



24 July 2024
EMA/HMPC/887980/2022
Committee on Herbal Medicinal Products (HMPC)

List of references supporting the assessment of *Plantago lanceolata L., folium*

Draft – Revision 1

The European Medicines Agency acknowledges that copies of the underlying works used to produce this monograph were provided for research only with exclusion of any commercial purpose.

Aktay G, Deliorman D, Ergun E, Ergun F, Yesilada E, Cevik C. Hepatoprotective effects of Turkish folk remedies on liver injury. *J Ethnopharm* 2000, 73:121-129

Aktay G, Deliorman D, Yesilada E, Ergun F. Effects of some folk remedies on zinc, copper and iron levels in liver homogenates after hepatotoxin challenging. *J Fac Pharm Gazi* 2001, 18(2):135-141

BGB (Bundesgesetzblatt) für die Republik Österreich 1, II, Nr. 122 vom 13. March 2004

Blaschek W, Ebel S, Hilgenfeldt U, Holzgrabe U, Reichling J, Schulz V, editors. HagerROM 2008: Hagers Enzyklopädie der Arzneistoffe und Drogen. Plantaginis lanceolatae herba. Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 2008

Blaschek W, Hilgenfeldt U, Holzgrabe U, Mörike K, Reichling J, Ruth P, editors. HagerROM 2021. Hagers Enzyklopädie der Arzneistoffe und Drogen. Plantaginis lanceolatae herba. Wissenschaftliche Verlagsgesellschaft, Stuttgart 2021

Borovskaya TG, Udintsov SN, Zueva EP, Fornina TI, Neishtadt EL, Yaremenko KV. Amelioration of 5-fluorouracil toxicity in murine small intestine mucosa by plantain juice treatment. *Vopr Onkol* 1987, 33:60-61 [in Russian, abstract in English]

Bräutigam M, Franz G. Schleimpolysaccharide aus Spitzwegerichblättern. *Dtsch Apoth Ztg* 1985, 125:58-62 [in German]

Bräutigam M. Untersuchungen über die Schleimpolysaccharide aus *Plantaginis lanceolatae* folium und Versuche zur Gewebekultur von schleimbildenden pflanzlichen Geweben. Dissertation, Universität Regensburg 1985

Brøndegaard VJ. Wegerich als Wundheilmittel in der Volks- und Schulmedizin. *Sudhoffs Arch Geschicht Med Naturw* 1963, 47:127-151



Büechi S, Wegener T. Spitzwegerich (*Plantago lanceolata*). Neue Erkenntnis zu einem alten Heilmittel. *Schweiz Zeitschr GanzheitsMedizin* 2005, 17:167-170

Cáceres A, Girón LM, Alvarado SR, Torres MF. Screening of antimicrobial activity of plants popularly used in Guatemala for the treatment of dermatomucosal diseases. *J Ethnopharm* 1987, 20:223-237

Celik T, Aslantürk ÖZ. Anti-mitotic and anti-genotoxic effects of *Plantago lanceolata* aqueous extract on *Allium cepa* root Tipp meristem cells. *Biologia Bratislava* 2006, 61(6):693-697

Chang IM, Chang KS, Yun-Choi HS. Toxicological studies on aucubin (I). *Kor J Pharmacog* 1983, 14:95-101

Chang HM, Yun HS. Plants with liver-protective activities: Pharmacology and toxicology of aucubin. In: Chang HM, Yeung WH, Tso WW, Koo A, editors. Advances in Chinese medicinal materials research. World Scientific, Singapore, Philadelphia 1985, 269-285

Chiang LC, Chiang W, Ng LT, Lin CC. Antiviral activity of *Plantago major* extracts and related compounds in vitro. *Antiviral Res* 2002, 55:53-62

Commission E. Monographie Plantaginis lanceolatae herba. BAnz. Nr. 223; 30.11.1985 [in German]

Deutsches Arzneibuch. Spitzwegerichkraut. Deutscher Apotheker Verlag, Stuttgart 2005 [in German]

Deliorman D, Ergun F, Yesilada E. A preliminary study on hepatoprotective activity of some Turkish folk remedies by using pentobarbital-induced hypnosis model in mice. *J Fac Pharm Gazi* 1999, 16(2):77-81

del Recio M, Giner RM, Manez S, Rios JL. Structural considerations on the iridoids as anti-inflammatory agents. *Planta Med* 1994, 60:232-234

ESCOP (European Scientific Cooperative on Phytotherapy). 2nd ed. Monograph *Plantaginis lanceolatae* folium/herba. Thieme Verlag, Stuttgart 2003

European Pharmacopoeia. 6th ed. 2010 (6.7) Ribwort Plantain 01/2008: 1884

Felklova M. Antibakterielle Eigenschaften der Extrakte aus *Plantago lanceolata* L. [Antibacterial properties of *Plantago lanceolata* extracts]. *Pharm Zentralhalle* 1958, 97:61-65 [in German]

Fleer H, Verspohl EJ, Nahrstedt A. In-vitro spasmolytiche Aktivität von Extrakten aus *Cynara scolymus* und *Plantago lanceolata*. Proceedings of the 8th Congress on Phytotherapy, Würzburg 27-28 November 1997 [in German]

Fleer H, Verspohl EJ. Antispasmodic activity of an extract from *Plantago lanceolatae* and some isolated compounds. *Phytomedicine* 2007, 14:409-415

Franz G. Polysaccharides in Pharmacy: current applications and future concepts. *Planta Med* 1989, 55:493-497

Freerksen E. Zufuhr antibakterieller Wirkstoffe durch Nahrung und Futter. *Naturwissenschaften* 1950, 37:56-565 [in German]

Forkel S, Beutner C, Heetfeld A, Fuchs T, Schön MP, Geier J et al. Allergic Rhinitis to Weed Pollen in Germany: Dominance by Plantain, Rising Prevalence, and Polysensitization Rates over 20 Years. *Int Arch Allergy Immunol* 2020, 181(2):128-135, in press, doi 10.1159/000504297

Gálvez M, Martín-Cordero C, Houghton PJ, Ayuso MJ. Antioxidant activity of methanol extracts obtained from *Plantago* species. *J Agric Food Chem* 2005, 53:1927-1933

Hänsel R, Keller K, Rimpler H, Schneider G, editors. Hagers Handbuch der Pharmazeutischen Praxis. Vol. 5. 5th ed. Springer-Verlag, Berlin 1994 [in German]

Hausmann M, Obermeier F, Paper DH, Balan K, Dunger N, Menzel K et al. In vivo treatment with the herbal phenylethanoid actaeoside ameliorates intestinal inflammation in dextran sulphate sodium-induced colitis. *Clin Exp Immunol* 2007, 148:373-381

Hayashi K, Nagamatsu T, Ito M, Hattori T, Suzuki Y. Acteoside, a component of *Stachys Sieboldii* MIQ, may be a promising antinephritic Agent (2): Effect of acteoside on leucocyte accumulation in the Glomeruli of nephritic rats. *Jpn J Pharmacol* 1994, 66:47-52

Haznagy A. Recent results with *Plantaginis folium*. *Herba Hung* 1970, 9:57-63 [in Hungarian, abstract in English]

Heil BM, Kammerer E. Schleimhautdefekte heilen ab! *Natura Med* 1993, 8(5):257-259 [in German]

Herold A, Cremer L, Calugaru A, Tamas V, Ionescu F, Manea S et al. Hydroalcoholic plant extracts with anti-inflammatory activity. *Rom Arch Microbiol Immunol* 2003a, 62(1-2):117-129

Herold A, Cremer L, Calugaru A, Tamas V, Ionescu F, Manea S et al. Antioxidant properties of some hydroalcoholic plant extracts with anti-inflammatory activity. *Rom Arch Microbiol Immunol* 2003b, 62(3-4):217-227

Hoppe HA. Drogenkunde. Band 1 Angiospermen. *Walter de Gruyter* 1975, 309 [in German]

Horak F, Jäger S. Die Bedeutung der verschiedenen Pollenarten als Ursache des Heufiebers. *Med Klein* 1980, 75:532-538 [in German]

Kakooei S, Oloumi MM, Derakhshanfar A, Golmoradi L. A histopathological study of the healing potential of *Plantago lanceolata* ointment on collagenase-induced tendonitis in rats. *Comparative Clinical Pathology* 2013, 22(5):977-981

Kooperation Phytopharmaka. Kinderdosierungen von Phytopharmaka. 2nd revised ed. 1998 [in German]

Kozan E, Küpeli E, Yesilada E. Evaluation of some plants used in Turkish folk medicine against parasitic infections for their in vivo anthelmintic activity. *J Ethnopharm* 2006, 108:211-216

Kraft K. Therapeutisches Profil eines Spitzwegerichkraut-Fluidextraktes bei akuten respiratorischen Erkrankungen im Kindes- und Erwachsenenalter. In: Loew D and Rietbrock N, editors. Phytopharmaka III. Forschung und klinische Anwendung. Darmstadt Steinkopff 1997, 199-209 [in German]

Kraft K. Spitzwegerichkraut-Fluidextrakt als Antitussivum. Anwendung bei unspezifischen respiratorischen Erkrankungen im Kindes- und Jugendalter. *Z Phytother* 1998, 9:219 [in German]

Kováč I, Ďurkáč J, Hollý M, Jakubčová K, Perželová V, Mučaji P et al. *Plantago lanceolata* L. water extract induces transition of fibroblasts into myofibroblasts and increases tensile strength of healing skin wounds. *J Pharm Pharmacol* 2015, 67(1):117-25

Kuranel E, Süntar I, Gürsoy S, Keles H, Aktay G. Investigating Biological Activity Potential Of *Plantago lanceolata* L. In Healing Of Skin Wounds By A Preclinical Research. *Turk J Pharm Sci* 2016, 13(2):1-16

Kurt B, Bilge N, Sözmen M, Aydin U, Önyay T, Özaydın I. Effects of *Plantago lanceolata* L. extract on full-thickness excisional wound healing in a mouse model. *Biotech Histochem* 2018, 93(4):249-257

Loew D, Schrödter A, Schilcher H. Phytopharmaka bei katarrhalischen Erkrankungen der oberen und unteren Atemwege. In: Loew D and Rietbrock N, editors. Phytopharmaka III. Forschung und klinische Anwendung. Darmstadt Steinkopff, 1997 [in German]

Long C, Moulis C, Stanislas E, Fouraste I. L'aucuboside et le catapol dans les feuilles de *Plantago lanceolata* L., *Plantago major* L. et *Plantago media* L. *J Pharm Belg* 1995, 50:484-488 [in French, summary in English]

Madaus G. Lehrbuch der biologischen Heilmittel III. Georg Olms Verlag Hildesheim, New York 1976 [in German]

Mansoor K, Qadan F, Schmidt M, Mallah E, Abudayyih W, Matalka K. Stability Study and a 14-Day Oral Dose Toxicity in Rats of Plantain Leaf Extract (*Plantago lanceolata* L.) Syrup. *Sci Pharm* 2017, 85(1):15

Marchesan M, Hose S, Paper DH, Franz G. Spitzwegerich. Neue Untersuchungen zur

antiinflammatory Wirkung. *Dtsch Apoth Ztg* 1998a, 138(32):39-44 [in German]

Marchesan M, Hose S, Paper DH, Franz G. Investigation of the anti-inflammatory activity of liquid extracts of *Plantago lanceolata* L. *Phytother Res* 1998b, 12:533-534

Mascolo N, Autore G, Capasso F. Biological screening of Italian medicinal plants for anti-inflammatory activity. *Phytother Res* 1987, 1(1):28-31

Mascolo N, Pinto A, Capasso F. Flavonoids, leucocyte migration and eicosanoids. *J Pharm Pharmacol* 1988, 40:293-295

Matini M, Bakhtiarnejad S, Dastan D, Maghsoud AH, Fallah M. In-Vitro Efficacy of *Plantago lanceolata* L. Extracts on *Trichomonas vaginalis*. *J Arak Uni Med Sci* 2017, 20:74-82 [in Arabic, abstract in English]

Mehta V, Wheeler AW. IgE-mediated sensitization to English Plantain pollen in seasonal respiratory allergy: identification and partial characterisation of its allergenic components. *Int Arch Allergy Appl Immunol* 1991, 96:211-217

Molnàr J, Gunics G, Mucsi J, Koltai M, Petri I, Shoyama Y et al. Antimicrobial and immunomodulating effects of some phenolic glycosides. *Acta Microbiol Hun* 1989, 36(4):425-432

Müller-Limmroth W, Fröhlich HH. Wirkungsnachweis einiger phytotherapeutischer Expektorantien auf den mukoziliären Transport. *Fortschr Med* 1980, 98(3):95-101 [in German, summary in English]

Müller RS, Bettenay SV, Tideman L. Aero-allergens in canine atopic dermatitis in south-eastern Australia based on 1000 intradermal skin tests. *Aust Vet J* 2000, 78:392-399

Murai M, Tamayama Y, Sansei N. Phenylethanoids in the herb of *Plantago lanceolatae* and inhibitory effects on arachidonic acid-induced mouse ear oedema. *Planta Med*, 1995, 61:479-480

Orhan D, Cirak M, Külah C, Ergun F. Antimicrobial activity screening of some Turkish medical plants. *J Fac Pharm Gazi* 2002, 19(2):105-111

Pahlow M. Spitzwegerichkraut, Primelwurzeln und Schlüsselblumenblüten. *Dtsch Apoth Ztg* 1984, 124:801 [in German]

Paper DH, Marchesan M. Spitzwegerich (*Plantago lanceolatae* L.). Inhaltsstoffe, Analytik, Pharmakologie, Standardisierung. *Z Phytother* 1999, 20:231-238 [in German]

Plachcinska J, Matacz D, Kryztofik R, Dabrowa A, Brzosko WJ, Ozarowski A. Influence of medicinal herbs on the immune system. I. Induction of endogenous interferon. *Fitoterapia* 1984, 55:346-348

Ravn H, Nishibe S, Sasahara M, Xuebo L. Phenolic compounds from *Plantago asiatica*. *Phytochemistry* 1990, 29(11):3627-3631

Ruiz R, De la Torre RA, Alonso N, Villaescusa A, Betancourt J, Vizoso A. Screening of medicinal plants for induction of somatic segregation in *Aspergillus nidulans*. *J Ethnopharmacol* 1996, 52:123-127

Schapoval EE, Vargas MR, Chaves CG, Bridi R, Zuanazzi JA, Henriques AT. Antiinflammatory and antinociceptive activities of extracts and isolated compounds from *Stachytarpheta cayennensis*. *J Ethnopharmacol* 1998, 60:53-59

Schilcher H, Kammerer S, Wegener T. Leitfaden Phytotherapie. Spitzwegerichkraut (*Plantaginis lanceolatae* herba). Urban & Fischerl München [in German]

Schimmer O, Krüger A, Paulini H, Haefele F. An evaluation of 55 commercial plant extracts in the Ames mutagenicity test. *Pharmazie* 1994, 9:448-451

Schmidgall J, Schnetz E, Hensel A. Evidence for bioadhesive effects of polysaccharides and polysaccharide-containing herbs in an ex vivo bioadhesion assay on buccal membranes. *Planta Med* 2000, 66:48-53

Sezik E, Ye E, Honda G, Takaishi Y, Takeda Y, Tanaka T. Traditional medicine in Turkey X. Folk

medicine in Central Anatolia. *J Ethnopharmacol* 2001, 75:95-115

Sparabombe S, Monterubbiano R, Tosco V, Orilisi G, Hosein A, Ferrante L et al. Efficacy of an All-Natural Polyherbal Mouthwash in Patients With Periodontitis: A Single-Blind Randomized Controlled Trial. *Front Physiol* 2019, 10:632

Standardzulassung (German standard registration) Spitzwegerichkraut. Reg. No. 12899.99.99; February 1996 [in German]

Stemeseder T, Metz-Favre C, de Blay F, Pauli G, Gadermaier G. Do *Plantago lanceolata* Skin Prick Test-Positive Patients Display IgE to Genuine Plantain Pollen Allergens? Investigation of Pollen Allergic Patients from the North-East of France. *Int Arch Allergy Immunol* 2018, 177(2):97-106

Strzelecka H, Glinkowska G, Skopinska-Rózewska E, Malkowska W, Zwierz W, Sikorska E et al. Immunotropic activity of plant extracts. Influence of water extracts of chosen crude drugs on humoral and cellular immune response. *Herba Pol* 1995, 41:23-32 [in Polish, summary in English]

Suh NJ, Shim CK, Lee MH, Kim SK, Chang IM. Pharmakokinetic study of an iridoid glucoside: aucubin. *Pharm Res* 1991, 8:1059-1063

Tammaro T, Xepapadakis G. Plants used in Phytotherapy, cosmetics and dyeing in the Pramanda district (Epirus, North-West Greece). *J Ethnopharmacol* 1986, 16:167-174

Teuscher E, Melzig MF, Lindequist U. Biogene Arzneimittel. Ein Lehrbuch der Pharmazeutischen Biologie. Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 2004 [in German]

Tordera M, Ferrández ML, Alcaraz MJ. Influence of anti-inflammatory flavonoids on degranulation and arachidonic acid release in rat neutrophils. *Z Naturforsch* 1994, 49c:235-240, in press, doi:10.1515/znc-1994-3-412

Urbina AVO, Martin ML, Fernandez B, San Roman L, Cubilo L. In vitro antispasmodic activity of peracetylated penstermonoside, aucubin and catalpol. *Planta Med* 1994, 60:512-515

Wichtl M. Herbal drugs and Phytopharmaceuticals. 3rd ed. Medpharm Scientific Publishers GmbH, Stuttgart 2004

Wichtl M. Teedrogen und Phytopharmaka. 4th ed. Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 2002 (in German)

Wüthrich B, Much T, Kopper E. Zur Bedeutung von Spitzwegerich-, Beifuß- und Gänsefußpollen für die spezifische Diagnostik der Pollinosis: ein Vergleich zwischen RAST- und in-vivo-Tests. *Z Hautkr* 1977, 52(3):87-94 [in German]

References read but not included in the AR

- Adler LS, Schmitt J, Bowers MD. Genetic variation in defensive chemistry in *Plantago lanceolata* (Plantaginaceae) and its effect on the specialist herbivore *Junonia coenia* (Nymphalidae). *Oecologia* 1995, 101:75-85
- Aníbarro PC, Picón SJ, González FG, Gómez PA, Giménez RP, Carmona JB et al. Allergenic pollens and pollinosis in the city of Burgos. *Allergol Immunol Clin* 2005, 20:90-94
- Asero R, Mistrello G, Roncarolo D, Casarini M. Detection of allergens in plantain (*Plantago lanceolata*) pollen. *Allergy* 2000, 55:1059-1062
- Baldo BA, Chensee QJ, Howden MEH, Sharp PJ. Allergens from Plantain (*Plantago lanceolata*). *Int Archs Allergy Appl Immun* 1982, 68:295-304
- Beer AM, Loew D. Arzneipflanzen bei Infekten der oberen und unteren Atemwege. Mit Spitzwegerich und Thymianöl in die Hustensaison. *MMW-Fortschr Med* 2008, 41:29-33
- Böcher TW. Studies on variation and biology in *Plantago lanceolata* L. *Dansk Bot Ark* 1943, 11:1-18
- Bond W, Davies G, Turner R. The biology and non-chemical control of Ribwort Plantain (*Plantago lanceolata* L.). Available at: <https://www.gardenorganic.org.uk/expert-advice/garden-management/weeds/weed-datasheets/ribwort-plantain>. Accessed 03/2023
- Bowers MD, Stamp NE. Chemical variation within and between individuals of *Plantago lanceolatae* (Plantaginaceae). *J Chem Ecol* 1992, 18:985-995
- Bräutigam M, Franz G. Versuche zur Gewebekultur von schleimbildenden pflanzlichen Geweben. *Sci Pharm* 1985, 53:237-246
- Bräutigam M, Franz G. Structural features of *Plantago lanceolata* mucilage. *Planta Med* 1985, 51:293-295
- Büechi S. Antivirale Gerbstoffe. *Dtsch Apoth Ztg* 1998, 138:67-78
- Büechi S. Antivirale Saponine. *Dtsch Apoth Ztg* 1996, 136:19-28
- Calabozo B, Barber D, Polo F. Studies on the carbohydrate moiety of Pla I 1 allergen. Identification of a major N-glycan and significance for the immunoglobulin E-binding activity. *Clin Exp Allergy* 2002, 32:1628-1634
- Calabozo B, Diaz-Perales A, Salcedo G, Barber D, Polo F. Structural and antigenic similarity between Pla L 1 and Ole E 1, the major allergens of English plantain and olive pollens. *J Clin Immunol* 2001, 107(2):15
- Catapano AL. Antioxidant effect of flavonoids. *Angiology* 1997, 48(1):39-44
- Chang IM. Antiviral activity of aucubin against hepatitis B virus replication. *Phytother Res* 1997, 11:189-192
- Chang IM, Sook HS, Yan KH. Pharmacology and toxicology of aucubin. *J Pharm Soc Korea* 1984, 28:35-48 [in Korean, abstract in English]
- Chang IM, Yamaura Y. Aucubin: A new antidote for poisonous Amanita mushrooms. *Phytother Res* 1993, 7:53-56
- Chang IM, Yun HS, Kim YS, Ahn JW. Aucubin: Potential antidote for alpha-amanitin poisoning. *Clin Toxcol* 1984, 22:77-85
- Chattopadhyay D, Khan MTH. Ethnomedicines and ethnomedicinal phytophores against herpes viruses. *Biotechnol Annu Rev* 2008, 14:297-348
- Chiang LC, Ng LT, Chiang W, Chang MY, Lin CC. Immunomodulatory activities of flavonoids, monoterpenoids, triterpenoids, iridoid glycosides and phenolic compounds of *Plantago* species. *Planta*

Med 2003, 69:600-604

Chudnicka A, Matysik G. Research of enzymatic activities of fresh juice and water infusions from dry herbs. *J Ethnopharmacol* 2005, 99:281-286

Doekes G, Gijsbers J. Occupational allergy to pollen of plantain (*Plantago* spp.) in an ecological research institute. *Europ Resp J* 1998, 12(28):32

Ebringerová A, Kardosová A, Hromádkova Z, Hribalová V. Mitogenic and comitogenic activities of polysaccharides from some European herbaceous plants. *Fitoterapia* 2003, 74:52-61

Egger M, Mutschlechner S, Wopfner N, Gadermaier G, Briza P, Ferreira F. Pollen-food syndromes associated with weed pollinosis: an update from the molecular point of view. *Allergy* 2006, 61:461-476

Elich J. Antibakterielle Aktivität einiger einheimischer *Plantago*-Arten. Dissertation, FU Berlin 1962 [in German]

Elich J. Die antibakterielle Aktivität einiger einheimischer *Plantago*-Arten. *Dtsch Apoth Ztg* 1966, 106:428 [in German]

Elich J. Das antibakterielle Prinzip unserer einheimischen *Plantago*-Arten. *Dtsch Apoth Ztg* 1961, 101:1387 [in German]

Fraga C, Martino V, Ferraro G, Coussio J, Boveris A. Flavonoids as antioxidants evaluated by in vitro and in situ liver chemiluminescence. *Biochem Pharmac* 1987, 36(5):717-720

Gálvez M, Martín-Cordero C, López-Lázaro M, Cortés F, Ayuso MJ. Cytotoxic effect of *Plantago* spp. on cancer cell lines. *J Ethnopharm* 2003, 88:125-130

Garg HS, Bhandari SPS, Tripathi SC, Patnaik GK, Puri A, Saxena R et al. Antihepatotoxic and immunostimulant properties of the iridoid glycosides of *Scrophularia koelzii*. *Phytother Res* 1994, 8:224-228

Hänsel R. Glykosidische Bitterstoffe der Monoterpene Reihe. *Dtsch Apoth Ztg* 1966, 106:1761-1767 [in German]

Háznagy A, Tóth G, Bula E. Apigenin-7-O-monoglucosid im Kraut von *Plantago lanceolata*. *Pharmazie* 1976, 31:482-483

Herbert JM, Maffrand JP. Verbascoside isolated from *Lantana camara*, an inhibitor of protein kinase C. *J Nat Prod* 1991, 54:1595-1600

Ji L, Wang PF, Zheng R, Liu Z, Jia Z. Protection of phenylpropanoid glycosides from pedicularis against oxidative haemolysis in vitro. *Planta Med* 1993, 59:315-317

Jurisic R, Debeljak Z, Vladimir-Knezevic S, Vukovic J. Determination of aucubin and catalpol in *Plantago* species by micellar electrokinetic chromatography. *Z Naturforsch* 2004, 59c:27-31

Kardosová A, Machová E. Antioxidant activity of medicinal plant polysaccharides. *Fitoterapia* 2006, 77:367-373

Keeser E. Untersuchung einiger Blutstillungsmittel. *Dtsch Med Wochenschr* 1939, 65:375-376 [in German]

Kernan MR, Amarquaye A, Chen JL, Chan J, Sesin DF, Parkinson N et al. Antiviral phenylpropanoid glycosides from the medicinal plant *Markhamia lutea*. *J Nat Prod* 1998, 61:564-570

Kuppusamy UR, Khoo HE, Das NP. Structure-activity studies of flavonoids as inhibitors of hyaluronidase. *Biochem Pharmac* 1990, 40(2):397-401

Kuppusamy UR, Das NP. Effects of flavonoids on cyclic AMP phosphodiesterase and lipid mobilization in rat adipocytes. *Biochem Pharmac* 1992, 44(7):1307-1315

Li W, Zheng R, Su B, Jia Z, Li H, Jiang Y et al. Repair of dGMP hydroxyl radical adducts by verbascoside

via electron transfer: a pulse radiolysis study. *Int J Radiat Biol* 1996, 69:481-485

Matthews PA, Baldo BA, Howden MEH. Cytochrome c allergens isolated from the pollens of the dicotyledons English plantain (*Plantago lanceolata*) and Paterson's curse (*Echium plantagineum*). *Mol Immunol* 1988, 25:63-68

Mehrotra R, Rawat S, Kulshreshtha DK, Patnaik GK, Dhawan BN. In vitro studies on the effect of certain natural products against hepatitis B virus. *Indian J Med Res* 1990, 92:133-138

Middleton E, Fujiki H, Savliwala M, Drzewiecki G. Tumor promoter-induced basophil histamine release: effect of selected flavonoids. *Biochem Pharmacol* 1987, 36(12):2048-2052

Nakamura Y, Maguchi S, Oridate N, Takagi D, Furuta Y, Fukuda S. *Plantago lanceolata* (English plantain) pollinosis in Japan. *Auris Nasus Larynx* 2005, 32:251-256

ÖAB. Österreichisches Arzneibuch (ÖAB 90). Band II: Folium Plantaginis. Spitzwegerichblatt. Verlag der Österreichischen Staatsdruckereien, Wien 1991 [in German]

Österreichisches Arzneibuch, Amtliche Ausgabe. Verlag Österreich 2009 [in German]

Orovito A, de Luque V, Rubiano C, Guardia P, de la Calle A, Conde J. Prevalence of hypersensitivity to different pollens in the population from Seville with pollinosis and their clinical characteristics. *Allergy* 2007, 62(83):167-551

Pan N, Hori H. Antioxidant action of acteoside and its analogs on lipid peroxidation. *Redox Report* 1996, 2(2):149-154

Pharmacopoeia Helvetica VII. Plantaginis folium. Eidgenössische Drucksachen- und Materialzentrale, Bern 1995 [in German]

Polo F, Calabozo B, Duffort O, Barber D. Monoclonal antibody-based ELISA to quantify the major allergen of *Plantago lanceolata* Pollen, Pla I 1. *J Allergy Clin Immunol* 2000, 105(1):334

Ramos A, Visozo A, Piloto J, García, Rodríguez A, Rivero R. *J Ethnopharmacol* 2003, 87:241-246

Rischer M, Adamczyk M, Ratz H, Hose S, Marchesan M, Paper DH et al. Quantitative determination of the iridoid glycosides aucubin and catapol in *Plantago lanceolata* L. extracts by HPTLC and HPLC. *JPC* 1998, 11:374-378

Rønsted N, Göbel E, Franzyk H, Rosendal Jensen S, Olsen CE. Chemotaxonomy of *Plantago*. Iridoid glucosides and caffeoyl phenylethanoid glycosides. *Phytochemistry* 2000, 55:337-348

Sagar GR, Harper JL. Biological Flora of the British Isles No. 95 *Plantago major* L., *P. media* L. and *P. lanceolata* L. *J Ecol* 1964, 52:189-221

Sasaki H, Nishimura H, Morota T, Chin M, Mitsuhashi H, Komatsu Y et al. Immunosuppressive principles of *Rehmannia glutinosa* var. hueichigensis. *Planta Med* 1989, 55:458-462

Schmidt W, Steinbach S. Sensing Iron – a whole plant approach. *Ann Bot* 2000, 86:589-593

Schmidt W, Schuck C. Pyridine nucleotide pool size changes in iron-deficient *Plantago lanceolata* roots during reduction of external oxidants. *Physiol Plant* 1996, 98:215-221

Schmidt W, Janiesch P, Brüggemann W. Fe-EDTA reduction in roots of *Plantago lanceolata* by a NADH-dependent plasma membrane-bound redox system. *J Plant Physiol* 1990, 136:51-55

Schmidt W, Bartels M. Orientation of NADH-linked ferric chelate (turbo) reductase in plasma membranes from roots of *Plantago lanceolata*. *Protoplasma* 1998, 203:186-193

Schmidt W. Reduction of extracytoplasmatic acceptors by roots of *Plantago lanceolata* L. Evidence for enzyme heterogeneity. *Plant Sci* 1994, 100:139-146

Shipochliev T, Dimitrov A, Aleksandrova E. Study on the antiinflammatory effect of a group of plant extracts. *Vet Med Nauki* 1981, 6:87-94

Spilkova J, Hubik J. Biologische Wirkungen von Flavonoiden. *PharmZ* 1988, 1:1-9

Suomi J, Wiedmer SK, Jussila M, Riekkola MJ. Determination of iridoid glycosides by micellar electrokinetic capillary chromatography-mass spectrometry with use of the partial filling technique. *Electrophoresis* 2001, 22:2580-2587

Steffan B. Inhaltsstoffe aus Pflanzen der indonesischen Volksmedizin (Jamu): Isolierung, Identifikation und Charakterisierung der antioxidativen Eigenschaften. Dissertation, Heinrich-Heine- Universität Düsseldorf [in German]

Taskova R, Evstatieva L, Handjeva N, Popov S. Iridoid pattern of *Plantago* L. and their systematic significance. *Z Naturforsch* 2002, 57c:47-50

van Acker SA, de Groot MJ, van den Berg DJ, Tromp MN, Donné-op den Kelder G, van der Vijgh WJ et al. A quantum explanation of the antioxidant activity of flavonoids. *Chem Res Toxicol* 1996, 9:1305-1312

Vigo E, Cepeda A, Gualillo O, Perez-Fernandez R. In-vitro anti-inflammatory activity of *Pinus sylvestris* and *Plantago lanceolata* extracts: effect on inducible NOS, COX-1, COX-2 and their products in J774A.1 murine macrophages. *JPP* 2005, 57:383-391

Wang P, Kang J, Zheng R, Yang Z, Lu J, Gao J et al. Scavenging effects of phenylpropanoid glycosides from Pedicularis on superoxide anion and hydroxyl radical by the spleen trapping method (95) 02255-4. *Biochem Pharmacol* 1996, 51:687-691

Warwick SI, Briggs D. The genecology of lawn weeds. III. Cultivation experiments with *Achillea millefolium* L., *Bellis perennis* L., *Plantago lanceolata* L., *Plantago major* L. and *Prunella vulgaris* L. collected from lawns and contrasting grassland habitats. *New Phytologist* 1979, 85:275-288

Watzl B, Rechkemmer G. Flavonoide. *Ernährungs-Umschau* 2001, 48:498-502

Weber B, Kahlert H, Petersen A, Fiebig H, Cromwell O. Purification of the plantain (*Plantago lanceolata*) allergen Pla I 1. *J Allerg Clin Immunol* 1996, 97(1):209

Wegener T, Kraft K. Der Spitzwegerich (*Plantago lanceolata* L.): Reizlinderung bei Infektionen der oberen Atemwege. *Wien Med Wschr* 1999, 149:211-216 [in German, summary in English]

Xiong Q, Hase K, Tezuka Y, Tani T, Namba T, Kadota S. Hepatoprotective activity of phenylethanoids from *Cistanche deserticola*. *Planta Med* 1998, 64:120-125

Yamahara J, Kitani T, Kobayashi H, Kawahara Y. Studies on *Stachys sieboldii* MIQ. II. Antianoxia action and the active constituents. *Yagugaku Zashi* 1990, 110:932-935 [in Chinese, abstract in English]

Zanon SM, Cerlatti FS, Rovera M, Sabini LJ, Ramos BA. Search for antiviral activity of certain medicinal plants from Córdoba, Argentina. *Rev Latinoam Microbiol* 1999, 41:59-62