In vitro Plant-tech

Greater Plantain (*Plantago major L.*) Plant Stem Cell Extract

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Greater Plantain a Powerful Wound Healing Plant

Greater plantain (*Plantago major L.*), also called healing blade or white man's footprint, is a perennial plant with elliptic shaped leaves [1,2]. The plant was originally distributed in Northern Europe and Central Asia, but can today be found in may parts of the world. The names plantain and *Plantago* originates from the Latin word *planta*, meaning footprint.

P. major is an old medicinal plant well known for its wound healing properties[1,3]. It was described during the 1st century AD by the Greek physician Dioscorides and was used by the Vikings. The plant is also used to treat skin diseases[3], due to anti-inflammatory[2,3], antibacterial[2], antiviral[3], analgesic[2,3], antioxidant[2,3] and antibiotic properties[2]. In addition, some of its triterpenoids has been shown to increase the concentration of ceramides and collagen in skin cells[5].

New Production of Extract

In vitro Plant-tech is producing plant extracts by sustainable bioreactor based cultivation of plant cells. This production method does not deplete the natural populations and uses less water than field cultivation. Furthermore, bioreactor based cultivation enables production of uniform, high quality plant material, free from pests, hazardous chemicals and unwanted plant species.

* **DPPH** assay, is a spectrophotometric analysis method based on reduction of the colorimetric 2,2'-diphenyl-1-picrylhydrazyl (DPPH) reagent.
** **Scavenging activity** of the extract is correlated with the antioxidant activity and is quantified as EC50. EC50 value refers to how many mg extract that is required for a 50% decrease in absorbance of a DPPH solution.
*** **HPLC** (high performance liquid chromatography) is a powerful analysis methods allowing separation, characterisation and quantification of organic molecules and ions.

Plant Stem Cell Extracts

Our extracts are derived from plant stem cells. A plant stem cell is an undifferentiated precursor cell (callus cell), which has not yet started to differentiate. Our plant stem cells are produced in bioreactors under controlled laboratory conditions, resulting in high quality products. The extracts originating from plant stem cells are becoming increasingly popular to use as an active ingredient, especially within cosmetics. An active ingredient has a biological beneficial effect. The substances produced will vary between plant species and within different organs of the plant. By selecting plant stem cell extracts and materials from plants which have a traditional beneficial use within wound healing, skin care and/or as health supplements, we believe that the beneficial effect of the plant stem cell technology can be even greater.

Antioxidant Properties

We are confirming the antioxidant activity of our plant stem cell extracts using the DPPH* assay. Through this method the free radical scavenging activity of a given substance is determined. We standardize our extracts to the total phenolic content and scavenging activity**.

The metabolic profile of our extract is verified by HPLC*** to assure the highest quality and reproducible composition of our products.

[1] Anderberg (2005) Den virtuella floran. Naturhistoriska museet. Hämtad från: http://linnaeus.nrm.se/flora/di/plantagina/plant/planmaj.html
[2] Zubair (2012) Doctoral Thesis, SLU, http://pub.epsilon.slu.se/8685/1/zubair_m_120402.pdf .
[3] Samuelsen (2000) J of Ethnopharm., 71, 1-21 .
[4] Chiang et al. (2003) Planta Med., 69, 600-604 .
[5] Yarosh et al. (2000), Horm. Res., 54, 318–321.

In vitro cultivated Plantago major

PRODUCT SPECIFICATION

INCI: Plantago Major Callus Extract
Botanical name: *Plantago major L.*
Description: Extract obtained from *in vitro* produced greater plantain plant stem cells
Plant part used: Plant stem cell (undifferentiated cell)
Extraction solvent: Ethanol/water
Composition: 10% dried natural extract in glycerol OR maltodextrin
Appearance: viscous liquid OR powder
Country of origin: Sweden

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