Tropical Rainforests: Nature’s Medicine Cabinet

Preserving Rainforests May Be a Matter of Life and Death for Future Generations

By [Earth Talk](http://environment.about.com/od/environmentalorganizations/a/earthtalk-bio.htm)

**Dear EarthTalk: Is it true that rainforests contain perhaps thousands of plants and herbs with medicinal properties?**

—*E. Wolfson, Brooklyn, NY*

Tropical rainforests, which account for only seven percent of the world’s total land mass, harbor as much as half of all known varieties of plants. Experts say that just a four-square-mile area of rainforest may contain as many as 1,500 different types of flowering plants and 750 species of trees, all which have evolved specialized survival mechanisms over the millennia that mankind is just starting to learn how to appropriate for its own purposes.

**Rainforests are a Rich Source of Medicines** Scattered pockets of native peoples around the world have known about the healing properties of rainforest plants for centuries and perhaps longer. But only since World War II has the modern world begun to take notice, and scores of drug companies today work in tandem with conservationists, native groups and various governments to find, catalog and synthesize rainforest plants for their medicinal value.

**Rainforest Plants Produce Life-saving Medicines** Some 120 prescription drugs sold worldwide today are derived directly from rainforest plants. And according to the U.S. National Cancer Institute, more than two-thirds of all medicines found to have cancer-fighting properties come from rainforest plants. Examples abound. Ingredients obtained and synthesized from a now-extinct periwinkle plant found only in Madagascar (until deforestation wiped it out) have increased the chances of survival for children with leukemia from 20 percent to 80 percent.

Some of the compounds in rainforest plants are also used to treat malaria, heart disease, bronchitis, hypertension, rheumatism, diabetes, muscle tension, arthritis, glaucoma, dysentery and tuberculosis, among other health problems. And many commercially available anesthetics, enzymes, hormones, laxatives, cough mixtures, antibiotics and antiseptics are also derived from rainforest plants and herbs.

**The Untapped Potential of Rainforest Medicines** Despite these success stories, less than one percent of the plants in the world’s tropical rainforests have even been tested for their medicinal properties. Environmentalists and health care advocates alike are keen to protect the world’s remaining rainforests as storehouses for the medicines of the future.

**The Challenge of Preserving Valuable Rainforests** But saving tropical rainforests is no easy task, as poverty-stricken native people try to eke out a living off the lands and many governments throughout the world’s equatorial regions, out of economic desperation as well as greed, allow destructive cattle ranching, farming and logging. As rainforest turns to farm, ranch and clear-cut, some 137 rainforest-dwelling species—plants and animals alike—go extinct every single day, according to noted Harvard biologist Edward O. Wilson. Conservationists worry that as rainforest species disappear, so will many possible cures for life-threatening diseases.

Medicinal Treasures of the Rainforest

***A look at the botanical treasures, both known and undiscovered, that exist within tropical rainforests.***

The widespread destruction of tropical rainforest ecosystems and the consequent extinction of numerous plant and animal species is happening before we know even the most basic facts about what we are losing.

Covering only 6 percent of the Earth's surface, tropical moist forests contain at least half of all species. The abundant botanical resources of tropical forests have already provided tangible medical advances; yet only 1 percent of the known plant and animal species have been thoroughly examined for their medicinal potentials. Meanwhile, 2 percent of the world's rainforests are irreparably damaged each year. Scientists estimate that, at the accelerating rate at which rainforests are now being destroyed, as much as 25 or 30 percent of the world's plant species will be extinct by the year 2010.

Approximately 7,000 medical compounds prescribed by Western doctors are derived from plants. These drugs had an estimated retail value of US$43 billion in 1985. Seventy percent of the 3000 plants identified by the United States National Cancer Institute as having potential anti-cancer properties are endemic to the rainforest. Tropical forest species serve Western surgery and internal medicine in three ways. First, extracts from organisms can be used directly as drugs. For maladies ranging from nagging headaches to lethal contagions such as malaria, rainforest medicines have provided modern society with a variety of cures and pain relievers.

• Quinine, an aid in the cure of malaria, is an alkaloid extracted from the bark of the cinchona tree found in Latin America and Africa.

• From the deadly poisonous bark of various curare lianas, used by generations of indigenous peoples in Latin America, has been isolated the alkaloid d-turbocuarine, which is used to treat such diseases as multiple sclerosis, Parkinson's disease and other muscular disorders. It also permits tonsillectomies, eye, abdominal and other kinds of surgery due to its anesthetic qualities.

• From Africa, Madagascar's rosy periwinkle provides two important anti-tumor agents. One provides for a 99 percent chance of remission in cases of lymphocytic leukemia. The other offers a life in remission to 58 percent of Hodgkin's Disease sufferers. In 1960, only 19 percent had a chance for survival. Commercial sales of drugs derived from this one plant are about US$160 million a year.

• Without wild yams from Mexico and Guatemala, society would be without diosgenin and cortisone, the active ingredients in birth control pills. Until recently this plant provided the world with its entire supply of diosgenin.

Secondly, chemical structures of forest organisms sometimes serve as templates from which scientists and researchers can chemically synthesize drug compounds. For example, the blueprint for aspirin is derived from extracts of willow trees found in the rainforest. Neostigmine, a chemical derived from the Calabar bean and used to treat glaucoma in West Africa, also provides the blueprint for synthetic insecticides. However, the chemical structures of most natural drugs are very complex, and simple extraction is usually less expensive than synthesis. Ninety percent of the prescription drugs that are based on higher plants include direct extractions from plants.

Finally, rainforest plants provide aids for research. Certain plant compounds enable scientists to understand how cancer cells grow, while others serve as testing agents for potentially harmful food and drug products. Tropical forests offer hope for safer contraceptives for both women and men. The exponential growth of world population clearly demonstrates the need for more reliable and effective birth control methods. Worldwide, approximately 4,000 plant species have been shown to offer contraceptive possibilities. The rainforest also holds secrets for safer pesticides for farmers. Two species of potatoes have leaves that produce a sticky substance that traps and kills predatory insects. This natural self-defense mechanism could potentially reduce the need for using pesticides on potatoes. Who knows what other tricks the rainforest might have up its leaves? Shamans and Indigenous Peoples

The chemical components of plants that medicine men use in healing rites could conceivably be building blocks for new drugs or even cures for such scourges as cancer or AIDS.

For thousands of years, indigenous groups have made extensive use of the materials contained in the rainforest to meet their health needs. Forest dwellers in Southeast Asia, for example, use around 6,500 different plants to treat their ills. Shamans were the first medical specialists in indigenous communities, and their traditional methods are known to be effective in treating both physical and psychological ailments. The World Health Organization estimates that 80 percent of the people in developing countries still rely on traditional medicine for their primary health care needs. Without money, access to, or faith in modern facilities, indigenous people depend on shamans, herbal healers, and rainforest plants for their survival. Shamans also play a crucial role in helping scientists to discover the potentials of plants. As one scientist has said, "Each time a medicine man dies, it is as if a library has been burned down. There is much yet to be learned from local shamans, yet their individual and cultural survival is seriously threatened as modern loggers, miners, multinational corporations, and landless farmers invade and decimate the forest.

**What You Can Do**

Tropical forest plants serve as vital resources for the eradication of disease, but we could easily lose these plants as well as the traditional knowledge that can unlock their potential if tropical ecosystems and indigenous cultures are not preserved intact. The future health and welfare of humanity will be determined, to a great extent, by the fate of the rainforests. There are no easy answers to the social and environmental crises facing the rainforest today. But one important step towards saving the rainforest is to increase public recognition of the importance of rainforest medicines in our modern pharmacopoeia and the importance of preserving the primary habitats of these flora. You can do your part by educating yourself and others about the rainforests and the forces that are destroying them. Countless books and environmentally friendly travel opportunities exist, such as research documentation and in-depth Amazon tours.

Rosy periwinkle: A life saving plant

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In the field of medicine, many life-saving drugs have been developed from plants. In this category, few have been as successfully employed as the rosy periwinkle, *Cathanthus roseus*.

Native to the island nation of Madgascar off the southeastern coast of Africa, the rosy periwinkle is an evergreen shrub bearing five-petaled pink flowers, and it is a much-beloved ornamental garden plant. In India the plant goes by several folk names, including “Good Night,” “Shameless Maria,” and “Cat’s Vinca.” In France the plant is known as “Sorcerer’s Violet.”

In Italy the rosy periwinkle was traditionally referred to as the “Flower of Death.” This is due to the extreme toxicity of the flower and the whole plant. While rosy periwinkle is a valuable medicine, it is also extremely poisonous. Consumption of the plant, other than in small amounts, can be fatal.

As a traditional medicine, rosy periwinkle has historically been used topically in the Indian system of Ayurveda to treat wasp stings, in traditional Chinese medicine to treat diabetes and malaria, and in Jamaican folk medicine also to treat diabetes. The same anti-diabetic use has been part of the folk medicine of the Philippines.

The plant contains as many as 70 known alkaloids, many of which demonstrate medicinal value. These compounds include the anti-cancer compounds vinblastine, vincristine, and the blood pressure-lowering compound reserpine. Some compounds in rosy periwinkle show benefit in regulating blood sugar, and others are known to help reduce high blood pressure. Other folk uses of the plant include those for memory loss, circulatory disorders and toothache.

The best known medical agents from rosy periwinkle arose from investigation into the plant’s use in Jamaican folk medicine. Known as periwinkle tea in Jamaica, the well-known folk use of rosy periwinkle led researchers to delve into its natural chemical properties in the 1950s. Scientific analysis of rosy periwinkle led to the discovery of two previously unknown compounds, vincristine and vinblastine, which have been subsequently developed into potent medicines to save lives from leukemia and Hodgkin’s lymphoma, respectively.

As modern chemotherapeutic medicines, both vincristine and vinblastine have demonstrated profound value. Leukemia, a cancer of the blood and bone marrow, involves the formation of excessive amounts of white blood cells. The name leukemia means “white blood.” In the treatment of leukemia, the periwinkle-derived alkaloid vincristine has shown great benefit, especially in pediatric cases. As a result of vincristine use, survival rates in these cases has risen from approximately 10 percent to 90 percent.

Marketed initially by Eli Lilly and Co in the early 1960s under the name Oncovin, the drug is both effective and highly toxic. Effects of taking vincristine include hair loss, neuropathy, sodium imbalance and constipation. The drug must be used with great care and in tiny amounts, or its toxic properties will result in death.

The periwinkle alkaloid vinblastine was first isolated at the University of Ontario. Used in the treatment of the head, neck, lungs and other cancers the drug has proven especially effective with Hodgkin’s lymphoma. Named after Thomas Hodgkin who discovered the disease in the early 1800s, Hodgkin’s lymphoma spreads through the lymphatic system and is characterized by swollen and painful lymph nodes, weight loss, night sweats and a host of other symptoms.

Fortunately, the disease responds well to administration of vinblastine, but adverse effects of the drug are rugged – including nausea, hair loss, vertigo, headaches, depression, muscle cramps, high blood pressure and gastrointestinal disorders.

Both vincristine and vinblastine are found in tiny amounts in the rosy periwinkle. Because of this, a very large quantity of the plant is required to produce small amounts of these drugs. Thus the plant must be cultivated in large quantities.

Many agencies in the field of international intellectual property rights consider the development of rosy periwinkle a classic case of “biopiracy.” The traditional native use of this plant has led to drug discovery without benefits accruing to natives who first used the plant. A long-standing battle has been fought over the rights of those in Madagascar due to profits arising from the development of vincristine and vinblastine, but no royalties have ever gone to the Malagasy people.