

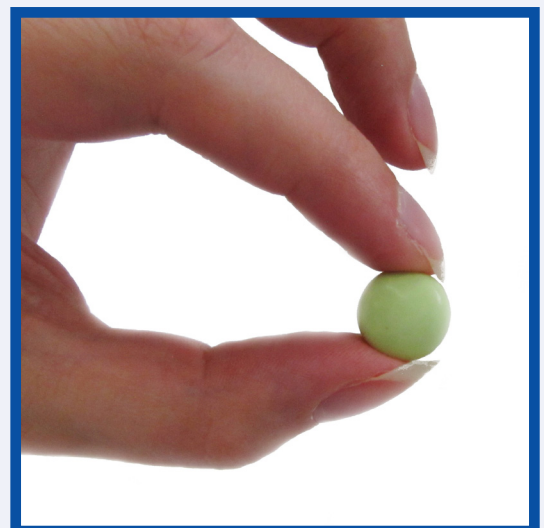
# E/S/C/O/P MONOGRAPHS

ONLINE  
SERIES

The Scientific Foundation for Herbal Medicinal Products

**Althaeae radix**  
Marshmallow Root

2019



**E/S/C/O/P**  
EUROPEAN SCIENTIFIC COOPERATIVE  
ON PHYTOTHERAPY

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**MONOGRAPHS**

*The Scientific Foundation for*  
**Herbal Medicinal Products**

**ALTHAEAE RADIX**  
**Marshmallow Root**

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### **Althaeae radix - Marshmallow Root**

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Plant illustrated on the cover: *Althaea officinalis*

## FOREWORD

It is a great pleasure for me to introduce the online era of ESCOP Monographs. Interest in herbal medicinal products continues to stimulate research on herbal substances and the body of knowledge in this field is steadily growing. ESCOP takes account of this by preparing new monographs and - as the only organisation in the field at the moment - particularly through regular revision of our published monographs. In order to provide readers and authorities with balanced compilations of scientific data as rapidly as possible, ESCOP Monographs will be published online from now on. This contemporary way of publishing adds further momentum to ESCOP's endeavours in the harmonization of European standards for herbal medicinal products.

The Board of ESCOP wishes to express its sincere gratitude to the members of the Scientific Committee, external experts and supervising editors, and to Peter Bradley, the final editor of every monograph published up to March 2011. All have voluntarily contributed their time and scientific expertise to ensure the high standard of the monographs.

**Dr. Tankred Wegener**  
*Chair of the Board of ESCOP*

## PREFACE

Over the 15 years since ESCOP published its first monographs, initially as loose-leaf documents then as two hardback books, ESCOP Monographs have achieved a reputation for well-researched, comprehensive yet concise summaries of available scientific data pertaining to the efficacy and safety of herbal medicinal products. The Second Edition, published in 2003 with a Supplement in 2009, covered a total of 107 herbal substances.

The monograph texts are prepared in the demanding format of the Summary of Product Characteristics (SPC), a standard document required in every application to market a medicinal product for human use within the European Union and ultimately providing information for prescribers and users of individual products.

As a change in style, literature references are now denoted by the name of the first author and year of publication instead of reference numbers; consequently, citations at the end of a monograph are now in alphabetical order. This is intended to give the reader a little more information and perspective when reading the text.

Detailed work in studying the pertinent scientific literature and compiling draft monographs relies to a large extent on the knowledge, skills and dedication of individual project leaders within ESCOP Scientific Committee, as well as invited experts. After discussion and provisional acceptance by the Committee, draft monographs are appraised by an eminent Board of Supervising Editors and all comments are taken into account before final editing and approval. In this way a wide degree of consensus is achieved, but it is a time-consuming process.

To accelerate the publication of new and revised monographs ESCOP has therefore decided to publish them as an online series only, commencing in 2011. We trust that rapid online access will prove helpful and convenient to all users of ESCOP Monographs.

As always, ESCOP is indebted to the many contributors involved in the preparation of monographs, as well as to those who provide administrative assistance and hospitality to keep the enterprise running smoothly; our grateful thanks to them all.

## NOTES FOR THE READER

From 2011 new and revised *ESCOP Monographs* are published as an online series only. Earlier monographs are available in two books, *ESCOP Monographs Second Edition (2003)* and the *Second Edition Supplement 2009*, but are not available online for copyright reasons.

After purchase of a single monograph, the specific items to be downloaded are:

- Front cover
- Title page
- Verso
- Foreword and Preface
- Notes for the Reader
- Abbreviations
- The monograph text
- Back cover

Information on the member organizations and people involved in ESCOP's activities can be found on the website ([www.escop.com](http://www.escop.com)):

- Members of ESCOP
- Board of Supervising Editors
- ESCOP Scientific Committee
- Board of Directors of ESCOP

## ABBREVIATIONS used in ESCOP monographs

AA	arachidonic acid
ABTS	2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid)
ACE	angiotensin converting enzyme
ADP	adenosine diphosphate
ALAT or ALT	alanine aminotransferase (= SGPT or GPT)
ALP	alkaline phosphatase
anti-IgE	anti-immunoglobulin E
ASA	acetylsalicylic acid
ASAT or AST	aspartate aminotransferase (= SGOT or GOT)
ATP	adenosine triphosphate
AUC	area under the concentration-time curve
BMI	body mass index
BPH	benign prostatic hyperplasia
b.w.	body weight
cAMP	cyclic adenosine monophosphate
CI	confidence interval
CCl <sub>4</sub>	carbon tetrachloride
C <sub>max</sub>	maximum concentration of a substance in serum
CNS	central nervous system
CoA	coenzyme A
COX	cyclooxygenase
CSF	colony stimulating factor
CVI	chronic venous insufficiency
CYP	cytochrome P450
d	day
DER	drug-to-extract ratio
DHT	dihydrotestosterone
DMSO	dimethyl sulfoxide
DNA	deoxyribonucleic acid
DPPH	diphenylpicrylhydrazyl
DSM	Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association)
ECG	electrocardiogram
ED <sub>50</sub>	effective dose in 50% of cases
EDTA	ethylenediamine tetraacetate
EEG	electroencephalogram
EMA	European Medicines Agency
ENT	ear, nose and throat
ER	oestrogen receptor
ERE	oestrogen-responsive element
FSH	follicle-stimulating hormone
GABA	gamma-aminobutyric acid
Gal	galactose
GFR	glomerular filtration rate
GGTP	gamma-glutamyl transpeptidase
GOT	glutamate oxalacetate transaminase (= SGOT)
GPT	glutamate pyruvate transaminase (= SGPT)
GSH	glutathione (reduced)
GSSG	glutathione (oxidised)
HAMA	Hamilton Anxiety Scale
12-HETE	12-hydroxy-5,8,10,14-eicosatetraenoic acid
HDL	high density lipoprotein
HIV	human immunodeficiency virus
HMPC	Committee on Herbal Medicinal Products (of the EMA)
HPLC	high-performance liquid chromatography
5-HT	5-hydroxytryptamine (= serotonin)
IC <sub>50</sub>	concentration leading to 50% inhibition
ICD-10	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision
ICH	The International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use
ICSD	International Classification of Sleep Disorders
IFN	interferon
IL	interleukin
i.m.	intramuscular
iNOS	inducible nitric oxide synthase

INR	International Normalized Ratio, a measure of blood coagulation (clotting) tendency
i.p.	intraperitoneal
IPSS	International Prostate Symptom Score
i.v.	intravenous
kD	kiloDalton
KM Index	Kuppermann Menopausal Index
kPa	kiloPascal
LC-MS	liquid chromatography-mass spectrometry
LD <sub>50</sub>	the dose lethal to 50% of animals tested
LDH	lactate dehydrogenase
LDL	low density lipoprotein
LH	luteinizing hormone
5-LOX	5-lipoxygenase
LPS	lipopolysaccharide
LTB <sub>4</sub>	leukotriene B <sub>4</sub>
M	molar (concentration)
MAO	monoamine oxidase
MBC	minimum bactericidal concentration
MDA	malondialdehyde
MFC	minimum fungicidal concentration
MIC	minimum inhibitory concentration
Mr	molecular
MRS	Menopause Rating Scale
MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
MTD	maximum tolerated dose
MTT	3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
MW	molecular weight
NBT	nitro blue tetrazolium
NF-κB	necrosis factor kappa-B
NO	nitric oxide
NOS	nitric oxide synthase
n.s.	not significant
NSAID	non-steroidal anti-inflammatory drug
ovx	ovariectomy or ovariectomized
ORAC	oxygen radical absorbance capacity
PA	pyrrolizidine alkaloid
PAF	platelet activating factor
PCR	polymerase chain reaction
PEG	polyethylene glycol
PGE	prostaglandin E
Pgp	P-glycoprotein
PHA	phythaemagglutinin
p.o.	per os
POMS	profile of mood states
PVPP	polyvinylpyrrolidone
RANKL	receptor activator of nuclear factor kappa-B ligand
RNA	ribonucleic acid
RT-PCR	reverse transcription polymerase chain reaction
s.c.	subcutaneous
SCI	spinal cord injury
SERM	selective oestrogen receptor modulator
SGOT or GOT	serum glutamate oxalacetate transaminase (= ASAT or AST)
SGPT or GPT	serum glutamate pyruvate transaminase (= ALAT or ALT)
SHBG	sex hormone binding globulin
SOD	superoxide dismutase
SSRI	selective serotonin reuptake inhibitor
STAI	state-trait anxiety inventory
t <sub>1/2</sub>	elimination half-life
TBARS	thiobarbituric acid reactive substances
TC	total cholesterol
TGF-β	transforming growth factor-beta
TNF	tumour necrosis factor
TPA	12-O-tetradecanoylphorbol-13-acetate
URT	upper respiratory tract
URTI	upper respiratory tract infection
UTI	urinary tract infection
VAS	visual analogue scale
VLDL	very low density lipoprotein

## Marshmallow Root

### DEFINITION

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Marshmallow root consists of the peeled or unpeeled, whole or cut, dried root of *Althaea officinalis* L. It has a swelling index of minimum 10, determined on the powdered herbal drug.

The material complies with the monograph of the European Pharmacopoeia [Marshmallow Root].

### CONSTITUENTS

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Characteristic constituents of the dried root are mucilage polysaccharides (from 5% up to 20% in late autumn and winter, in biennial roots), consisting of rhamnogalacturonans ( $\leq 30\%$ ), arabinans, glucans and arabinogalactans [Franz 1966; Karawya 1971; Tomoda 1977; Tomoda 1980; Capek 1983; Akhtardzhiev 1984; Rosík 1984; Capek 1984; Shimizu 1985; Capek 1987; Capek 1988; Evans 1996; Nosalova 2005; Blaschek 2014]. The mucilage can withstand temperatures of 40-60°C [Franz 1990].

Other constituents include flavone glycosides (ca. 0.2% as aglycones) [Gudej 1990; Shah 2011], mainly isoscutellarein 4'-methyl ether 8-glucoside-2''-sulphate, 4 sulfated hypolaetin-glucosides, phenolic acids, the coumarin scopoletin, fatty acids: linolenic acid (omega 3) and hexadecanoic acid [Gudej 1991; Ninov 1992; Valiei 2011; Sendker 2017], starch, pectin [Evans 1996; Blaschek 2014] and tannins [Bieloszabska 1966].

### CLINICAL PARTICULARS

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#### Therapeutic indications

a) Dry cough; irritation of the oral or pharyngeal mucosa [Braun 1987; Weiss 1991; Bradley 1992; Bone 1993; Barnes 2002; Sweetman 2002; Schulz 2004; Fasse 2005; Rouhi 2007; Wichtl 2009; Blaschek 2014].

b) For symptomatic relief of mild gastrointestinal discomfort and irritation of the gastric mucosa [Villar 1984; Schilcher 2003; Bäumlner 2007; Blaschek 2014].

In these indications, efficacy is plausible on the basis of human experience and long-standing use.

#### Posology and method of administration

##### Dosage

##### a) Internal use for dry cough and irritation of the oral mucosa.

*Adult single and daily dose:*

- 0.5-3 g herbal substance as an aqueous cold macerate\* (several times daily up to an equivalent of 15 g of the drug).
- 10 ml of syrup (DER 1:20), repeated up to 6 times daily [Bradley 1992; Schilcher 2003; Schulz 2004; Wichtl 2009; Blaschek 2014].

*Daily dose for children, between 6 and 12 years of age, for dry cough:*

- 0.5-1.5 g as a macerate\*, up to 3 times daily.
- 5-10 ml of syrup (DER 1:20), up to 4-6 times daily. [Weiss 1999; Schilcher 2003; Fasse 2005].

*Daily dose for children, between 3 and 6 years of age, for dry cough:*

- 0.5-1 g as a macerate\*, up to 3 times daily.
- 2.5-5 ml of syrup (DER 1:20), up to 4-6 times daily. [Weiss 1999; Schilcher 2003; Fasse 2005].



**b) Internal use for gastrointestinal irritation.****Adult single and daily dose:**

- 3-5 g herbal substance, as an aqueous cold macerate\*, up to 3 times daily [Bradley 1992; Schilcher 2003; Wichtl 2009].

\* To make a macerate pour 150 ml of water (max. temp. 40°C) over one dose of comminuted marshmallow root. Steep for 30 min., stirring frequently. The filtered macerate should be used immediately after preparation.

**Method of administration**

For oral administration.

**Duration of administration**

If symptoms persist or worsen, medical advice should be sought.

**Contraindications**

None known.

**Special warnings and special precautions for use**

For dry cough: the use in children under 3 years of age is not recommended [Fasse 2005].

**Interaction with other medicinal products and other forms of interaction**

The absorption of other drugs taken simultaneously may be retarded [Barnes 2002; Blaschek 2014]. As a precaution, marshmallow root should be taken ½ to 1 hour before or 2 hours after intake of other medicinal products.

**Pregnancy and lactation**

No data available. In accordance with general medical practice, the product should not be used during pregnancy and lactation, without medical advice.

**Effects on ability to drive and use machines**

None known.

**Undesirable effects**

None reported.

**Overdose**

No case of overdose reported.

**PHARMACOLOGICAL PROPERTIES****Pharmacodynamic properties**

The mucilage from marshmallow root covers the mucosa, especially of the mouth and pharynx, and the gastric mucosa, protecting them from local irritation [Meyer 1956; Müller-Limmroth 1980; Braun 1987; Franz 1989; Weiss 1999; Schulz 2004; Wichtl 2009; Shah 2011; Blaschek 2014].

**In vitro experiments****Antimicrobial activity**

A dry methanol extract (15 g extracted, filtered and evaporated) demonstrated significant antibacterial activity against periodontal pathogenic bacteria resident in the oral cavity (*Porphyromonas gingivalis*, *Prevotella* spp., *Actinomyces* spp.). The MIC for 9/12 strains was  $\leq 3125$  mg/L [Iauk 2003].

Antimicrobial activity against *Pseudomonas aeruginosa*, *Proteus vulgaris* and *Staphylococcus aureus* has been documented for chloroform and methanol extracts of marshmallow root [Recio 1989].

Good antimicrobial activity was reported for hexane extracts containing mainly fatty acids and hexadecanoic acid methylester. The strongest antibacterial effects, by zone of inhibition (mm), were demonstrated for *Bacillus subtilis* (18.9 mm), *Staphylococcus aureus* (16.8 mm), *S. epidermidis* (17.3 mm) and *Escherichia coli* (16.0 mm). Antifungal effects were observed against *Candida albicans* (14.7 mm) and *Saccharomyces cerevisiae* (14.7 mm) [Valiei 2011].

**Protection of mucilage**

Mucociliary transport in isolated, ciliated epithelium of the frog oesophagus was inhibited up to 17% by 200 µl of a cold, 30-minute macerate of marshmallow root (6.4 g/140 ml) [Müller-Limmroth 1980].

In a study of the bioadhesive effects of purified polysaccharides (>95%) on isolated porcine buccal membranes, polysaccharides from marshmallow root showed dose dependent moderate adhesion to epithelial tissue [Schmidgall 2000].

A dried cold aqueous extract (100 g powdered root yielding 9.9 g (w/w) dry extract), at 10 µg/ml, stimulated cell viability (marginally) and proliferation (significantly,  $p < 0.01$ ) of human epithelial cells. Isolated polysaccharides, at 10 µg/ml, significantly ( $p < 0.01$ ) increased cell viability but not proliferation. Primary dermal human fibroblasts were not stimulated by the extract or the polysaccharides. Fluorescence-labelled-polysaccharides were detected inside epithelial cells with detectable changes in cell physiology. The fibroblasts did not demonstrate any internalisation, but were found to be covered with a bioadhesive layer of polysaccharides [Deters 2010].

A 50% methanolic extract, depleted of high molecular weight material by alcohol precipitation, yielded 8.1% plant material (relative to the dried drug) in a raw extract. This low molecular weight raw extract contained, among others, flavonoid glycosides, four hypolaetin glycosides and coumarins. The raw extract inhibited human hyaluronidase-1 activity (expressed on *E. coli*) and hyaluronidase mRNA expression in keratinocytes (representing skin and mucosal epithelial cells) at 125 and 250 µg/ml [Sendker 2017].

The bioadhesive properties of 2 mucopolysaccharide-containing aqueous marshmallow root extracts, added to 2 commercial cough syrups (syrup 1: 2.5 g extract (DER: 7-9:1) in 100 ml syrup; syrup 2: 35.6 g extract (DER: 1:19.5-23.5) in 100 g syrup), were investigated in isolated porcine buccal mucosa (attached to glass plates) kept humid by artificial saliva, which was also used as a control solution. The positive adherence of these 2 syrups (coloured with eosin) to porcine mucosa was demonstrated by measuring a reduction in flow-velocity (6% flow for syrup 1; 25% flow for syrup 2) compared to the control solution which did not demonstrate any adhesive properties (100% flow). A subsequent experiment, using the same 2 marshmallow extract-containing syrups and an identical mucosal test system, measured inhibition of caffeine transport through the mucosa (a protective property). Both syrups inhibited caffeine transport: syrup 1 by 30% and syrup 2 by 10%; compared to 100% transport of caffeine alone. A control marshmallow extract (DER: 7-9:1) showed only slight inhibition, indicating that the galenic composition of the syrup supports the inhibitory activity of the marshmallow polysaccharides [Appel 2018].

**Immunological activity and effects on melanocytes and keratinocytes**

An acidic polysaccharide isolated from marshmallow root, althaea-mucilage O, exhibited weak anti-complement activity (alternative route) in normal human serum at concentrations of 100-1000 µg/ml [Yamada 1985].

A filtered extract (dissolved in 45% 1,3-butylene glycol) was found to inhibit intracellular calcium mobilization in normal human melanocytes (involved in pigmentation) and to strongly inhibit endothelin-1 induced proliferation of melanocytes. The extract also reduced the secretion of endothelin-1 in normal human keratinocytes. The authors suggest that because of these effects, the extract may be a useful ingredient in a whitening agent [Kobayashi 2002].

Pronounced antioxidant activity (tests: ABTS+ radical cation scavenging assay; hypochlorous acid scavenging assay; trolox as positive control) of ethanol/water extracts (50:50 and 70:30 V/V) of marshmallow root (100 mg/ml) was found to correlate well with the phenolic and flavonoid content of the extracts [Benbassat 2013].

#### ***In vivo experiments***

Mucilaginous herbs like marshmallow root may inhibit coughing by forming a protective coating on the mucosal lining of the respiratory tract, shielding it from irritants.

#### ***Antitussive effects***

Extracts from marshmallow root and isolated mucilage polysaccharides were administered orally to cats at doses of 50 or 100 mg/kg b.w. in order to investigate their antitussive effects in comparison with controls. Both the extract and isolated polysaccharides, as well as syrupus Althaeae (1000 mg/kg), significantly diminished the intensity and amount of coughing induced by mechanical irritation [Nosalova 1992a, 1992b, 1993].

Cats (with experimentally induced cough reflex, induced by mechanical stimulation of the airway mucosa) were treated orally with either a syrup (1 g/kg b.w.), or an aqueous extract (1 g/kg), or root mucilage (prepared as a crude mixture of polysaccharides obtained by precipitation of the aqueous extract with ethanol and subsequent dialysis of the precipitate; 100 mg/kg), or with isolated rhamnogalacturonan (50 mg/kg). These were compared to commonly used cough suppressants, both a narcotic (codeine at 10 mg/kg) and a non-narcotic drug (dropropizine at 100 mg/kg). The marshmallow-derived polysaccharides exhibited impressive antitussive activity after 30 min., 1, 2 and up to 5 hours, for various cough-related parameters. Rhamnogalacturonan was 2.5 times more active than the other marshmallow preparations [Nosalova 2005].

Antitussive activity of the marshmallow polysaccharide, rhamnogalacturonan, was shown to be dose dependent (25 mg/kg and 50 mg/kg b.w.), when given orally to unsensitized guinea pigs, with experimental citric acid aerosol-induced airways inflammation. The highest oral rhamnogalacturonan dose with strong cough reflex suppressant activity was comparable to the effect of codeine at 10 mg/kg b.w. This dose suppressed the cough reflex significantly ( $p \leq 0.01$ ) up to 5 hours after application [Sutovska 2011].

#### ***Anti-inflammatory effects***

An ointment containing an aqueous marshmallow root extract (20%), applied topically to the external ear of rabbits, reduced irritation induced by ultraviolet irradiation or tetrahydrofurfuryl alcohol; the anti-inflammatory effect was less than that of an ointment containing dexamethasone (0.05%). An ointment containing both active ingredients at these levels had an anti-inflammatory effect superior to that of the individual active ingredients [Beaune 1966].

On the other hand, a dry 80%-ethanolic extract, administered orally at 100 mg/kg b.w., did not inhibit carrageenan-induced rat paw oedema [Mascolo 1987].

Hypolaetin 8-glucoside has been shown to possess anti-inflammatory activity [Alcaraz 1989; Villar 1987; Villar 1984]. When administered i.p. at 90 mg/kg b.w., it dose-dependently inhibited carrageenan-induced rat paw oedema by 74% after 3 hours ( $p < 0.01$ ) compared to 49% inhibition by phenylbutazone at the same dose. The anti-inflammatory effect of hypolaetin 8-glucoside declined more rapidly than that of phenylbutazone, but gastric erosions were only seen after phenylbutazone [Villar 1984]. Hypolaetin 8-glucoside also showed gastric anti-ulcer activity in rats [Alcaraz 1988] and was more potent than troxerutin in inhibiting histamine-induced capillary permeability in rats [Villar 1987].

#### ***Hypoglycaemic activity***

Mucilage polysaccharides isolated from marshmallow root and administered intraperitoneally to mice at doses of 10, 30 and 100 mg/kg reduced plasma glucose levels respectively to 74%, 81% and 65% of the control level after 7 hours, demonstrating significant hypoglycaemic activity [Tomoda 1987].

#### ***Phagocytic activity, immunomodulatory effect***

Isolated mucilage polysaccharides from marshmallow root, administered intraperitoneally to mice at 10 mg/kg, produced a 2.2-fold increase in phagocytic activity of macrophages in the carbon-clearance test [Wagner 1985; Hänsel 2014].

#### ***Clinical studies***

In a randomized, double-blind, placebo-controlled clinical study 63 adults suffering from dry cough, associated with angiotensin-converting enzyme inhibitors, were assessed using a cough score of 0 to 4 (0 = no cough, 1 = tickling in throat; 2 = mild cough; 3 = moderate tolerable cough; 4 = severe persistent cough). The patients were randomized to receive 20 drops 3 times per day of either a marshmallow root preparation (not further defined) or a placebo for 4 weeks. After 4 weeks the severity of cough in the marshmallow group was significantly ( $p < 0.05$ ) reduced. Eight patients in the marshmallow group showed almost complete abolition of cough, as opposed to 1 patient in the placebo group. Three patients were excluded from the study because of noncompliance with the test drug [Rouhi 2007].

In a postmarketing surveillance study, 313 children in 3 groups (0-3 y,  $n=100$ ; 3-6y,  $n=115$ ; 6-12y,  $n=98$ ) were treated 4-6 times daily with 2.5, 5 and 10 ml (according to their age group) of marshmallow root syrup (Phytohustil<sup>®</sup>; DER: 1:20). Duration of treatment was three days for  $\frac{3}{4}$  of the patients and was continued longer for the remaining  $\frac{1}{4}$  (2.2% were treated for  $< 3$  days). Three children were excluded from efficacy evaluation due to disallowed concomitant medication. The following cough symptoms were evaluated: cough intensity, cough frequency and extent of coughing periods per day. Coughing intensity and frequency as well as cough-dependent symptoms were strongly reduced after three days. Two adverse events occurred in the 0-3 age group which were not attributed to the drug. Tolerability of marshmallow root was reported as very good [Fasse 2005].

#### ***Pharmacokinetic properties***

No data available.

#### ***Preclinical safety data***

No data available.

#### ***Clinical safety data***

A total of 373 adults and children with cough were treated with various doses of marshmallow root in 2 clinical studies. In thirty patients treated with 3 x 40 mg/d marshmallow root for 4 weeks, adverse events were not reported [Rouhi 2007]. In the study with 313 children that received a marshmallow root

containing syrup (Phytohustil®; DER 1:20), for 3 days or more, one adverse event (development of obstructive bronchitis) and one serious adverse event (development of bronchopneumonia resulting in hospitalisation) occurred in the 0-3 years age group, but these were not attributed directly to the drug. The tolerability of marshmallow root was reported as very good [Fasse 2005].

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# E/S/C/O/P MONOGRAPHS

## MOST RECENT VERSIONS

Title	Common name	Publication
ABSINTHII HERBA	Wormwood	Second Edition, 2003
AGNI CASTI FRUCTUS	Agnus Castus	Second Edition, 2003
AGRIMONIAE HERBA	Agrimony	Supplement 2009
ALCHEMILLAE HERBA	Lady's Mantle	Online Series, 2013
ALLII SATIVI BULBUS	Garlic	Second Edition, 2003
ALOE BARBADENSIS	Barbados Aloes	Online Series, 2014
ALOE CAPENSIS	Cape Aloes	Online Series, 2014
ALTHAEAE RADIX	Marshmallow Root	Online Series, 2019
ANGELICAE RADIX	Angelica Root	Supplement 2009
ANISI FRUCTUS	Aniseed	Online Series, 2014
ARNICAE FLOS	Arnica Flower	Second Edition, 2003
ARCTII RADIX	Burdock Root	Online Series, 2016
BALLOTAE NIGRAE HERBA	Black Horehound	Online Series, 2015
BETULAE FOLIUM	Birch Leaf	Online Series, 2015
BOLDI FOLIUM	Boldo Leaf	Second Edition, 2003
CALENDULAE FLOS	Calendula Flower	Second Edition, 2003
CAPSICI FRUCTUS	Capsicum	Supplement 2009
CARVI FRUCTUS	Caraway Fruit	Second Edition, 2003
CARYOPHYLLI AETHEROLEUM	Clove Oil	Online Series, 2014
CENTAURII HERBA	Centaury	Online Series, 2015
CENTELLAE ASIATICAE HERBA	Centella	Supplement 2009
CHELIDONII HERBA	Greater Celandine	Second Edition, 2003
CIMICIFUGAE RHIZOMA	Black Cohosh	Online Series, 2011
CINNAMOMI CORTEX	Cinnamon	Second Edition, 2003
COLAE SEMEN	Cola	Online Series, 2014
CRATAEGI FOLIUM CUM FLORE	Hawthorn Leaf and Flower	Second Edition, 2003
CRATAEGI FRUCTUS	Hawthorn Berries	Supplement 2009
CUCURBITAE SEMEN	Pumpkin Seed	Supplement 2009
CURCUMAE LONGAE RHIZOMA	Turmeric	Second Edition, 2003
CURCUMAE XANTHORRHIZAE RHIZOMA	Javanese Turmeric	Supplement 2009
CYNARAE FOLIUM	Artichoke Leaf	Supplement 2009
ECHINACEAE ANGUSTIFOLIAE RADIX	Narrow-leaved Coneflower Root	Supplement 2009
ECHINACEAE PALLIDAE RADIX	Pale Coneflower Root	Online Series, 2018
ECHINACEAE PURPUREAE HERBA	Purple Coneflower Herb	Supplement 2009
ECHINACEAE PURPUREAE RADIX	Purple Coneflower Root	Supplement 2009
ELEUTHEROCOCCI RADIX	Eleutherococcus	Supplement 2009
EQUISETI HERBA	Equisetum stem	Online Series, 2018
EUCALYPTI AETHEROLEUM	Eucalyptus Oil	Second Edition, 2003
FILIPENDULAE ULMARIAE HERBA	Meadowsweet	Online Series, 2015
FOENICULI FRUCTUS	Fennel	Second Edition, 2003
FRANGULAE CORTEX	Frangula Bark	Online Series, 2017
FUMARIAE HERBA	Fumitory	Online Series, 2018
GENTIANAE RADIX	Gentian Root	Online Series, 2014
GINKGO FOLIUM	Ginkgo Leaf	Second Edition, 2003
GINSENG RADIX	Ginseng	Second Edition, 2003
GRAMINIS RHIZOMA	Couch Grass Rhizome	Online Series, 2016
GRINDELIAE HERBA	Grindelia	Online Series, 2015
HAMAMELIDIS AQUA	Hamamelis Water	Online Series, 2012
HAMAMELIDIS CORTEX	Hamamelis Bark	Online Series, 2012
HAMAMELIDIS FOLIUM	Hamamelis Leaf	Online Series, 2012
HARPAGOPHYTI RADIX	Devil's Claw Root	Supplement 2009
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HIPPOCASTANI SEMEN	Horse-chestnut Seed	Second Edition, 2003
HYDRASTIS RHIZOMA	Goldenseal rhizome	Online Series, 2013
HYPERICI HERBA	St. John's Wort	Online Series, 2018
JUNIPERI PSEUDO-FRUCTUS	Juniper	Second Edition, 2003
LAVANDULAE FLOS/AETHEROLEUM	Lavender Flower/Oil	Supplement 2009
LICHEN ISLANDICUS	Iceland Moss	Second Edition, 2003

LINI SEMEN	Linseed	Online Series, 2017
LIQUIRITIAE RADIX	Liquorice Root	Second Edition, 2003
LUPULI FLOS	Hop Strobile	Second Edition, 2003
MALVAE FLOS	Mallow Flower	Online Series, 2016
MARRUBII HERBA	White horehound	Online Series, 2013
MATRICARIAE FLOS	Matricaria Flower	Second Edition, 2003
MELALEUCAE AETHEROLEUM	Tea Tree Oil	Supplement 2009
MELILOTI HERBA	Melilot	Second Edition, 2003
MELISSAE FOLIUM	Melissa Leaf	Online Series, 2013
MENTHAE PIPERITAE AETHEROLEUM	Peppermint Oil	Second Edition, 2003
MENTHAE PIPERITAE FOLIUM	Peppermint Leaf	Second Edition, 2003
MENYANTHIDIS TRIFOLIATAE FOLIUM	Bogbean Leaf	Online Series, 2013
MILLEFOLII HERBA	Yarrow	Supplement 2009
MYRRHA	Myrrh	Online Series, 2014
MYRTILLI FRUCTUS	Bilberry Fruit	Online Series, 2014
OLIBANUM INDICUM	Indian Frankincense	Supplement 2009
ONONIDIS RADIX	Restharrow Root	Online Series, 2015
ORTHOSIPHONIS FOLIUM	Java Tea	Online Series, 2014
PASSIFLOAE HERBA	Passion Flower	Second Edition, 2003
PAULLINIAE SEMEN	Guarana Seed	Supplement 2009
PELARGONII RADIX	Pelargonium Root	Online Series, 2015
PIPERIS METHYSTICI RHIZOMA	Kava-Kava	Second Edition, 2003
PLANTAGINIS LANCEOLATAE FOLIUM/HERBA	Ribwort Plantain Leaf/Herb	Online Series, 2013
PLANTAGINIS OVATAE SEMEN	Ispaghula Seed	Second Edition, 2003
PLANTAGINIS OVATAE TESTA	Ispaghula Husk	Online Series, 2016
POLYGALAE RADIX	Senega Root	Second Edition, 2003
PRIMULAE RADIX	Primula Root	Second Edition, 2003
PRUNI AFRICANAE CORTEX	Pygeum Bark	Supplement 2009
PSYLLII SEMEN	Psyllium Seed	Online Series, 2017
RATANHIAE RADIX	Rhatany Root	Online Series, 2017
RHAMNI PURSHIANI CORTEX	Cascara	Online Series, 2015
RHEI RADIX	Rhubarb	Online Series, 2019
RIBIS NIGRI FOLIUM	Blackcurrant Leaf	Online Series, 2017
ROSAE PSEUDO-FRUCTUS	Dog Rose Hip	Supplement 2009
ROSMARINI FOLIUM	Rosemary Leaf	Second Edition, 2003
RUSCI RHIZOMA	Butcher's Broom	Online Series, 2017
SALICIS CORTEX	Willow Bark	Online Series, 2017
SAMBUCI FLOS	Elder flower	Online Series, 2013
SALVIAE OFFICINALIS FOLIUM	Sage Leaf	Second Edition, 2003
SALVIA TRILOBAE FOLIUM	Sage Leaf, Three-lobed	Online Series, 2014
SENNAE FOLIUM	Senna Leaf	Second Edition, 2003
SENNAE FRUCTUS ACUTIFOLIAE	Alexandrian Senna Pods	Second Edition, 2003
SENNAE FRUCTUS ANGUSTIFOLIAE	Tinnevely Senna Pods	Second Edition, 2003
SERENOAE REPENTIS FRUCTUS (SABAL FRUCTUS)	Saw Palmetto Fruit	Second Edition, 2003
SERPILLI HERBA	Wild Thyme	Online Series, 2014
SOLIDAGINIS VIRGAUREAE HERBA	European Golden Rod	Online Series, 2018
SILYBI MARIANI FRUCTUS	Milk Thistle Fruit	Supplement 2009
SYMPHYTI RADIX	Comfrey Root	Online Series, 2012
TANACETI PARTHENII HERBA	Feverfew	Online Series, 2014
TARAXACI FOLIUM	Dandelion Leaf	Second Edition, 2003
TARAXACI RADIX	Dandelion Root	Second Edition, 2003
THYMI HERBA	Thyme	Second Edition, 2003
TORMENTILLAE RHIZOMA	Tormentil	Online Series, 2013
TRIGONELLAE FOENUGRAECI SEMEN	Fenugreek	Second Edition, 2003
UNCARIAE TOMENTOSAE CORTEX	Cat's Claw Bark	Online Series, 2018
URTICAE FOLIUM/HERBA	Nettle Leaf/Herb	Online Series, 2018
URTICAE RADIX	Nettle Root	Online Series, 2015
UVAE URSI FOLIUM	Bearberry Leaf	Online Series, 2012
VACCINII MACROCARPI FRUCTUS	Cranberry	Supplement 2009
VALERIANAE RADIX	Valerian Root	Supplement 2009
VERBASCI FLOS	Mullein Flower	Online Series, 2014
VIOLAE HERBA CUM FLORE	Wild Pansy	Online Series, 2015
VITIS VINIFERA FOLIUM	Red Vine Leaf	Supplement 2009
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