STINGING NETTLE

Urtica dioica L.
Urticaceae

Common Names in English:
stinging nettle, common nettle, American stinging nettle, European stinging nettle, hoary nettle

Other species and subspecies:
Many varieties and subspecies of Urtica dioica have been described including an introduced subspecies from Europe. Although formerly separated into four species, most recent authors agree that the North American plants cannot be distinguished at the species level from each other and from European plants[1]. The following three subspecies are currently recognized:

Urtica dioica ssp. dioica (European stinging nettle)
Urtica dioica ssp. gracilis (Ait.) Selander (American stinging nettle)
Urtica dioica ssp. holosericea (Nutt.) Thorne (hoary nettle)

Two subspecies, American stinging nettle and hoary nettle, are native; the third subspecies in North America, European stinging nettle, was introduced in the mid-1800's[2].
American stinging nettle is the most common subspecies in North America.

Urtica urens L. is an annual stinging nettle with a tap root and is also medicinal.

Other taxonomic names in literature:
None

Description of Plant

Stinging nettle is a native perennial herbaceous plant. It grows 1-3m tall with leafy stems and forms dense patches. These dense clonal patches can dominate large areas.[3]. Both leaves and stems are armed with stinging hairs. The leaves are opposite, narrowly lance shaped, to oval or heart-shaped, coarsely saw-toothed. It flowers from early summer through to fall; the flowers are tiny, greenish and numerous in dense, drooping clusters in the leaf axils and at the stem tips. There are separate male and female

Urtica dioica leaves

flowers, sometimes on the same plant, sometimes on different plants[4]. The seeds ripen in mid summer to fall. The rhizomes form dense underground and surface mats.
Stinging nettle occurs in moist sites along streams, coulees, and ditches, on mountain slopes, in woodland clearings, and in disturbed areas. Stinging nettle generally grows on deep, rich soils.

Range

Much of United States and southern Canada; lowlands to subalpine elevations, under 3000m.

Common Misidentification Errors

Can be misidentified as a mint but this mistake is quickly discovered on contact with the stinging hairs[5].
Should not be confused with dead nettle (*Lamium album*) or any of the other plants with the common name nettle such as Hedge nettle (*Stachys spp*) , red dead nettle etc or hemp nettle (*Galeopsis spp*). None of these “nettles” have the stinging hairs of *Urtica dioica*. They have different medicinal actions and cannot be substituted for *Urtica dioica*.


Urtica dioica and Lamium album growing together

➢ *Part of the Plant Used Medicinally*

Root	Leaf	Flower	Seed		
x	x	x	x	All parts fresh and dried	Bairacli Levi 1982
	x			Dried leaf	Bartram 1998
x				Root	Blankenship 1905
x	x	x		Root, leaf, flower	Bolyard 1981
x	x				Boon 1999
	x	x			British Herbal Pharmacopoeia 1983
x	x	x			Blumenthal 2000
x	x	x	x		Cook 1869
x	x		x	Fresh and Dried	Culpeper 1819
x	x		x		Drum 2005
x					ESCOP 1997
x	x	x	x	Fresh and Dried	Grieve 1975
x	x				Heinrich et al 2004
	x	x			Hoffmann 1986
x	x				Hutchens 1973
x	x	x	x	Root, leaf, fresh and dried	Kavalali 2003
x	x	x	x	Root, leaf fresh and dried, flower, seed	King's American Dispensatory 1898
x	x		x		Kloss 1988
	x				Leighton 1985
x	x				Lust 1974
x	x			Root, leaf fresh and dried	Mills and Bone 2000
	x		x		Millspaugh 1974
x	x	x		Roots and aerial parts	Moerman 1998
	x		x	Leaf, Seed	Moore 1993
x	x	x	x		Moore 1993
	x			Fresh Plant	Ray 1932
	x			Fresh and Dried	Schauenberg and Paris 1977

	x		x		Schofield 1998
	x				Tilford 1993
x	x			Leaf - fresh and dried	Turner 1971, 1982, 1990, 2004
	x			Fresh and Dried	Weiss 1988
x	x			Fresh and Dried leaf and root	Willard 1992
x					World Health Organisation 2003
	x	x	x	Fresh and Dried	Wren 1988

The parts used in natural health products are the roots, leaves both fresh and dried, flowers and seeds.

➢ *Harvesting Times*

Stinging nettles will produce a flush of new growth after harvesting and can potentially be harvested two or three times a year, depending on the climate. Therefore the times of year given below will vary if the second or third harvest is being collected. Stinging nettles may not achieve flowering with the second or third harvest depending on the climate.
Leaf: The leaf should be harvested in spring/early summer before flowering[6,7,8,9]. The mature leaves, post flowering, can cause kidney irritation and should not be harvested[10,11]. This irritation is frequently reported as due to cystoliths in the leaves but the cause of the irritation is not completely clear (the cystoliths contain calcium carbonate[12]). Stinging nettles are prone to being eaten by insects and should be harvested before any holes begin to appear in the leaves. The plants elongate with more stem between the leaves as they mature and the stem becomes woody, so they should be harvested before too much stem develops. The WHO and ESCOP monographs and Hoffmann (1986) recommends harvesting during flowering, however this may be too late to harvest in some areas due to insect attack. Protein levels in the leaves significantly increase with flowering and then drop to the lowest levels in December[13].
If the leaves are being harvested for juicing rather than drying they should be harvested before flowering.
Specific buyer requirements should be requested before harvesting.

Seed: The seed should be harvested while the seed husks are still green[14,15] The seeds themselves have a light brown coat. Harvest whenever the fruit is ripe which can be anytime from late Spring to Fall. Harvest before the husks are dried and have become brown or grey[16].

Flower: The flowers should be harvested when the plant just starts to bloom rather than waiting until some of the flowers have gone to seed. The flowers are often harvested along with the leaf. If this is the case care should be taken to ascertain whether the plant has just started to flower or if it has already gone to seed. If it has gone to seed the leaves should not be harvested as they will be over-mature and may cause kidney irritation.

Root: The roots are usually harvested in fall[17], [18].

➢ *Harvest Area*

Stinging nettle frequently grows in previously disturbed sites, in ditches, on the edge of agricultural fields and on roadways. It is therefore very important to ensure that the harvest area is not contaminated with heavy metals, industrial pollutants, pesticides or herbicides, or oil run off from roads[19],[20].
Stinging nettles absorb heavy metals[21],[22],[23] and other pollutants readily so the harvester should be certain that the area is not polluted. The harvest area should not be within the fall out area for industrial pollutants as the plants can absorb pollutants through their leaves even if the pollutants are not found in significant amounts in the soil[24]. If the history of the harvest site or any adjacent waterway is not known a soil sample should be tested for the above pollutants.
Stinging nettles are considered noxious weeds in some areas and invasive species and as a result may have been sprayed with herbicide. Make sure that the stinging nettles have not been sprayed.

➢ *Harvesting Methods*

The plant should be identified using "Good Practices for Plant Identification for the Herbal Industry"[25]. If there is any doubt about identity of the plant seek an experienced person to confirm identity.

Leaf: The plant should be harvested on a cool dry day when the leaves are dry. A catching scythe can be used to harvest[26]. The leaf and stem can be harvested just above the ground[27], taking care not to include yellow or damaged leaves in the harvest. It may be necessary to harvest from higher on the stalk if lower leaves are damaged or yellowing.
Nettle bruises very easily and care should be taken not to bruise the leaves during harvest; breathable harvest containers should be used. If harvesting onto a tarp ensure that the leaves are not left in piles as they will sweat and this will cause blackening on drying. The plant should be spread out to dry as soon as possible.
The following practices should be avoided as they will cause the plant to sweat and the leaves will blacken. DO NOT: harvest into plastic bags, pack a large amount of plant into a harvesting container, leave the plant piled up for any period of time prior to drying, bruise the plant during harvesting, or harvest on a hot day.

Flower and Seeds: The flowers and seeds hang in clusters and these can be picked individually as recommended by some authors for a high quality product. Alternatively the whole stem can be harvested and the flowers or seeds can be removed from the stems at the processing site.

Roots and rhizomes: Prior to harvesting the roots cut off the aerial parts as close to the ground as possible[28]. First ensure that there are no other plants growing among the nettles that will adulterate the root harvest. The roots can be dug using a fork or vine hoe. Nettles often form dense colonies that exclude other vegetation; this can be used to advantage by harvesting from areas where there is no other vegetation so that roots from other plants are not harvested with the nettle roots by mistake. The brownish yellow roots and rhizomes should be harvested rather than the younger white roots. The roots and rhizomes may form dense mats depending on the site. Mechanical harvesting will bruise the roots and will lead to decay during drying which will result in a lower quality product[29].

In order to ensure that the harvesting is not having a negative impact:

- always make sure there are enough mature plants left after harvesting to maintain habitats that other wildlife depend on;
- avoid damage to neighbouring species, especially rare or threatened species;

- take particular care with species that have symbiotic relationships or otherwise depend on each other;
- avoid harvesting operations that lead to erosion or damage to sensitive habitat, and
- take and keep samples of each batch harvested[30].

Harvester must have clean hands and be free of any disease that is transmittable through food.

Harvested plant material should be collected in clean containers and contact with the ground should be avoided. Harvesting containers or tarps must be cleaned between harvest batches.

Tools must be cleaned between harvest batches.

Urtica dioica roots

➢ *Regeneration*

Stinging nettles are considered a noxious weed in some provinces in Canada and are considered invasive in some states in the USA[31].
Stinging nettles regenerate both vegetatively and by seed. Stinging nettle produces abundant seed and the seedlings produce spreading roots in the first year.
Stinging nettle also reproduces and spreads through rhizomes and sends new shoots up each year from perennating buds on rhizomes. Maximum root development occurs in the spring prior to flowering[32].
Stinging nettles will send up a flush of new growth if they are cut down during the growing season. Continual mowing may kill them, but two harvests per year are unlikely to impact on the size of the colony.
When distributed through the soil by disturbance such as mechanical cultivation, stinging nettle rhizomes can establish dense new colonies. However, repeated ploughing will eliminate stinging nettle[33].
Stinging nettle patches provide habitat for butterflies and certain animals and this should be taken into account when harvesting large amounts.

➢ *Harvest Records[34],[35].*

The harvester must keep records of each harvest batch which should include identification of the plant, name of plant in Latin, common name, harvest date, harvest location (using map reference or indicated on a map), part harvested, quantity harvested, sustainable harvest rate for area (if known), harvest rate for this harvest, quality of material collected, unusual weather during the growing season that might influence plant constituents, delays in getting the plant to drying stage which would affect quality. Each harvest batch must be given a batch code that will correspond with the record for the harvest batch and with the batch sample and this code will follow the batch through drying, processing and storage or to whatever point the material is sold. Record sale details including name and contact details of buyer. Records should be kept for two years. CHSNC[36] is in the process of developing templates for GAP records that can be used for wildcrafting. The “Good Practices for Plant Identification for the Herbal Industry”[37] can be used to document plant identity.

➢ *Preparation for Drying*

Leaf: Ensure that no other plants have been included in the harvest. The leaves must not be washed prior to drying. Handle with care to avoid bruising the plant and ensure that the leaves are spread out for drying as soon as possible after harvesting.

Flowers and Seeds: should be picked off the stem prior to drying if this was not done at harvest. Ensure that no other plants or seeds have been included in the harvest at this point.

Roots: the fine roots should be washed carefully of debris and soil[38]. Ensure that roots from other plants have not been included in the harvest. Remove any old dead roots. There is no need to chop roots prior to drying[39].

➢ *Drying*

Leaf: The leaves should be spread out on racks and dried between 30°C to 45°C out of direct light, in a drying shed. A good airflow around the drying racks is essential. Drying outside, or with no heat will tend to result in reabsorbtion of moisture and blackening of the finished product[40],[41]. The leaves should be crisp, but not brittle when dry. The stems and young tips are the slowest part to dry and should be checked carefully. The stem should snap when dry. Once the leaves are dry they can be easily removed from the stem if the buyer requires no stem. Wear protective clothing and dust mask during processing of dried material.
Drying racks should be labeled individually with the name of the drying herb and the code applied at harvesting. Any problems associated with drying must be recorded with the corresponding batch records.
Drying, processing and storage facilities should provide protection of the plant-material against pests, rodents, insects, birds, and pets and other domestic animals[42].
Drying racks must be cleaned between harvest batches.

Flowers and Seeds: The Flowers and Seeds should be spread out on racks and dried between 30°C to 45°C out of direct light, in a drying shed. A good airflow around the drying racks is essential. Unless the racks are very small mesh, sheets should be spread under the racks to collect any falling seed or flowers as they dry.

Roots: The roots should be spread out on racks an inch thick and dried slowly at 15 – 30°C for about six days[43].

Drying racks must be cleaned between harvest batches.

➢ *Processing*

Leaf: Rub through 2 ½ to 3 dent screen for tea grade leaf.
Aerial parts: Chaff cut.
Roots: Work over a 2 ½ to 3 dent screen. Any root big enough to be yellow can be included. Can also be chaff cut.
Equipment must be cleaned between harvest batches.

➢ *Storage*

Stinging nettles do not contain volatile oils so can be baled or stored in clean, new polypropylene sacks. Store in dry conditions out of direct light. The storage area should be heated to avoid damp and mould,

but not at high temperatures as degradation of the product will occur. Each harvest batch and storage bag or container must be labeled appropriately with the name of the plant, harvest date, harvest location and harvesters name.

Be sure to wear protective clothing and dust mask during handling of dried material.

➢ *Toxicity or Health and Safety Cautions for Harvesters.*

Protective clothing and gloves should be worn when harvesting stinging nettles. Take care to protect the wrist area between the glove and the sleeve. The sting of *Urtica dioica* causes minor irritation for a few minutes up to 24 hours (the stinging action has traditionally been used medicinally). It does not recur like poison ivy and will not cause permanent skin damage. The cause of the stinging pain could be due to oxalic acid and tartaric acid in the stinging hairs, not formic acid as was formerly thought[44].

A dust mask should be worn when processing dried stinging nettles.

There are species of Urtica growing in other parts of the world that can cause a significant reaction and even death[45].

➢ *Extraction Techniques*

Tincture, fluid extract, encapsulation, infusion and decoction are all used. Stinging nettles are also used in shampoos and other medicinal skin and hair products.
The fresh herb is commercially juiced.

➢ *Identification of Commercial Finished Product*

Leaf: Leaf pieces wrinkled and rolled, of various shades of dark green, bearing obvious stinging hairs. Stem pieces ridged, hollow, perhaps split, hairy, pale green-brown. May cause irritation if handled[46].

Root: greyish-brown, irregularly twisted, about 5mm thick, distinct longitudinal furrows; hollow in cross-section, cut surface white; fracture fibrous and tough.
Rhizome: cylindrical and tapering, occasionally branched, up to about 6mm thick at upper end; outer surface yellowish-brown; internodes with deep longitudinal furrows, numerous smooth, very thin and wiry roots arising from the nodes; in the outer part, inner surface creamy-white with a central hollow; fracture fibrous and tough.
Odourless;
Taste: faintly aromatic, characteristically bitter

Pharmacopeial grade stinging nettle herb (leaf, flower, and stem) must be collected during the flowering period and contain not less than 18% water-soluble extractives, not more than 2% stem above 3 mm in diameter, and other quantitative standards, and the German Pharmaceutical Codex specifies not more than 10% stem fragments[47].

The Mater report states that there is good market demand from Europe for stinging nettles[48].

➢ *Official monographs*

English language monographs:

British Herbal Pharmacopoeia.[49]
Commission E Monographs[50]

European Pharmacopoeia[51]
Natural Health Products Directorate Monographs. [52]
United States Pharmacopeia[53]
World Health Organisation Monographs on Selected Medicinal Plants[54]

See "*Classic Herbal Texts"* for historical monographs. Available online at: http://www.henriettesherbal.com/eclectic/index.html

➢ *Organic certification*

Standards for organic certification of wildcrafted plants have not yet been formalised in Canada[55]. The Soil Association (organic certifying body in the UK) have standards for Wild Harvesting. These standards are recognized in the EU. The standards address endangered species, harvesting areas, requirements for sustainable harvest management plans, processing, personnel training, batch tracking, samples and record keeping. The full Wild Harvesting Standards can be ordered from the Soil Association[56].

➢ *Land Access for Harvesting*

Private Land: Written permission to harvest must be obtained from the land owner.
Crown Land: No permission or license is required however harvesting must be carried out within provincial Ministry guidelines. In BC such harvesting is subject to the Forest and Range Practices Act.[57]
First Nations Reserve Land: Permission must be obtained from the Band with details of exactly what you wish to harvest. For many First Nations harvesting of medicinal plants is a spiritual practice with strict rules about how the harvest is carried out. Knowledge of and respect for these practices should be a part of any request for permission to harvest.
National or Provincial Parks: It is illegal to harvest in National or Provincial Parks.

➢ *Points of Concern*

It is important not to harvest over-mature *Urtica dioica* leaves due to the possibility of kidney irritation with leaves harvested after the plant has flowered.
Do not introduce *Urtica dioica* into an area for the purposes of harvest as it is an invasive weed in some areas.
Always check carefully to ensure that herbicides have not been used on Urtica dioica patches; it is at higher risk due to its noxious weed status.

[1] Carey, Jennifer H. 1995. Urtica dioica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/forb/urtdio/ 1995

[2] Carey, Jennifer H. 1995. Urtica dioica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/forb/urtdio/ 1995

[3] Vance, N., Borsting, M., Pilz, D. *Special Forest Products - Species Information Guide for the Pacific Northwest*. USDA Forest Service. Pacific Northwest Research Station. Available from: http://www.fs.fed.us/pnw/pubs/gtr513/gtr513b.pdf 2001.

[4] Flora of North America Editorial Committee, eds. *Flora of North America North of Mexico*. 7+ vols. New York and Oxford. Available from: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=220014002#KEY-1-2 1993

[5] Moore, M. Medicinal Plants of the Pacific West. New Mexico: Red Crane Books. 1993.

[6] Vance, N., Borsting, M., Pilz, D. *Special Forest Products - Species Information Guide for the Pacific Northwest*. USDA Forest Service. Pacific Northwest Research Station. Available from: http://www.fs.fed.us/pnw/pubs/gtr513/gtr513b.pdf 2001.

[7] Janke, R. *Farming a Few Acres of Herbs: Stinging Nettle*, Kansas State University, May 2004.

[8] Grieve, M. *A Modern Herbal.* London:Jonathan Cape. 1975.

[9] Schofield, J. *Nettles*. London:McGraw Hill. 1998.

[10] Lust, J. *The Herb Book*. New York: Bantam Books. 1974.

[11] Tilford, G. *Ecoherbalists Fieldbook*. Montana: Mountain Weed Pub. 1993.

[12] Boufford, David E. *Urticaceae. Nettle Family*. Flora of North America. Available at: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=10931

[13] Kavalali, G.M. ed. *Urtica : therapeutic and nutritional aspects of stinging nettles*. London ; New York : Taylor & Francis. 2003.

[14] Schofield, J. *Nettles*. London:McGraw Hill. 1998.

[15] Drum, R. *Wildcrafting Medicinal Plants*. Available at: http://www.ryandrum.com/wildcrafting.htm 2005.

[16] Drum, R. *Wildcrafting Medicinal Plants*. Available at: http://www.ryandrum.com/wildcrafting.htm 2005.

[17] Rhonda Janke, *Farming a Few Acres of Herbs: Stinging Nettle*, Kansas State University, May 2004.

[18] Drum, R. *Wildcrafting Medicinal Plants*. Available at: http://www.ryandrum.com/wildcrafting.htm 2005.

[19] Carey, Jennifer H. 1995. Urtica dioica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/forb/urtdio/. 1995

[20] Kavalali, G.M. ed. *Urtica : therapeutic and nutritional aspects of stinging nettles*. London ; New York : Taylor & Francis. 2003.

[21] Otte, M. L.; Wijte, A. H. B. M. Environmental variation between habitats and uptake of heavy metals by Urtica dioica. *Environmental Monitoring and Assessment*. 28(3): 263-275. 1993.

[22] Murphy AP, Coudert M, Barker J. *Plants as biomarkers for monitoring heavy metal contaminants on landfill sites using sequential extraction and inductively coupled plasma atomic emission spectrophotometry (ICP-AES*). J Environ Monit. 2000 Dec;2(6):621-7. PMID: 11296751 [PubMed - indexed for MEDLINE] 2000

[23] *Notten MJ, Oosthoek AJ, Rozema J, Aerts R.* Heavy metal concentrations in a soil-plant-snail food chain along a terrestrial soil pollution gradient. *Environ Pollut*. 2005 Nov;138(1):178-90. PMID: 16005127 [PubMed - indexed for MEDLINE] 2005.

[24] Barona, A., Romero, F. *Relationships among metals in the solid phase of soils and in wild plants*. Department of Chemical Engineering and Environment, Engineering High School, University of Basque Country, Alda Urquijo s/n 48013 Bilbao, Spain. 1996.

[25] Brigham, Tim, Michelle Schröder and Wendy Cocksedge. *Good Practices for Plant Identification for the Herbal Industry*. Saskatchewan Herb and Spice Association. February 2004. Available from <http://www.saskherbspice.org/Good%20Practices%20for%20plant%20identification.pdf>. 2004

[26] Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

[27] Vance, N., Borsting, M., Pilz, D. Special Forest Products - Species Information Guide for the Pacific Northwest. USDA Forest Service. Pacific Northwest Research Station. Available from: http://www.fs.fed.us/pnw/pubs/gtr513/gtr513b.pdf 2001.

[28] Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

[29] Drum, R. *Wildcrafting Medicinal Plants*. Available at: http://www.ryandrum.com/wildcrafting.htm 2005.

[30] *Soil Association Wild Harvesting Standards*. Soil Association UK, Bristol House, 40-56 Victoria Street , Bristol, BS1 6BY, UK. Available at: http://www.soilassociation.org

[31] Carey, Jennifer H. 1995. Urtica dioica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/forb/urtdio/. 1995

[32] Carey, Jennifer H. 1995. Urtica dioica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/forb/urtdio/. 1995

[33] Carey, Jennifer H. 1995. Urtica dioica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/forb/urtdio/. 1995

[34] IMO (Institute for Marketecology) and Klaus Durbeck Consulting. 2005. *Guidance Manual for Organic Collection of Wild Plants*. Switzerland: SIPPO

[35] Canadian Herb Spice and Natural Health Products Coalition. *A Good Agricultural Practice Workbook*. DRAFT. Version 1/2005. Available from: www.nationalherbspice.com

[36] Canadian Herb Spice and Natural Health Products Industry. *A Good Agricultural Practice Workbook*. DRAFT. Available from: www.nationalherbspice.com

[37] Brigham, Tim, Michelle Schröder and Wendy Cocksedge. 2004. Good Practices for Plant Identification for the Herbal Industry. Saskatchewan Herb and Spice Association. February 2004. Available from <*http://www.saskherbspice.org/Good%20Practices%20for%20plant%20identification.pdf*>.

[38] Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

[39] Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

[40] Miller, R. *The Potential of Herbs as a Cash Crop*. Missouri: Acres 1985.

[41]Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

[42] Harnischfeger, G. Proposed Guidelines for Commercial Collection of Medicinal Plant Material. *Journal of Herbs, Spices and Medicinal Plants*. Vol 7(1). Haworth Press. 2000

[43] Drum, R. *Wildcrafting Medicinal Plants*. Available at: http://www.ryandrum.com/wildcrafting.htm 2005.

[44] Fu HY, Chen SJ, Chen RF, Ding WH, Kuo-Huang LL, Huang RN. *Identification of Oxalic Acid and Tartaric Acid as Major Persistent Pain-inducing Toxins in the Stinging Hairs of the Nettle, Urtica thunbergiana.* Ann Bot (Lond). 2006 Jul;98(1):57-65 2006.

[45] Schofield, J. *Nettles*. London:McGraw Hill. 1998.

[46] British Herbal Pharmacopoeia. British Herbal Medicine Association.1983.

[47] Blumenthal, M. 2002.

[48] Mater, C., Alaskan Special Forest Products Markets Report. Available at: URL:http://www.fs.fed.us/pnw/pubs/gtr500/alaskan.pdf 1999.

[49] British Herbal Pharmacopoeia 1983. British Herbal Medicine Association

[50] Blumenthal M, Goldberg A, Brinkmann J, editors. 2000Herbal Medicine: Expanded Commission E Monographs. Boston (MA): Integrative Medicine Communications; Available online at: http://www.herbalgram.org/default.asp?c=herbal_medicine_online

[51] European Directorate for the Quality of Medicines. European Pharmacopoeia 5th Edition. http://www.pheur.org/

[52] Natural Health Products Directorate Health Canada. http://www.hc-sc.gc.ca/dhp-mps/prodnatur/applications/licen-prod/monograph/mono_list_e.html

[53] www.usp.org

[54] World Health Organisation Monographs on Selected Medicinal Plants. 2002. Volume 2. http://whqlibdoc.who.int/publications/2002/9241545372.pdf

[55] Pacific Agriculture Certification Society. Available at http://www.certifiedorganic.bc.ca/cb/pacs.php. Pers. communications

[56] Soil Association UK. 2005. *Wild Harvesting Standards*. Chapter 9. Soil Association UK, Bristol House, 40-56 Victoria Street , Bristol, BS1 6BY, UK. Available at: http://www.soilassociation.org. 2005

[57] Ministry of Forests and Range, British Columbia. http://www.for.gov.bc.ca/dcs/General/nontimber_forest_products.htm

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