

## A DRUG: *URTICA DIOICA*

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### ABSTRACT

Most of us think of weeds as annoying shrubs that ruin the aesthetics of a yard or garden with zero value. But before you pluck and discard, make sure stinging nettle (*Urtica dioica*) isn't one of those weeds. *Urtica dioica* is commonly known as nettle or stinging nettle. Nettle leaf is legendary for its benefits and even finds mention in the folklore of diverse cultures. Stinging nettle is a common understory component of riparian communities and also occurs in and adjacent to marshes and meadows and in disturbed areas. Stinging nettles are widespread, growing mostly in moist woods often under alders where the soil is soft and black. Colonies sometimes cover acres. Nettles contain antihistamines which act against the body's natural response. Nettle leaves have anti-inflammatory properties and can be used for treating skin burns and reducing the burn scars.

**Keywords:** *Urtica dioica*, Nettle leaves

### INTRODUCTION

*Urtica dioica* is a perennial flowering plant that has been used medicinally for ages. It belongs to Urticaceae family. Today, stinging nettle can be found all over the world, but its origins are in the colder regions of Europe and Asia. The plant usually grows between two to four feet high and blooms from June to September. It grows best in nitrogen-rich soil, has heart-shaped leaves, and produces yellow or pink flowers. While best known for the stinging reaction that occurs when the skin comes into contact with the fine hairs located on its leaves and stems, when processed and used medicinally, stinging nettle has a number of helpful health benefits.

Common name: Stinging nettle, tall nettle, California nettle, slender nettle

Latin name: *Urtica dioica* L. Syn

English names: Nettle; Common nettle; Stinging nettle; Tall nettle; Slender nettle; Greater nettle.

French names: Ortie dioïque; Grande ortie; Ortie piquante; Ortie élevée.

Arabic names: 15 كيرحلا; صارقلا ءت (Hourriga; Kerrass)

Spanish names: Ortiga; Ortiga gran; Ortiga grossa; Ortiga major; Ortiga inayor.

German names: Brennesslbatter; Brennessel-kraut; Nesslkraut; Haarnesselkraut<sup>[12]</sup>

Taxonomical classification: <sup>[2][1]</sup>

Kingdom: *Plantae*

Subkingdom: *Tracheobionta*

Class: Equisetopsida

Subclass: Magnoliidae

Superorder: Rosanae

Order: Rosales

Family: Urticaceae

Genus: *Urtica*

Species: *Urtica Dioica*



Figure 1: PARTS OF PLANT: (A) Roots (B) Fruits (C) Seeds (D) Nettle plant (E) Flowers (F) Stinging nettle

### DESCRIPTION:

This species is a herbaceous perennial, which grows as an upright plant to 2 m tall. The soft, serrated leaves are opposite each other in pairs on the stem. The leaves and the rest of the plant are coated in

stinging and non-stinging hairs. The plant spreads by underground roots which are noticeably yellow. The tiny greenish-white flowers, each with four petals, are densely clustered on elongated inflorescences towards the top of the stem. *Urtica dioica* is divided into at least five subspecies, each of which is slightly different. The nettle is well known for its toothed, hairy leaves and for its sting. The painful sensation of nettle stings occurs when toxins from specialised hairs are delivered into the skin. Each stinging hair has a bulbous tip which breaks off to leave a sharp, needle-like tube that pierces the skin and injects histamine and acetylcholine, causing itching and burning that may last up to 12 hours.

**Cultivation:** Although not cultivated at Kew, this perennial species is planted as a crop elsewhere. Until recently it was cultivated in Scotland, Denmark and Norway for use in food, textile and medical industries. This species can be propagated by seed or by rhizome (that is an underground stem that grows horizontally) division. Abundant seed is produced and can be collected in late autumn, before frost causes seed-fall. The seed does not pass through a dormant stage and can germinate just days after maturity. Open ground is preferred for germination. Rhizome division can be carried out from spring through to late summer. As deep, rich soils are preferred by this species, a substrate rich in organic matter is recommended, with nutrition added. This species responds well to generous watering. Given the tendency to flop, it is recommended that nettles be grown with support, such as that provided by pea sticks if a neat appearance is required. Control of the spread of the rhizomes can be carried out by using a pot or polyurethane barrier in the soil. If the purpose of cultivation is to provide for butterflies, large discrete clumps should be grown where eggs will usually be laid on leaves on the outside of the clumps. As young foliage is generally preferred, cutting can be carried out to produce fresh growth. Gloves are required for handling the plants.

### Microscopic identification

#### *Urtica dioica*

**Leaf:** *Surface view:* Upper epidermis composed of cells with slightly sinuous anticlinal walls; idioblasts (lithocysts) occur, containing ovoid or spherical cystoliths 30–50  $\mu\text{m}$  in diameter that are visible through the leaf surface, appearing as light areas on

the dark green leaf; covering trichomes unicellular, thick-walled, rigid, tapering, up to ~150–200  $\mu\text{m}$  in length, occurring more frequently towards the leaf margin; epidermal cells form a rosette pattern around the trichome base; glandular trichomes have a unicellular stalk and a 2-celled head (seldom 1, 3, or 4 cells), are ~20  $\mu\text{m}$  long and occur abundantly mainly along the veins; stinging trichomes have a multicellular parenchymatous base in which a single large needle-like cell up to 2 mm long is embedded; the wall of this cell is heavily thickened; the cell is rounded at the base, tapering, and closed at the apex with a small, lateral, globose head that breaks off when touched, discharging a fluid irritant; stinging trichomes may be frequent, rare, or absent on the upper surface; stomata absent on the upper surface; lower epidermis has abundant anomocytic (less frequently anisocytic) stomata; stinging trichomes present; covering and glandular trichomes as on upper surface, may be absent, moderate, or dense.

*Transverse section:* Bifacial; palisade cells in a single row; cystoliths 2-3x the width of a palisade cell, and not as long, often tapering towards the mesophyll, with a stratified or warty surface; cystoliths on upper side conspicuous, on lower side considerably smaller or absent.

**Stem:** *Surface view:* Trichomes as on the leaf; stinging trichomes may be present or absent.

*Transverse section:* Quadratic with prominent corners; several vascular bundles are located at each corner; between bundles the cells are thickened and pitted; fiber caps with an irregular outline occur outside of the phloem; fiber cell walls are only slightly thickened, with a large cell lumen; small calcium oxalate cluster crystals 10–20  $\mu\text{m}$  diameter are present; pith parenchymatous with a central cavity.

*Longitudinal section:* Cluster crystals arranged in distinct columns.

**Flowers:** Unisexual; pollen grains spheroidal with a smooth exine, ~16–20  $\mu\text{m}$  diameter; ovary with numerous very small cluster crystals of calcium oxalate.

**Powder:** Fragments of the leaves with cystoliths and small glandular trichomes; covering trichomes; stinging trichomes (mostly broken); fragments of flowers (pollen grains, calcium oxalate from ovary) and stems (fibers, calcium oxalate) may be present.

**PHARMACOLOGICAL ACTIVITIES:**

**Arthritis/analgesia:** In vitro studies using human cell lines suggest extracts may down-regulate the inflammation cascade, exert effects on cyclooxygenase enzymes, and reduce primary T-cell responses. In writhing and licking tests in rodent studies, extracts of *U. dioica* showed analgesic and antinociceptive properties. Reduced inflammation in induced paw edema was also demonstrated.

**Benign prostatic hyperplasia:** Experimental studies suggest a number of possible mechanisms of action for extracts of nettle in managing the symptoms of BPH. Reductions in the plasma level of sex hormone-binding globulin (SHBG), the protein involved in binding of circulating androgens and estrogen, have been demonstrated. An effect on enzyme activity, including the conversion of testosterone to estrogens and weak inhibition of 5 alpha-reductase and aromatase, has been demonstrated in vitro. Reduced prostate growth has also been shown by some, but not all, nettle extracts. Animal studies have been conducted to evaluate the effect of extracts of *U. dioica* in BPH; however, the availability of more recent clinical trial data makes these studies less important. In vitro and animal studies have examined a potential role of nettle extract in prostate cancer, suggesting inhibition of adenosine deaminase to be a possible mechanism of action.

**Cardiovascular effects:** Nettles have traditionally been used for their diuretic and hypotensive effects. In vitro studies show that *U. dioica* extracts inhibit thrombin-induced platelet aggregation, possibly due to flavonoid content. Rats fed a high-fat diet and aqueous *U. dioica* extracts had reductions in total and low-density lipoprotein (LDL) cholesterol, plasma apoprotein B, and LDL/high-density lipoprotein ratio. In a similar study, higher doses resulted in mild steatosis, with lower dosages improving the lipid profile. Diuretic, natriuretic, and hypotensive action have been demonstrated in rats. In isolated heart studies, decreased heart rate and inotropic activity have been shown, as well as increased left ventricular pressure and vascular contractility.

**Diabetes:** Lectins isolated from the seeds and leaves of nettle have been evaluated for a potential role in the management of diabetes. In vitro studies suggest effects on Langerhans and muscle cells with increased glucose uptake into cells, as well as

reduced intestinal absorption of glucose. In rats with induced diabetes, serum glucose levels were reduced in some, but not all, experiments. No effect of nettle extracts was demonstrated on renal indices in diabetic rats.

**Other effects:**

**Allergic rhinitis:** Freeze-dried nettle has been evaluated for allergic rhinitis. In a double-blind trial, freeze-dried nettle leaf 600 mg was more effective than placebo in controlling symptoms. Effects may be due to immunomodulatory or anti-inflammatory actions.

**Antimicrobial:** In vitro studies have shown antiviral action against HIV, cytomegalovirus, and feline immunodeficiency virus.

**Antioxidant:** Antioxidant action of *U. dioica* has been evaluated. The roots and stem have little action, while the leaves and seeds demonstrate high activity. The antioxidant effect may be responsible for a hepatoprotective effect, as well as an anti-apoptotic action in brain cells.

**PHYTO-CHEMICAL SCREENING OF PARTS OF *Urtica dioica*:**

**Nettle Leaves:** flavonoids (isoquercetin, rutin) acid components, particularly in the stinging hairs (including histamine and 5-hydroxytryptamine (serotonin), formic acid, volatile and resinous acids); silica, glucoquinone, tannins, ascorbic acid and other minerals and vitamins in appreciable levels.

**Nettle Root:** polysaccharides, sterols and sterol glucosides, lignans, ceramides, fatty acids, monoterpene diols and glucosides Up

**Nettle's main plant :** acetophenone, acetylcholine, agglutinins, alkaloids, astragalins, butyric acid, caffeic acids, carbonic acid, chlorogenic acid, chlorophyll, choline, coumaric acid, folacin, formic acid, friedelins, histamine, kaempferols, koproporphyrin, lectins, lecithin, lignans, linoleic acid, linolenic acid, neoolivil, palmitic acid, pantothenic acid, quercetin, quinic acid, scopoletin, secoisolariciresinol, serotonin, sitosterols, stigmasterol, succinic acid, terpenes, violaxanthin, and xanthophylls.

**MEDICINAL USES OF *Urtica dioica*:**

- It contains properties that help to reduce nasal inflammation and ease allergy symptoms, particularly hay fever.
- It relieves cases of benign prostatic hyperplasia (BPH) or the enlargement of the prostate gland.
- It helps with internal bleeding like excessive menstruation, vaginal bleeding, hemorrhoids, lung and stomach bleeding, and bleeding piles formed in the body. It also helps in stopping external bleeding like nosebleeds.
- It works to clear out the excess uric acid and relieve some symptoms of the disease.
- It promotes urination which flushes the body of infection causing bacteria.
- It helps to treat arthralgia, colds and flu, diabetes, joint pain, cancers, hypertension and liver diseases.
- It stimulates digestive glands and helps in treating indigestion and gas problems.

#### **SIDE EFFECTS:**

#### **INTERACTIONS:**

Stinging nettle can interact with the following medications:

- **Blood thinners** such as Warfarin (Coumadin), Clopidogrel (Plavix) and aspirin because stinging nettle contains large amounts of Vitamin K, which can help the blood's ability to clot. Taking stinging nettle can decrease the effects of these drugs.
- **Drugs for high blood pressure** such as ACE inhibitors, beta-blockers and calcium channel blockers because stinging nettle can lower blood pressure and strengthen the effects of these drugs.
- **Diuretics and water pills** such as Furosemide (Lasix) and hydrochlorothiazide because stinging nettle is also a diuretic and when used together can cause dehydration.
- **Lithium** because of stinging nettle's diuretic qualities. It may reduce the body's ability to remove this drug, resulting in higher than recommended levels of lithium.
- **NSAIDs** because stinging nettle can enhance the anti-inflammatory effect of some of them. Despite the evidence that combining stinging nettle and NSAIDs leads to more pain relief, it should be taken under supervision.
- **Sedative medications (CNS depressants)** such as clonazepam (Klonopin), lorazepam (Ativan),

phenobarbital (Donnatal), zolpidem (Ambien) because when large amounts of aboveground parts of stinging nettle are taken, sleepiness and drowsiness can occur. Taking sedatives along with stinging nettle might cause too much drowsiness.

#### **Precautions When Using Stinging Nettle:**

Stinging nettle is a very safe herb when used appropriately — although, there are a few precautions to take when starting to use stinging nettle.

**When harvesting:** Always harvest stinging nettle with thick gardening gloves to avoid being stung. It's also best to harvest young plant parts, preferably in the spring. They become more bitter after they flower and as they age.

**When using with other herbs and supplements:** As with any herb or supplement, it's important to be cautious when mixing to avoid adverse side effects. You should always start an herbal supplement plan under the care of your health care provider.

**When pregnant:** Because stinging nettle affects the menstrual cycle and can stimulate uterine contractions, it could potentially lead to miscarriage.

**When you're a diabetic:** It can also affect the strength of diabetes drugs and increase the risk of hypoglycemia. Diabetics who want to use stinging nettle should only do so under the supervision of their health care providers.

**When you first start:** Some people have upset stomach, diarrhea or other mild reactions when they first take stinging nettle. It's best to ease into usage, starting with a small dosage.

#### **CONCLUSION:**

Notorious for its unpleasant irritant effects, stinging nettle is actually rich in vitamins and minerals and possesses many medicinal properties. During the last decades, several studies have focused on the pharmacological properties and the analysis of the chemical composition of this plant.

Although its potential benefits are still not entirely defined, many studies have strengthened its claimed indications from traditional medicine. Conducted *in vitro* and *in vivo* in animals, these studies have indeed approved many of the nettle pharmacological effects as antiproliferative, anti-inflammatory, anti-oxidant,

analgesic, antiulcer, immunostimulating, anti-infectious, anti-hypertensive and also as protective against cardiovascular diseases.

In addition, and in regard to its richness in protein, minerals and vitamins, the stinging nettle provides a proven great nutritional value. In the perspective of a large medical use, several clinical trials conducted in humans, confirmed these pharmacological and nutritional properties. And many toxicological studies proved that nettle can be considered safe since significant doses, administered orally in humans.

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