

PLANTAIN

Plantago lanceolata L.

Plantago major L.

Plantaginaceae

Common Names in English:

P. lanceolata: English plantain, lanceleaf plantain, narrowleaf plantain, ribwort plantain, ribwort;

P. major: common plantain, greater plantain, broadleaf plantain, white mans foot.

Other species and subspecies:

There are a number of subspecies of both *P. major* and *P. lanceolata* in North America.

Other taxonomic names in literature:

None

Description of Plant.

Plantago major is a non-native low-growing perennial weed. It has short perennial rootstock which sends up a basal rosette of leaves, which are oval to broadly ovate, 50-300mm long, dark green, with 7 prominent parallel veins¹. The leaves are ground-hugging and fibrous. The small inconspicuous flowers are borne along the length of the stalk, which somewhat resembles a rat's tail and is 50 – 400mm tall. The plant dies down in winter but retains some green leaves².

Plantago lanceolata is also a non-native perennial weed. It grows in a rosette with the leaves more or less erect. Leaves are lanceolate or ovate-lanceolate, smooth edged, 30-200mm long, with 3 to 7 parallel veins. Flowers are in a cylindrical or ovoid spike, much shorter than the length of their stalk which stands taller than the leaves. The flower stalk has longitudinal furrows on it^{3, 4}.

P. lanceolata has much narrower leaves than *P. major*, but sometimes develops broader leaves in early spring which can make it look like *P. major*. However the flower stalks of *P. lanceolata* are quite different. They are tall with a short, thick flowering spike at the end, whereas *P. major* flowers extend all the way down the stem

Both bloom in late spring and early summer. Both plantains are common in disturbed areas, such as roadways, grazed areas, lawns, and



Plantago major leaves and flowers



Plantago lanceolata leaves and flowers

agricultural areas. It can be found in very diverse habitats.

Range

Both these plantains are common weeds from low elevations to timber line across North America. It is also found across the globe.

Common Misidentification Errors

Several years ago there was a case where *Plantago* was adulterated with *Digitalis*, believed to be the result of misidentification by a wildcrafter⁵. There are several plants such as *Digitalis* and *Verbascum thapsus* that could be mistaken for *P. major* when the plants are young. This mistake cannot be made when the plant is flowering.

Members of the lily family could also be mistaken for *P. lanceolata* with potentially toxic results. Once again, such a mistake could not happen when the plant is flowering.

P. major and *P. lanceolata* should both be harvested when flowering to eliminate the potential for misidentification.

➤ *Part of the Plant Used Medicinally*

<i>P. major</i>	Leaf and root fresh	Bairacli Levi 1982
<i>P. lanceolata</i>	Leaf and flower	Blumenthal 2000
		Bolyard 1981
		Boon 1999
<i>P. major</i>	Leaf. Dried	British Herbal Pharmacopoeia 1983
<i>P. major</i>	Leaf, Root	Cook 1869
<i>unspecified</i>	Leaf, Root, seed. Juice	Culpeper 1819
<i>P. major and P. lanceolata</i>	Leaf	Drum 2005
<i>P. major</i>	Leaf. Juice	Ellingwood 1919
<i>P. major</i>	Whole Plant	Felter 1922
<i>P. major and P. lanceolata</i>	Leaf, root	Grieve 1975
<i>P. major</i>	Leaf	Hoffmann 1986
<i>P. major</i>	Leaf, root and seed. Fresh and Dried	Hutchens 1973
<i>P. major</i>	Root and leaf, fresh only.	King's American Dispensatory 1898
<i>P. major</i>	Leaf, root. Juice.	Kloss 1988
<i>P. major and P. lanceolata</i>	Leaf. Juice	Lust 1974
<i>P. lanceolata</i>	Leaf	Mills 1991
		Millspaugh 1974
		Moerman 1998
<i>P. major and P. lanceolata</i>	Leaf. Fresh and Dried. Juice	Moore 1993
		Ray 1932
<i>P. major and P. lanceolata</i>	Leaf. fresh	Remington 1918
<i>P. major and P. lanceolata</i>	Whole plant. Leaf	Schauenberg and Paris 1977
<i>P. major and P. lanceolata</i>	Leaf	Tilford 1993

<i>P. major</i>	Leaf, fresh	Turner 1982 , 1983
	Leaf	Weiss 1988
<i>P. major</i>	Leaf Fresh and Dried	Wren 1988

Plantago lanceolata and *Plantago major* are both included here because both are referred to as plantain. They are medicinally similar but have slightly different uses. Find out which species of plantain the buyer requires before harvesting.

➤ *Harvesting Times*

Harvested at flowering time^{6,7}.

➤ *Harvest Area*

Plantain frequently grows in previously disturbed sites, in ditches, on the edge of agricultural fields and on roadways⁸. It is therefore very important to ensure that the harvest area is not contaminated with heavy metals, industrial pollutants, pesticides or herbicides, oil run off from roads, or run off from mines. 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 soil⁹. If the history of the harvest site or any adjacent waterway is not known a soil sample should be tested for the above pollutants.

Harvesting should not take place within 50 metres of roadways¹⁰.

Plantago is considered a weed so it is important to ensure that it has not been sprayed with herbicide at any point prior to harvesting.

➤ *Harvesting Methods*

The plant should be identified using “Good Practices for Plant Identification for the Herbal Industry”¹¹. If there is any doubt about identity of the plant seek an experienced person to confirm identity.

Harvest the leaves at ground level using a sharp knife or small reaping hook. Avoid any method that will bruise the leaves as this will result in blackening during drying. Only leaves are harvested, not flower stalks.

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. These practices will cause the plant to sweat and the leaves will blacken.

Ensure that you:

- 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, and
- take and keep samples of each batch harvested¹².

Harvested plant material should be collected in clean containers and contact with the ground should be avoided. Do not delay transporting plant to drying facility.

Harvesting containers or tarps must be cleaned between harvest batches.

Tools should be cleaned between harvest batches.

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

➤ *Regeneration*

Propagates by seed and is very prolific.

➤ *Harvest Records*^{13, 14}.

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. CHSNC¹⁵ 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”¹⁶ can be used to document plant identity.

➤ *Preparation for Drying*

As the leaves are spread on racks for drying ensure that no other plants have been included in the harvest. No roots should be included. Plantain leaves must be handled gently to avoid bruising which will result in blackening of the leaves as they dry. The leaves must not be washed prior to drying.

➤ *Drying*

The leaves should be spread out thinly and gently 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. The leaves of *P. major* are quite thick and fleshy and need to be dried quickly to avoid fading. If they are dried too slowly they are subject to remoistening and will discolour badly. The fleshy leaf stalks are the slowest part of the leaf to dry and the level of dryness can be deceptive¹⁷.

Drying outside, or with no heat will tend to result in browning¹⁸. The leaves should be crisp, but not brittle when dry.

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 animals¹⁹.

Drying racks must be cleaned between harvest batches.

➤ *Processing*

Chaff cutting is not an option as too much flower stalk would be included if the flower stalks have been harvested with the leaves. Cut and sift to ½ inch for tea grade²⁰.

➤ *Storage*

Plantain does not contain volatile oils therefore it can be baled or stored in 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. The level of dryness can be difficult to determine, so it is important to check moisture levels a week or two after processing²¹.

Each harvest batch must be stored in a clean storage container, which must be labeled appropriately with the name of the plant, quantity and the code applied at harvesting. Details of any problems that occurred during storage (e.g. Loss of heat, overheating, insect infestation in building etc.) 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 animals²². The storage area should be heated to avoid damp and mould, but not at high temperatures as degradation of the product will occur.

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

No toxicity or safety concerns for harvesters. Plantain may cause seasonal allergies²³.

➤ *Extraction Techniques*

[Tincture, Fluid Extract, Encapsulation, Infusion and Decoction and Cataplasm](#) are all used.

The fresh herb is commercially juiced.

➤ *Identification of Commercial Finished Product*

German pharmacopoeial grade plantain herb consists of the whole or cut, dried aerial parts of *P. lanceolata* L. It may contain no more than 5% dark-brown to blackish-brown fragments and no more than 2% other foreign matter. The pulverized dried herb must have a swelling index of not less than 6. Botanical identity must be confirmed by thin-layer chromatography (TLC), macroscopic and microscopic examinations, and organoleptic evaluation (DAB 10, 1991–1996). The Swiss pharmacopoeia requires that it contain not less than 30% water-soluble extractive and not more than 10% discolored and brown leaves (Ph.Helv.VII, 1987; Wichtl and Bisset, 1994)²⁴.

Macroscopical: Pieces of folded, brittle, dull grey-green leaves. Pieces of grooved winged petiole²⁵.

In Germany, Plantain is official in the *German Pharmacopoeia*, approved in the Commission E monographs, and the tea form is official in the German Standard License monograph²⁶.

➤ *Official Monographs*

English language monographs:

British Herbal Pharmacopoeia²⁷

Commission E Monographs²⁸

E/S/C/O/P Monographs²⁹

European Pharmacopoeia³⁰

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 Canada³¹. The Soil Association (organic certifying body in the UK) has standards for Wild Harvesting which 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 Association³².

➤ *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.³³

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*

Toxic reactions due to adulteration with digitalis³⁴ occurred in 1997. This occurred due to misidentification of the plant. *Plantago major* and *Plantago lanceolata* usually grow interspersed with other plants and there are a number of broad-leafed plants that could be mistaken for *Plantago major* particularly when plants are young. It is also possible to mistake members of the Lily family for *Plantago lanceolata*. It is therefore important that *Plantago major* and *Plantago lanceolata* are picked when they are flowering to avoid misidentification.

Plantago major and *lanceolata* both grow on sites that could be contaminated, so care should be taken to ensure that the harvest site is free from contamination – see above.

¹ B.C. Ministry of Agriculture and Lands. Pest Management. Available at: <http://www.agf.gov.bc.ca/cropprot/weedguid/plantain.htm>

² Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

³ Pojar, J., Mackinnon, A. *Plants of Coastal British Columbia*. Vancouver: Lone Pine Publishing. 1994.

⁴ Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.

⁵ Blumenthal, M. Industry Alert: Plantain Adulterated with Digitalis. *HerbalGram*.40:28-29. American Botanical Council. 1997.

⁶ Blumenthal et al. editors. *Herbal Medicine: Expanded Commission E Monographs*. Boston (MA): Integrative Medicine Communications; Available at: http://www.herbalgram.org/default.asp?c=herbal_medicine_online 2000.

⁷ *British Herbal Pharmacopoeia*. British Herbal Medicine Association. 1983.

⁸ 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>

⁹ 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.

¹⁰ Soil Association Wild Harvesting Standards. Soil Association UK, Bristol House, 40-56 Victoria Street, Bristol, BS1 6BY, UK. Available at: <http://www.soilassociation.org>

APPENDIX 2

- ¹¹ 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>>.
- ¹² Soil Association Wild Harvesting Standards. Soil Association UK, Bristol House, 40-56 Victoria Street , Bristol, BS1 6BY, UK. Available at: <http://www.soilassociation.org>
- ¹³ IMO (Institute for Marketecology) and Klaus Durbeck Consulting. 2005. *Guidance Manual for Organic Collection of Wild Plants*. Switzerland: SIPPO
- ¹⁴ Canadian Herb Spice and Natural Health Products Coalition. *A Good Agricultural Practice Workbook*. DRAFT. Version 1/2005. Available from: www.nationalherbspice.com
- ¹⁵ Canadian Herb Spice and Natural Health Products Industry. *A Good Agricultural Practice Workbook*. DRAFT. Available from: www.nationalherbspice.com
- ¹⁶ 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>>.
- ¹⁷ Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.
- ¹⁸ Miller, R. *The Potential of Herbs as a Cash Crop*. Missouri: Acres 1985.
- ¹⁹ Harnischfeger, G. Proposed Guidelines for Commercial Collection of Medicinal Plant Material. *Journal of Herbs, Spices and Medicinal Plants*. Vol 7(1). Haworth Press. 2000
- ²⁰ Miller, R. *The Potential of Herbs as a Cash Crop*. Missouri: Acres 1985
- ²¹ Whitten, G. *Herbal Harvest. Commercial organic production of quality dried herbs*. Melbourne, Australia: Bloomings Books. 1997.
- ²² Harnischfeger, G. Proposed Guidelines for Commercial Collection of Medicinal Plant Material. *Journal of Herbs, Spices and Medicinal Plants*. Vol 7(1). Haworth Press. 2000
- ²³ Silny W, Kuchta D, Siatecka D, Silny P. Antigen specific immunoglobulin E to grass and weed pollens in the plasma of patients with seasonal allergic rhinitis. *Otolaryngol Pol*. 53(1):55-8. 1999.
- ²⁴ Blumenthal et al. editors. *Herbal Medicine: Expanded Commission E Monographs*. Boston (MA): Integrative Medicine Communications; Available online at: http://www.herbalgram.org/default.asp?c=herbal_medicine_online 2000
- ²⁵ British Herbal Pharmacopoeia. British Herbal Medicine Association. 1983.
- ²⁶ Blumenthal et al. editors. *Herbal Medicine: Expanded Commission E Monographs*. Boston (MA): Integrative Medicine Communications; Available online at: http://www.herbalgram.org/default.asp?c=herbal_medicine_online 2000
- ²⁷ British Herbal Pharmacopoeia 1983. British Herbal Medicine Association
- ²⁸ Blumenthal M, Goldberg A, Brinkmann J, editors. *Herbal Medicine: Expanded Commission E Monographs*. Boston (MA): Integrative Medicine Communications; Available online at: http://www.herbalgram.org/default.asp?c=herbal_medicine_online 2000
- ²⁹ *E/S/C/O/P Monographs: The Scientific Foundation for Herbal Medicinal Products, 2nd ed*. Published by ESCOP, the European Scientific Cooperative on Phytotherapy: Exeter, UK, in collaboration with Georg Thieme Verlag, Stuttgart, Germany, and Thieme New York. 2003
- ³⁰ European Directorate for the Quality of Medicines. European Pharmacopoeia 5th Edition. <http://www.pheur.org/>
- ³¹ Pacific Agriculture Certification Society. Available at <http://www.certifiedorganic.bc.ca/cb/pacs.php>. Pers. communications

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³² Soil Association UK, Bristol House, 40-56 Victoria Street , Bristol, BS1 6BY, UK. Available at: <http://www.soilassociation.org>

³³ British Columbia Ministry of Forests and Range. Guidelines for Collecting Non-Timber Forest Products in the Cascades Forest District. Available at: http://www.for.gov.bc.ca/dcs/General/nontimber_forest_products.htm 2006.

³⁴ Blumenthal, M. Industry Alert: Plantain Adulterated with Digitalis *HerbalGram*. 40:28-29. American Botanical Council 1997.

Photos of *Plantago lanceolata* and *Plantago major* with kind permission of Henriette Kress.
Researched and compiled by Amanda Howe MSc. MNIMH