Status: Currently Official on 16-Feb-2025
Official Date: Official as of 01-Aug-2017
Document Type: USP Monographs
DocId: GUID-957C06F1-EE10-470C-8560-7E9752369084_1_en-US
DOI: https://doi.org/10.31003/USPNF_M65990_01_01
DOI Ref: 7nk0d

Podophyllum

DEFINITION

Podophyllum consists of the dried rhizomes and roots of *Podophyllum peltatum* L. (Fam. Berberidaceae). It yields NLT 5.0% of podophyllum resin.

ASSAY

• **Procedure**

Sample: 10 g of Podophyllum, in fine powder

Analysis: Place the *Sample* in a 125-mL conical flask, add 35 mL of alcohol, and reflux on a steam bath for 3 h. Transfer the mixture to a small percolator, and percolate slowly with warm alcohol until the percolate measures 95 mL. Cool, add sufficient alcohol to the percolate to measure 100.0 mL, and mix. Transfer 10.0 mL of this percolate to a separator, and add 10 mL each of chloroform and dilute hydrochloric acid (7:500). Shake the mixture, allow it to separate, draw off the alcohol–chloroform layer into a second separator, and wash the acid layer with three 15-mL portions of a mixture of chloroform and alcohol (2:1), adding the washings to the second separator. Add 10 mL of dilute hydrochloric acid (7:500) to the combined extract and washings, again shake the mixture, allow it to separate, and draw off the alcohol–chloroform layer into a tared vessel. Wash the acid layer three times with 15-mL portions of the alcohol–chloroform mixture, adding the washings to the tared vessel. Evaporate the combined extracts on a steam bath to approximately 1 mL, add 5 mL of dehydrated alcohol, again evaporate to dryness, and dry the residue at 80° for 4 h. The weight of this residue is the weight of resin in 1 g of the Podophyllum taken.

Acceptance criteria: NLT 5.0% of podophyllum resin

CONTAMINANTS

• **Articles of Botanical Origin** ⟨561⟩, *Methods of Analysis*, *Acid-Insoluble Ash*: NMT 2.0%

• **Articles of Botanical Origin** ⟨561⟩, *Methods of Analysis*, *Foreign Organic Matter*: NMT 2.0%

• **Articles of Botanical Origin** ⟨561⟩, *Pesticide Residue Analysis*: Meets the requirements

SPECIFIC TESTS

• **Botanical Characteristics**

Macroscopic: Consists of nearly cylindrical rhizomes, jointed, compressed or flattened somewhat on upper and lower surfaces, and sometimes branched. It occurs as pieces of rhizome up to 20 cm in length, with internodes 2–9 mm in diameter, some of the nodes being somewhat thickened. The rhizome is dusky red to light yellowish brown, longitudinally wrinkled or nearly smooth, with irregular, somewhat V-shaped scars of scale leaves; some of the nodes are annulate, the upper portion having large, circular, depressed stem-scars and buds or stem-bases. On the lower portion there are numerous root-scars or roots, the latter 2–7 cm in length and 2 mm in thickness. The fracture is short and weak, the fractured surface being yellowish orange to pale yellow or grayish white.

Microscopic: The rhizome shows an outer portion consisting of a brown epidermis, often necrosed, and 1–3 layers of brown to olive-brown suberized cells; a cortex 20 cells in width, consisting chiefly of nearly isodiametric cells, the cells containing single or compound starch grains and resin masses and, in scattered cells of the nodes, rosette aggregates of calcium oxalate; a circle of 16–34 open collateral vascular bundles, separated by rather wide medullary rays, each bundle containing a few lignified vessels, a more or less distinct cambium, and a rather large phloem. The pith is large, the cells being more or less rounded and containing starch grains and reddish-brown resin masses. The roots show an epidermal layer of brownish suberized cells and a single row of hypodermal cells; a broad cortex of thin-walled nearly isodiametric cells; a distinct endodermis of tangentially elongated cells having uniformly thickened walls; and a 4- to 7-rayed vascular bundle.

Powdered Podophyllum: It is pale brown to weak yellow and has a slight odor. It contains numerous starch grains, simple or 2- to 6-compound, the individual grains being spheroidal, plano- to angular-convex, or polygonal, up to 20 µm in diameter; occasional rosette aggregates of calcium oxalate, up to 80 µm in diameter; vessels with simple pits or reticulate thickenings; fragments of starch- and resin-bearing parenchyma and reddish-brown to yellow cork cells.

Indian podophyllum: *Podophyllum peltatum* is differentiated from *Podophyllum hexandrum* Royle (Indian podophyllum) by the reaction described in the test for *Distinction from resin of Indian podophyllum* in Podophyllum Resin. [NOTE—Distinction from resin of Indian podophyllum.]

Sample: 400 mg

Analysis: Add the *Sample* to 3 mL of 60% alcohol, then add 0.5 mL of 1 N potassium hydroxide, shake the mixture gently, and allow to stand for 2 h.

Acceptance criteria: The solution does not gelatinize.

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
PODOPHYLLUM	Nam-Cheol Kim Scientific Liaison	BDSHM2020 Botanical Dietary Supplements and Herbal Medicines
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Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 42(2)

Current DocID: GUID-957C06F1-EE10-470C-8560-7E9752369084_1_en-US
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