

**Distribution:** Khent., Khang., Mong-Dag., Mong. Alt. (east), Dund. Khalkh (north), Dor. Mong., Ikh n., Olon n., Zyyngar (Bulgan).

**Habitat:** River banks, waterside meadow [2–4]

**Parts used:** Herb

**Traditional Uses:** The taste is bitter and the potency is cool. It is used for the following: treating blood fever, pneumonia, typhoid fever, and alleviating pain. Usually used for hepatitis, blood and bile disorders. It also stimulates cardiac activity and decreases blood pressure. It is an ingredient of the following traditional prescriptions: Arjutan, Degd-4, Tsarvon-4, Chintan, Vontag-25, Vanjangerav-15, Givan-9,13, Gurgum-7, 10, Zandan-8, Gagol-19, Jonsh-21, Zovu-8, Ruda-6, Tanchen-25, Agar-35, Bavo-6, Balega-4, Banjan-25, Bremog-7, Jalchin-16, and Jonsh-19 [4–8].

#### **Microscopic characteristics:**

**Leaf:** Leaf is dorsoventral. Palisade 2-layered cells, spongy parenchyma 2–4 layered. Numerous glandular and non-glandular trichomes covered by epidermal cells. Anomocytic stomata on lower epidermis only. Epidermal cells wavy walled. Vascular bundle is collateral type.

**Stem:** The transverse section is quadrangular. Cutinized outer walls; palisade 3–7 layered. Parenchymatous cells are angular [9].

**Chemical constituents:** 1.8% iridoids: aucubin, catalpol, isocatalpol, aucubin 10-acetate, odontoside, odontosid 10-acetate, 8-epi-loganin, mussaenoside, aucubigenin 1-*O*- $\beta$ -serotinoside, aucubigenin 1-*O*- $\beta$ -cellobioside, aucubigenin 1-*O*- $\beta$ -gentiobioside, aucubigenin 1-*O*- $\beta$ -glucopyranoside [10–12], carotenoid [12], 2.26% saponin, 0.06% alkaloid [12,13], 2.72% phenolcarboxylic acids, 2.34% flavonoids: apigenin, luteolin, apigenin 7-*O*- $\beta$ -D-glucoside, luteolin 7-*O*- $\beta$ -D-glucoside [10,12].

**Qualitative and quantitative assays:** Flavonoids in the plant are identified by reaction with lead tetraacetate. Total flavonoid content is determined by titration using potassium permanganate as the titrant [9].

**Qualitative and quantitative standards:** Loss on drying, not more than 6.3%. Ash, not more than 6.0%. Organic matter, not more than 0.5% and mineral matter, not more than 0.5%. Water-soluble extractive, not less than 17.0%. Total polyphenolic compound content, not less than 5.0% [9].

**Bioactivities:** Hepatoprotective [14], membranoprotective, antiallergic, sedative, antihypertensive, bile-expelling, and antioxidant activity [12].