Species: Cichorium intybus

**Botanical name:** *Cichorium intybus* Linn.3,4,5,6,7

****

**Figure 1: Flowers and leaves of *kasni (Cichorium intybus)***

**Vernaculars:**

The name of the common chicory plant (Cichorium intybus L.) most probably derives from several Greek and Latin words. Cichorium means field and intybus is came from Arabic word handiba which is partly derived from the Greek “to cut”, because of the leaves, and partly from the Latin word tubus meaning “a tube” to indicate the hollow stem which describes the structure of the stem. Its name kasni has been derived from one of the cities of Samarqand named Kasan where it is found abundantly.5,8

Common names:

* Greek: *Kichora*
* Arabic: *Indyba, Hindubar* shikoryah, hidaba, hindaba bariah;5,8
* Chinese: ju ju;
* Persian: *Kasni.*
* Urdu: *Kasani*
* Hindi: *Kashini, kasini*8

•

* English: Wild Chicory, Chicory, Endive3,4,6,7 Succory coffee chicory
* Spanish: achicoria de Bruselas, achicoria de café, achicoria de raíz;
* Italian: cicoria, radicchio
* French endive, succor, witloof
* German: Chicorée, Fleischkraut, Kaffeezichorie, Salatzichorie, Wegwarte, Wurzelzichorie8
* Sanskrit: *Kasani*5

**Description:**

**Habitat:**

It is native to temperate parts of the world,4 commonly occurs in North West India, Tamil Nadu and Andhra Pradesh8 It is cultivated in Bihar, Punjab, Assam, Gujarat, Orissa, Kerala etc. upto 1800 m elevation.Other countries which produce chicory are Baluchistan, Belgium, Europe, France, Germany, Persia, Netherlands, Switzerland, South Africa Waziristan, West Asia, United Kingdom.5,6,7,10

**Morphology (*Mahiyat):***

It is an erect usually rough more or less glandular perennial herb, with milky juice. Height is 30-90 cm. Roots are dirty brownish, yellow outside, white within bark thin.3,4,8,11,12 There are two varieties of *kasni* plant wild and cultivated variety. Both the varieties bear broad and thin leaves.5 The cultivated variety is called as Bustani, Hindba e Shami-o-Hashmi-o-Balaqhi: Its leaves are rough & equal to the size of *kahu* leaves leaves *,* and slightly bitter in taste,8 broadly oblong crowded at the base forming rosette arranged spirally on the stem; lower leaves pinnately divided, upper leaves entire, small, alternate, light, dark green or very dark greenwith variable shape.3,4,5,6,7

Flowers are bigger and usually bright blue in colour blue fading to white rarely its white, all ligulate; truncate 5-toothed. Seeds are small, blackish & bitter in taste.3,4,13 Wild variety is called as Dashti, Hindba e Baqhal: Its Leaves are wider than cultivated variety and flowers are smaller. flowers are bluish / purple and taste is very bitter. This variety is also called as Hindba e Baqhal.5

**Temperament *(Mizaj):***

Fresh (Green) kasni leaves are cold first degree wet last phase of first degree and bustani (cultivated) is colder and wet than is burri (wild) type because it has more moisture content. Dry cichory is dry in first degree inclined towards dryness due to less moisture content. The temperament of kasni varies with environmental condition. Cichorium which grows in hot tempered region is inclined towards heat and its roughness increases due to this its bitterness also increase. Its bitterness gets intensified and inclines towards heat in summer season.5

**Separately;**

*Barg e ksni sabz* cold and wet,

*Beekhe kasni* hot mild and dry (moderate).

*Tukhme kasni* cold and dry (mild).

**Overall;**

* *Barid Yabis 2* (Cold Dry 2)
* *Barid Yabis 1* (Cold Dry 1)5,6,

**Parts used:**

 Leaves, roots and seeds, flowers, whole plant. Fresh and dried material is the most commonly used for medicinal purposes5,6, 13, 14,15.

**Action *(Af’al):***

*The whole plant is: Mufatteh sudda, mudir baul, qabiz, muqawwi qalb musakkin safra wa khoon,dafia’e hummiyate safrawia,muhallili warami meda, jigar wa tihal, muqawwi meda wa jigar and mushtahi.5,15,16,17,18*

The main action of Tukhm

Kasni ishepatoactive in various diseases e.g. Yaraqan

(jaundice), Sudda Jigar(obstructive disorder of liver),

Humma (fever) due to Safra (bile); [4] Leaves are

musakkin-i-hararat(coolant of heat) and Musakkin-i-

Tishnagi(relieves thrust); Chakida Kasni is useful for

Warm-i-Jigar (hepatitis), Warm-i-Rehm(metritis) and

Warm-i-Tihal(inflammation of spleen)

**Uses *(Iste’mal):***

* *Amraz dimagh: Dard sar.*
* *Amraz chashm: Warm chashm.*
* *Amraz mafasil: Nuqris.*
* *Amraz jild: Surkhbadah*
* *Amraz meda wa ama: Zof meda, iltehab meda and also use for tanqiya meda.*
* *Amraz qalb: Zof qalb, khafqan.*
* *Amraz jigar wa tihal: useful in waram i jigar, waram i rahim & waram i tihal, Iltehab jigar, zofe tihal, also effective in istisqaand yarqan. and in suddah of jigar & tihal and dard jigar due to hararat or baroodat,*
* *Amraz alat baul: Zof gurda also use for tanqiya majari baul.*
* *Others: Suddah, humma,nafsuddam/spitting of blood and also effective in scorpion bite.5,6,15,16,17*

**Actions and uses:**

Endive is less effective for reducing hotness and producing nutrition but more effective than lettuce as deobstruent in hepatic obstructions. Wild Kasni is more useful for stomach diseases than the cultivated variety. Bitter cultivated variety is considered more useful for the liver. The medicinal properties of the plant is mainly found on the layers of leaves that’s why its better not to wash.

Root is Aperient, Bitter, Cholagogue, Deobstruent, Diuretic, Emmenagogue, Febrifuge, Resolvent. Seed is Appetizer, Carminative, Demulcent and Tonic. Leaves are resolvant, anti inflammatory and analgesic. etc.

* It has properties of antihistaminic, appetizer, carminative, digestive,stomachic, and liver tonic. It is useful in anorexia, dyspepsia, flatulence, vomiting, diarrhoea, jaundice, and colic.
* It also possesses properties of alterative, resolvant, anti inflammatory and analgesic. It is helpful in hepatomegaly,spleenomegaly, rheumatism and gout. It is also indicated in Metritis, Salpingitis and Cervicitis. Leaves are used in Dropsy, Gout, Rheumatism, Warts, Headache, Ophthalmia, Arthritis, Stomach Inflammation and Irritation.
* It also possesses antimicrobial activity against organisms causing gingival inflammation and also purifies the blood.
* Its leaves acts as febrifuge used in fever and thirst
* It is used in headache as it is a brain tonic.
* It also has properties of cordial, depurative, emmenagogue, diuretic, alexiteric, and cholegogue.
* Its roasted roots are well known for use in coffee mixtures and as a coffee substitute.4,6,7,11,12,13,18

**Important Formulations**

*Ikseer-e- Jigar, Ma-ul- Hayat, Majoon Dabeed-ul-Ward, Sharbat Bazoori Barid, Sharbat Bazoori Mo’atadil and Sharbat Deenar.*6,15,16,17

***Muzir:***

*Cough*

***Musleh:***

* *Shakkar safed,*
* *Sharbat banafsha.*5,15,16

***Badal:***

*Tukhm Kasoos, Aab barg khatmi tazah wa barg khubbazi taza.*5,15,17

**Doses:**

* *Beekh kasni (Root): 7 g*
* *Tukhm kasni ( Seeds): Up to 5-10 g*
* *Aab kasni sabz murawaq (Fresh juice): Up to 40-50 ml.5,15,16,17*

**Chemical constituents:**

AlthoughC. intybus presents a little-investigated plant in terms of phytochemistry and pharmacology, all morphological parts of chicory (roots, herb, flowers and leaves) contain a large number of various chemical compounds. Approximately, 100 individual compounds have been isolated and identified from this plant. Cichoric acid was found to be the main component of the methanolic extract from C. intybus L.

**Phytochemical analysis** showed that the different parts Cichorium intybus contained Volatile oil, gum, choline phytosterols, mucus, tannins saponins,, copper, latex, lipids, proteins, P and K vitamins, amino acids, β-sitosterol, malic acid, oxalic acid, shikimic acid, quinic acid, succinic acid, alkaloids, steroids, terpenoids, insulin chicorin, inulin, esculetin, esculin, coumarins, hydroxycoumarins, umbelliferone, scopoletin, sesquiterpene, lactones, flavones, glycosides beta sitosterolcaffeic acid derivatives, quercetin, fructo-oligosaccharides, polyphenol. These compounds are present in various amounts, which depend on both the part of the plant and the origin of the chicory.

**Roots** of chicory contain amongst others, sap, sesquiterpene lactones, such as e.g., germacranolides (lactucin, lactucopicrin and 8-desoxylactucin) as well as guajanolides (cycriozides B and C, sonchuzide C), which gives a bitter taste. Taraxane-type triterpenes is also found here, such as taraxasterol, phenolic acids (e.g., chlorogenic, isochlorogenic, neochlorogenic, caffeic and cichoric acids). The root contains 0.01–0.02% of the bitter intybin glycoside, 9–15% reducing sugars, and between 40–60% of inulin (as the plant energy store); however, no starch is present in chicory roots. Also worth mentioning are: intybinene, a common component of the coffee substitutes, pectins, vitamins B and C.

**Leaves** contain inulin, A, B1, B2 and C vitamins, Ca, K, Mg, Na, Fe, Cu, Mn, Zn, phenolic compounds, amongst others. The aerial parts and roots are also a source of essential oils, too.

**Flowers** contain various sugars, coumarin derivatives (e.g., umbelliferone, esculin, cicorin (esculetin 7-O-glucoside, scopoletin), silicic acid, taraxosterol, valeric acid, flavonoids (hyperoside), etheric oils and anthocyanins.1,4,6,8,9,18,19,20,21

**Toxicity and side effects:**

Chicory has been used since ancient time and considered safe drug for human use. No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages. There is a slight potential for sensitization via skin contact with the drug. About 28 days study on rats confirmed that there was no extract-related mortality or any other signs of toxicological significance of orally administered CRE. Hence, Cichorium intybus was considered safe for human use. The leaves extract did not show any toxic effect at acute and subchronic toxicity level and was found to be free of any cytotoxicity towards rats. A placebo-controlled, double-blind trial on chicory root in patients with osteoarthritis reported that it was well tolerated; only one patient treated with the highest dose of chicory discontinued the treatment due to adverse effects. Only two reported cases are there where fresh chicory roots induced an allergic reaction topically. The majority of reactions occurred in response to leaves (raw and cooked) after skin contact or inhalation. Few mild reactions were noted caused by the inhalation of dried chicory roots and consumption of inulin-containing products and one mild reaction by intravenous inulin administration during a standard renal function test. It is not yet clear exactly how allergic reactions to chicory are triggered. Due to ambiguity, the general advice is that people with allergies or occupational exposure to Asteraceae family members, people with birch-pollen allergies, and people with atopic dermatitis should be cautious when coming into contact or consuming chicory- and inulin-containing foods.

Chicory extract is generally regarded as safe by FDA and has been included in the ‘Everything Added to food in the United States’ (EAFUS) list. However, the edibility of the chicory seeds and the possible toxicity has yet to be fully established. 22,23,24

**Pharmacological studies:**

**Anti microbial activity:**

Nandagopal S *et al* reported that root extract of *Cichorium intybus* possess potent antimicrobial activity and suggesting that *cichory* root extracts contains the effective active constituents responsible for eliminating the bacterial pathogens.3

Kumar S G *et al* reported that *cichorium* leaf has very good sensitivity against both gram positive and gram negative organisms and fungi possibly due to presence of glycosides, steroids, alkaloids, terpenoids and carbohydrates.25

Verma R *et al* concluded that plant fractions have great potential as antibacterial compound against E. Coli and P. Aeruginosa due to presence of potent compounds such as inulin, caumarins, sesquiterpene, lactones, flavonoids etc. and can be used in the treatment of infectious diseases caused by above resistant micro-organisms.1

It is interesting to note that chicory was among the plants with potential against SARS-CoV-2. However, further studies, including in vitro and in vivo studies, are needed to confirm this antiviral property of chicory.3,26

**Wound healing activity:**

Wound healing activity of the aerial parts, leaves, and roots as well as ashes of either leaves or roots were studied in rats, and concluded that Methanolic extract of Cichorium intybus roots possess potent wound healing activity and β-sitosterol was determined as the active compound responsible from the activity25,26 .

**Anti oxidant activity:**

In vitro studies by Mehmood N *et al* reported that *Cichorium intybus* being a good source of phenolic compound exhibit antioxidant activity.21

**Immune Mediated Activity:**

A study by Karimi MH *et al* on immune mediated disorder stated that *C. intybus* extract at higher concentrations inhibited T cell stimulating activity of dendritic cells whereas at lower concentrations can modulate cytokine secretion toward a Th1 pattern.22 Oxidative stress plays a key role in the lifestyle disorders such as type 2 diabetes mellitus, obesity, metabolic syndrome, and coronary artery disease.21

**Nephroprotective activity:**

A study carried out by Khaliq T *et al* concluded that aqueous extract of *C. intybus* roots possesses nephroprotective potential which might due to the inherent antioxidant and free radical scavenging principles contained in *C. intybus* plant. The phytochemical analysis of *C. intybus* revealed the presence of terpenoids, glycosides, saponins, flavonoids, phenols, steroids and ascorbic acid. Flavonoids and phenols are considered to provide nephroprotection by their antioxidant potential.24

**Multi therapeutic activity:**

A pilot studies on multi therapeutic activity of*C. Intybus*byChandra K *et al* reported that it was beneficial in osteoarthritis and has antithrombotic and anti-inflammatory effect and is beneficial in non alcoholic fatty liver disease and experimental studies in animal models it shows that it has hepatoprotective, anti-oxidative, antithrombotic and antidiabetic properties.23,27,28,29

**Culinary Activity:**

The usage of chicory root as coffee substitute dates back to the 15th century. Inulin, a polysaccharide present in roots, is converted during roasting into fructose and caramel, hence contributing to the dried roots’ dark hue and a pleasant taste with a bitter tinge, hence making it handy as a beer coloring. Young leaves of the wild chicory variety may be prepared for salads, alone or with other leafy plants. Young leaves can also be ground, mixed with salt and stored for several months, for use in soups and sauces. Chicory roots are also used to prepare drinks. The most popular are coffee surrogate. Koumiss (a drink) is an interesting example prepared traditionally by nomadic populations of Central Asia through fermenting mare milk. 2, 8, 23

**Conclusion:**

C. intybus is a coffee substitute and having great potential. It certainly does deserve a wider use in medical prophylaxis and phytotherapy. Individual parts, e.g., leaves or flowers, both in fresh and dried form, can be a valuable addition to daily diet. The documented indigenous knowledge relating to various medicinal uses of chicory has been supported by phytochemical isolation and investigations of its biological activities. The multipurpose effects of C. intybus extracts may be a promising alternative source for the pharmaceutical industry.

**Reference:**

1. Verma R, Rawat A, Ganie SA, Agnihotri RK, Sharma R, Mahajan S *et al.* In vitro antibacterial activity of Cichorium intybus against some pathogenic bacteria. *British Journal of Pharmaceutical Research* 2013; 3(4): 767- 75.
2. WenYing G., Li J.-G. Chicory Seeds: A Potential Source of Nutrition for Food and Feed. Journal of Animal & Plant Sciences, 2012. Vol. 13, Issue 2: 1736-1746
3. Nandagopal S, Kumari BDR. Phytochemical and antibacterial studies of Cichory (Cichorium intybus L.)- A multipurpose medicinal plant. Advan Biol Res 2007; 1(1-2): 17-21.
4. Evan WC, Trease and Evan pharmacognocy. 15th ed. Reed Elsevier India (P) Ltd; 2005: 228, 320, 472, 480.
5. Baitar I. Al Jameul Mufredat Wa Al Advia Wa Al Aghzia. Vol- III, Vol- IV. New Delhi: CCRUM; YNM: Vol- IV: 442- 43.
6. Anonymus. The wealth of India. Vol- III. New Delhi: CSIR; 2003: 555- 61.
7. Nadkarni KM. Indian Meteria Medica. Vol- I, II. Mumbai: Popular Prakashan (P) Ltd; 2010: Vol- I 313- 14, Vol- II 283.
8. Saeed M., Abd El-Hack M.E., Alagawany M., Arain M.A., Arif M., Mirza M.A., Naveed M., Chao S., Sarwar M., Sayab M. Chicory (Cichorium Intybus) Herb: Chemical Composition, Pharmacology, Nutritional and Healthical Applications. *Int. J. Pharmacol.*2017;13:351–360. doi: 10.3923/ijp.2017.351.360. [[CrossRef](https://doi.org/10.3923/ijp.2017.351.360%22%20%5Ct%20%22_blank)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Int.+J.+Pharmacol.&title=Chicory+(Cichorium+Intybus)+Herb:+Chemical+Composition,+Pharmacology,+Nutritional+and+Healthical+Applications&author=M.+Saeed&author=M.E.+Abd+El-Hack&author=M.+Alagawany&author=M.A.+Arain&author=M.+Arif&volume=13&publication_year=2017&pages=351-360&doi=10.3923/ijp.2017.351.360&)]
9. Haghi G., Arshi R., Ghazian F., Hosseini H. Chemical Composition of Essential Oil of Aerial Parts of Cichorium Intybus L. from Iran. *J. Essent. Oil Bear. Plants.*2012;15:213–216. doi: 10.1080/0972060X.2012.10644038.
10. Anonymus. Standardisation of single drugs of Unani Medicine. Part I. New Delhi: CCRUM; 1987: 156-61.
11. Kritikar KR, Basu BD. Indian medicinal plants 2nd ed. Vol- II. Uttaranchal: Oriental Press; 2006: Vol II 1433- 35.
12. Lindley J. Flora medica. New Delhi: Ajay Book service; 2001: 41, 470, 511.
13. Prajapati ND, Purohit SS, Sharma AK, Kumar T. A handbook of medicinal plants, A complete source book. India: Agrobios; 2009: 139.
14. Khare CP. Indian medicinal plants. New Delhi: Sptinger India (P) Ltd; 2007: 146-47.
15. Kabeeruddin M. Ilmul Advia Nafeesi. New Delhi: Ejaz Publishing House 2007: 124- 25.
16. Ghani N. Khazainul Advia. New Delhi: Idarae Kitabus Shifa 2010; 997- 98.
17. Kabeeruddin H. Makhzanul Mufradat wa Khawasul Advia. New Delhi: Ejaz Publishing House 2007: 404-05.
18. Chatterjee A, Pakrashi SC. The treatise of Indian medicinal plants. Vol- V. New Delhi: NISCIR; 2010: Vol- V 156-57.
19. Jangra S.S., Madan V.K. Proximate, Mineral and Chemical Composition of Different Parts of Chicory (Cichorium Intybus L.) *J. Pharmacogn. Phytochem.*2018;7:3311–3315.
20. Rastogi RP, Mehrotra BN. Compendium of Indian medicinal plants. Vol- IV. New Delhi: CDRI; 2002: 83, 87- 95.
21. Mehmood N, Zubair M, Rizwan K, Rasool N, Shahid M, Ahmed VU. Antioxidant antibacterial and phytochemical analysis of *Cichorium intybus* seeds extracts and various organic fractions. *IJPR* 2012; 11(4): 1145- 53.
22. Karimi MH, Ebrahimnezad S, Namayandeh M, Amirghofran Z. The effect of *Cichorium intybus* extract on the maturation and activity of dendritic cells. DARU Journal of Pharmaceutical Sciences 2014, 22: 28.
23. Moreno DA, [C García-Viguera](https://scholar.google.co.in/citations?user=fP611sUAAAAJ&hl=en&oi=sra), M Bodroža-Solarov [Chicory (Cichorium intybus L.) as a food ingredient–Nutritional composition, bioactivity, safety, and health claims: A review](https://www.sciencedirect.com/science/article/pii/S0308814620315387), Food chemistry Elsevier [Volume 336](https://www.sciencedirect.com/journal/food-chemistry/vol/336/suppl/C), 30 January 2021, 127676
24. Khaliq T, Mumtaz F, Rehman Z, Javed I, Iftikhar A. Nephroprotective potential of *Rosa damascena* mill flowers, *Cichorium intybus* Linn roots and their mixtures on Gentamicin-induced toxicity in albino rabbits. Pak Vet J 2015; 35(1): 43- 47.
25. Kumar S.G, Riyazullah S.M. Rajesh B, Santosh. Pharmacological Profiles on Cichorium intybus. International Research Journal of Pharmacy. 2011; 2 (11), 85- 87.
26. Liu H., Wang Q., Liu Y., Chen G., Cui J. Antimicrobial and Antioxidant Activities of Cichorium Intybus Root Extract Using Orthogonal Matrix Design. *J. Food Sci.*2013;78:M258–M263. doi: 10.1111/1750-3841.12040
27. Chandra K, Jain SK. Therapeutic potential of Cichorium intybus in lifestyle disorders: A review. Asian J Pharm Clin Res 2016; Vol- 9 (3): 20-25.
28. Pushparaj PN, Low HK, Manikandan J, Tan BK, Tan CH. Anti-diabetic effects of Cichorium intybus in streptozotocin- induced diabetic rats. J Ethnopharmacol. 2007; 111 (2): 430- 4.
29. Epure A., Pârvu A.E., Vlase L., Benedec D., Hanganu D., Gheldiu A.-M., Toma V.A., Oniga I. Phytochemical Profile, Antioxidant, Cardioprotective and Nephroprotective Activity of Romanian Chicory Extract. *Plants.*2021;10:64. doi: 10.3390/plants10010064. 25