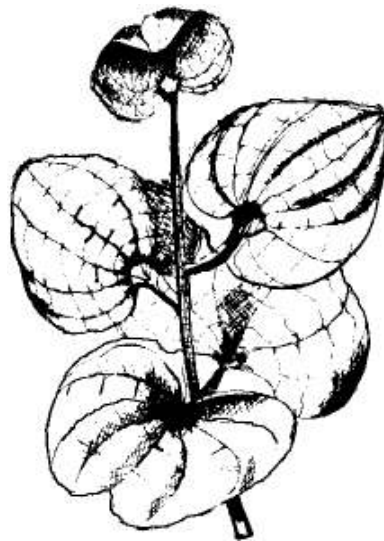


Technical Data Report

for

PATA DE VACA

Bauhinia forficata



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Pata de Vaca

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Family: Leguminosae

Genus: *Bauhinia*

Species: *forficata*

Synonyms: *Bauhinia candicans*

Common Names: Pata de vaca, casco de vaca, mororó, pata de boi, unha de boi, unha de vaca, unha-de-anta

Parts Used: Leaves, bark

Pata de vaca is a small tree that grows 5–9 m tall. Its leaves are 7–10 cm long and shaped like a cow's hoof, which is distinctive to the *Bauhinia* genus. Its Brazilian name, *pata de vaca*, translates to *cow's foot*. It produces large, drooping white flowers and a brown seed pod resembling that of mimosa. It can be found in the rainforests and tropical parts of Peru and Brazil, as well as in tropical zones of Asia, eastern Paraguay, and northeastern Argentina. It is quite prevalent in Rio de Janeiro and Brazil's Atlantic rainforest to the south. The *Bauhinia* genus comprises about 500 species of shrubs, small trees, and lianas in the tropics—most of which bears the distinctive cow's hoof shaped leaves.

The indigenous uses of pata de vaca are not well documented, but it has long held a place in Brazilian herbal medicine. It has been described as hypoglycemic, depurative, and diuretic, and has been used for over 60 years to balance blood sugar levels in diabetics. It is considered a good blood cleanser, and a leaf decoction is used internally and externally for elephantiasis and snakebite, as well as other skin problems (including those of a syphilitic nature). It is a highly regarded treatment for diabetes, even being called “vegetable insulin.” As such, it is used in South America to help balance blood sugar levels and to alleviate other symptoms of diabetes (such as polyuria, renal disorders, and other urinary problems). Pata de vaca leaves and tea bags are common items on pharmacy shelves in South America; traditionally, a leaf tea (standard infusion) is drunk after each meal to help balance sugar levels.

Pata de vaca's hypoglycemic activity was first reported by a Brazilian researcher in an *in vivo* 1929 clinical study, which was followed by another *in vivo* (dog) study in 1931.^{1,2} The same Brazilian researcher published another study in 1941, reporting the antihyperglycemic effects of pata de vaca in humans, dogs, and rabbits.³ A study was funded in 1945 to determine the active constituents responsible for its activity.⁴ Since a simple leaf tea was shown to help balance sugar levels, it became a popular natural remedy, however, no subsequent studies were done for many years due to a lack of funding for nonproprietary remedies and drugs. In the mid-1980s, however (when herbal remedies again were popular), pata de vaca's continued use as a natural insulin substitute was reiterated in two Brazilian studies. Both studies reported *in vivo* hypoglycemic actions in various animal and human models.^{5,6} Chilean research in 1999 reported the actions of pata de vaca in alloxan-induced diabetic rats. Their study determined that pata de vaca was found to “elicit remarkable hypoglycemic effects,” and brought about a “decrease of glycemia in alloxan diabetic rats by 39%.”⁷ More recently (in 2002), two *in vivo* studies on the blood-sugar-lowering effects of pata de vaca were conducted by two separate research groups in Brazil. The first study reported “a significant blood glucose-lowering effect in normal and diabetic rats” at dosages of 800 mg/kg in diabetic rats and 500 mg/kg in normal rats.⁸ In the second study, 150 g of the leaf (per

liter of water) was given to streptozotocin-diabetic rats as their drinking water. Researchers reported that, after one month, those receiving pata de vaca had a “significant reduction in serum and urinary glucose and urinary urea . . .” as compared to the control group.⁹

Pata de vaca continues to be a popular natural medicine in South America for diabetes and clinical research there supports its use. A standard infusion is brewed and drunk after each meal, and pata de vaca is often combined with pedra hume caá (another South American plant featured in this book) for this after-meal tea. North American practitioners and herbalists are now using it for diabetes, hyperglycemia, and polyuria.

Documented Properties and Actions: Depurative, diuretic, hypoglycemic, molluscicidal, tonic, vermifuge

Main Phytochemicals: Astragalin, bauhiniside, beta-sitosterol, flavonols, flavonoids, glycosides, guanidine, heteroglycosides, kaempferitrin, organic acids, quercitrosides, rhamnose, saponins

Traditional Remedy: One-half to 1 cup of a standard leaf infusion 2–3 times daily with meals.

Contraindications: Pata de vaca has been documented to have a hypoglycemic effect in animal and human studies. It is contraindicated in those with hypoglycemia. Diabetics who wish to use this plant should seek the advice and supervision of a qualified health care practitioner while using this plant as blood sugar levels will need to be monitored carefully and medications may need adjustments.

Drug Interactions: May potentiate antidiabetic and insulin medications.

WORLDWIDE ETHNOBOTANICAL USES

Region	Uses
Amazonia	Diarrhea, tonic
Chile	Diabetes
Brazil	Astringent, blenorrhagia, CNS, cystitis, depurative, diabetes, diarrhea, diuretic, elephantiasis, glucosuria, hyperglycemia, leprosy, obesity, polyuria, purgative, renal, renal calculi, skin disorders, snakebite, syphilis, urinary, vermifuge
Peru	Tonic
Elsewhere	Antioxytotic

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The information contained herein is intended for education, research, and informational purposes only. This information is not intended to be used to diagnose, prescribe or replace proper medical care. The statements contained herein have not been evaluated by the Food and Drug Administration. The plant described herein is not intended to diagnose, treat, cure, mitigate, or prevent any disease.

Ethnomedical Information on Pata de Vaca (*Bauhinia forficata*)

Plant Part / Location	Documented Ethnomedical Use	Type Extract Route	Used For	Ref #
Leaf Amazonia	Used as a tonic and for diarrhea.	Not stated	Human Adult	ZZ1003
Entire Plant Brazil	Used for diabetes and obesity. Used as a diuretic and astringent.	Hot H2O Ext Oral	Human Adult	ZZ1096
Leaf Brazil	Used as an antidiabetic.	Hot H2O Ext Oral	Human Adult	A12810
Leaf Brazil	Used for diabetes.	Infusion Oral Decoction Oral Wine Ext Oral	Human Adult Human Adult Human Adult	K12432 M29305 T15975
Leaf Brazil	Used for diabetes. Used as a diuretic.	Infusion Oral	Human Adult	K12432
Leaf Brazil	Used for diabetes.	Hot H2O Ext Oral	Human Adult	L09106
Leaf Brazil	Used for diabetes.	Hot H2O Ext Oral	Human Adult	ZZ1070
Leaf Brazil	Used as an antidiabetic and for cystitis.	Various Oral	Human Adult	ZZ1099
Leaf Brazil	Used as an insulin substitute for diabetics. Used for polyuria, hyperglycemia and for its diuretic properties.	Various Oral	Human Adult	ZZ1014
Leaf Brazil	Used for diabetes mellitus II, making the pancreas produce more insulin; used to normalize glucose.	Hot H2O Ext Oral	Human Adult	ZZ1076
Leaf Brazil	Used for renal and urinary affections, polyuria and for diabetes. Used for elephantiasis.	Hot H2O Ext Oral	Human Adult	ZZ1072
Leaf Brazil	Used as an antidiabetic, purgative, diuretic and for problems of the urinary system.	Hot H2O Ext Oral	Human Adult	ZZ1092
Leaf Brazil	Used for diabetes. Used as a diuretic to eliminate renal calculi. Used to calm the nervous system.	Hot H2O Ext Oral	Human Adult	ZZ1081
Leaf Brazil	Used for diabetes.	Various Oral	Human Adult	ZZ1016
Leaf Brazil	Used for elephantiasis, affections of the skin and syphilis. Used as a substitute for insulin; called 'vegetable insulin.' Used for glucosuria, diabetes and renal affections.	Hot H2O Ext Oral	Human Adult	ZZ1013

Plant Part / Location	Documented Ethnomedical Use	Type Extract Route	Used For	Ref #
Stem Brazil	Used for elephantiasis, snakebite and diabetes; used as a diuretic and depurgative.	Hot H2O Ext Oral	Human Adult	ZZ1002
Stem Brazil	Used for diarrhea.	Hot H2O Ext Oral	Human Adult	ZZ1081
Root + Leaf Brazil	Used as an antidiabetic, vermifuge and diuretic. Used for leprosy, elephantiasis, snakebite and blenorrhagia.	Not stated	Human Adult	AQ1005
Flower Brazil	Used as a purgative.	Not stated	Human Adult	AQ1005
Not Stated	Used as an antioxytocic.	Not Stated	Human Adult (Pregnant)	L16798

Presence of Compounds in Pata de Vaca (*Bauhinia forficata*)

Compound	Chemical type	Plant Part	Plant Origin	Quantity	Ref #
Astragalin	Flavonone	Leaf	Brazil	Not stated	ZZ1002
Bauhinoside	Glycoside	Leaf	Brazil	Not stated	AQ1005
Guanidina	Flavonol	Leaf	Brazil	Not stated	AQ1005
Kaempferol	Flavonol	Leaf	Brazil	Not stated	ZZ1092
Kaempferitrin	Flavonol	Leaf	Brazil	Not stated	L09106
Quercetin	Flavonol	Leaf	Brazil	Not stated	ZZ1092
Quercitrin	Flavonol	Leaf	Brazil	Not stated	ZZ1002
Quercitrin, iso	Flavonol	Leaf	Brazil	Not stated	ZZ1002
Quercetol	Flavonol	Leaf	Brazil	Not stated	AQ1005
Rhamnose	Flavonol	Leaf	Brazil	Not stated	AQ1005
Rutin	Flavonol	Leaf	Brazil	Not stated	ZZ1092
Sitosterol, beta	Sterol	Leaf	Brazil	Not stated	L09106

Biological Activities for Extracts of Pata de Vaca (*Bauhinia forficata*)

Part – Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Entire Plant Brazil	Antihyperglycemic Activity	Hot H2O Ext	Oral Dog	10.0 ml	Active	Diabetic condition induced by removal of two-thirds of pancreas.	W01037
Entire Plant Brazil	Antihyperglycemic Activity	Hot H2O Ext	Oral Dog	10.0 ml	Active	vs. adrenalin-induced hyperglycemia.	W01037
Entire Plant Brazil	Antihyperglycemic Activity	Hot H2O Ext	Oral Human Adult	15 ml	Active		W01037
Entire Plant Brazil	Antihyperglycemic Activity	Hot H2O Ext	Oral Rabbit	5.0 ml	Active	vs. adrenalin-induced hyperglycemia.	W01037
Leaf Not Stated	Antihyperglycemic Activity	Infusion	Oral Human Adult	Not Stated	Inactive	Data from a review article.	J12034
Leaf Brazil	Antihyperglycemic Activity	Infusion	Oral Human Adult	3.0 g	Inactive	Tested in Type II diabetic patients over 56 days.	M29305
Leaf Brazil	Hypoglycemic Activity	Hot H2O Ext	Dog	Not Stated	Active		A12810
Leaf Brazil	Hypoglycemic Activity	n-BuOH Ext	Oral Rat	500 mg/kg 600 mg/kg	Active Active	In normal rats a hypoglycemic effect was seen after 1 and 2 hours of treatment.	AQ1001
Leaf Brazil	Hypoglycemic Activity	n-BuOH Ext	Oral Rat	800 mg/kg	Active	Effect seen within 1 hour in alloxan-induced diabetic rats and maintained for 3 hours.	AQ1001
Leaf Brazil	Hypoglycemic Activity	n-BuOH Ext	Oral Rat	Not stated	Inactive	Glucose-fed hyperglycemic normal rats.	AQ1001
Leaf Brazil	Hypoglycemic Activity	Hot H2O Ext	Oral Rat	150 g/L	Active	Reduction in serum and urinary glucose and urinary urea seen in streptozotocin-induced diabetic rats.	AQ1002
Leaf Chile	Hypoglycemic Activity	Hot H2O Ext	Oral Rat	Not stated	Inactive Active	Normal rats. Alloxan-induced diabetic rats - decrease in glycemia by 39%.	AQ1003
Part Not Specified Japan	Renal Protective Activity	Fraction: Kaempferitrin	Cell Culture	Not stated	Active	Ameliorated renal cellular injury and protected renal cells.	AQ1004
Leaf Brazil	Mutagenic Activity	Hot H2O Ext	Agar Plate	500.0 mg	Active	<i>Salmonella Typhimurium</i> TA100 and TA102.	K12432
Leaf Brazil	Mutagenic Activity	Hot H2O Ext	Agar Plate	500.0 mg	Inactive	<i>Salmonella Typhimurium</i> TA98.	K12432
Bark Brazil	Molluscicidal Activity	ETOH (95%) Ext	Not Stated	1000 ppm	Weak Activity	<i>Biomphalaria glabrata</i> <i>Biomphalaria straminea</i>	W02949
Bark Brazil	Molluscicidal Activity	H2O Ext	Not Stated	1000 ppm	Weak Activity	<i>Biomphalaria glabrata</i> <i>Biomphalaria straminea</i>	W02949

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CLINICAL ABSTRACTS

J Ethnopharmacol 2002 Nov;83(1-2):33-7

Acute effect of *Bauhinia forficata* on serum glucose levels in normal and alloxan-induced diabetic rats.

Silva FR, Szpoganicz B, Pizzolatti MG, Willrich MA, de Sousa E.

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Experimental diabetes was used to study the acute effect of the n-butanol fraction of *Bauhinia forficata* Link (Leguminosae) (BF) leaves on the serum glucose levels of rats. Body weight was measured on the day of diabetes induction and on the day of the experiment. Levels of glucose were determined at different doses and times following treatment with BF or with vehicle in normal, diabetic and hyperglycemic normal rats. Oral administration of n-BuOH fraction led to a significant blood glucose-lowering effect in normal and diabetic rats. However, in glucose-fed hyperglycemic normal rats, the maximum dose of this fraction failed to decrease blood glucose levels. The hypoglycemic effect was observed at doses of 500 and 600 mg/kg after 1 and 2 h treatment respectively, in normal rats. The maximum effect of BF was detected at 1 h with 800 mg/kg in diabetic animals and this profile was maintained for the next 3 h. Treatment of normal and alloxan-induced diabetic rats with BF decreased glucose levels, while this fraction was devoid of hypoglycemic effect in glucose-fed hyperglycemic normal rats.

J Ethnopharmacol 2002 Jul;81(2):191-7

Anti-diabetic activity of *Bauhinia forficata* decoction in streptozotocin-diabetic rats.

Pepato MT, Keller EH, Baviera AM, Kettelhut IC, Vendramini RC, Brunetti IL.

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The effects of using *Bauhinia forficata* leaf decoction (150 g leaf/l water; 35.2±7.8 ml/100 g body weight mean daily dose) as a drinking-water substitute for about 1 month on streptozotocin-diabetes (STZ-diabetes) in male Wistar rats were investigated. The physico-metabolic parameters measured were: body weight, food and liquid intake, urinary volume, hepatic glycogen, serum triglycerides and cholesterol, plasma glucose, urinary glucose and urea, and the weight of epididymal and retroperitoneal adipose tissue and soleus and extensor digitorum longus muscles. The STZ-diabetic rats treated with decoction showed a significant reduction in serum and urinary glucose and urinary urea as compared to the STZ-diabetic control, no difference being seen between decoction-treated and -untreated non-diabetic rats. The other physico-metabolic factors showed no changes in treated STZ-diabetic rats. The improvement in carbohydrate metabolism seen in the rats treated with *Bauhinia forficata* decoction does not appear to be linked to the inhibition of glycogenolysis or the stimulation of glycogenesis nor does it appear to act in a way similar to insulin or the sulfonylureas, although it may act by the inhibition of neoglycogenesis in a manner similar to that of the biguanides.

Z Naturforsch [C] 2000 May-Jun;55(5-6):478-80

Phytochemical and pharmacognosic investigation of *Bauhinia forficata* Link (Leguminosae).

da Silva KL, Biavatti MW, Leite SN, Yunes RA, Delle Monache F, Cechinel Filho V.

Nucleo de Investigações Químico-Farmacêuticas, Universidade do Vale do Itajaí-UNIVALI, SC, Brazil.

We have isolated two phytoconstituents present in the *B. forficata* leaves, a medicinal plant employed in folk medicine specially for the treatment of diabetes. These compounds were isolated by column chromatography and identified as beta-sitosterol and kaempferol-3,7-dirhamnoside (kaempferitrin) by spectroscopical data and comparison with authentic samples. A comparative study with different parts of the plant indicated that the latter is present only in the leaves, suggesting that it might be useful for a suitable quality control of phytotherapeutics which contain this organ of *B. forficata* in its composition.

Braz J Med Biol Res 1990;23(1):11-20

Clinical trial of *Myrcia uniflora* and *Bauhinia forficata* leaf extracts in normal and diabetic patients.

Russo EM, Reichelt AA, De-Sa JR, Furlanetto RP, Moises RC, Kasamatsu TS, Chacra AR.

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1. *Myrcia uniflora* and *Bauhinia forficata* were compared with placebo for their hypoglycemic effect in randomized cross-over double-blind studies in 2 groups of normal subjects (10 subjects each) and 2 groups of Type II diabetic patients (18 in the *M. uniflora* group and 16 in the *B. forficata* group). The protocol with each plant lasted 56 days. 2. After the ingestion of infusions of 3 g leaves/day of *M. uniflora* and *B. forficata* leaves, no acute or chronic effects on plasma glucose levels or glycated hemoglobin were found in either group. However, plasma insulin levels in the diabetic group were lower after *M. uniflora* than after placebo. 3. Among other clinical parameters tested, a statistically significant difference was found only in the alkaline phosphatase level after placebo compared with that after *M. uniflora* in the normal group. 4. There were no differences in any clinical parameters after the use of placebo or of *B. forficata*. 5. We conclude that infusions prepared from the leaves of *M. uniflora* or *B. forficata* have no hypoglycemic effect on normal subjects or Type II diabetic patients.

