

The Unexpected Garden Pharmacy

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By

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INTRODUCTION

I am NOT a medical doctor. I am not a white *sangoma* or *inyanga*¹ either. However, my love of plants, especially the indigenous plants of Southern Africa, has led me to develop a basic knowledge of how to keep at bay some health problems. I do not pretend I was able to “cure” myself. Most plant-based therapies are not about “curing” anything or anybody, as I explain below.

I have personally tested all these short recipes. However, there is a good deal of individual variation between people (age, race, general health condition, genetic patterns, food, mode of life, and a myriad of other factors), and great variability in the plant material I refer to here. Therefore, I cannot guarantee that my recipes will work for everybody, every time. This book offers only some general thoughts and guidance. Please treat the recipes as general thoughts and guidelines – all the rest is your experiment.

First, I must explain what I believe in when trying to help myself (or others, mainly from my own family). As I mention in the “rules” below, plants can be enormously helpful but also enormously dangerous. Why is this so? Every pill we take was designed for a specific purpose by a process of biochemical and chemical research, research that is based on three pillars: mechanistic reduction, scientific induction, and modeling (which includes trials and testing procedures).

Mechanistic reduction means an application of the “watchmaker’s attitude”: taking apart “the object” (for example, a willow tree) to single out the tiny part (for example, salicylates) which is a candidate for the cure. It is a candidate because a chemical formula and structure becomes known in the process of research, and the chemical properties of this compound are known or researched further, if necessary. Nothing here is blind “trial and error”.

¹ In Africa, a herbalist or traditional healer. Sangoma: spiritual and physical; inyanga: in Zulu, herbalist only.

In this context, scientific induction means the statistical probability that the treatment will have the desired effect.

Modeling means that both previous steps must be tested. At this stage a protocol is written and a small model run; then the procedure is tested live on a large number (preferably >1000) of animals and humans. These tests involve various doses and control groups which receive placebos.

Many plant-related medicines are prepared differently, with the exception of extracts of one particular ingredient, which is then turned into the “orthodox” cure, as described above (e.g., salicylates). Each treatment deals with a medley of many different chemicals, in low concentrations, which usually (there are exceptions) act in unison, and precisely because of that, they deliver help.

Why is this so? Plants are prisoners of their environment; fixed to one spot, they cannot escape. So biological evolution has developed methods that enable plants to defend themselves against various threats. Many of these threats are frequently the same for them (or surprisingly similar) as they are for us because we share the same biochemical principles of life.



Fig. 1. *Acokanthera oppositifolia* (author’s garden). Never use this plant for any amateurish “medicinal” preparations! It is a useful medicinal plant, but only in the hands of indigenous experts.

Thus, if we choose carefully, examine human experience and tradition, and research as deeply as we can, we may achieve incredible results using plants, as humankind discovered millennia ago. However, in the twenty-first century, this knowledge has been largely lost, misunderstood, deliberately muddled to extract more money, and married with legends and myths. It is true that ancient plant medicine (the Khoi-San of Africa were probably the first doctors among the tribes known to us today) was a mixture of an intuitive connection with Nature (no one knows exactly how, in terms of our reductionist and largely inductive science), and hard and expensive trial-and-error in the form of casualties, lasting – who knows? A hundred thousand years, or maybe more?

This lack of knowledge and insight may render plant medicine dangerous. Some of the most potent toxins on Earth come from plants (such as the resin from the common Bushman poison tree, *Acokanthera oppositifolia*). In a sense, every plant on Earth can be poisonous to humans if used incorrectly. We are too short of proper answers and tests to reduce this holistic knowledge to “pharmacology”. We know only the basics. Holistic research (in contrast to reductionist research) exists but is difficult to conduct in practice and in its early stages. This is why – before we know more – I recommend using only ointments based on the ointment medium and some ground plant material which may be added to the medium. I also recommend various gargles. My technique relies on a belief in the “balance of the body”, the very same principle used by acupuncture and chiropractic, and many other techniques. Similar practices (not covered in this publication) are inhalations, such as aromatherapy and bath therapies, based on plant material.

Each “feeling unwell” experience stems from a disturbance within and loss of balance of the body’s functioning, which is governed by the nervous system, general metabolism, immunological defense mechanisms and the equilibrium corrective mechanisms derived from these, all of which encounter a gradient, the interface between the body and the external environment. Sometimes cleverly prepared and used ointments can restore the balance of our tiny galaxy.

Plants (in contrast to specific compounds isolated from plants and then synthesized in the laboratory) should NOT be seen as vehicles for “curing” anything. They do not “cure” – they may help to stabilize and restore metabolic equilibria. Therefore, they must be used together, and not instead of, or worse – against – official, ordinary medicine. They just do something different. A popular notion that “the use of [plants] in some communities

with limited access to modern medical facilities represents a viable primary health care alternative” (Maroyi, 2013 p. 59) is not true, although it describes a real situation on the ground. However, the twin approach of using plant and “official” medicine together, as described above, should be the goal for the future, once well understood and applied. In this, there are no secrets, mysteries and miracles, just well-known old common sense. The same common-sense approach applies to the interpretation of another old, well-known fact: a positive mental attitude on the part of the patient who firmly believes that he/she can and will be cured greatly assists and enhances the final good outcome. There is no mystery. We can partially steer our neurotransmitters and hormones in the required quantity and at the correct time to the places of the structure where they are badly needed. For this reason, every doctor should teach his/her patient the healing importance of a positive attitude approach to the therapy.

I believe such medicine of the future will take cognizance of two elements largely missing from medicine now. I call present-day treatments “the short-cut, or symptomatic, medicine” which focuses only on the cause-effect part (diagnosis-treatment-desired result) and stops there. What is missing is the holistic treatment of the “whole metabolism’s well-being”. Plant therapy may provide this part right now. However, there is some rejection, prejudice against and even intense dislike of the holistic plant-based therapies on the part of mainstream medicine. An example is the use of *Ginkgo biloba* extracts (for references, see the specific chapter on trees), most frequently EGb761 (22–27% flavone glycosides; terpene lactones; bilobalide; with ginkgolide acid eliminated as far as possible). This component is commercially available as tablets and has been evaluated in many published, well-documented studies and clinical trials. My personal experience confirms its efficacy. My mother took *Ginkgo biloba* extract as a preventive measure against dementia and reached 96 years in relatively good health; an achievement historically unheard of in her family, as most members had died relatively young. The Conclusions section of the voluminous and well-researched European Medicines Agency (Committee on Herbal Medicinal Products) Report states:

A specified preparation of *Ginkgo biloba* fulfils the requirements of well-established use. Different clinical studies have demonstrated the benefits of *Ginkgo biloba* in patients with dementia, especially above the age of 50 years, which are displayed in the indication: ‘Herbal medicinal product for the improvement of (age-associated) cognitive impairment and of quality of life in mild dementia.’ The results are supported by meta-analysis of several clinical trials.

In their report, the EMA (CHMP) quote and review at length numerous studies and publications which attest to this conclusion. Yet, in their assessment, the U.S. Department of Health and Human Services, National Institutes of Health and, more specifically, the National Center for Complementary and Integrative Health, state categorically (NIH Website):

There is no conclusive evidence that ginkgo is helpful for any health condition. Although some studies suggest that ginkgo may help to slightly improve some symptoms of dementia, the findings have been described as unreliable. Also, other studies have had conflicting findings. Ginkgo neither helps prevent dementia or cognitive decline, nor prevents Alzheimer's-related dementia from getting worse – this is according to studies that include the long-term Ginkgo Evaluation of Memory Study, which enrolled more than 3000 older adults and was funded in part by the National Center for Complementary and Integrative Health (NCCIH). For various health conditions, a small amount of evidence suggests a benefit from taking ginkgo, but the overall evidence is not conclusive. These conditions include anxiety, diabetic retinopathy, glaucoma, peripheral artery disease, premenstrual syndrome (PMS), schizophrenia, and vertigo. Research seems to suggest that ginkgo does not help with memory enhancement in healthy people, or with high blood pressure, tinnitus, multiple sclerosis, seasonal affective disorder, or the risk of having a heart attack or stroke.

The Mayo Clinic website concurs:

Research on ginkgo use for specific conditions shows:

- **Dementia.** There is not enough evidence to support the use of ginkgo to prevent dementia or treat people with mild cognitive impairment.
- **Claudication.** A review of the research suggests that taking ginkgo has no significant benefits for people with this condition.

Ginkgo's effect on memory enhancement has had conflicting results. While some evidence suggests that ginkgo extract might modestly improve memory in healthy adults, most studies indicate that ginkgo does not improve memory, attention or brain function.

My explanation of this profound conflict in science-based conclusions is at least two- and maybe three-fold. The first explanation stems from *primum non nocere* responsibility (“first, do no harm”): even if there is bulky but quality-diverse evidence of benefits and some evidence to the contrary, the overall assessment should be negative. In other words, it is safer to err on the conservative side. The second part of the explanation stems from the rule of reductionist proof requirement: it is nearly impossible to provide this

proof in the holistic multi-component treatment, where there is (by default) a large body of negative evidence which is the consequence of a large (and variable) number of active compounds, their varying quantity and quality and their poor control in the treatment. The third issue may be the lobbying of large pharmaceutical companies: the one-component treatment and a well-controlled market (via intellectual property rights and patents) is their forte, which they defend for very good reasons.

Another part, which is largely missing in mainstream medicine, is the “care of the soul”, the psychological part of treatment which leaves the patient feeling good and stable. This aspect is largely left to the discretion (and preference and talent) of the doctor; some try it, some do not. However, all three aspects (classic or mainstream treatments, holistic treatments, and psychological care) should be covered by medical academia from the first medical interview to the final goodbye – they should be applied in practice by every medical doctor on this Earth. This is my message.

Observations and recommendations concerning holistic, plant-based healing:

1. Rely on the enormous knowledge of mankind, stretching back thousands of years; experiment only if and when you must; control your experiments with care.
2. Where will you find information? Everywhere. The best, are good, large, established and famous Botanical Gardens. Become a member of the Botanical Society.
3. Plants and their use may be enormously dangerous; be careful with what you do; be even more careful what you do to others. *Primum non nocere* (First, do no harm).
4. If at all possible, do not buy medical plant material (dry, powdered or liquid); buy the plants themselves, plant them, know them. This means planning ahead. Planning ahead is critically important. However, you may be prohibited from buying (let alone planting) some plants described below. A good example is the Brazilian pepper tree (*Schinus terebinthifolia*) – forbidden in some US states (Florida, Texas) and in South Africa (all trees in Kwazulu-Natal must be destroyed, and in other provinces they cannot be planted). In such a case, the only solution is to obtain ground powders.

5. In the plant medicine which I recommend, ointments and gargles are safer than and superior to anything taken internally.
6. Always check for allergies when using ANY plant material. Use as much common sense as you can. Liaise with a medical doctor who knows and understands allergies.
7. Consult medical doctors frequently: your GP, specialists, if necessary. One little-known disadvantage of using herbal medicines lies in their masking effect (making diagnosis difficult): physiologically you may appear healthy, your blood tests may be fine, etc. Yet, you still may be ill, and you may be dangerously ill. This is why I strongly advocate the proper timing of your treatment: exhaust the proper medical diagnostic processes FIRST, and then apply your herbal remedies to balance your physiology in such a way to avoid nullifying or contradicting what your doctors (GP and specialists) prescribe or advocate. They MAY discourage you from using herbal treatments, as many doctors do not believe in them (for a good reason: “not scientifically proven = nonexistent”). However, make up your own mind – this is your exercise in independent thinking. Another little-researched disadvantage of using holistic plant-related remedies is an adverse, multi-interaction with prescribed medicines. Doctors are quite wary of these interactions and prefer to follow the principle of “unknown = do not use at all”.
8. Another under-researched by-product of holistic plant treatment is the “paradoxical outcome”: what normally helps, may actually be making things worse. Some forms of cancer and auto-immune diseases may behave in such a way; one must be extra careful with holistic treatments. These paradoxical outcomes occur simply because the whole treatment is holistic: there is a high and not experimentally known number of interlinks between components and metabolic pathways. Another danger is an imbalance due to rare, unexpected, natural dominance of one particular component in the holistic treatment (which will have occurred naturally in the plant used), unknown to the doctor and to the patient. The outcome is predictable: instead of achieving the balanced metabolism, the effect is the contrary: a greater imbalance of the system.

The beauty of the official, conventional, one-component pharmacology lies in its predictability and in a reasonable level of physiological control. At

this stage of our knowledge, holistic plant-related treatment is, and will remain for a long time, largely unpredictable.

Nevertheless, I believe that the potential of holistic plant-related treatment is great, and it remains underrated and underexplored. Research should include the following basic points:

- Criteria for the choice of the species and individual plants in this species (their age, condition, part of the life cycle, geographic location, timing of the harvest, etc.).
- Criteria for the choice of the parts of the plant for treatment.
- How these *à peu près* (approximate) choices (although as scientifically driven as possible) fit into the metabolic pathways to improve the general well-being of the patient.
- Choice of treatment based on the above (dose, duration, timing; ramifications and links; side effects, warnings; ecosystem considerations).
- Alcohol-related medicine should be applied externally only. Rather, drink red wine in a quantity always proportional to your own pleasure, with regard to your safety not far behind.

Equipment

You will need a large bowl for collecting plant material from your garden; a sieve to wash your plant material carefully and thoroughly; a drying cabinet (or other means) to dry your plant material at a temperature of 35–40°C; small electronic scale (with 0.1 g accuracy); mortar and pestle; vials, jars and/or bottles to store your dry powders or ready-to-use preparations. Do NOT use metal of ANY kind during all preparation; use only neutral wood, plastic, and glass.

I recommend that you drink plenty of fluids during these therapies, and that you gargle using specific gargles, recipes for which are given below. Drinking plenty of fluid (and especially good quality fluid) is always beneficial in any therapy, unless expressly not recommended by the doctor. Gargles address a common lack of balance in the upper respiratory tract which sometimes develops along with all other ailments; gargling is merely a preventive and supportive measure.

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TREES

BRAZILIAN PEPPER TREE

(*SCHINUS TEREBINTHIFOLIA*)

FAMILY ANACARDIACEAE

This tree is described here as an example of both an undesirable plant (irritant, allergy concern, pest and invader) and, at the same time, a tree of great medicinal and cultural value.

Botanical characteristics (healthbenefitstimes.org; Patocka & de Almeida 2017)

This tree belongs to the sumac family, **Anacardiaceae**, which includes poison ivy, poison oak, poison sumac and poisonwood. It is evergreen, and when grown as an ornament can reach 15 m, with the same spread. The trunk may be as large as 1 m in diameter. In the wild in Brazil, the tree may reach 40 m, and the trunk measure up to 3 m in diameter. This tree can grow very big in 70 years and occasionally reaches an age of 200 years.



Fig. 2. Brazilian pepper trees lining Keurboom Road in Cape Town, South Africa

The bark may vary from light to dark gray; it is smooth in younger trees and deeply furrowed in long ridges in older trees. Twigs are light brown, finely hairy when young, with many raised dots (lenticels). The sap is aromatic, sticky, resinous. Leaves are alternate pinnate, 7.5–15 cm; they are long, green, narrowly winged, with a finely hairy axis of 2.5–7.5 cm, with mostly 5, 7, or 9 stalkless leaflets, paired, except at the end. Leaflets are glabrous, elliptical or oblong, and are 2.5–5 cm long and 1.3–2 cm wide, with the largest at the end of the leaf being 7.5 cm by 2.5 cm. They are short-pointed at both ends, often with inconspicuous small, blunt teeth towards the apex, and slightly thickened, hairless, or nearly so. The upper surface is shiny green with several straight side veins, and the lower surface is a dull light green. The leaves are highly aromatic when crushed, giving off a peppery smell (or some say, turpentine-like; hence the species' Latin name).



Fig. 3. Trunk of the Brazilian pepper tree (author's garden)

The flowers are about 3 mm long and broad, consisting of a calyx of five tiny, pointed green sepals. The corolla of five spreading white petals is less than 5 mm long. Ten stamens are attached at the base of a large, ring-shaped disk. The pistil has a rounded ovary, a short style, and dot stigma. Flowering occurs from September and lasts until November.

Fruits are drupes, many in dense, glossy clusters, with the calyx at the base. The pulp is up to 6 mm in diameter, and is aromatic, resinous, brown, and slightly bitter. The fruit is green and juicy at first, becoming reddish on ripening. The red skin dries to become a papery shell surrounding the seed. The seed is single, elliptical, light brown, and less than 3 mm long.



Fig. 4. Leaves of the Brazilian pepper tree:
left – upper surface; right – lower surface.

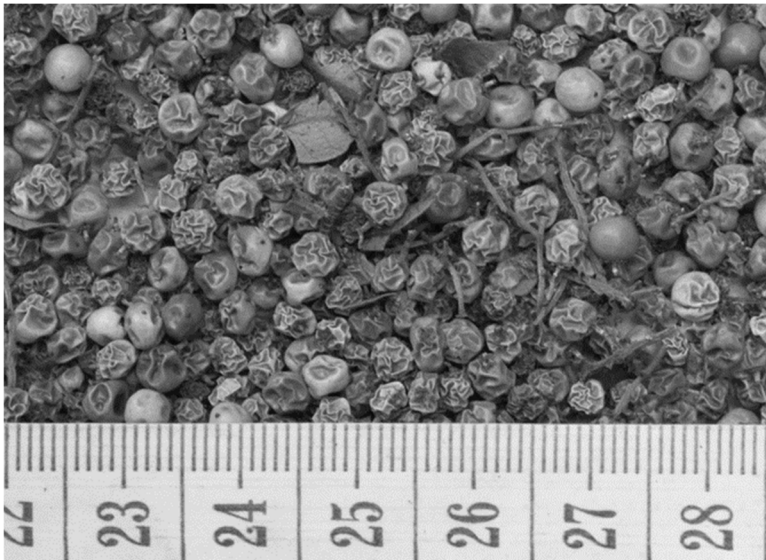


Fig. 5. Dried berries of the Brazilian pepper tree

Vernacular names (Taylor, 2005)

The vernacular names of this tree are numerous, and the following list is not a complete one: *aroeira*, *aroeira salsa*, *escobilla*, *aguaribay*, *anacahuita*, *castilla*, *galeguay*, *mulli*, *pimentero*, *pimentillo*, *pirul*, *molle del Peru*, *pepperina*, *schinus*, *wilelaiki*, rose pepper, broadleaved pepper tree, Christmas berry, Florida holly, Brazilian holly, Brazilian pepper, Brazilian

pepper tree, Japanese pepper, Peruvian pepper, California pepper tree, South American pepper, mastic tree, false pepper, Jesuit's balsam.

Distribution (CABI.org)

The tree is native to subtropical and tropical South America (south-eastern Brazil, northern Argentina, and Paraguay). It is widely distributed in the forests of thirteen states of Brazil. Aggressively invasive in Florida, Hawaii, and in the Bahamas, it is also a popular street and garden tree in South Africa. It is now also present in the following countries or states: Australia, the Bahamas, Bermuda, China, Cuba, Fiji, French Polynesia, Guam, Hawaii, Israel, Malta, the Marshall Islands, Mauritius, New Caledonia, New Zealand, Norfolk Island, Puerto Rico, Reunion.

The plant thrives in many types of soil and in various ecosystems, from sand dunes to wet swamps. Since its introduction into Florida (where it is known as Florida holly) at the end of the 19th century, this tree has displaced mangroves especially and formed mono-habitats covering thousands of acres. Altogether, it covers more than 3000 km² of all terrestrial types of the environment. It is especially dangerous in damaged or disturbed ecosystems, forming thickets under mature canopies and choking other plants. To eradicate the Brazilian pepper tree, the herbicides triclopyr and glyphosate are approved and used in the U.S. (plantdollar.com; these are dangerous chemicals, especially active in water; proceed with caution; read the data sheets first).

Traditional medicinal uses and benefits (Taylor, 2005)

The general medicinal properties of the tree are recognized in both traditional medicine and academic research. In South America, all parts of the tree (leaves, twigs, inner and outer bark, whole berries, seeds, resin, roots, oleoresin) have been extensively used by indigenous tribes for medicinal and religious purposes since ancient times. The leaves were used for tea and decoctions to treat colds and flu; decoctions were used as inhalations to treat arrhythmia, hypertension and even depression and psychological disorders. Strong decoctions of the bark were used in baths to treat back pain, arthritis, and rheumatism. Diverse parts of the tree were traditionally used in many ways as anti-bacterial, anti-inflammatories, antivirals and antifungals, and for diuretic, urinary treatment, and women's ailments. The plant has been used as a digestive stimulant and tonic, for respiratory infections, and as a wound healer. A general summary of traditional use by local healers follows:

- A liquid extract or tincture prepared with the bark is used internally as a stimulant, tonic, and astringent; against sore throat as a gargle, and externally for rheumatism, gout, syphilis, and generally for inflammation, itching, and scabies.
- Various preparations and extracts from the bark, leaves, and berries have been used as a diuretic and to treat tumours, ulcers, and leprosy.
- Folk healers from Brazil recommend that the leaves and fruit be added to baths to help heal open wounds or ulcers on the body.
- Dried leaves are used in Argentina for respiratory and urinary infections.
- In Peru, the sap is used as a mild laxative and a diuretic; various parts of the tree are used externally for fractures, and as a topical antiseptic.
- The oleoresin² is used externally as a wound healer, to stop bleeding, and for toothache.
- In South Africa, the leaf tea is used to treat colds, and a leaf decoction is inhaled for colds, hypertension, depression, and irregular heartbeat.
- Bark tea is used as a laxative, and a bark-and-leaf tea is used as a stimulant and antidepressant in the Brazilian Amazon.
- In Brazilian herbal medicine today, the dried bark and/or leaves are employed for heart problems (hypertension and irregular heartbeat, as in South Africa), infections of all sorts, as well as for tumours, general inflammation, and spasms.
- In Argentina, a decoction of dried leaves can be taken for menstrual disorders with excessive bleeding; a similar decoction is used for respiratory and urinary tract infections and disorders.

² Oleoresins are semi-solid extracts composed of resin and essential or fatty oil, obtained by evaporation of the solvents used for their production. Naturally occurring oleoresins are also known as balsams.

In summary, various preparations are used for many conditions in the tropics: menstrual disorders, bronchitis, gingivitis, gonorrhea, gout, eye infections, rheumatism, sores, swellings, tuberculosis, ulcers, urethritis, urogenital disorders, warts, and wounds.

Phytochemical analysis (Taylor, 2005)

Analysis of the Brazilian pepper tree indicates a large quantity of essential oil³ in all parts of the tree (berries: >5%; leaves >2%), in which about 50 various chemicals are present, including biologically active triterpenes and sesquiterpenes, as well as tannins, alkaloids, flavonoids, steroidal saponins, sterols, and various terpenes. Some of these chemicals are unique, and many of the plant's documented biological activities are attributed to the essential oil.

The alphabetical list of the chemicals discovered so far is as follows: amyryn, behenic acid, bergamot, bicyclogermacrene, bourbonene, γ -cadinene (unusual >18%), cadinol, calacorene, calamenediol, calamenene, camphene, carvacrol, caryophyllene, cerotic acid, copaene, croweacin, cubebene, cyanidins, *p*-cymene, elemene, elemol, elemonic acid, eudesmol, fisetin, gallic acid, geraniol butyrate, germacrene, germacrone, guaiene, gurjunene, heptacosanoic acid, humulene, laccase, lanosta, limonene, linalool, linoleic acid, malvalic acid, muurolene, muurolol, myrcene, nerol hexanoate, octacosanoic acid, oleic acid, peonidin, palmitic acid, pentacosanoic acid, α - and β -phellandrene (dominant; over 40% of all components), phellandrene, phenol, α - and β -pinene, piperine, piperitol, protocatechuic acid, quercetin, quercitrin, raffinose, sabinene, sitosterol, spathulene, terpinene, α -terpineol, terpinolene, and tricosanoic acid. This list is far from complete.

³ An essential oil is a concentrated hydrophobic liquid containing volatile chemical compounds from plants. Essential oils are also known as volatile oils, ethereal oils, or simply as the oil of the plant from which they were extracted, such as oil of cloves. An essential oil is "essential" in the sense that it contains the "essence" of the plant's fragrance—the characteristic fragrance of the plant from which it is derived. The term "essential" used here does not mean indispensable or usable by the human body, as with the terms such as "essential amino acid" or "essential fatty acid", which are so called because they are nutritionally required by a given living organism.

Biological activity of these chemicals and clinical research (Queires et al., 2006; Patocka & de Almeida, 2017)

Demonstrated potent antimicrobial and antifungal properties: the Brazilian pepper tree (and especially the essential oil) has *in vitro* antifungal clinical activity against numerous fungi, including *Candida albicans*. The essential oil has shown *in vitro* antibacterial activity against *Pseudomonas* and *Staphylococcus*⁴ for humans and animals. It was also effective in ear, nose, and throat preparations against other bacteria, and in wound healing.

Research conducted in South America has suggested that the oil was toxic *in vitro* against a human liver cancer cell line. The essential oil extracted from leaves has shown cytotoxic effects in several other cancer cell lines, mainly in leukemia and cervical carcinoma. Extracts from berries were effective against tested cell lines of breast cancer. Polyphenols extracted from the Brazilian pepper tree (in various doses) inhibited an androgen-insensitive group of human prostate cell line proliferation. These results suggest that these polyphenols induce apoptotic and autophagic cell death (Fig. 6).

Over the years, several research groups have used the Brazilian pepper tree in animal studies that have further substantiated some of its many traditional uses in herbal medicine. A fruit extract and a leaf extract were shown to reduce blood pressure in dogs and rats, as well as to stimulate uterine activity in guinea pigs and rabbits. Leaf extracts have demonstrated pain-relieving activity in mice and antispasmodic properties in rats and guinea pigs (including uterine antispasmodic actions). In 1974, the anti-inflammatory effect of the Brazilian pepper tree was documented when the herb was used to treat 100 patients with chronic cervicitis and vaginitis.

⁴ Fairly recently (2017–2018) berries of the *S. therebinthifolia* were used in a promising study on treatments of the MRSA (Methicillin-Resistant *Staphylococcus aureus*) which showed that extracts significantly decreased toxicity of the bacteria and their ability to break down the attacked tissue (Tang et al., 2020).

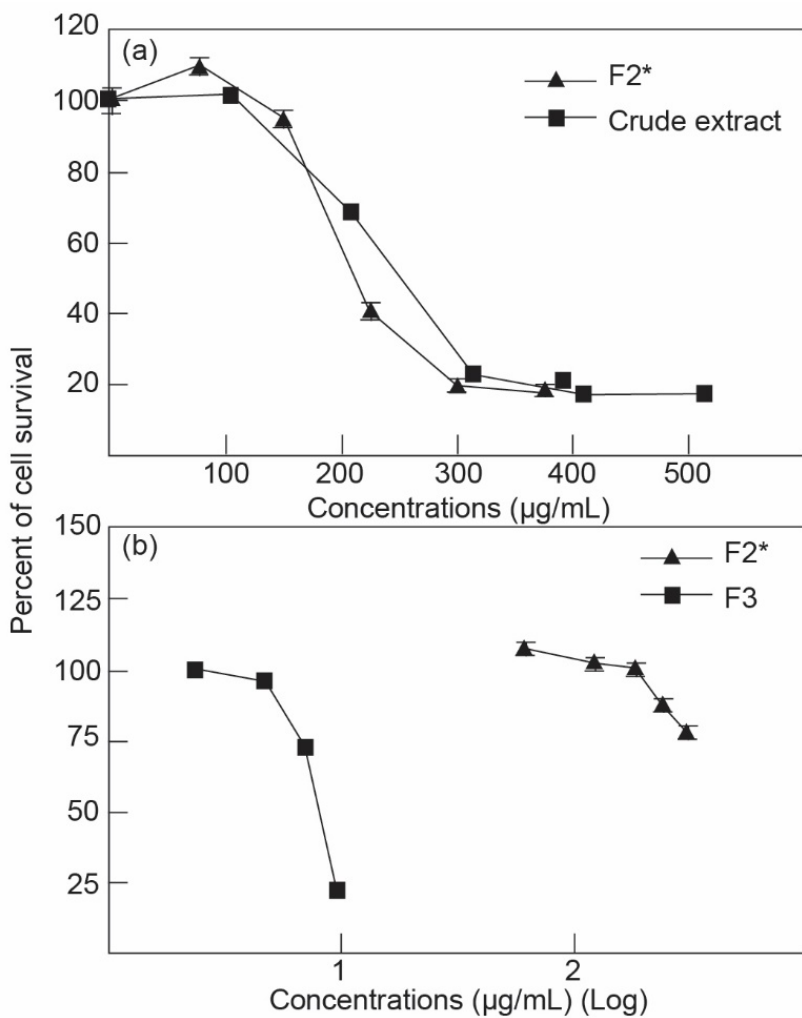


Fig. 6. Effect of fractions (F) and crude extract of unspecified powder from the Brazilian pepper tree on the survival of human prostate cancer cells. From Queires et al., 2006 (reproduced with the permission of Anticancer Research)

Examples of popular preparations (Taylor, 2005)

The leaves are most often used in an infusion, and the bark as a decoction or an alcohol tincture. For example, ½ cup of a bark decoction twice daily is used for colds, flu, sore throats, and other upper respiratory infections; 2–3 ml of a 4:1 tincture taken two or three times daily can also be taken instead of a decoction. These traditional remedies are also used as a heart tonic and for irregular heartbeat. A leaf decoction used twice daily is effective for menstrual disorders. The aqueous extract of leaves was effective against *Candida albicans*.

Contraindications (Taylor, 2005)

No part of this tree in any form should be used during pregnancy as it may trigger uterine contractions.

Drug interaction (Taylor, 2005)

The Brazilian pepper tree has hypotensive properties and may conceivably interfere with high blood pressure medication.

Culinary usage (healthbenefitstimes.com)

The Brazilian pepper tree is a source of an excellent spicy and popular honey, for which reason beekeepers in both Americas are strongly opposed to the eradication of the tree. Interestingly, the main honey-producing bee associated with this tree is the small, stingless *Tetragonisca angustula*. The berries of the Brazilian pepper tree are also rich in various oils with characteristic complex flavors, making the berries popular for producing syrups, vinegar, and beverages (including Chilean wines). Ground berries used as a substitute for true black pepper are popular in South America.

Pest control (Silva et al., 2010)

The essential oil of the Brazilian pepper tree has been effective against the larvae of *Stegomyia aegypti* (mosquito).

Health precautions and warnings (Taylor, 2005)

The most common villain in the species of the family Anacardiaceae is poison ivy (*Toxicodendron radicans*, with three subspecies). However, other members of this family should also be treated with caution, among them *Lithraea molleoides* (aroeira brava), and the Brazilian pepper tree

(aroeira mansa). Contact with virtually all parts of the Brazilian pepper tree (and especially the resin, flowers and leaves) may cause allergic reactions of various forms, duration and intensity in susceptible people. Burning the wood and leaves of this tree may also cause allergic reactions. However, during more than 30 years of dealing with all parts of this tree, including using the wood in a fireplace and making braais (=barbecues, grills), I have never experienced any adverse or even unpleasant reactions, and neither have members of my family, including small children.

A host of negative and cautionary opinions from the USA:

<https://davesgarden.com/guides/pf/go/1911/>

- The Brazilian pepper tree has an aromatic sap that can cause skin reactions (similar to poison ivy burns) in some sensitive people – although the reaction is usually weaker than that induced by the touch of the closely related *Lithraea molleoides*.
- Contact with the sap from a cut or bruised tree can result in a rash, lesions, oozing sores, severe itching, welts, and reddening and swelling (especially of the eyes). Contact with most parts of the Brazilian pepper tree can cause an itchy skin rash, and sometimes inflammation and swelling of the face and eyes.
- Eating the berries may cause vomiting and diarrhoea.
- When in flower, the tree may cause sneezing, asthma-like reactions, and headaches.
- Flowers and fruits can cause respiratory irritation.

Other facts (healthbenefitstimes.com)

- The bright red berries and brilliant green foliage are used frequently as Christmas decorations.
- The berries have been used in the perfume industry.

Planting and care (Geiger et al., 2011)

Because this tree is so adaptable, planting and care (in countries where it is allowed) are not difficult. Although it adapts to all soils, from sandy to rich, it grows better in grounds with good filtration (not in dense clays). It thrives

both in full sun and in shade, in dry weather and wet conditions. The tree does not tolerate severe frost for long periods but is happy in cold weather, even with temperatures approaching 0°C.

Published Research on the Brazilian Pepper tree

Some of these publications are listed repeatedly in different categories of properties and applications.

Systematics and general reviews

- Braga JA, et al. 2012. Floral sources to *Tetragonisca angustula* (Hymenoptera: Apidae) and their pollen morphology in a southeastern Brazilian Atlantic Forest. *Revista de Biologia Tropical* 60(4): 1491–1501.
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- Patocka J, de Almeida JD. 2017. Brazilian pepper tree: review of pharmacology. *Military Medical Science Letters* (Voj. Zdrav. Listy) 86(1): 32–41.
- Singh RJ, et al. 2011. Medicinal plants – nature’s pharmacy. In *Genetic resources, chromosome engineering, and crop improvement: medicinal plants* edited by R.J. Singh. CRC Press, Boca Raton; 1098 pp.
- Taylor L. 2005. The healing power of rainforest herbs (*Schinus terebinthifolia*: pages 118–119; 204–207). Square One Publishers, Garden City Park NY: 519 pp.
- Tomlinson PB. 2015. *The biology of trees native to tropical Florida*. Harvard University Printing Office, Allston (1980).
- Zona S. 2015. The correct gender of *Schinus* (Anacardiaceae). *Phytotaxa* 222(1): 75–77.

Antimicrobial Properties

- Alves L, et al. 2013. Effect of *Schinus terebinthifolius* on *Candida albicans* growth kinetics, cell wall formation and micromorphology. *Acta Odontologica Scandinavica* May–Jul; 71(3–4): 965–971.
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- Biasi-Garbin R, et al. 2016. Antifungal potential of plant species from Brazilian caatinga against dermatophytes. *Revista do Instituto de Medicina Tropical de São Paulo* 58:18.
- Cairo P, et al. 2018. Effects of dietary supplementation of red pepper (*Schinus terebinthifolius* Raddi) essential oil on performance, small intestinal morphology and microbial counts of weanling pigs. *Journal of the Science of Food and Agriculture* Jan; 98(2): 541–548.
- Camano R. 1997. Essential oil composition with bactericide activity. United States patent 5,635,184; June 3.
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- Carvalho de MC. 2003. Evaluation of mutagenic activity in an extract of pepper tree stem bark (*Schinus terebinthifolia* Raddi). *Environmental and Molecular Mutagenesis* 42(3): 185–191.
- Cole E, et al. 2014. Chemical composition of essential oil from ripe fruit of *Schinus terebinthifolius* Raddi and evaluation of its activity against wild strains of hospital origin. *Brazilian Journal of Microbiology* Oct; 45(3): 821–828.
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- Dikshit A. 1986. *Schinus 22ole*: a new source of natural fungi-toxicant. *Applied and Environmental Microbiology* 51(5): 1085–1088.
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