

# *Epimedium brevicornu* Maxim., *E. grandiflorum* C. Morren, *E. koreanum* Nakai, *E. pubescens* Maxim., *E. sagittatum* (Sieb. & Zucc.) Maxim., *E. wushanense* T. S. Ying

Standardized Common Name: Epimedium

**Other Common Names:** Horny Goat Weed, Yin-yanghuo

**Family:** Berberidaceae

**Taxonomy:** *Epimedium* includes about 54 species in the most recent complete treatment, although new Chinese species continue to be described with some frequency. These are divided into two subgenera: Subg. *Rhizophyllum* has only two species, while Subg. *Epimedium* comprises five sections. The genus is endemic to Eurasia, except for Subg. *Rhizophyllum*, which extends into North Africa; the major center of diversity is in China.

*Epimedium sagittatum* and *E. grandiflorum* (which is found primarily in Japan and Northern Korea, as well as Manchuria) are the species most commonly found on the North American market, where they are frequently sold under the name Horny Goat Weed. In Chinese practice, all of the above-listed species except *E. grandiflorum* are sold interchangeably as Yinyanghuo; according to *Herbs of Commerce*, all six may be sold as Epimedium. These species do not form a natural group: *E. grandiflorum* and *E. koreanum* are placed within Sect. *Macroceras*, while the other four species belong to Sect. *Diphyllum*. *Epimedium koreanum* is very doubtfully distinguished from *E. sempervirens* Nakai ex F. Maek., and both are treated by some authorities as subspecies of *E. grandiflorum*. *Epimedium brevicornu* is incorrectly rendered as “*brevicornum*” by many sources.

**Description:** Rhizomatous perennial herbs to 0.6(–1) m tall. Leaves mostly basal, with 1 or 2 or rarely 3 leaves on flowering stem (if >1, leaves opposite or whorled); leaves 1–2(–4)-ternately compound, stipulate with stipules forming a ligulate sheath on basal leaves, reduced in size on stem leaves; leaflets at least a few cm long, with spiny margins; bases of lateral leaflets usually more or less oblique or asymmetrical. Inflorescence usually a loose, erect, many-flowered panicle. Flower size varies greatly among species; sepals 8 in two whorls, the inner whorl petaloid; petals 4, often spurred or reduced in size; stamens 4; ovary 1. Fruit a 2-valved capsule; seeds few, arillate.

**Parts in Commerce:** Leaves (harvested at leaf maturity, after flowering)

**Identification:** All species have ternately compound leaves; *E. sagittatum*, *E. wushanense* and *E. pubescens* have usually trifoliolate leaves (rarely reduced to one leaflet in basal leaves), while the other species used have mostly biternate or occasionally more finely divided leaves. Since

leaflets will probably be separated from petioles and broken or cut in drying, this character will be of limited use as a diagnostic feature for commercial material. Leaflets are always well separated from each other on fairly long petiolules. A few characters are common among these species:

- Leaf apex usually more or less acuminate, sometimes acute
- Bases of central leaflets more or less cordate; bases of lateral leaflets slightly to greatly asymmetrical; lobes never overlap
- Margins always bearing small spines, usually minutely toothed with the spines tipping the teeth
- Venation palmate, with the midrib strongest; main veins from base usually 7 in central leaflets, (5–)6–8(–10) in lateral leaflets; higher order venation reticulating, even very small veins observable on both surfaces
- Lower surface usually lighter in color, often appearing somewhat waxy
- Taste slightly bitter

However, the official species vary in other characteristics:

## *E. brevicornu*

- Leaflets ovate to suborbicular, (2–)3–8 cm long
- Apex acute to short-acuminate
- Base of central leaflets cordate; lateral leaflets slightly asymmetrical, the larger lobe rounded or sometimes pointed
- Texture fairly thick at maturity
- Lower surface grayish green, sparsely pubescent at base of main veins

## *E. grandiflorum*

- Leaves narrowly to broadly ovate, 3–13 cm long
- Base of central leaflets deeply cordate; lateral leaflets somewhat asymmetrical, both lobes rounded or rarely outer lobe pointed
- Texture thin
- Lower surface glabrous or sparsely pubescent especially around petiole attachment and midrib; hairs thin, sometimes brownish or with brown bands of pigment

*E. koreanum*

- Leaves narrowly to broadly ovate, 4–10 cm long
- Base of central leaflets usually deeply cordate with a narrow cleft between lobes; lateral leaflets very asymmetrical, the larger lobe pointed or sometimes rounded
- Texture thin or leathery
- Lower surface glabrous and waxy or bearing small appressed hairs

*E. pubescens*

- Leaflets ovate to lanceolate, 3–15 cm long
- Base of central leaflets cordate; lateral leaflets very asymmetrical, the larger lobe usually rounded, rarely acute-pointed
- Texture leathery
- Lower surface usually pubescent with soft gray hair, especially around base of main veins and petiole attachment

*E. sagittatum*

- Leaflets lanceolate to narrowly ovate, 4–12(–19) cm long
- Base of central leaflets cordate to sagittate (similar to cordate but with pointed lobes); lateral leaflets very asymmetrical with large pointed or sometimes rounded outer lobe, small rounded inner lobe
- Texture leathery
- Lower surface glabrous or bearing minute single-celled appressed hairs

*E. wushanense*

- Leaflets lanceolate to narrowly lanceolate, 7–13(–23) cm long
- Base of central leaflets shallowly cordate; lateral leaflets very asymmetrical with outer lobe usually long and pointed
- Texture leathery
- Lower surface glabrous or densely pubescent with erect hairs

**Adulterants:** A number of other species are native to the same geographical region, so accidental substitution is a possibility, although it is not reported to be a problem. The popular species are frequently cultivated, and some of the other species are very rare or of limited distribution; these facts reduce the likelihood of confusion. Many species can be distinguished from the official six by differing leaf morphology. However, given the considerable variation within as well as among species, it is impossible to reliably identify material to the species level without flowers. The possible inclusion of similar species therefore cannot be completely ruled out by morphological examination.

In-depth chemical surveys of *Epimedium* would be desirable; if fixed chemical differences justifying the preference for the official six species were discovered, a chemical method of identifying those species would simultaneously be made available.

**References:**

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