Arctium Species

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Botany

Burdock root (E.), Klettenwurzel (G.) or racine de bardane (F.) is obtained from several species of the genus Arctium (Asteraceae). The most common source plants are [1–7]:

- *Arctium lappa* L. = *A. majus* Bernh. = *Lappa major* Gaertn. (Große Klette in German);
- *Arctium minus* (Hill) Bernh. = *Lappa minor* Hill (Kleine Klette in German);
- *Arctium tomentosum* Mill. = *Lappa tomentosa* (Spinnwebklette or Filzklette in German);
- *Arctium nemorosum* Lej. et Court. (Hausklette in German).

In addition to the root, the herb and fruits of burdock may also be used medicinally. According to a German text book, however, the trade in these plant parts is relatively small [3].

Chemistry

Burdock roots contain large amounts of carbohydrate in the form of inulin (up to 45% in *A. lappa*, up to 27% in *A. minus*, and up to 19% in *A. tomentosum*). The root of *A. lappa* also yields 0.06–0.18% of volatile oil, tannin, sitosterol, stigmasterol, resin, mucilage, 0.4–0.8% of fatty oil, sugar, and acids [3,4].

Washino et al. [8] reported numerous different components of the essential oil of burdock root, including phenylacetaldehyde, benzaldehyde, 2-alkyl-(C₃-C₅)-3-methoxypyrazines and 2-methoxy-3-pyrazine, costic acid, dehydrocostuslactone and dehydrodihydrocostuslactone. Schulte et al. [2] identified 14 polyacetylenes in fresh root samples of different burdock source plants with tridecadiene-(1,11)-tetrayne-(3,5,7,9) (up to 1.5 mg%), tridecene-(1)-pentayne-(3,5,7,9,11) (up to 1.1 mg%) and tridecatriene-
(1,3,11)-triyne-(5,7,9) (up to 0.2 mg%) as major components. Other root constituents of *Arctium lappa* are γ-guanidino-n-butyric acid [9], and sulphur-containing acetylenic compounds, such as arctinones, arctinols, arctinal and arctic acids [10].

Burdock leaves contain inulin, tannin, mucilage and traces of essential oil [3]. Yochkova et al. [11] identified the triterpene alcohols α- and β-amyrin, lupeol, phytol, taraxasterol and ψ-taraxasterol in free and esterified state as well as the sterols stigmasterol and sitosterol in the leaves of *A. lappa*.

Burdock fruits contain fatty oil, lappaurin (a yellow substance), arctiin (glycosidic bitter principle) and lappanaesthin (an anesthetic substance), resin, and wax [3,4]. Yamanouchi et al. [12] isolated arctin, arctigenin and matairesinol as well as two new sesquilignan derivatives from the fruits of *A. lappa*.

Surewicz-Szewczyk [13] found 21.4% and 22.1% of fatty oil in the seeds of *A. minus* and *A. tomentosum*, respectively. Predominant fatty acids were linoleic acid (resp. 67.0% and 67.8%), oleic acid (resp. 20.3% and 15.4%), palmitic acid (resp. 9.0% and 9.6%) and linolenic acid (resp. 1.7% and 5.7%). Morris et al. [14] recovered 9.9% of *trans-3,cis-9,cis-12-octadecatrienoic acid* from the seed oil of *A. minus*.

Pharmacology and Uses

Burdock root has been recommended as a blood purifier and has been used externally to treat various chronic skin conditions, including psoriasis and acne. It is also claimed to have diuretic and diaphoretic properties [3,5,7]. In France the roots of *Arctium lappa* are permitted as a herbal drug for internal use, and its leaves may be applied topically [15]. In Germany, however, burdock root is considered an obsolete herb, which occurs primarily in homoeopathic products [2]. The German health authorities have not accepted burdock root as a herbal drug, because no therapeutic efficacy has been proven [7].

Burdock root extracts are claimed to have antitumor activity [16] and a lowering effect on the blood sugar level [3,6] in experimental animals. Kit et al. [17] reported a relatively weak hypoglycemic effect in alloxane-treated rats following a subcutaneously administered tincture of burdock root. In a recent study, oral administration of burdock leaves did not affect glucose homeostasis in normal mice, and it aggravated the hyperglycemia, polydipsia and loss of body weight in streptozotocin diabetic mice [18].

The young leaves of burdock may be eaten as greens [5], and the roots of a cultivated form of *A. lappa*, formerly known as *A. edulis* or *Lappa edulis*, are used as vegetables in Japan [3].