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BS Thorat
Ph.D. (Scholar), Dr. BSKKV, Dapoli, Maharashtra, India

SM Raut
Senior Research Assistant (SRA), Dr. BSKKV, Dapoli, Maharashtra, India

Correspondence
BS Thorat
Ph. D. (Scholar), Dr. BSKKV, Dapoli, Maharashtra, India

Chicory the supplementary medicinal herb for human diet

BS Thorat and SM Raut

Abstract
Common chicory (*Cichorium intybus*) is a somewhat woody, perennial herbaceous plant of the dandelion family Asteraceae, usually with bright blue flowers, rarely white or pink. This is also known as blue daisy, blue dandelion, blue sailors, blue weed, bunk, coffee weed, cornflower, hendibeh, horseweed, ragged sailors, succory, wild bachelor's buttons, and wild endive which is native in Europe, and is now common in North America, China, and Australia, where it has become widely naturalized. Many varieties are cultivated for salad leaves, chicons (blanched buds), or roots (var. *sativum*), which are baked, ground, and used as a coffee substitute and additive. Common chicory contains carbohydrtes (4.7 g), dietary fiber (4 g), protein (1.7 g), sugars (0.7 g) and fat (0.3 g). It is also contains various vitamins like, Vitamin A (36%), Thiamine (5%), Riboflavin (8%), Niacin (3%), Pantothenic acid (23%), Vitamin B6 (8%), Folate (28%), Vitamin C (29%), Vitamin E (15%) and Vitamin K (283%). Common chicory contains different minerals *viz*., Calcium (10%), Iron (7%), Magnesium (8%), Manganese (20%), Phosphorus (7%), Potassium (9%), Sodium (3%) and Zinc (4%). It is also grown as a forage crop for livestock. Chicory is highly digestible for ruminants and has a low fiber concentration. Chicory roots are an "excellent substitute for oats" for horses due to their protein and fat content. Chicory contains a low quantity of reduced tannins that may increase protein utilization efficiency in ruminants. Some tannins reduce intestinal parasites. Excessively large quantities of tannins, however, could bind with and precipitate proteins, resulting in low digestibility and nutrient reduction. It is variously used as a tonic and as a treatment for gallstones, gastroenteritis, sinus problems, and cuts and bruises. Chicory contains inulin, which may help humans with weight loss, constipation, improving bowel function, and general health. It also increases absorption of calcium and other minerals in humans.

Keywords: *Cichorium intybus*, horseweed, carbohydrtes, vitamin, protein, dietary fiber

1. Introduction
Common chicory (*Cichorium intybus*) is a somewhat woody, perennial herbaceous plant of the dandelion family Asteraceae (IUCN), usually with bright blue flowers, rarely white or pink. This is also known as blue daisy, blue dandelion, blue sailors, blue weed, bunk, coffee weed, cornflower, hendibeh, horseweed, ragged sailors, succory, wild bachelor's buttons, and wild endive (Agronomy, 2005) [1]. Many varieties are cultivated for salad leaves, chicons (blanched buds), or roots (var. *sativum*), which are baked, ground, and used as a coffee substitute and additive (Leach, 2004) [14]. It lives as a wild plant on roadsides in its native Europe, and is now common in North America, China, and Australia, where it has become widely naturalized (John *et. al*. 2013) [11]. "Chicory" is also the common name in the United States for curly endive (*Cichoriumendivia*); these two closely related species are often confused. It is also grown as a forage crop for livestock (Schreurs *et. al*. 2002) [18]. Chicory is highly digestible for ruminants and has a low fiber concentration (Blair, 2011) [6]. Chicory roots are an "excellent substitute for oats" for horses due to their protein and fat content (Heckendorn *et. al*. 2007) [10] (Kidane *et. al*. 2010) [13]. Chicory contains a low quantity of reduced tanninsthat may increase protein utilization efficiency in ruminants (Wilson, 2004) [21]. Some tannins reduce intestinal parasites (Athanasiadou *et. al*. 2007) [5]. Excessively large quantities of tannins, however, could bind with and precipitate proteins, resulting in low digestibility and nutrient reduction (Harsh Pal Bais, 2001) [9]. Root chicory contains volatile oils (Zafar and Mujahid, 1998) [22], similar to those found in plants in the related genus *Tanacetum* which includes tansy, and is similarly effective at eliminating intestinal worms (Coudray *et. al*. 1997) [7]. All parts of the plant contain these volatile oils (Abrams *et. al*. 2005) [2] with the majority of the toxic components concentrated in the plant's root (Roberfroid, 2007) [17].

It is variously used as a tonic and as a treatment for gallstones, gastroenteris, sinus problems, and cuts And bruises (Madrigal, 1999) [15] (Ahmed *et. al*. 2008) [4]. Chicory contains inulin, which may help humans with weight loss, constipation, improving bowel function, and general health (Joseph, 2008) [12]. In rats, it may increase calcium absorption and bone mineral density (Roberfroid *et. al*. 2002) [16] (Tabassum *et. al*. 2010) [19] (Hassan and Yousef, 2010) [8]. It also increases absorption of calcium and other minerals in humans (Tzamaloukas, *et. al*. 2006) [20] (Abrams *et. al*. 2007) [3].

2. Botanical Descriptions

Botanically chicory (*Cichorium intybus*) (IUCN) is an annual herb. When flowering, chicory has a tough, grooved, and more or less hairy stem, from 30 to 100 cm (10 to 40 in) tall. The leaves are stalked, lanceolate and unlobed. The flower heads are 2 to 4 cm (¼ to 1½ inches) wide, and usually light purple or lavender (see picture) and it has been described as light blue, rarely white or pink. Of the two rows of involucral bracts, the inner is longer and erect; the outer is shorter and spreading. It flowers from July until October. The achenes have no pappus (feathery hairs), but do have toothed scales on top.

Fig 1: Plant of Chicory

Fig 2: Flower bud of Chicory

Fig 3: Chicory Coffee Powder

Table 1. Various Nutritional value in Chicory.

S. No	Nutritional value per 100 g	
1.	**Energy**	96 kJ (23 kcal)
2.	**Carbohydrates**	4.7 g
3.	**Sugars**	0.7 g
4.	**Dietary fiber**	4 g
5.	**Fat**	0.3 g
6.	**Protein**	1.7 g
7.	**Vitamins**	
	Vitamin A equiv. beta-Carotene lutein zeaxanthin	(36%) or 286 µg (32%) or 3430 µg 10300 µg
	Thiamine (B1)	(5%) or 0.06 mg
	Riboflavin (B2)	(8%) or 0.1 mg
	Niacin (B3)	(3%) or 0.5 mg
	Pantothenic acid (B5)	(23%) or 1.159 mg
	Vitamin B6	(8%) or 0.105 mg
	Folate (B9)	(28%) or 110 µg
	Vitamin C	(29%) or 24 mg
	Vitamin E	(15%) or 2.26 mg
	Vitamin K	(283%) or 297.6 µg
8.	**Minerals**	
	Calcium	(10%) or 100 mg
	Iron	(7%) or 0.9 mg
	Magnesium	(8%) or 30 mg
	Manganese	(20%) or 0.429 mg
	Phosphorus	(7%) or 47 mg
	Potassium	(9%) or 420 mg
	Sodium	(3%) or 45 mg
	Zinc	(4%) or 0.42 mg
	Units *µg = micrograms *mg = milligrams *IU = International units	

Fig 4: Roots of Chicory

Fig 5: Inflorescence of Chicory

3. Medicinal uses of Chicory

Chicory is a plant. Its roots and dried, above-ground parts are used to make medicine. It is used for loss of appetite, upset stomach, constipation, liver and gallbladder disorders, cancer, and rapid heartbeat. In foods, chicory leaves are often eaten like celery, and the roots and leaf buds are boiled and eaten.

These medicinal uses of chicory are as follows which are explained by many scientists.

1. Digestive Support

The most common benefit of chicory is of digestion.

There are friendly bacteria or symbiotic bacteria such as lactobacillus and bifidobacteria in our intestine, which aid healthy digestion. These bacteria inhibit pathogens like candida and support our immune function (Blair, 2011) [6].

Chicory also contains inulin, a powerful probiotic and soluble fibre. Inulin is present in all the plants, but chicory contains the highest amount of inulin. Inulin has the power to reduce the body's acidity and can be helpful to prevent digestive problems like acid reflux and indigestion. Studies have shown that chicory root increases the flow of bile, and this helps to break down fat, thus helping in digestion (Harsh Pal Bais, 2001) [9]. Chicory root extracts help to reduce digestive discomfort caused due to intestinal gastric problems.

2. Antioxidant Activity

All plants and herbs contain compounds called as phenols, and most of the phenols found in plants have anti-oxidant properties. Chicory root is rich in polyphenols that make it a good anti-oxidant (Madrigal, 1999) [15].

Being an anti-oxidant, it helps to remove toxins from the body, keeping the body clean and free from harmful substances (Ahmed *et. al*. 2008) [4].

3. Fights against Harmful Organisms

Chicory root extracts are found to have anti-microbial and anti-fungal properties too, due to which it has the power to fight against harmful bacteria (Athanasiadou *et. al*. 2007) [5].

4. Good for the Liver

Kidneys and liver act as the major detoxifying channels in our body. The health benefits of chicory root include increased detoxification by stimulating diuresis and bile secretion. Ancient Egyptians have been known to be using chicory to purify liver and blood. Chicory has been used as a medicine for centuries, especially for detoxifying the liver (Athanasiadou *et. al*. 2007) [5]. The studies conducted by the zoology department in Egypt have concluded that chicory has a promising role for halting oxidative stress and liver injury in certain situations.

Dried chicory roots can be used to prevent liver damage by treating jaundice.It can also be used in the treatment of stones in gall and the liver. This is done by increasing the secretion of bile from the liver and gallbladder, thus promoting urination and excretion of harmful substances (Coudray *et. al*. 1997) [7].

5. Heart Disease

Chicory root contains inulin, which, along with its digestive benefits, also helps to reduce the amount of bad cholesterol in the body. LDL cholesterol is the bad cholesterol that causes blockage of atherosclerosis. The increase in the levels of LDL increases the risk of heart attacks and strokes. Inulin present in chicory also helps to lower blood pressure that occurs due to an increase in LDL cholesterol (Madrigal, 1999) [15].

6. Reduces Arthritis Pain

Chicory root can be an effective remedy for joint problems like arthritis and rheumatism. Various studies have shown that it contains anti-inflammatory properties, due to which it can reduce the pain caused by osteoarthritis. It can also be used as a general anti-inflammatory agent for aches, muscle pain and joint soreness (Athanasiadou *et. al*. 2007) [5].

7. Weight Loss

Chicory contains inulin and oligo-fructose, which can be added to the diet to lose weight. It contains the highest concentration of inulin in the entire plant kingdom. Inulin, a soluble fibre, acts as an appetite suppressant. Inulin can give you a feeling of fullness, without raising blood sugar levels or increasing calories. These properties have created interest in inulin's possible use for weight loss (Joseph, 2008) [12].

The presence of fructo-oligosaccharides in the plant encourages the development of beneficial bacteria in the intestine that help to restore the balance of microorganisms in the intestine, thereby leading to the proper functioning of the digestive system. The proper functioning of the digestive system is the key factor in all weight loss diets (Joseph, 2008) [12].

8. Constipation

Chicory root is a rich source of vitamin C, vitamin K, choline, and beta-carotene. It contains soluble dietary fiber, called inulin, which is useful for preventing intestinal disorders and is said to be a great remedy for constipation and other digestive disorders. Inulin promotes the growth of beneficial bacteria in the intestine, thereby promoting digestion and preventing constipation (Joseph, 2008) [12].

9. Immune System

Chicory has anti-bacterial properties and a number of other benefits that make it a powerful immune booster. It acts against various harmful bacteria, and the polyphenol compounds present in chicory act as anti-oxidants (Tzamaloukas *et. al*. 2006) [20]. These phenolic compounds are also believed to have the power to prevent cancer, especially breast and colorectal cancers (Abrams *et. al*. 2007) [3].

10. Anxiety and Stress

Chicory is used as a natural sedative for the nervous system, and can reduce anxiety and ease the mind. This relieves the stress and dangerous effects it can have on the body. Studies have shown that chicory extract acts as a sedative and an anti-inflammatory agent for the nervous system. For people suffering from nervous system disorders, this can reduce inflammation thereby relieving pain (Abrams *et. al*. 2007) [3].

Chicory root extract can also be used as a sleep aid due to its sedative quality, and is a much better natural alternative to sleeping pills. Relieving stress and anxiety can be helpful to reduce chances of heart disease, hormonal imbalance, sleeplessness and premature aging (Tzamaloukas, *et. al*. 2006) [20].

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