Clausena anisata (Rutaceae)

Engl: Horsewood, maggot killer

African vernacular names:
Kwere: Mkomavikali Massai: Ol matassia Pare: Mkwingwimi
Shona: Runga honya Venda mudede Xhosa: Umukambi, isifuta, isitutu
Zigua: Mjavikali Zulu: Nukamdida, umsanga
Philippines: nampi (Tagalog)

The plant

The plant, a tropical shrub or tree up to 10 meters high is growing in and on the margins of evergreen forests. The leaves are pinnate, compound with 10 – 17, Alternate, and with a terminal one. They are densely dotted with glands and have a strong scent when crushed. It can be compared with aniseed. The branched inflorescences originate with an axillary spray. The small white flowers have orange-yellow stamens. Flowering time is August – November.

Plant parts used:

The root, the stem bark, the fresh leaves

Constituents

Carbazole alkaloids are the major constituents of Rutaceous plants together with coumarines and phenylpropanoids which are named clausamines. Their chemical structure was determined by spectroscopic data and MS. They belong to the class of 1-oxygenated-3-methoxy-carbazoles having a prenyl side chain or an analogous moiety at C-4.
In Cl. anisata nine carbazole alkaloids extracted by acetone could be found.
Among them:
Clausamine D is a colourless powder, structure formula $C_{20}H_{21}NO_3$,
Clausamine E is a colourless oil, $C_{20}H_{21}NO_4$
Clausamine G is a yellow oil, $C_{20}H_{21}NO_5$ (4)
From the alcoholic extract of the **stem bark** of C. anisata contains the two alkaloids clausenol and clausenine. Their structure was 1-hydroxy-6-methoxy-3-methylcarbazole and 1,6-dimethoxy-3-methyl carbazole, respectively. The molecular weight of clausenol was 227(m/z), the structure formula $C_{14}H_{31}NO_2$ (1).
In Nigeria four coumarins could be found from the **root bark**, among these chalepin and imperatorin (5).
Steam distillation of **fresh leaves** yields sweet smelling, brownish-yellow oil. Its major component is estragole, not anethole. It is 1 ½ times more toxic than the crude oil (8).

Traditional uses

In Nigeria a mixture of Clausena anisata, Afraegle paniculata and Azadirachtha indica is taken against gut disturbance and a concoction of the latter called "Agbo" is used as an antimalarial medicine(9). In Tanzania, traditional healers use Cl. anisata against oral candidiasis and fungal infections of the skin (3). In the Temeke district (Daressalam, Tanzania) traditional healers employ C. anisata against epilepsy and as an anticonvulsant (6). In South Africa the leaves of C. anisata are applied against high blood pressure. In some parts of Africa and in the Philippines the burning of fresh leaves is utilized to repel mosquitoes (8).

Results of experimental studies

Pharmacological studies

The furanocoumarins imperatorin, oxypeucedanine and chalepin, isolated from the roots of C.anisata were studied in rats. Only chalepin was found to have a strong anticoagulant activity when administered to rats at a single dose. It was the most active one. In chalepin treated animals a mild necrosis of hepatocytes was observed. Four rats from ten given two doses of 100 mg/kg intraperitoneally on the second day died of which the livers showed necrosis of the hepatocytes, as the histological investigation showed. No deaths were recorded for the treatment with imperatorin or oxypeucedanine. Rats surviving after 8 weeks showed no changes in hepatic enzyme activity, reduced glutathion and DNA concentrations. However, chalepin and imperatorin induced alterations in the serum protein pattern within this period. No lesions were observed in the livers of rats treated with imperatorin and oxypeucedanine. A treatment of rats with 50 mg/kg chalepin for three days resulted in the increase of alpha-1-globulin and in the decrease of ß-globulin content. Single doses of 50 mg/kg of these three substances did not affect hepatic DNA, reduced glutathion and glucose-6-phosphatase (2).

Imperatorin isolated from the Nigerian plant Cl. anisata was screened on 6 Ames tester strains (TA92, TA94, TA97, TA98, TA100, and TA102). Imperatorin was mutagenic except in TA94 and TA102). Its mutagenic potency was 0.2. The highest mutagenity on TA98 and TA100 was 30 µg. Microsomal activation was not required (9).

Effects on blood high pressure

Towards the use of C. anisata in the treatment of high blood pressure by indigenous healers in South Africa aqueous and ethanolic extracts were tested in the angiotensin converting enzyme assay. The inhibition levels were found greater than 50 % with differences between both. This strong activity was explained by the absence of tannins in the plant C. anisata.

To examine the hypoglycaemic effect of C. anisata with normal and streptozotocin-treated diabetic rats a methanolic root extract of 100-800 mg/kg was given. per os. The stepwise treatment with 100-800 mg/kg produced dose-dependent significant reductions in the blood glucose concentration in both fasted normal and diabetic rats. The maximal hypoglycaemic effect was at 8oo mg/kg being comparable with insulin (5µU/kg sc) and glibenclamide (0.2mg/kg p. o.) with fasted normal and diabetic animals. The mean basal blood glucose concentration was reduced to 57.52 % and 51.30 %, respectively. These facts lend credence to the suggested folkloric use (7).

Antifungal and antibacterial activity

Between 65 crude methanolic extracts belonging to 56 plant species the methanol extract of C. anisata was tested according to the microdilution method against

different infective Candida species. Among 56 plant species the extract of C.anisata exhibited a strong antifungal activity (3). Clausenol, extracted by alcohol out of the stem bark of C. anisata was active against Gram-postive and Gram-negative bacteria (1).

Antiviral activity

Four carbazol alkaloids, clausamines D, E, F, and G, isolated from Cl. anisata are inhibitors of Epstein-Barr virus early antigen activation induced by 12-O-tetradecanoylphorbol-13-acetate in Raji cells (4).

Activity against insects

The volatile oil is toxic to the third state of the grashopper Zonocerus variegatus and and repels the tick Rizodes ixinus (8).The burning of dried plants repels mosquitoes (8).

Results of clinical studies

No results were available

Toxicity

Chalepin	**LD 50**	**100 mg/kg in rats i. p.**
Coumarin (basic substance):	**LD 50**	**680 mg/kg in rats p. o.**
	LD 50	**202 mg/kg in guinea pigs p. o.**

Evaluation

According to the experimental results the plant Clausena anisata is biologically very active because of its constituents like carbazole alkaloids, coumarins and estragole. They all work together and it would be speculative to ascribe a single activity to a single constituent.

Regarding the circulatory effects of the different extracts in rats the use of any plant product from Clausena anisata with men must be advised against.

Burning of the plants can be useful against mosquitoes and ticks

Clausena anisata

for the treatment of men	**- - -**
against mosquitoes and ticks	*** * ***

References Clausena

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