

OLEA AFRICANA HERBA

Definition

Olea Africana Herba consists of the fresh or dried leaves and smaller stems of *Olea europaea* L. ssp. *africana* (Mill.) P.S. Green (Oleaceae).

Synonyms

Olea africana Mill.

Vernacular names

Wild olive, swartolienhout (A), umquma (Z, Xh, Nd), motlhwane (Ts, So)

Description

Note: *Olea europaea*, the origin of the cultivated olive, is very widespread in Mediterranean countries, Africa, the Arabian peninsula, the Indian subcontinent and Asia. Several subspecies are recognised, one of which is the small-fruited subspecies *africana* (formerly *Olea africana*).

Macroscopical ^{1,2}



Figure 1 – Live plant

Tree 3-15m in height, may assume bushy habit if stunted; **leaves** simple, opposite, lanceolate to elliptic, 20-90mm × 7-15mm, grey-green to shiny green on upper surface, greyish or yellow-gold on lower surface due to the presence of fine dense scales; margins reflexed and lamina curling downwards; **flowers** (Oct-Mar) fragrant, 6-10mm long, cream to white, borne in lax axillary panicles; **fruit** an ovoid, thinly fleshy green drupe with whitish spots, becoming black to dark purple when ripe, ±10mm in diameter, tapering to a sharp tip.



Figure 2 – line drawing

Microscopical

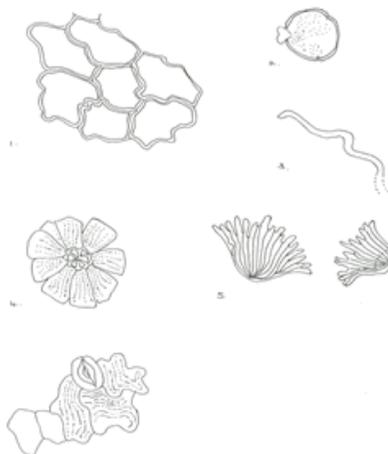


Figure 3 – microscopical features

¹ Verdoorn, I.C. (1963). The genus *Olea*. *Flora of Southern Africa* 26:112-119.

² Green, P.S. and Kupicha, F.K. (1979). Notes on the genus *Olea*. *Kew Bulletin* 34: 69.

Characteristic features are: the very numerous scales of the lower leaf surface, also occurring loose in the powdered drug, ± 200 microns in diameter (5) the abundant clothing hairs of both leaf surfaces, unicellular, thin-walled, ± 700 microns in length (3); the small cells of the leaf epidermis with sinuous walls (1); the anomocytic stomata present on the lower leaf surface only (4); the absence of calcium oxalate crystals; the occasional yellow-brown pollen grains, ± 40 microns in diameter (2).

Crude drug

Collected when required or available in the marketplace as bundles of fresh or dried material comprising mainly leaf, with some smaller stems and occasional flowers and fruit. Texture leathery, odour faintly aromatic, taste extremely astringent, leaf colour grey-green above, golden to grey-brown below.

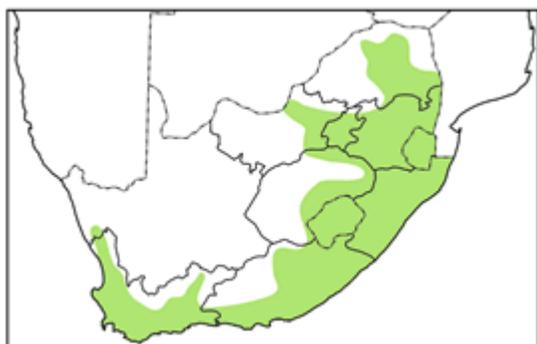


Figure 4 – distribution map

Geographical distribution

Widespread in a variety of habitats, from forest and riverside bush to open grassveld, stony flats, mountain kloofs and rocky ledges throughout Southern Africa and northwards through east Tropical Africa into Eritrea.

Quality standards

Identity tests

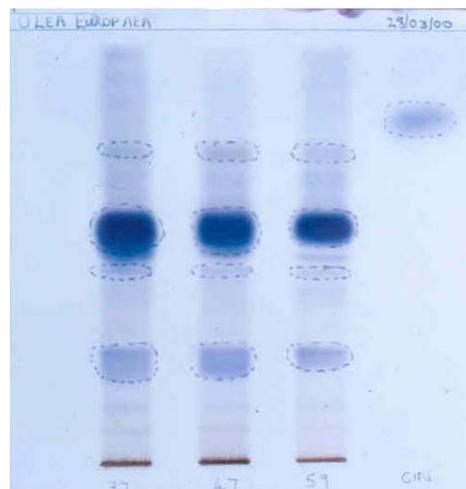


Figure 5 – TLC plate

Thin layer chromatography on silica gel using as solvent a mixture of toluene:diethyl ether:1.75M acetic acid (1:1:1). Reference compound cineole (0,1% in chloroform). Method according to Appendix 2a.

R_f values of major compounds: 0,23 (lavender); 0,44 (pale lilac); 0,55 (indigo); 0,73 (grey); cineole: 0,81 (blue-purple)
HPLC on C₁₈ column, method according to Appendix 2b.

Major compounds:

Methanol extract:

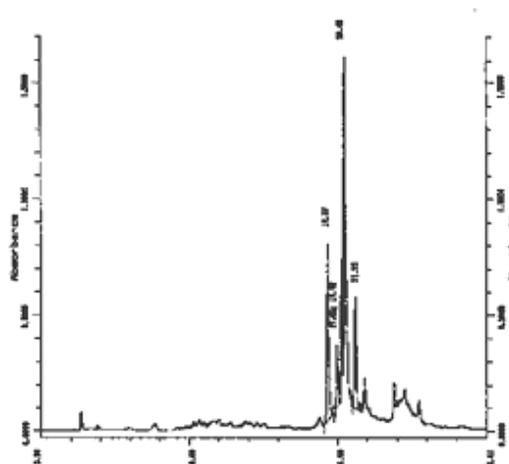


Figure 6 – HPLC spectrum

Retention times (mins): 19.37; 20.48; 21.23

Ethanol (70%) soluble extractive value: not less than 15.5% (range: 15.6-33.93%)

Purity tests

Assay

Not yet available

Major chemical constituents

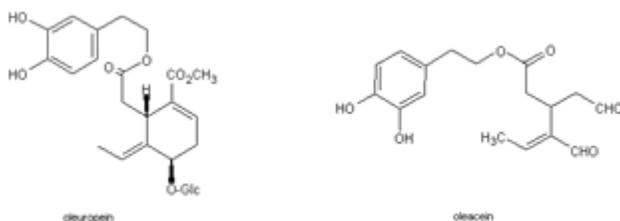


Figure 7 – chemical constituents

Microchemical tests in our laboratories indicated the presence of alkaloids, saponins and tannins, but not of cardiac or cyanogenic glycosides. There is little in the published literature regarding the leaf secondary chemistry of this subspecies, but studies of that of *Olea europaea* collections from Europe indicate the presence of the flavonoids apigenin, luteolin, chrysoeriol and their derivatives. The quinoline group alkaloids cinchonine and cinchonidine have been isolated from leaves of Algerian, Moroccan, French and Italian collections of *Olea europaea*; whether similar compounds account for the positive alkaloid test given by subspecies *africana* remains to be established.

Also present are various common triterpenes e.g. β -amyrin, oleanolic acid and unusual monoterpenes e.g. the secoiridoids oleuropein and oleacein^{3 4}.

Dosage forms

Infusions or decoctions are taken orally or applied externally as an eye lotion or gargle.

³ Hansen, K. *et al.* (1996). Isolation of an Angiotensin Converting Enzyme (ACE) inhibitor from *Olea europaea* and *Olea lancea*. *Phytomedicine* **2(4)**: 319-325.

⁴ Le Tutour, B. and Guedon, D. (1992). Antioxidative activities of *Olea europaea* leaves and related phenolic compounds. *Phytochemistry* **31(4)**: 1173-1178.

Medicinal uses

Used as an infusion in the Montagu district, taken orally for sore throat, kidney problems and backache. Leaf infusions are used elsewhere as a lotion to treat eye infections or a gargle to relieve sore throat; also taken internally as a remedy for colic or urinary tract infections; powdered leaf is used as styptic.

Pharmacology/bioactivity

While little pharmacological investigation of South African populations of *Olea europaea* subsp. *africana* appears to have been carried out, some information is available from studies of other subspecies/populations.

Antimicrobial activity

Hot water extracts of Argentinian leaf, at a concentration of 62.5mg/ml, were found to be inactive against *Staphylococcus aureus*, *Aspergillus niger* and *Escherichia coli* (agar plate method)⁵. Dried leaf extracts (ethanol:water 1:1) at concentrations of 500mg/ml, were found to be inactive *in vitro* against *Aspergillus fumigatus*, *A. niger*, *Fusarium oxysporum*, *Penicillium digitatum*, *Rhizopus nigricans*, *Trichophyton mentagrophytes*, *Candida albicans* and *Saccharomyces pastorianus*.⁶ Hot water leaf extracts (1mg/ml) were inactive against *Salmonella typhi*.⁷ Activity against *Mycobacterium tuberculosis* (H37RV/TMC 102) of 95% ethanol extracts of *Olea europaea* (part not specified) has been reported, using the broth culture method.⁸

⁵ Anesini, C. and Perez, C. (1993). Screening of plants used in Argentinian folk medicine for antimicrobial activity. *Journal of Ethnopharmacology* **39(2)**: 119-128.

⁶ Guerin, J.C. and Reveillere, H.P. (1985). A study of 40 plant extracts against 9 fungal species. *Annales Pharmaceutiques Françaises* **43(1)**: 77-81.

⁷ Perez, C. and Anesini, C. (1994). *In vitro* antibacterial activity of Argentine folk medicinal plants against *Salmonella typhi*. *Journal of Ethnopharmacology* **44(1)**: 41-46.

⁸ Grange, J.M. and Davey, R.W. (1990). Detection of antituberculous activity in plant

In vitro antiviral activity of a leaf extract against HIV-1 virus (infected H9 T lymphocytes) has been demonstrated in cell culture (IC₅₀ 0,2mcg/ml)⁹

Effects on the endocrine system

Antihyperglycaemic/hypoglycaemic activity

Dried leaf powder extracts of Egyptian collections, when administered intragastrically to the rat, in a dose of 750mg/kg, were found to be inactive in streptozotocin-induced hyperglycaemia.¹⁰ An early study, using ethanol leaf extracts (defatted with petrol ether) given by gastric intubation to the rabbit (dose not specified), showed a 17-23% decrease in blood sugar levels which reached a minimum within 6 hours and rose to normal after 48 hours.¹¹ Aqueous extracts of dried leaf from Italy, administered intragastrically (IG) to male rats in a dosage of 500mg/kg, reduced the blood glucose levels of normal or alloxan-induced diabetic rats.¹² Aqueous decoctions of Spanish leaf, administered IG to the rat at a dose of 32.0mg/kg, showed activity against alloxan-induced hyperglycaemia.¹³

extracts. *Journal of Applied Bacteriology* **68(6)**: 587-591.

⁹ Lee-Huang, S., Zhang, L., Huang, P.L., Chang, Y.T. and Huang, P.L. (2003). Anti-HIV activity of olive leaf extract (OLE) and modulation of host cell gene expression by HIV-1 infection and OLE treatment. *Biochemical and Biophysical Research Communications* **307(4)**: 1029-1037.

¹⁰ Eskander, E.F and Jun, H.W. (1995). Hypoglycaemic and hyperinsulinaemic effects of some Egyptian herbs used for the treatment of Diabetes mellitus (Type II) in rats. *Egyptian Journal of Pharmaceutical Sciences* **36(1-6)**: 331-342.

¹¹ Manceau, P., Netien, G. and Jardon, P. (1942). Hypoglycaemic action of extracts of olive leaves. *Comptes rendues de la Société Biologique*. **136**:810-811.

¹² Trovato, A., Forestieri, A.M., Iauk, L., Barbera, R., Monforte, M.T. and Galati, E.M. (1993). Hypoglycaemic activity of different extracts of *Olea europaea* L. in the rat. *Plant Med Phytother.* **26(4)**: 300-308.

¹³ Gonzalez, M., Zarzuelo, A., Gamez, M.J., Utrilla, M.P., Jiminez, J and Osuna, I. (1992).

Lyophilised extracts of freeze dried Saudi Arabian leaf samples proved active *in vivo* in the male rat. Given IG in doses of 500, 250 and 100mcg/animal, no increase in thyroxine level, a decreased triiodothyronine (T3) level and TSH inhibition was recorded respectively¹⁴.

Effects on the cardio-vascular system

Antiarrhythmic activity of 95% ethanol, glycerine and ethanol:glycerine (50:50) extracts of European leaf and shoot has been demonstrated in the rat (IG) at doses of 25mg/kg, following aconite-induced arrhythmia. In the same study, antihypertensive activity was demonstrated by glycerine:ethanol (50:50) extracts given IG to the rat at dosages of 125-250mg/kg, following desoxycorticosterone acetate(DCSA)-induced hypertension. Positive inotropic effects of 95% ethanol, glycerine and ethanol:glycerine (50:50) extracts were demonstrated in the rabbit at dosages of 5.0 mg/ml (heart). Spasmolytic activity of similar extracts was demonstrated in the guinea pig at doses of 50mg/kg against vasopressin-induced coronary spasm and hypotensive activity in the rat at doses of 100mg/kg, given IG. Maximum hypotensive activity effect was seen 60-120 minutes after administration of each extract. Positive chronotropic effects of glycerine:ethanol (50:50) extracts were noted, when given IG to the DCSA-hypertensive rabbit at a dose of 125mg/ml.¹⁵

Spasmolytic activity of dried leaf extracts (30% ethanol) has been demonstrated against VSK+ induced contractions, when administered (aorta) to the rabbit in doses of

Hypoglycaemic activity of olive leaf. *Planta Medica* **58(6)**: 513-515.

¹⁴ Al Qarawi, S.A., Al Damegh, M.A. and Elmougy, S.A. (2002). Effect of freeze-dried extract of *Olea europaea* on the pituitary-thyroid axis in rats. *Phytotherapy Research* **16(3)**: 286-287.

¹⁵ Cicosta, C., Occhiuto, F., Gregorio, A., Toigo, S. and Pasquale, A. (1990). Cardiovascular activity of the young shoots and leaves of *Olea europaea* L. and of oleuropein. *Plant Med. Phytother.* **24(4)**: 264-277.

1mg/ml¹⁶. Leaf decoctions or lyophilised extracts administered to the rat (aorta) showed spasmolytic activity against phenylephrine-induced contractions, both in the presence of and without endothelium (IC₅₀ 1.12mg/ml).¹⁷

Antihypercholesterolaemic activity has been shown in rats given a daily dose (IG) of 500mg/kg of a glycerine:ethanol leaf extract for 15 days. Activity was noted both in diet-induced and triton-induced hypercholesterolaemic animals¹⁸

Some of the cardio-vascular effects noted for *Olea europaea* have been attributed to the secoiridoids oleuropein (increased coronary flow) and oleacein (ACE inhibitory activity)³.

Antihypertensive effects of olive leaf extracts were noted *in vivo* in the rat following IG administration of 50mg/kg of an 80% ethanol extract¹⁹.

Renal effects

Diuretic activity was observed in human adult patients given a leaf infusion (5ml) or decoction (3ml) by mouth once daily for 20-25 days. A daily increase in urinary output of 100-145ml was noted for both dosage forms, with no effect on blood Na, K or

chloride levels.²⁰ Ethanol:water (50:50) extracts of fresh leaf from Brazil, given IG to the rat in doses of 40ml/kg, showed diuretic activity.²¹

Effects on the inflammatory response

Aqueous leaf extracts from Tunisia, given IG to the rat (dose unspecified), showed activity against carrageenan-induced paw oedema.²² The effects of fresh leaf extracts of Italian provenance were assessed *in vitro* (RBC) for effects on the complement alternative and classical pathways. Neither ethyl acetate (50mcg/ml) nor methanol (50mcg/ml) extracts inhibited the alternative pathway while both inhibited the classical pathway, at IC₅₀ >7.7mcg/ml (EtOAc) and >5.8mcg/ml (MeOH)²³.

Hepatic activity

In vivo glutathione S-transferase induction activity has been demonstrated in mice given olive leaf extracts in the diet (ethyl acetate extract: 0,4% of diet; methanol extract: 1,0% of diet)²⁴.

Aqueous leaf extracts from Tunisia, given IG to the rat (dose unspecified), showed activity

¹⁶ Rauwald, H.W., Brehm, O. and Odenthal, K.P. (1994). Screening of 9 vasoactive medicinal plants for their possible calcium antagonistic activity. Strategy for the selection and isolation of the active principles of *Olea europaea* and *Peucedanum ostruthium*. *Phytotherapy Research* **8(3)**: 135-140.

¹⁷ Zarzuelo, A., Duarte, J., Jimenez, J., Gonzalez, M. and Utrilla, M.P. (1991). Vasodilator effect of olive leaf. *Planta Medica* **57(5)**: 417-419.

¹⁸ De Pasquale, R., Monforte, M.T., Trozzi, A. Raccuia, A and Tommasini, S. (1991). Effects of leaves and shoots of *Olea europaea* and oleuropein on experimental hypercholesterolaemia in the rat. *Plant Med. Phytother.* **25(2/3)**:134-140.

¹⁹ Khayyyal, M.T., El-Ghazaly, M.A., Abdallah, D.M., Nassar, N.N., Okpanyi, S.N. and Kreuter, M.H. (2002). Blood pressure lowering effect of an olive leaf extract (*Olea europaea*) in induced hypertension in rats. *Arzneimittel-Forschung* **52(11)**: 797-802.

²⁰ Capretti, G. and Bonaconza, E. (1949). Effects of infusions or decoctions of olive leaves (*Olea europaea*) on some physical constants of blood and components of metabolism. *Giorn.Clin.Med.* **30**: 630-642.

²¹ De A Ribeiro, R *et al.*(1988). Acute diuretic effects in conscious rats produced by some medicinal plants used in the state of Sao Paulo, Brazil. *Journal of Ethnopharmacology* **24(1)**: 19-29.

²² Fehri, B., Aiache, J.M., Mrad, S., Korbi, S. and Lamaison, J.L. (1996). *Olea europaea* L. : stimulant, anti-ulcer and anti-inflammatory effects. *Boll. Chim. Pharm.* **135(1)**: 42-49.

²³ Pieroni, A., Heimler, D., Pieters, L., van Poel, B. and Vlietinck, A.J. (1996). *In vitro* anti-complementary activity of flavonoids from olive (*Olea europaea* L.)leaves. *Pharmazie* **51(10)**: 765-768.

²⁴ Han, Y.M., Nishibe, S., Kamazawa, Y., Ueda, N. and Wada, K. (2001). Inductive effects of olive leaf and its component oleuropein on mouse liver glutathione S-transferases. *Natural Medicine* **55(2)**: 83-86.

against carrageenan-induced paw oedema.²⁵

Contraindications

None known

Adverse reactions

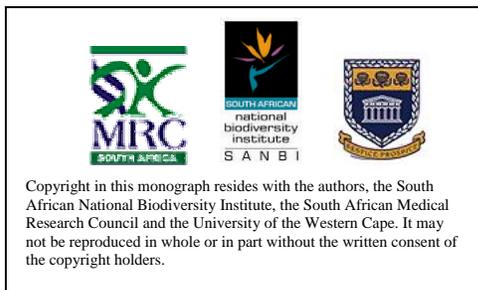
None known

Precautions

No special precautions

Dosage

To be determined



²⁵ Fehri, B., Aiache, J.M., Mrad, S., Korbi, S. and Lamaison, J.L. (1996). *Olea europaea* L. : stimulant, anti-ulcer and anti-inflammatory effects. *Boll. Chim. Pharm.* **135(1)**: 42-49.